National Aeronautics and Space Administration
Langley Research Center
Scientific and Technical Information Program Office

Scientific and Technical Aerospace Reports

STAR

Volume 44 Issue 26

January 3, 2007

WHAT'S INSIDE

- NASA STI Program Overview
- Introduction
- NASA STI Availability Information
- Table of Contents
- Subject Term Index
- Personal Author Index

NASA STI Program ... in Profile

Since its founding, NASA has been dedicated to the advancement of aeronautics and space science. The NASA scientific and technical information (STI) program plays a key part in helping NASA maintain this important role.

The NASA STI program operates under the auspices of the Agency Chief Information Officer. It collects, organizes, provides for archiving, and disseminates NASA's STI. The NASA STI program provides access to the NASA Aeronautics and Space Database and its public interface, the NASA Technical Report Server, thus providing one of the largest collections of aeronautical and space science STI in the world. Results are published in both non-NASA channels and by NASA in the NASA STI Report Series, which includes the following report types:

- TECHNICAL PUBLICATION. Reports of completed research or a major significant phase of research that present the results of NASA Programs and include extensive data or theoretical analysis. Includes compilations of significant scientific and technical data and information deemed to be of continuing reference value. NASA counterpart of peer-reviewed formal professional papers but has less stringent limitations on manuscript length and extent of graphic presentations.

- TECHNICAL MEMORANDUM. Scientific and technical findings that are preliminary or of specialized interest, e.g., quick release reports, working papers, and bibliographies that contain minimal annotation. Does not contain extensive analysis.

- CONTRACTOR REPORT. Scientific and technical findings by NASA-sponsored contractors and grantees.

- CONFERENCE PUBLICATION. Collected papers from scientific and technical conferences, symposia, seminars, or other meetings sponsored or co-sponsored by NASA.

- SPECIAL PUBLICATION. Scientific, technical, or historical information from NASA programs, projects, and missions, often concerned with subjects having substantial public interest.

- TECHNICAL TRANSLATION. English-language translations of foreign scientific and technical material pertinent to NASA's mission.

Specialized services also include creating custom thesauri, building customized databases, and organizing and publishing research results.

For more information about the NASA STI program, see the following:

- Access the NASA STI program home page at *http://www.sti.nasa.gov*

- E-mail your question via the Internet to *help@sti.nasa.gov*

- Fax your question to the NASA STI Help Desk at (301) 621-0134

- Phone the NASA STI Help Desk at (301) 621-0390

- Write to:
  NASA STI Help Desk
  NASA Center for AeroSpace Information
  7115 Standard Drive
  Hanover, MD 21076-1320

Introduction

Scientific and Technical Aerospace Reports (*STAR*) is an online information resource listing citations and abstracts of NASA and world wide aerospace-related STI. Updated biweekly, *STAR* highlights the most recent additions to the NASA Aeronautics and Space Database. Through this resource, the NASA STI Program provides timely access to the most current aerospace-related research and development (R&D) results.

STAR subject coverage includes all aspects of aeronautics and space research and development, supporting basic and applied research, and application, as well as aerospace aspects of Earth resources, energy development, conservation, oceanography, environmental protection, urban transportation and other topics of high national priority. The listing is arranged first by 11 broad subject divisions, then within these divisions by 76 subject categories and includes 2 indexes: subject and author.

STAR includes citations of R&D results reported in:

- NASA, NASA contractor, and NASA grantee reports
- Reports issued by other U.S. Government agencies, domestic and foreign institutions, universities, and private firms
- Translations
- NASA-owned patents and patent applications
- Other U.S. Government agency and foreign patents and patent applications
- Domestic and foreign dissertations and theses

The NASA STI Program

The NASA Scientific and Technical Information (STI) Program was established to support the objectives of NASA's missions and research to advance aeronautics and space science. By sharing information, the NASA STI Program ensures that the U.S. maintains its preeminence in aerospace-related industries and education, minimizes duplication of research, and increases research productivity.

Through the NASA Center for AeroSpace Information (CASI), the NASA STI Program acquires, processes, archives, announces and disseminates both NASA's internal STI and world-wide STI. The results of 20th and 21st century aeronautics and aerospace research and development, a worldwide investment totaling billions of dollars, have been captured, organized, and stored in the NASA Aeronautics and Space Database. New information is continually announced and made available as it is acquired, making this a dynamic and historical collection of value to business, industry, academia, federal institutions, and the general public.

The STI Program offers products and tools that allow efficient access to the wealth of information derived from global R&D efforts. In addition, customized services are available to help tailor this valuable resource to meet your specific needs.

For more information on the most up-to-date NASA STI, visit the STI Program Web site at http://www.sti.nasa.gov.

NASA STI Availability Information

NASA Center for AeroSpace Information (CASI)

Through NASA CASI, the NASA STI Program offers many information products and services to the aerospace community and to the public, including access to a selection of full text of the NASA STI. Free registration with the program is available to NASA, U.S. Government agencies and contractors. To register, contact CASI at help@sti.nasa.gov. Others should visit the program at www.sti.nasa.gov. The 'search selected databases' button provides access to the NASA Technical Reports Server (TRS) – the publicly available contents of the NASA Aeronautics and Space Database.

Each citation in *STAR* indicates a 'Source of Availability'. When CASI is indicated, the user can order this information directly from CASI using the STI Online Order Form or contact help@sti.nasa.gov or telephone the CASI Help Desk at 301-621-0390. Before ordering you may access price code tables for STI documents and videos. When information is not available from CASI, the source of the information is indicated when known.

NASA STI is also available to the public through Federal information organizations. NASA CASI disseminates publicly available NASA STI to the National Technical Information Service (NTIS) and to the Federal Depository Library Program (FDLP) through the Government Printing Office (GPO). In addition, NASA patents are available online from the U.S. Patent and Trademark Office.

National Technical Information Service (NTIS)

The National Technical Information Service serves the American public as a central resource for unlimited, unclassified U.S. Government scientific, technical, engineering, and business related information. For more than 50 years NTIS has provided businesses, universities, and the public timely access to well over 2 million publications covering over 350 subject areas. Visit NTIS at http://www.ntis.gov.

The Federal Depository Library Program (FDLP)

The U.S. Congress established the **Federal Depository Library Program** (FDLP) to ensure access by the American public to U.S. Government information. The program acquires and disseminates information products from all three branches of the U.S. Government to nearly 1,300 Federal depository libraries nationwide. The libraries maintain these information products as part of their existing collections and are responsible for assuring that the public has free access to the information. Locate the Federal Depository Libraries http://www.gpoaccess.gov/index.html.

The U.S. Patent and Trademark Office (USPTO)

The U.S. Patent and Trademark Office provides online access to full text patents and patent applications. The database includes patents back to 1976 plus some pre-1975 patents. Visit the USPTO at http://www.uspto.gov/patft/.

Table of Contents

Subject Divisions/Categories

Document citations are grouped by division and then by category, according to the *NASA Scope and Subject Category Guide.*

Aeronautics

01 Aeronautics (General) 1
02 Aerodynamics 1
03 Air Transportation and Safety 3
04 Aircraft Communications and Navigation 9
05 Aircraft Design, Testing and Performance 9
06 Avionics and Aircraft Instrumentation 17
07 Aircraft Propulsion and Power 18
08 Aircraft Stability and Control 19

Astronautics

12 Astronautics (General) 20
14 Ground Support Systems and Facilities (Space) 22
15 Launch Vehicles and Launch Operations 23
16 Space Transportation and Safety 25
17 Space Communications, Spacecraft Communications, Command and Tracking 27
18 Spacecraft Design, Testing and Performance 29
20 Spacecraft Propulsion and Power 30

Chemistry and Materials

23 Chemistry and Materials (General) 32
24 Composite Materials 36
25 Inorganic, Organic and Physical Chemistry 38
26 Metals and Metallic Materials 46
27 Nonmetallic Materials 52
28 Propellants and Fuels 55

Engineering

31 Engineering (General) 57
32 Communications and Radar 58
33 Electronics and Electrical Engineering 76
34 Fluid Mechanics and Thermodynamics 85
35 Instrumentation and Photography 89
36 Lasers and Masers 94
37 Mechanical Engineering 94
39 Structural Mechanics 98

Geosciences

42 Geosciences (General) 101
43 Earth Resources and Remote Sensing 101
44 Energy Production and Conversion 104
45 Environment Pollution 107
46 Geophysics 115
47 Meteorology and Climatology 116

Life Sciences

51 Life Sciences (General) 119
52 Aerospace Medicine 181
53 Behavioral Sciences 186
54 Man/System Technology and Life Support 187

Mathematical and Computer Sciences

59 Mathematical and Computer Sciences (General) 188
60 Computer Operations and Hardware 190
61 Computer Programming and Software 191
62 Computer Systems 213
63 Cybernetics, Artificial Intelligence and Robotics 223
64 Numerical Analysis 230
65 Statistics and Probability 235
66 Systems Analysis and Operations Research 238
67 Theoretical Mathematics 242

Physics

70 Physics (General) 244
71 Acoustics 251
72 Atomic and Molecular Physics 253
73 Nuclear Physics 253
74 Optics 257
75 Plasma Physics 260
76 Solid-State Physics 261
77 Physics of Elementary Particles and Fields 261

Social and Information Sciences

82 Documentation and Information Science 265
85 Technology Utilization and Surface Transportation 271

Space Sciences

88 Space Sciences (General) 271
89 Astronomy 274
90 Astrophysics 275

91 Lunar and Planetary Science and Exploration 277
92 Solar Physics 282
93 Space Radiation 283

General

99 General 284

Indexes

Two indexes are available. You may use the find command under the tools menu while viewing the PDF file for direct match searching on any text string. You may also select either of the two indexes provided for linking to the corresponding document citation from *NASA Thesaurus* terms and personal author names.

Subject Term Index

Personal Author Index

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS

A Biweekly Publication of the National Aeronautics and Space Administration

VOLUME 45, JANUARY 3, 2007

01
AERONAUTICS (GENERAL)

Includes general research topics related to manned and unmanned aircraft and the problems of flight within the Earth's atmosphere. Also includes manufacturing, maintenance, and repair of aircraft. For specific topics in aeronautics, see categories 02 through 09. For information related to space vehicles see 12 Astronautics.

20060056069 NASA Langley Research Center, Hampton, VA, USA

An Overview of the Role of Systems Analysis in NASA's Hypersonics Project

Robinson, Jeffrey S.; Martin John G.; Bowles, Jeffrey V\g; Mehta, Unmeel B.; Snyder, CHristopher A.; 2006; 9 pp.; In English; 14th AIAA/AHI International Space Planes and Hypersonics Systems and Technologies Conference, 6-9 Nov. 2006, Canberra, Australia; Original contains color illustrations

Report No.(s): AIAA Paper 2006-8013; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056069; Avail.: CASI: A02, Hardcopy

NASA's Aeronautics Research Mission Directorate recently restructured its Vehicle Systems Program, refocusing it towards understanding the fundamental physics that govern flight in all speed regimes. Now called the Fundamental Aeronautics Program, it is comprised of four new projects, Subsonic Fixed Wing, Subsonic Rotary Wing, Supersonics, and Hypersonics. The Aeronautics Research Mission Directorate has charged the Hypersonics Project with having a basic understanding of all systems that travel at hypersonic speeds within the Earth's and other planets atmospheres. This includes both powered and unpowered systems, such as re-entry vehicles and vehicles powered by rocket or airbreathing propulsion that cruise in and accelerate through the atmosphere. The primary objective of the Hypersonics Project is to develop physics-based predictive tools that enable the design, analysis and optimization of such systems. The Hypersonics Project charges the systems analysis discipline team with providing it the decision-making information it needs to properly guide research and technology development. Credible, rapid, and robust multi-disciplinary system analysis processes and design tools are required in order to generate this information. To this end, the principal challenges for the systems analysis team are the introduction of high fidelity physics into the analysis process and integration into a design environment, quantification of design uncertainty through the use of probabilistic methods, reduction in design cycle time, and the development and implementation of robust processes and tools enabling a wide design space and associated technology assessment capability. This paper will discuss the roles and responsibilities of the systems analysis discipline team within the Hypersonics Project as well as the tools, methods, processes, and approach that the team will undertake in order to perform its project designated functions.

Author

Hypersonic Speed; Systems Analysis; NASA Programs; General Overviews; Aeronautics

02
AERODYNAMICS

Includes aerodynamics of flight vehicles, test bodies, airframe components and combinations, wings, and control surfaces. Also includes aerodynamics of rotors, stators, fans, and other elements of turbomachinery. For related information see also 34 Fluid Mechanics and Thermodynamics.

20060055395 Duke Univ., Durham, NC USA

Quiet Tunnel Experiments of Shock/Boundary Layer Interactions

Chokani, Ndaona; Mar 3, 2006; 92 pp.; In English

Contract(s)/Grant(s): FA9550-05-1-0178

Report No.(s): AD-A456817; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA456817; Avail.: CASI: A05, Hardcopy

The effect of freestream noise on the shockwave/turbulent boundary layer interaction on a compression ramp is experimentally examined. The experiments are conducted in a supersonic low-disturbance tunnel under both low-level ('quiet') and high-level ('noisy"/'conventional') freestream noise levels. A large-scale, low-frequency oscillation of the shock, that is comparable to that measured In previous conventional tunnel experiments is observed. The intermittent length of the interaction is comparable to that of previous experiments, but larger than that predicted in numerical simulations. Thus the freestream noise levels do not appear to be the source of the previously reported discrepancies between conventional tunnel experiments and simulations.
DTIC
Boundary Layers; Free Flow; Shock Layers; Shock Waves; Supersonic Flow; Supersonic Wind Tunnels; Turbulent Boundary Layer

20060055610 Institut Franco-Allemand de Recherches, Saint-Louis, France
Aerodynamic Characteristic of the A3 DRDC-ISL Reference Projectile: Missile with Lattice Fins
Dupuis, A; Berner, C; Bernier, A; Dec 12, 2005; 269 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457243; R-138/2005; No Copyright; Avail.: CASI: A12, Hardcopy

Free-flight tests were conducted in the Defence R&D Canada (DRDC) Valcartier aeroballistic range and at the ISL open range test site, and wind tunnel experiments in the DRDC Valcartier Indraft Trisonic, and the French-German Research Institute wind tunnels, as well as numerical computations on the A3 DRDC-ISL reference projectile at subsonic and supersonic velocities. The projectile consisted of an ogive-cylinder body with a length-to-diameter ratio of 10 with four lattice control surfaces. The reference grid fin consisted of nine thick cells in a vertical orientation and located at 0.7 cal from the base. The wind tunnel tests were conducted for various fin deflection angles at a range of angles of attack and roll orientations to determine the static aerodynamic coefficients. Very thin walls, an open base concept as well as a cruciform cell orientation, were also investigated in the wind tunnels. Flow visualizations were obtained from wind tunnel as well as free-flight tests. The wind tunnel tests were conducted in the Mach number range of 0.6 to 4.0, while the free-flight tests were conducted in the Mach number range of 1.4 to 3.3. The stability derivatives and static aerodynamic coefficients were very well determined. Numerical investigations were carried out on the reference configuration to visualize the flow features and obtain predictions of the aerodynamic coefficients. The aerodynamic coefficients and stability derivatives are presented individually and then compared where warranted. Finally, the results are compared with a classical fin design.
DTIC
Aerodynamic Characteristics; Fins; Lattice Vibrations; Missiles; Projectiles

20060055784 Naval Postgraduate School, Monterey, CA USA
Wind Tunnel Renovation, Flow Verification and Flapping Wing Analysis
Hickle, Curtis; Jun 2006; 95 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457564; No Copyright; Avail.: CASI: A05, Hardcopy

The Naval Postgraduate School (NPS) Micro-Air Vehicle (MAV) wind tunnel was refurbished in this study. This wind tunnel has a 61 by 38 centimeter test section with a contraction ratio of 6.75, and testing speeds up to 9 meters per second (m/s). The objectives of this work were to create a high quality, customized facility for further MAV study, and to fully characterize the wake of the MAV at a plane downstream of the model. Extensive repairs were made to the wind tunnel intake, test section, and fan. The flow field produced in the tunnel was analyzed with hot wire anemometry. The turbulence intensity ranged from .7% to .5% for freestream velocities of 2 m/s to 5 m/s. The velocity variation across the test section ranged from .251% to .125%. A model of the NPS MAV was placed in the test section and the wake was studied with and without the main wing, and in vertical and horizontal orientations. The wake was characterized with hot wire anemometry and flow visualization techniques at various flapping frequencies and freestream velocities.
DTIC
Flapping; Flow Characteristics; Flow Visualization; Proving; Wind Tunnels; Wings

20060056443 NASA Langley Research Center, Hampton, VA, USA
Orion Aerodynamics for Hypersonic Free Molecular to Continuum Conditions
Moss, James N.; Greene, Francis A.; Boyles, Katie A.; November 09, 2006; 24 pp.; In English
Report No.(s): AIAA Paper 2006-8081; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056443; Avail.: CASI: A03, Hardcopy

Numerical simulations are performed for the Orion Crew Module, previously known as the Crew Exploration Vehicle

(CEV) Command Module, to characterize its aerodynamics during the high altitude portion of its reentry into the Earth's atmosphere, that is, from free molecular to continuum hypersonic conditions. The focus is on flow conditions similar to those that the Orion Crew Module would experience during a return from the International Space Station. The bulk of the calculations are performed with two direct simulation Monte Carlo (DSMC) codes, and these data are anchored with results from both free molecular and Navier-Stokes calculations. Results for aerodynamic forces and moments are presented that demonstrate their sensitivity to rarefaction, that is, for free molecular to continuum conditions (Knudsen numbers of 111 to 0.0003). Also included are aerodynamic data as a function of angle of attack for different levels of rarefaction and results that demonstrate the aerodynamic sensitivity of the Orion CM to a range of reentry velocities (7.6 to 15 km/s).
Author
Aerodynamic Forces; Hypersonics; Spacecraft Modules; Computerized Simulation; Monte Carlo Method; Navier-Stokes Equation; Continuums; Angle of Attack

03
AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; airport ground operations; flight safety and hazards; and aircraft accidents. Systems and hardware specific to ground operations of aircraft and to airport construction are covered in 09 Research and Support Facilities (Air). Air traffic control is covered in 04 Aircraft Communications and Navigation. For related information see also 16 Space Transportation and Safety and 85 Technology Utilization and Surface Transportation.

20060054212 NASA Ames Research Center, Moffett Field, CA, USA
PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD
Rogers, Stuart E.; Suhs, Norman; Dietz, William; Rogers, Stuart; Nash, Steve; Chan, William; Tramel, Robert; Onufer, Jeff; October 02, 2006; 17 pp.; In English; 8th Overset Symposium, 2-5 Oct. 2006, Houston, TX, USA; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060054212; Avail.: CASI: A03, Hardcopy

This viewgraph presentation reviews the use and requirements of Pegasus 5. PEGASUS 5 is a code which performs a pre-processing step for the Overset CFD method. The code prepares the overset volume grids for the flow solver by computing the domain connectivity database, and blanking out grid points which are contained inside a solid body. PEGASUS 5 successfully automates most of the overset process. It leads to dramatic reduction in user input over previous generations of overset software. It also can lead to an order of magnitude reduction in both turn-around time and user expertise requirements. It is also however not a 'black-box' procedure; care must be taken to examine the resulting grid system.
CASI
Computational Fluid Dynamics; Computational Grids; Grid Generation (Mathematics); Grid Refinement (Mathematics)

20060054219 Virginia Univ., Charlottesville, VA, USA
Comparative Evaluation of Air and Auto Travel Between Urban Regions (Quantifying Intercity Modal Accessibility)
Smith, B. L.; Hoel, L. A.; Repaka, V.; May 2006; 133 pp.; In English
Report No.(s): PB2007-102068; UVACTS-14-5-97; No Copyright; Avail.: National Technical Information Service (NTIS)

The economic competitiveness of a region, in addition to the quality of life of its citizens, is dependent upon its accessibility to other regions. As the surface and air transportation systems evolve, it is important to explicitly measure the impact of transportation changes on a region's accessibility. Therefore, the purpose of this research project is to develop a methodology to quantify intercity accessibility by mode, and to use this methodology to investigate the impact of air service changes in a region to its intercity accessibility.
NTIS
Air Transportation; Cities; Surface Vehicles; Transportation

20060054442 NASA Ames Research Center, Moffett Field, CA, USA
Evaluation of Cabin Crew Technical Knowledge
Dunbar, Melisa G.; Chute, Rebecca D.; Jordan, Kevin; [1998]; 21 pp.; In English; Original contains black and white illustrations
Contract(s)/Grant(s): NCC2-798; No Copyright; ONLINE: http://hdl.handle.net/2060/20060054442; Avail.: CASI: A03, Hardcopy

Accident and incident reports have indicated that flight attendants have numerous opportunities to provide the flight-deck crew with operational information that may prevent or essen the severity of a potential problem. Additionally, as carrier fleets

transition from three person to two person flight-deck crews, the reliance upon the cabin crew for the transfer of this information may increase further. Recent research (Chute & Wiener, 1996) indicates that light attendants do not feel confident in their ability to describe mechanical parts or malfunctions of the aircraft, and the lack of flight attendant technical training has been referenced in a number of recent reports (National Transportation Safety Board, 1992; Transportation Safety Board of Canada, 1995; Chute & Wiener, 1996). The present study explored both flight attendant technical knowledge and flight attendant and dot expectations of flight attendant technical knowledge. To assess the technical knowledge if cabin crewmembers, 177 current flight attendants from two U.S. carriers voluntarily :ompleted a 13-item technical quiz. To investigate expectations of flight attendant technical knowledge, 181 pilots and a second sample of 96 flight attendants, from the same two airlines, completed surveys designed to capture each group's expectations of operational knowledge required of flight attendants. Analyses revealed several discrepancies between the present level of flight attendants.
Author
Flight Crews; Flight Training; Flight Safety; Air Transportation; Cabins

20060055391 Wyle Labs., Inc., Houston, TX, USA
The Role of Spatial Disorientation in Fatal General Aviation Accidents
Scheuring, RIchard; [2005]; 1 pp.; In English; Aerospace Medical Association Annual Conference, 8-12 May 2005, Kansas City, MO, USA; No Copyright; Avail.: Other Sources; Abstract Only

In-flight Spatial Disorientation (SD) in pilots is a serious threat to aviation safety. Indeed, SD may play a much larger role in aviation accidents than the approximate 6-8% reported by the National Transportation Safety Board (NTSB) each year, because some accidents coded by the NTSB as aircraft control-not maintained (ACNM) may actually result from SD. The purpose of this study is to determine whether SD is underestimated as a cause of fatal general aviation (GA) accidents in the NTSB database. Fatal GA airplane accidents occurring between January 1995 and December 1999 were reviewed from the NTSB aviation accident database. Cases coded as ACNM or SD as the probable cause were selected for review by a panel of aerospace medicine specialists. Using a rating scale, each rater was instructed to determine if SD was the probable cause of the accident. Agreement between the raters and agreement between the raters and the NTSB were evaluated by Kappa statistics. The raters agreed that 11 out of 20 (55%) accidents coded by the NTSB as ACNM were probably caused by SD (p less than 0.05). Agreement between the raters and the NTSB did not reach significance (p greater than 0.05). The 95% C.I. for the sampling population estimated that between 33-77% of cases that the NTSB identified as ACNM could be identified by aerospace medicine experts as SD. Aerospace medicine specialists agreed that some cases coded by the NTSB as ACNM were probably caused by SD. Consequently, a larger number of accidents may be caused by the pilot succumbing to SD than indicated in the NTSB database. This new information should encourage regulating agencies to insure that pilots receive SD recognition training, enabling them to take appropriate corrective actions during flight. This could lead to new training standards, ultimately saving lives among GA airplane pilots.
Author
Aircraft Accidents; Disorientation; General Aviation Aircraft; Aerospace Medicine

20060055607 Personnel Decisions Research Inst., Inc., Minneapolis, MN USA
U.S. Army Aviator Job Analysis
Kubisiak, Chris; Katz, Lawrence; Aug 2006; 91 pp.; In English
Contract(s)/Grant(s): DASW01-03-D-0016; Proj-A792
Report No.(s): AD-A457239; TR-493; No Copyright; Avail.: CASI: A05, Hardcopy

This report describes the job analysis performed by The U.S. Army Research Institute for the Behavioral and Social Sciences Rotary Wing Aviation Research Unit (ARI RWARU). It was part of a larger research project to develop and validate a selection system for U.S. Army rotary wing aviators, called Selection Instrument for Flight Training (SIFT). The activities performed by Army aviators and the personal attributes required to perform those activities were examined. This job analysis helped identify predictor measures subsequently used to validate the prototype SIFT test battery.
DTIC
Aircraft Pilots; Flight Training; Inventories; Military Personnel; Personnel Selection; Tasks

20060055657 Naval Postgraduate School, Monterey, CA USA
Effectiveness of Introductory Flight Screening (IFS) for USA Navy and Marine Corps Student Pilots
Morrison, Peter L; Sep 2006; 91 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457331; No Copyright; Avail.: CASI: A05, Hardcopy

This study examined the effectiveness of Introductory Flight Screening (IFS) for U.S. Navy and Marine Corps student pilots. It compared a non-IFS group to an IFS-complete group to determine if IFS had any effect on Primary drop-on-request (DOR) and flight-failure (FF) attrition. It then examined the return on investment (ROI) of the IFS program utilizing T-34 flying-hour costs, active-duty costs, and opportunity cost-savings of IFS-screened students who did not enter undergraduate pilot training. Results suggest that IFS did not have an effect on the DOR rate and may have produced the undesired effect of delaying the DOR-student's decision until later in the syllabus. IFS had a desirable effect on the FF attrition rate with no significant change in T-34 flight hours per FF. The combined Primary DOR and FF rate, although significantly lower, did not achieve expectations. The ROI analysis was completed with both composite-pay costs and Individual Account costs. In both cases, the IFS-investment costs significantly outweighed the IFS savings resulting in a net loss and an undesirable ROI. Several alternatives were discussed as possible improvements to the current IFS program.
DTIC
Cost Effectiveness; Flight Training; Navy; Performance Tests; Pilot Training; Pilots; Students; United States

20060055669 California Univ., Santa Cruz, CA USA
Performance of Directional Collision Avoidance in Multihop Wireless Networks
Garcia-Luna-Aceves, J J; Wang, Yu; Jan 2005; 26 pp.; In English
Contract(s)/Grant(s): DAAD19-01-C-0026; F49620-00-1-0330
Report No.(s): AD-A457360; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This chapter analyzes the performance of directional collision avoidance schemes, in which antenna systems are used to direct the transmission and reception of control and data packets in channel access protocols based on four-way handshakes to try to avoid collisions. The first analytical model to consider directional reception and the possible difference in gain between omni-directional and directional transmissions is presented. Analytical results show that, when the directional collision avoidance scheme in which all transmissions are directional is augmented with directional receiving, one-hop throughput does not decrease due to the increased spatial reuse, even when the number of competing nodes within a region increases. It is also shown that, as expected, the performance of directional collision avoidance schemes degrades when directional transmissions have much higher gain than omni-directional transmissions. However, this degradation is relatively small. Simulations of the IEEE 802.11 protocol and its directional variants validate the results predicted in the analysis. The simulation results also show that the presence of broadcast traffic does not degrade the performance of the all-directional collision avoidance scheme significantly, even for relatively large percentages of broadcast traffic. The performance results of this study indicate that the most attractive collision avoidance approach consists of using directional transmissions of control and data packets, together with the directional reception of packets whenever a node is expecting a particular packet. Given the high tolerance to broadcast traffic of directional collision avoidance schemes, it is argued that the periodic transmission of beacons omni-directionally suffices to provide such schemes with the relative location of neighboring nodes.
DTIC
Broadcasting; Collision Avoidance; Communication Networks; Telecommunication

20060055671 California Univ., Santa Cruz, CA USA
A Hybrid Collision Avoidance Scheme for Ad Hoc Networks
Wang, Yu; Garcia-Luna-Aceves, J J; Jan 2006; 20 pp.; In English
Contract(s)/Grant(s): F49620-00-1-0330
Report No.(s): AD-A457363; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A novel hybrid collision avoidance scheme that combines both sender-initiated and receiver-initiated collision-avoidance handshakes is proposed for multi-hop ad hoc networks. The new scheme is compatible with the popular IEEE 802.11 MAC protocol and involves only some additional queue management and book-keeping work. Simulations of both UDP- and TCP-based applications are conducted with the IEEE 802.11 MAC protocol, a measurement-based fair scheme and the new scheme. It is shown that the new scheme can alleviate the fairness problem with almost no degradation in throughput. More importantly, it is shown that without explicit information exchange among nodes, the fairness problem cannot be solved conclusively if reasonable throughput is to be maintained.
DTIC
Collision Avoidance; Communication Networks

20060055675 Naval Postgraduate School, Monterey, CA USA
Guided Standoff Weapons: A Threat to Expeditionary Air Power
Vish, Jeffrey A; Sep 2006; 73 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457379; No Copyright; Avail.: CASI: A04, Hardcopy

The Air Base has long been a potential target of attack for enemy planners. An effective way to attack the USA Air Force (USAF) is to avoid the United State's usual dominance in the air, attacking airbases with ground forces inserted into the Joint Rear Area. The history of airbase ground attacks from 1942 to 1994, documented in the book Snakes in the Eagle's Nest, shows that the dominant strategy employed by air base attackers has been the standoff attack. Roughly, 75 percent of all airbase attacks have been through the use of rockets or mortar fire from outside the airbase's perimeter defenses. In Vietnam, where the defenses against penetrating ground attacks were emphasized, this percentage rose to 96 percent. Historically robust main operating bases, with passive defensive measures such as hardened facilities and redundant systems, have been able to withstand standoff attacks. The relative inaccuracy of the attacker's standoff systems and their limited ability to sustain fire on the air base minimized damage. The USAF finds itself operating in an expeditionary mode across the globe. Expeditionary Air Forces cannot depend on the luxury of operating off main operating bases. In addition, the emergence of guided munitions for mortars and anti-tank missiles has increased the accuracy of potential standoff weapons. Finally, the sophistication of Improvised Explosive Devices in Iraq and of modern radiocontrolled model aircraft even suggests a potential for attackers to build guided weapons. The potential for a one shot, one kill standoff weapon is here, negating the effectiveness of passive hardening measures. Disrupting these attacks will take new strategies. Understanding current Joint and USAF doctrine is the first step. Areas for further study include disrupting the enemy forces before they launch a standoff attack, intercepting the standoff round in flight and mitigating the damage on impact are discussed.
DTIC
Accuracy; Airports; Probability Theory

20060055727 Air Force Flight Test Center, Edwards AFB, CA USA
Limited Investigation and Characterization of Boundary Avoidance Tracking (Project HAVE BAT)
Warren, Randy; Abell, Brian; Heritsch, Scott; Kolsti, Kyle; Miller, Brandon; Jun 2006; 62 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457462; AFFTC-TIM-06-04; No Copyright; Avail.: CASI: A04, Hardcopy

HAVE BAT was the first program to gather flight test data on the phenomenon of boundary tracking. Boundary tracking occurs when a pilot perceives an impending hazardous situation and abandons other tasks to avoid the hazard (avoiding the boundary). The purpose of the HAVE BAT test program was to determine the relationship between longitudinal characteristics of an airborne system (consisting of the pilot and the aircraft) and the characteristic parameters of the boundary avoidance tracking events.
DTIC
Avoidance; Bats; Boundaries; Computer Programs; Flight Tests

20060055824 Naval Postgraduate School, Monterey, CA USA
Effect of Span Variation on the Performance of a Cross Flow Fan
Schreiber, Charla W; Jun 2006; 65 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457632; No Copyright; Avail.: CASI: A04, Hardcopy

Over the past few decades, advances in aeronautic and control technologies have established a new vision for future air transportation systems. NASA has initiated the motion with several programs supporting the 'highway of the sky,' a system of launch pads and air pathways enabling smaller and more easily piloted aircraft to travel the open space above instead of busy freeways and crowded city streets. Previous investigations into crossflow fan technology as a propulsion source have identified its potential for use in personal aircraft and vertical takeoff and landing applications. To further development, performance characteristics must be determined for the possible configurations and under variable conditions to understand factors critical to design. This experiment studied flow characteristics of a crossflow fan incorporating 30 blades of six inch length in a six inch diameter rotor. Comparison was made against the performance of a fan of similar design but one-fourth the length span previously tested. Results were plotted for various parameters along constant speed lines of operation and general trends were determined. These results were used to quantitatively deduce scaling relationships for this device.
DTIC
Air Transportation; Cross Flow; Propulsion System Configurations; Propulsion System Performance; Space Flight

20060055826 Naval Postgraduate School, Monterey, CA USA
Flow Field Surveys in a Transonic Compressor Rig
Rose, Christopher W; Jun 2006; 69 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457637; No Copyright; Avail.: CASI: A04, Hardcopy

As the Navy prepares to transition to F-35C Joint Strike Fighter the need to understand 'pop stalls' caused by steam leakage in catapult systems is of concern. 'Pop stalls' caused by steam ingestion through the aircraft engine result in a loss of power and possible engine stall. The F-35C is a single engine aircraft and therefore the probability of a 'pop stall' resulting in the loss of the aircraft is increased. Investigation of this phenomenon is currently being examined at the Turbopropulsion Laboratory by means of a transonic compressor rotor. The present study utilizes both three and five-hole probes to survey the flow field upstream and downstream of the rotor to examine compressor stability. A new compressor performance map was defined and a validation of previous steam ingestion was performed.
DTIC
Aircraft Engines; Fighter Aircraft; Flow Distribution; Jet Aircraft; Surveys; Transonic Compressors

20060056166 Air Force Research Lab., Wright-Patterson AFB, OH USA
Performance and Psychophysiological Measures of Fatigue Effects on Aviation Related Tasks of Varying Difficulty
Wilson, Glenn F; Russell, Christopher A; Caldwell, John A; Jan 2006; 51 pp.; In English
Contract(s)/Grant(s): Proj-7184
Report No.(s): AD-A457616; AFRL-HE-WP-TP-2006-0095; No Copyright; Avail.: CASI: A04, Hardcopy
Fatigue is a well known stressor in aviation operations and its interaction with mental workload needs to be understood. Performance, psychophysiological, and subjective measures were collected during performance of three tasks of increasing complexity. A psychomotor vigilance task, multi-attribute task battery and an uninhabited air vehicle task were performed five times during one night's sleep loss. EEG, ECG and pupil area were recorded during task performance. Performance decrements were found at the next to last and/or last testing session. The EEG showed concomitant changes. The degree of impairment was at least partially dependent on the task being performed and the performance variable assessed.
DTIC
Psychophysiology; Mental Performance; Workloads (Psychophysiology); Human Performance

20060056185 Massachusetts Inst. of Tech., Lexington, MA, USA
Required Surveillance Performance Accuracy to Support 3-Mile and 5-Mile Separation in the National Airspace System
Thompson, S. D.; Andrews, J. W.; Harris, G. S.; Sinclair, K. A.; Nov. 01, 2006; 122 pp.; In English
Report No.(s): PB2007-101889; ATC-323; No Copyright; Avail.: National Technical Information Service (NTIS)
Surveillance in today's National Airspace System (NAS) is provided by a system of terminal and en route radars. The separation distance that an air traffic controller is required to maintain between aircraft depends, in part, on the performance of these radars. The accuracy of these radar systems depends on the range of the aircraft from the radar and whether the aircraft being separated are tracked by the same or different radars. For this reason the separation standards are expressed in terms of range from the radar and also depend on whether or not the two aircrafts being separated are tracked by the same or different radars. As new technologies for surveillance are introduced, it is worthwhile to express the requirements for surveillance systems in terms of a technology-independent Required Surveillance Performance (RSP) for the types of separation service being provided, i.e., 3-mile separation or 5-mile separation. This report presents an analysis and flight test validation to derive the RSP accuracy needed to support 3-mile and 5-mile separation. The approach taken in this analysis is to examine the error characteristics of the various types of surveillance sensors in the FAA inventory and to analyze their performance with regard to providing accurate separation measurements to controllers. The report is organized to first give a background describing the current surveillance systems and separation standards and their evolution. Next the concept of RSP is introduced. This is followed by a section describing the analysis that was used to derive the RSP attributes presented in this paper followed by a description and results of a flight test performed to validate this analysis.
NTIS
Air Traffic Control; National Airspace System; Surveillance

20060056188 Government Accountability Office, Washington, DC, USA
Aviation Finance: Observations on Potential FAA Funding Options
Sep. 2006; 50 pp.; In English
Report No.(s): PB2007-102012; GAO-06-973; No Copyright; Avail.: CASI: A03, Hardcopy
The Federal Aviation Administration (FAA), the Airport and Airway Trust Fund (Trust Fund), and the excise taxes that support the Trust Fund are scheduled for reauthorization at the end of fiscal year 2007. FAA is primarily supported by the Trust Fund, which receives revenues from a series of excise taxes paid by users of the national airspace system (NAS). The Trust

Fund's uncommitted balance decreased by more than 70 percent from the end of fiscal year 2001 through the end of fiscal year 2005. The remaining funding is derived from the General Fund. This report focuses on the portion of revenues generated from users of the NAS and addresses the following key questions: (1) What advantages and concerns have been raised about the current approach to collecting revenues from NAS users to fund FAA, and to what extent does available evidence support the concerns. (2) What are the implications of adopting alternative funding options to collect the revenues contributed by users that fund FAA's budget. (3) What are the advantages and disadvantages of authorizing FAA to use debt financing for capital projects. This report is based on interviews with relevant federal agencies, including FAA, the Office of Management and Budget, and the Congressional Budget Office. GAO also obtained relevant documents from these agencies, other key stakeholders, and academic and financial experts.
NTIS
Aircraft Industry; National Airspace System; Airports

20060056244 Clemson Univ., SC, USA, Mayo Clinic, Rochester, MN, USA
Developing A Methodology For Assessing Safety Programs Targeting Human Error In Aviation
Shappell, S.; Wiegmann, D.; November 2006; 13 pp.; In English
Contract(s)/Grant(s): AM-B-05-HRR-521
Report No.(s): DOT/FAA/AM-06/24; No Copyright; Avail.: CASI: A03, Hardcopy

There is a need to develop an effective methodology for generating comprehensive intervention strategies that map current and proposed safety programs onto well-established types of human error. Two separate studies were conducted using recommendations from NTSB accident investigations and several joint FAA and industry working groups. The goal of the studies was to validate a proposed framework for developing and examining safety initiatives that target human error in aviation. The results suggest five approaches to reducing human factors associated with aviation accidents. When combined with the Human Factors Analysis and Classification System, the resulting Human Factors Intervention Matrix will provide a useful tool for evaluating current and proposed aviation safety programs.
Author
Human Factors Engineering; Aircraft Accidents; Aircraft Safety; Pilot Error; Human Performance; Flight Safety; Classifications

20060056402 NASA Johnson Space Center, Houston, TX, USA
Development of a Test Facility for Air Revitalization Technology Evaluation
Lu, Sao-Dung; Lin, Amy; Campbell, Melissa; Smith, Frederick; [2006]; 1 pp.; In English; International Conference on Environmental Systems, 9 - 12 Jul. 2007, Chicago, IL, USA; Copyright; Avail.: Other Sources; Abstract Only

An active fault tolerant control (FTC) law is generally sensitive to false identification since the control gain is reconfigured for fault occurrence. In the conventional FTC law design procedure, dynamic variations due to false identification are not considered. In this paper, an FTC synthesis method is developed in order to consider possible variations of closed-loop dynamics under false identification into the control design procedure. An active FTC synthesis problem is formulated into an LMI optimization problem to minimize the upper bound of the induced-L2 norm which can represent the worst-case performance degradation due to false identification. The developed synthesis method is applied for control of the longitudinal motions of FASER (Free-flying Airplane for Subscale Experimental Research). The designed FTC law of the airplane is simulated for pitch angle command tracking under a false identification case.
Author
Fault Tolerance; Feedback Control; Active Control; Angular Distribution; Degradation; Sensitivity; Air Purification

20060056430 NASA Langley Research Center, Hampton, VA, USA
Next Generation NASA GA Advanced Concept
Hahn, Andrew S.; [2006]; 21 pp.; In English; SAE General Aviation Technology Conference & Exhibition (GATC), 29-31 Aug. 2006, Wichita, KS, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 581.02.08.07
Report No.(s): SAE-Paper-2006-01-2430; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056430; Avail.: CASI: A03, Hardcopy

Not only is the common dream of frequent personal flight travel going unfulfilled, the current generation of General Aviation (GA) is facing tremendous challenges that threaten to relegate the Single Engine Piston (SEP) aircraft market to a footnote in the history of U.S. aviation. A case is made that this crisis stems from a generally low utility coupled to a high

cost that makes the SEP aircraft of relatively low transportation value and beyond the means of many. The roots of this low value are examined in a broad sense, and a Next Generation NASA Advanced GA Concept is presented that attacks those elements addressable by synergistic aircraft design.
Author
General Aviation Aircraft; Single Engine Aircraft; Air Transportation

04
AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes all modes of communication with and between aircraft; air navigation systems (satellite and ground based); and air traffic control. For related information see also 06 Avionics and Aircraft Instrumentation; 17 Space Communications, Spacecraft Communications, Command and Tracking; and 32 Communications and Radar.

20060056384 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
The Outcome of ATC Message Complexity on Pilot Readback Performance
Prinzo, O. Veronika; Hendrix, Alfred M.; Hendrix, Ruby; November 2006; 36 pp.; In English
Contract(s)/Grant(s): DOT-AM-03-HRR-516
Report No.(s): DOT/FAA/AM-06/25; No Copyright; Avail.: CASI: A03, Hardcopy

Field data and laboratory studies conducted in the 1990s reported that the rate of pilot readback errors and communication problems increased as controller transmissions became more complex. This resulted in the recommendation that controllers send shorter messages to reduce the memory load imposed on pilots by complex messages. More than IO years have passed since a comprehensive analysis quantified the types and frequency of readback errors and communication problems that occur in the operational environment. Hence, a content analysis was performed on 50 hours of pilot and controller messages that were transmitted from 5 of the busiest terminal radar approach control facilities in the contiguous USA between October 2003 and February 2004. This report contains detailed and comprehensive descriptions of routine air traffic control (ATC) communication, pilot readback performance, call sign usage, miscommunications, and the effects of ATC message complexity and message length on pilot readback performance. Of importance was the finding that both the number of pilot requests and readback errors increased as the complexity and number of aviation topics in ATC messages increased - especially when pilots were performing approach tasks as compared with departure tasks. Also, nonstandard phraseology associated with a lack of English language proficiency and international communications were present in the data. In particular, pilot use of the word 'point' as part of a radio frequency was included in the read back of altitude ('three point five') and speed ('two point seven on the speed'). To limit the occurrence of communication problems and misunderstandings, controllers should be encouraged to transmit shorter and less complex messages. With increases in international travel, areas of concern related to English language proficiency and language production need to be addressed.
Author
Air Traffic Control; Radar Approach Control; Pilot Performance; Pilot Error; Ground Based Control; Terminal Guidance; Radio Frequencies

05
AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes all stages of design of aircraft and aircraft structures and systems. Also includes aircraft testing, performance and evaluation, and aircraft and flight simulation technology. For related information see also 18 Spacecraft Design, Testing and Performance and 39 Structural Mechanics. For land transportation vehicles see 85 Technology Utilization and Surface Transportation.

20060054195 Lectromechanical Design Co., Sterling, VA, USA
Development of an Electrical Wire Interconnect System Risk Assessment Tool
Linzey, W. G.; Sep. 2006; 43 pp.; In English
Report No.(s): PB2007-101017; No Copyright; Avail.: National Technical Information Service (NTIS)

During the last decade, there has been an evolving understanding of the importance of the Electrical Wire Interconnect System (EWIS) in aircraft safety. However, there is still no agreement on how the EWIS should be analyzed in aircraft safety assessment. The Federal Aviation Administration has initiated many programs to improve the understanding of safety issues related to the EWIS. This final report documents the development of Advanced Risk Assessment Methods for Aircraft Electrical Interconnect Systems (EIS). The project was divided into four tasks to identify current EIS design and risk assessment methods, techniques, practices, and tools; develop advanced EIS risk assessment methods; develop computer-

based EIS risk assessment tools; and finally assess the tools. At the conclusion of the research program, a software tool and an EWIS database was developed. The software tool contains collocation analysis, quantitative analysis, and reporting modules. The collocation analysis performs the qualitative aspects. The quantitative analysis is performed by failure matrix analysis and damage potential analysis. The bundle section report brings aspects of these analyses together and reports on the whole EWIS.
NTIS
Assessments; Risk; Wire; Wiring; Aircraft Safety

20060054443 NASA Ames Research Center, Moffett Field, CA, USA
In-Flight Skin Friction Measurements Using Oil Film Interferometry
Drake, Aaron; Kennelly, Robert A., Jr.; June 08, 1997; 10 pp.; In English; Copyright; Avail.: CASI: A02, Hardcopy

Oil film interferometry (OFI) has been successfully applied to skin friction measurement on an aircraft in flight. Measurements during two flights of a Beech F33C Bonanza single engine light aircraft were made at several locations on the wing's .upper surface including the leading edge, mid-chord, and on the flaps. OFI is a direct skin friction measurement method that works by measuring the thinning rate of a line of oil placed on a surface subject to a shear stress. The technique has previously been demonstrated in low-speed, transonic, and supersonic wind tunnels. The basics of oil film interferometry were first developed by Tanner and Blows in the 1970s. A transparent oil placed on a surface exposed to the airstream is thinned by the shear stress acting on it. Subject to certain assumptions, the resulting oil film's thickness varies linearly near the leading edge of the film. The rate at which this thinning occurs can be related to the skin friction shear stress using lubrication theory. The original technique used laser light to create visible interference fringes formed between reflections from the air - oil and oil-surface interfaces. A variant of the technique recently developed by Monson and Mateer, fringe imaging skin-friction' (FISF), employs several innovations which make oil film interferometry simpler to use. This technique makes use of readily-available mylar sheets for optical - quality model surfaces, more conventional illumination, and requires only a single, post - flight image. The interference patterns may be viewed directly or, with a modest amount of image analysis, may be used to obtain quantitative values for local skin friction.
Derived from text
Interferometry; Light Aircraft; Oils; Single Engine Aircraft; Skin Friction; Polymeric Films; Transonic Wind Tunnels; Flight Tests

20060055388 NASA Langley Research Center, Hampton, VA, USA
Mach 4 Test Results of a Dual-Flowpath, Turbine Based Combined Cycle Inlet
Albertson, Cindy w.; Emami, Saied; Trexler, Carl A.; 2006; 14 pp.; In English; 14th AIAA/AHI International Space Planes and Hypersonics Systems and Technologies Conference, 6-9 Nov. 2006, Canberra, Australia; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 489.02.07.07.01
Report No.(s): AIAA Paper 2006-8138; No Copyright; ONLINE: http://hdl.handle.net/2060/20060055388; Avail.: CASI: A03, Hardcopy

An experimental study was conducted to evaluate the performance of a turbine based combined cycle (TBCC) inlet concept, consisting of a low speed turbojet inlet and high speed dual-mode scramjet inlet. The main objectives of the study were (1) to identify any interactions between the low and the high speed inlets during the mode transition phase in which both inlets are operating simultaneously and (2) to determine the effect of the low speed inlet operation on the performance of the high speed inlet. Tests were conducted at a nominal freestream Mach number of 4 using an 8 percent scale model representing a single module of a TBCC inlet. A flat plate was installed upstream of the model to produce a turbulent boundary layer which simulated the full-scale vehicle forebody boundary layer. A flowmeter/back pressure device, with remote actuation, was attached aft of the high speed inlet isolator to simulate the back pressure resulting from dual-mode scramjet combustion. Results indicate that the inlets did not interact with each other sufficiently to affect inlet operability. Flow spillage resulting from a high speed inlet unstart did not propagate far enough upstream to affect the low speed inlet. Also, a low speed inlet unstart did not cause the high speed inlet to unstart. The low speed inlet improved the performance of the high speed inlet at certain conditions by diverting a portion of the boundary layer generated on the forebody plate.
Author
Turbojet Engines; Engine Inlets; Turbulent Boundary Layer; Scale Models; Free Flow; Boundary Layers

20060055397 Carnegie-Mellon Univ., Pittsburgh, PA USA

Case Study: Accelerating Process Improvement by Integrating the TSP and CMMI

Wall, Daniel S; McHale, James; Pomeroy-Huff, Marsha; Dec 2005; 39 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8721-05-C-0003

Report No.(s): AD-A456872; CMU/SEI-2005-SR-012; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA456872; Avail.: CASI: A03, Hardcopy

This report describes how two U.S. Naval Air Systems Command (NAVAIR) organizations integrated the use of the Software Engineering Institute's (SEI) Team Software Process (trademark) methodology and the Capability Maturity Modeling (trademark) framework to progress from Maturity Level 1 to Maturity Level 4 in 30 months. This is less than half of the average time it has taken other organizations to accomplish the same maturity level progression. This case study describes the process improvement efforts of both NAVAIR divisions and how they integrated the two SEI technologies to accelerate process improvement within their organizations. Finally, the report presents the key factors that allowed NAVAIR to achieve these rapid results,

DTIC

Computer Programming; Management Planning; Optimization; Production Engineering; Software Engineering

20060055402 Naval Postgraduate School, Monterey, CA USA

Metrics of METOC Forecast Performance and Operational Impacts on Carrier Strike Operations

Callahan, Jeremy; Sep 2006; 116 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457025; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457025; Avail.: Defense Technical Information Center (DTIC)

We have developed metrics of the performance and operational impacts of METOC support to strike operations conducted on operational aircraft carriers (CVs). Our goal was to assess that support and make recommendations on improving it. We adapted an existing automated real time METOC metrics system, which was developed for land based training missions, for use on CVs by developing a new data collection form, new metrics, and new collection, analysis, and reporting architecture for the remote entering of sensitive mission data without compromise. The weather support element of a CV, the OA division, does not provide strike mission planning support, but does provide situational awareness to pilots. Our system allows that situational awareness to be measured and assessed using metrics that quantify the performance of the forecasts, the relationship of the forecasts to the mitigating actions taken by pilots due to adverse weather conditions, and the effects of individual weather phenomena on the execution of strike missions. A key element of the data collection, analysis, and reporting system developed in this study is the collection of METOC related data from pilots during their intelligence debriefings. This system is readily adaptable for the assessment of METOC support to other warfare areas.

DTIC

Aircraft Carriers; Forecasting; International System of Units; Meteorology

20060055538 Naval Postgraduate School, Monterey, CA USA

Business Process Reengineering in the Inventory Management to Improve Aircraft Maintenance Operations in the Indonesian Air Force

Susanto, Martinus B; Jun 2006; 103 pp.; In English

Report No.(s): AD-A457125; No Copyright; Avail.: CASI: A06, Hardcopy

The Indonesian Air Force has utilized computers in its administration as early as 1990. However, the computers have not yet been optimized to support inventory management in aircraft maintenance operations, especially for the helicopter fleet. The processes involved in materials procurement to support maintenance operations still rely heavily on the services of intermediaries. Even though the Air Force has already adopted the Automatic Logistic Management System (ALMS), the system has several weaknesses. The objective of this study is to propose the implementation of the Material Requirement Planning (MRP) method to improve inventory management in the Air Force's helicopter fleet. It is hoped that by implementing the MRP, the Air Force can get the right materials in the right amount at the right time without imposing unnecessary costs by minimizing the roles of intermediaries. The implementation of MRP, however, cannot be done without redesigning the Air Force's business process in material acquisition and transforming it to an IT-enabled business process. Therefore, this study also discusses the Business Process Reengineering (BPR) concept to support the implementation of MRP.

DTIC

Commerce; Helicopters; Indonesia; Information Systems; Inventory Controls; Inventory Management; Logistics Management; Maintenance

20060055539 Naval Postgraduate School, Monterey, CA USA

Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF

Landreth, Kent A; Glass, John C; Sep 2006; 83 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457127; No Copyright; Avail.: CASI: A05, Hardcopy

The NPS Tactical Horizon Extension Project objective is to define and demonstrate a concept by which task force-level commanders and below can obtain a persistent, over-the-horizon surveillance capability for the purpose of target development and other missions without tasking national or theater-level assets. The goal is to increase the Intelligence, Surveillance, and Reconnaissance (ISR) capacity of units who normally would not rate the priority to task a Predator, Global Hawk, or U-2. There are two guiding tenets in developing this concept. First, the equipment and its control should be organic to the SOF unit or task force. Second, utilizing this capability should not require the soldier to carry any additional equipment into the field. Initial research led the authors to the idea of using networked unmanned aerial systems (UASs) to generate an over-the-horizon surveillance capability for SOF. They demonstrated the concept by forming a network consisting of a forward ground team, an inexpensive, test-bed UAS equipped with an off-the-shelf video camera, a manned aircraft, and a tactical operations center (TOC). They attained connectivity through an ITT Mesh structure at 2.4 GHz, amplified to 1W. Researchers were from the Defense Analysis, Mechanical and Astronautical Engineering, and Information Sciences Departments. They conducted successful experiments through the USSOCOM-NPS Cooperative Field Experimentation Program.

DTIC

Computer Networks; Detection; Drone Vehicles; Line of Sight; Military Personnel; Over-the-Horizon Radar; Pilotless Aircraft; Surveillance; Target Acquisition; Targets; Television Cameras

20060055570 Naval Postgraduate School, Monterey, CA USA

An Analysis of the Joint Strike Fighter Autonomic Logistics System

Tsoutis, Anastasios; Sep 2006; 114 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457174; No Copyright; Avail.: CASI: A06, Hardcopy

Traditionally in the Navy/Marine Corps, in an effort to be proactive and prevent failures, maintenance and inspections are performed at fixed intervals independent of aircraft status. The current preventive maintenance strategy services and replaces certain components on a predetermined schedule. Additionally, the current Navy/Marine Corps aircraft repair process is reactive. When failures occur, the logistics system - maintenance and supply - respond. The Joint Strike Fighter Autonomic Logistics System (ALS) is proposed to be better then the logistic system in place. Under the ALS maintenance is performed only as needed. The idea is to decrease the logistics infrastructure and simultaneously improve logistics performance, by performing maintenance only as needed. Additionally, parts are ordered autonomously without human intervention. The logistic system prepares for an independent failure. In this thesis simulation are developed to compare the traditional repair system and the ALS. An analysis is conducted to show differences in performance in respect to aircraft availability, failures per mission and maintenance-man-hour-per-flight-hour.

DTIC

Autonomic Nervous System; Fighter Aircraft; Logistics; Maintenance

20060055571 Institut Franco-Allemand de Recherches, Saint-Louis, France

Bouchon d'oreille a attenuation active adaptee aux bruits d'helicoptere (Ear Plugs for Active Attenuation Adapted for Helicopter Noises) (Gehoerschutzstopsel mit aktriver Daempfung, geeignet fuer Hubschrauberlaerm)

Zimpfer-Jost, Veronique; Buck, Karl; Apr 2006; 8 pp.; In French; Original contains color illustrations

Report No.(s): AD-A457175; ISL-PU-619/2006; No Copyright; Avail.: CASI: A02, Hardcopy

The helicopter noise spectrum is composed of two very distinct parts. The first is a low frequency component (\h600 Hz) corresponding to noise from the motor. The second consists of the tonal components between 800Hz and 3 kHz characteristic of the noise coming from the gear reduction box. The classic use of a helmet for active attenuation to reduce this noise can pose a problem since the domain of noise amplification (rejectio) for this type of protection is often located in the domain of the tonal components. The use of an ear plug for active attenuation with a buckle against reaction should permit active attenuation up to 2kHz. In this case, using electrodynamic miniature loudspeakers (high volume auditory prosthesis) proves that such a system doesn't provide enough attenuation and/or is not steady enough. This problem especially concerns the tonal components that are not attenuated sufficiently. For the helicopter noise, a mixed system using two principles is proposed: the first, based on a buckle against reaction (feedback) is optimized for the low frequency noises (\h600 Hz); the second based on the prediction (feedforward) permits to treat the tonal components to 800 Hz. This paper shows that such a protection for

active attenuation is feasible and that the performance of the system is adapted to the specific needs.
DTIC
Acoustic Attenuation; Aircraft Noise; Ear Protectors; Helicopters

20060055594 Naval Postgraduate School, Monterey, CA USA
Studies in Forecasting Upper-Level Turbulence
Kuhl, Christopher T; Sep 2006; 191 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457216; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Encounters with turbulence generated by complex topography, convection, or mechanical forcing present a significant threat to military aircraft operations. Properly forecasting the initiation, duration, and intensity of such encounters is a tremendous challenge to forecasters often resulting in the over-forecasting of turbulence. Over-forecasting the presence or intensity of turbulence can result in unnecessary mission delays, cancellations, and re-routing. The lack of observations and the fact that turbulence is a microscale phenomenon which Numerical Weather Prediction (NWP) models currently can not resolve are what make forecasting turbulence so difficult. Progress has been made in the last several decades in both the observation of turbulence and the resolution of NWP models. A new turbulence forecast approach has been created based on recent developments in observing turbulence and using automated turbulence diagnostics. The development of an in-situ observation platform, using the Eddy Dissipation Rate (EDR), and the Graphical Turbulence Guidance (GTG) model are discussed. A turbulence forecast approach is derived that includes the synoptic patterns which create or allow the turbulent environment to exist, the use of current tools to observe turbulence, and the use of models to help form the turbulence forecast. A turbulence forecasting manual has been created to give the new forecaster improved guidance to effectively forecast turbulence.
DTIC
Forecasting; Mechanical Properties; Military Operations; Systems Integration; Topography; Turbulence

20060055599 Naval Postgraduate School, Monterey, CA USA
Future Small Unmanned Aerial System (SUAS) Flight And Mission Control Support System (FMCSS) Design
Lamb, Timothy G; Sep 2006; 120 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457224; No Copyright; Avail.: CASI: A06, Hardcopy

Unmanned Aerial Systems (UAS) are playing a significant role in the Global War on Terrorism (GWOT). Until recently, small UAS (SUAS) were an insignificant part of these efforts. Now their numbers exceed those of their larger counterparts by an order of magnitude. Future projections anticipate a growing demand for SUAS making now the best time to examine the functions they perform in order to make better decisions concerning their future design and development. This thesis provides a brief history of UAS and discusses the current capabilities and mission areas in which they perform. Their relevance to modern warfare and assumptions concerning their future roles on the battlefield is presented. Predominant UAS missions are identified, as well as the technical requirements deemed necessary for their success. A generic UAS functional model is developed to illustrate where the challenges and technology gaps manifest in SUAS design. Possible technology solutions that could fill these gaps are presented and a field experiment is conducted to demonstrate the feasibility of several possible solutions. The goal of this thesis is to identify existing technology gaps and offer technology solutions that lead to better design of future SUAS flight and mission control support systems (FMCSS).
DTIC
Control; Control Systems Design; Drone Vehicles; Flight Control; Support Systems; Surveillance

20060055613 Naval Postgraduate School, Monterey, CA USA
Steady-State and Transient Measurements Within a Compressor Rotor During Steam-Induced Stall at Transonic Operational Speeds
Zarro, Sarah E; Sep 2006; 85 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457247; No Copyright; Avail.: CASI: A05, Hardcopy

Steam leakage from an aircraft carrier catapult is sometimes ingested into the aircraft engines upon launch which may induce compressor stall. Investigation of this phenomenon is of particular interest to the Navy with its new F-35C, the aircraft carrier variant of the joint strike fighter. The single engine configuration of the F-35C makes this aircraft particularly vulnerable to steam-induced stall. The present study examined both throttle-induced stall and steam-induced stall in a compressor at 90% and 95% speed through the use of 9 Kulite and 2 hot-film pressure transducers. The use of Fast Fourier Transform waterfall plots of the transient data before and during stall proved invaluable in determining stall precursors as well

as the mode of rotor stall. In addition, a new computational fluid dynamic model was designed using CFX-5 software to represent a single blade passage of the compressor rotor, in order to predict compressor performance. The computed results were compared to experimental results gathered at various throttle settings. An accurate model will enable researchers to predict compressor performance for various and multiple gases.
DTIC
Aircraft Carriers; Aircraft Engines; Compressor Rotors; Pressure Sensors; Steady State; Steam; Transonic Speed

20060055636 Naval Postgraduate School, Monterey, CA USA
Path Calculation and Packet Translation for UAV Surveillance in Support of Wireless Sensor Networks
Schall, Stephen; Sep 2006; 191 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457291; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Wireless Sensor Networks (WSNs) are a relatively new technology with many potential applications, including military and homeland security surveillance operations. Accurate classification of WSN contacts has been attempted using various sensor combinations over the past few years, yet video and photographic imagery remain the only choices for attaining context specific contact classification. While cameras have been successfully installed within some WSNs, there are serious limitations to this solution. Most stemming from the scarce power resources, immobility, and small form factor common among conventional WSN nodes. An efficient, low cost answer to this problem involves the use of unmanned aerial vehicles (UAVs) to acquire imagery of WSN contacts. For this system to scale to the wide expanses that WSNs deploy over, UAV contact surveillance operations must be controlled autonomously. The objective of this thesis is to research and implement an autonomous UAV WSN system, where an optimized two-dimensional flight plan is produced in response to WSN contact detection. Flight plans autonomously guide the UAV on a course to either an estimated interception point with the WSN contact or to the instigated WSN cluster, depending upon user input. The event driven application produced in this study functions in the periphery of the Kestrel Autopilot System, communicating flight plans to the UAV through properly crafted Kestrel packets.
DTIC
Communication Networks; Drone Vehicles; Surveillance; Translating

20060055718 Naval Air Warfare Center, Patuxent River, MD USA
Testing of 7050-T7451 Aluminum Strain-Life Coupons for a Probabilistic Strain-Life Curve
Rusk, David T; Taylor, Robert E; Hoffman, Paul C; Nov 2, 2006; 69 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457449; NAWCADPAX/TR-2006/140; No Copyright; Avail.: CASI: A04, Hardcopy

Fleet life tracking is an integral part of NAVAIR s approach to ensuring the airworthiness and operational readiness of U.S. Naval Aviation assets. Historically, life limits for Naval airframe components have been derived by deterministic analyses of stress-life or strain-life fatigue models. To improve fatigue life prediction capabilities for airframe structures, NAVAIR has begun development of a Probabilistic Strain-Life model. As a first step in the development of the Probabilistic Strain-Life method, an extensive testing program was initiated to characterize the scatter in standard ASTM strain-life test coupons for 7050-T7451 aircraft aluminum. Two different coupon geometries are described in the relevant standards: an axially loaded, uniform gage section test coupon and an axially loaded, hourglass gage section coupon. Both coupon types were investigated to determine the differences in fatigue life characteristics between the two. Two different test laboratories were also utilized for testing, to obtain a measure of interlaboratory variation in fatigue results. This investigation shows that the choice of coupon geometry, test procedures, and the test laboratory all have an effect on the statistics of the strain-life test results. From these tests, a probabilistic strain-life curve can be developed to characterize the scatter in material fatigue resistance.
DTIC
Aircraft Reliability; Aluminum; Fatigue Life

20060055793 Naval Postgraduate School, Monterey, CA USA
Analysis of the Assignment Scheduling Capability for Unmanned Aerial Vehicles (ASC-U) Simulation Tool
Nannini, Christopher J; Jun 2006; 131 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457579; No Copyright; Avail.: CASI: A07, Hardcopy

The U.S. Army Training and Doctrine Command (TRADOC) Analysis Center (TRAC) and the Modeling, Virtual Environments, and Simulations Institute (MOVES) at the Naval Postgraduate School, Monterey, California developed the Assignment Scheduling Capability for UAVs (ASC-U) simulation to assist in the analysis of unmanned aerial vehicle (UAV) requirements for the current and future force. ASC-U employs a discrete event simulation coupled with the optimization of

a linear objective function. At regular intervals, ASC-U obtains an optimal solution to a simplified problem that assigns available UAVs to missions that are available or will be available within a future time horizon. This thesis simultaneously explores the effects of 26 simulation and UAV factors on the mission value derived when allocating UAVs to mission areas. The analysis assists in defining the near term (2008) UAV force structure and the investment strategy for the mid term (2013), and far term (2018). We combine an efficient experimental design, exploratory modeling, and data analysis to examine 514 variations of a scenario involving five UAV classes and over 21,000 mission areas. The conclusions suggest the following: the optimization interval significantly influences the quality of the solution, percent mission coverage may depend on a few UAV performance factors, small time horizons increase percent mission coverage, and carefully planned designs assist in the exploration of the outer and interior regions of the response surface.
DTIC
Computerized Simulation; Pilotless Aircraft; Remotely Piloted Vehicles; Scheduling; Simulation; Virtual Reality

20060055794 Aerospace Medical Research Labs., Wright-Patterson AFB, OH USA
Biological Parameters of Impact
Brown, W K; Chandler, R F; Sep 1965; 14 pp.; In English
Report No.(s): AD-A457580; No Copyright; Avail.: CASI: A03, Hardcopy

Investigation of the biological effects of abrupt acceleration (impact) was stimulated by the advent of technical advances in aerospace flight such as high performance aircraft, ejection seats and, later, manned rockets. Anticipated exposure to abrupt dynamic forces by aviation and space flight crew members necessitated the establishment of useful tolerance criteria as a means of predicting survival in the impact environment. Efforts directed toward this goal used two complementary approaches. i.e., the development of criteria based on the mechanical characteristics and response of the body to impact, and the biological response to impact evaluated in terms of clinical and physiological observations. A wealth of data pertaining to the injurious effects of abrupt acceleration is available from automotive and aircraft accidents. However, these data are of limited value in assessing limits of tolerance as concerns the operational situation. Analysis of accidental impact injury data is of greater benefit in arriving at an all-or-none criterion, i.e., survival vs non-survival. In the operational environment of impact, one is vitally interested in that grey zone between no effect and gross Injury or death. For example, the pilot who survives an aircraft crash, but who is injured or unconscious so that he cannot protect himself from secondary environmental conditions such as fire, would not consider survival a suitable tolerance limit for the impact.
DTIC
Acceleration (Physics); Aerospace Systems; Aircraft; Ejection Seats; Flight

20060055795 Air Force Research Lab., Wright-Patterson AFB, OH USA
Space Cabin Landing Impact Vector Effects on Human Physiology
Stapp, John P; Taylor, Ellis R; Dec 1964; 18 pp.; In English
Report No.(s): AD-A457581; No Copyright; Avail.: CASI: A03, Hardcopy

Fifty-eight human volunteers in 146 experiments endured impact forces simulating space cabin landing impacts following parachute descent. Impact forces were experienced in 16 body positions in combination of pitch and yaw, and seven configurations of onset (1,000, 1,500 and 2,000 G/sec.), magnitude (10, 15, 20 and 25 G) and durations (60 to 130 milliseconds). The volunteer subject sat in a seat mounted in three sets of gimbals providing fixation by 10 degree increments in yaw (0 degrees to 360 degrees), pitch (0 degrees to 180 degrees) and roll (0 degrees to 180 degrees), on a sled suspended by 4 slippers between cylindrical rails of 1.524 meters gauge, 36.6 meters in length. A pneumatic piston propelled the sled through a 13.0 meter stroke to predetermined velocities ranging from 6.1 to 13.7 meters per second, letting the sled coast 23.5 meters to impact on a piston-and-cylinder water inertia brake to penetrations of 43 to 83 centimeters before stopping. A trailing cable from the sled to recorders in a block- house near the track transmitted electrocardiograph, pneu- mograph, haemo-barograph, electroencephalograph, biceps tendon reflex, handgrip dynamometer, and tri-axial accelerometer data before, during and after impact. Stomach X-rays to indicate gastric motility were taken before and after exposure to impact. During impact 2,000 frames per second motion pictures were taken from overhead, and from right and left profile positions to record body displacements. All body positions and impact configurations were within voluntary tolerance limits except the forward facing 45 reclining position at 25.4 G measured on the sled with onset of 1,000 G per second and 60 millisecond duration, in which compression of soft tissues around the 6th, 7th, 8th thoracic vertebrae caused pain and stiffness for 60 days.
DTIC
Aircraft Compartments; Gimbals; Impact Loads; Landing Loads; Vectorcardiography

20060055796 Aerospace Medical Research Labs., Wright-Patterson AFB, OH USA
Development and Evaluation of a Device for the Prevention of Arm Flail Injuries
Connors, Michael P; Specker, Lawrence J; Jennings, Thomas J; May 1983; 3 pp.; In English
Report No.(s): AD-A457582; No Copyright; Avail.: CASI: A01, Hardcopy

Past attempts to provide arm flail protection for USAF emergency ejection seats have not been successful. The devices that have been designed have ranged from mechanically deployed web nets to paddles which retain the arms during the ejection sequence. Although each system has had advantages, factors such as mechanical complexity, lack of crew acceptance, weight, space limitations, and dependence on directional stability of the ejection seat have precluded their acceptance or operational effectiveness. To overcome these factors, the authors designed and tested an active limb restraint system that can be used in current and future escape systems. This system, referred to as the Nonrestrictive Arm Restraint (NAR) is a sleeve-mounted strap configuration, as shown in Figure 1. It is attached to the seat by straps which are routed through snubbers to a shear pin on the aircraft floor. Seat motion up the ejection rails activates the system, simultaneously pulling the elbows of the crewmember to his torso and his wrists to the ejection controls. The crewmember is restrained in this position until released at seat/man separation. A Laboratory test program was conducted to evaluate the effectiveness of the design. The tests included emergency ground egress, seat/man separation, wind blast, and upper limb capture and haul back.
DTIC
Ejection Seats; Health; Injuries; Mechanical Properties; Prevention; System Effectiveness

20060056168 Air Force Research Lab., Wright-Patterson AFB, OH USA
Analyzing Requirements for and Designing a Collaborative Tool Based on Functional and User Input
Curtis, Christopher K; Burneka, Chris; Whited, Vaughan; Kancler, David E; May 2006; 10 pp.; In English
Contract(s)/Grant(s): FA8650-04-C-6406; Proj-2830
Report No.(s): AD-A457614; AFRL-HE-WP-TP-2006-0041; No Copyright; Avail.: CASI: A02, Hardcopy

In flightline maintenance, collaboration is an important factor in the maintainer's quest to complete a difficult or unusual repair. Technology provides a multitude of potential collaborative tools and techniques, and this must be balanced against the requirement to leverage and/or support maintainer's existing interaction skills, rather than requiring them to adapt to the technology. This paper discusses the definition of collaboration, a high-level classification of collaboration types, followed by a discussion of the strategy used by the Aircraft Maintenance Intuitive Troubleshooting (AMIT) research project design team to determine the appropriate collaboration tools for AMIT job aide. In general, this strategy utilized a blend of research and user feedback, balanced by end use environment constraints and requirements, to create a usable and useful collaboration capability for the Air Force maintenance technician.
DTIC
Maintenance; Aircraft Maintenance; Feedback

20060056176 Naval Research Lab., Washington, DC USA
Transient fault Currents in Aircraft D-C Systems
Scorgie, D G; Oct 9, 1950; 21 pp.; In English
Report No.(s): AD-A457230; NRL-3744; No Copyright; Avail.: CASI: A03, Hardcopy

Two simultaneous differential equations have been derived which satisfactorily describe the transient fault current in a shunt-wound aircraft d-c generator in terms of easily obtainable parameters. Improved accuracy of the result is attributed to eliminating the assumption of constant field flux linkages during the transient and substituting the assumption of constant rates of change of field flux linkages with armature and field currents. The field flux leakage coefficient was assumed constant. Theoretical and empirical transients compared favorably for both separately and self-excited generators. The effect of a carbon-pile voltage regulator was successfully predicted. Transient resistance has been redefined in such a manner that its value can be predicted in terms of the physical parameters of the generator.
DTIC
Aircraft; Direct Current; Voltage Regulators

20060056193 NASA Glenn Research Center, Cleveland, OH, USA
The Nutating Engine-Prototype Engine Progress Report and Test Results
Meitner, Peter L.; Boruta, Mike; October 2006; 11 pp.; In English; Forum 62, 9-11 May 2006, Phoenix, AZ, USA; Original contains color illustrations
Report No.(s): NASA/TM-2006-214342; E-15562; ARL-MR-0641; Copyright; Avail.: CASI: A03, Hardcopy

A prototype of a new, internal combustion (IC) engine concept has been completed. The Nutating Engine features an internal disk nutating (wobbling) on a Z-shaped power shaft. The engine is exceedingly compact, and several times more power dense than any conventional (reciprocating or rotary) IC engine. This paper discusses lessons learned during the prototype engine's development and provides details of its construction. In addition, results of the initial performance tests of the various components, as well as the complete engine, are summarized.
Author
Engine Design; Engine Tests; Nutation; Prototypes; Internal Combustion Engines

20060056391 NASA Langley Research Center, Hampton, VA, USA
On the Development of an Efficient Parallel Hybrid Solver with Application to Acoustically Treated Aero-Engine Nacelles
Watson, Willie R.; Nark, Douglas M.; Nguyen, Duc T.; Tungkahotara, Siroj; December 06, 2006; 10 pp.; In English; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy

A finite element solution to the convected Helmholtz equation in a nonuniform flow is used to model the noise field within 3-D acoustically treated aero-engine nacelles. Options to select linear or cubic Hermite polynomial basis functions and isoparametric elements are included. However, the key feature of the method is a domain decomposition procedure that is based upon the inter-mixing of an iterative and a direct solve strategy for solving the discrete finite element equations. This procedure is optimized to take full advantage of sparsity and exploit the increased memory and parallel processing capability of modern computer architectures. Example computations are presented for the Langley Flow Impedance Test facility and a rectangular mapping of a full scale, generic aero-engine nacelle. The accuracy and parallel performance of this new solver are tested on both model problems using a supercomputer that contains hundreds of central processing units. Results show that the method gives extremely accurate attenuation predictions, achieves super-linear speedup over hundreds of CPUs, and solves upward of 25 million complex equations in a quarter of an hour.
Author
Finite Element Method; Nacelles; Parallel Processing (Computers); Applications Programs (Computers); Aeroacoustics; Acoustic Ducts

06
AVIONICS AND AIRCRAFT INSTRUMENTATION

Includes all avionics systems, cockpit and cabin display devices, and flight instruments intended for use in aircraft. For related information see also 04 Aircraft Communications and Navigation; 08 Aircraft Stability and Control; 19 Spacecraft Instrumentation and Astrionics; and 35 Instrumentation and Photography.

20060055385 NASA Johnson Space Center, Houston, TX, USA
Human Exploration and Avionic Technology Challenges
Benjamin, Andrew L.; [2005]; 1 pp.; In English; Space Exploration Strategies, Missions, and Enabling Technologies Conference, 17-18 May 2005, Hampton, VA, USA; No Copyright; Avail.: Other Sources; Abstract Only

For this workshop, I will identify critical avionic gaps, enabling technologies, high-pay off investment opportunities, promising capabilities, and space applications for human lunar and Mars exploration. Key technology disciplines encompass fault tolerance, miniaturized instrumentation sensors, MEMS-based guidance, navigation, and controls, surface communication networks, and rendezvous and docking. Furthermore, I will share bottom-up strategic planning relevant to manned mission -driven needs. Blending research expertise, facilities, and personnel with internal NASA is vital to stimulating collaborative technology solutions that achieve NASA grand vision. Retaining JSC expertise in unique and critical areas is paramount to our long-term success. Civil servants will maintain key roles in setting technology agenda, ensuring quality results, and integrating technologies into avionic systems and manned missions. Finally, I will present to NASA, academia, and the aerospace community some on -going and future advanced avionic technology programs and activities that are relevant to our mission goals and objectives.
Author
Avionics; Technology Utilization; Manned Space Flight; Lunar Exploration; Mars Exploration

07
AIRCRAFT PROPULSION AND POWER

Includes primary propulsion systems and related systems and components, e.g., gas turbine engines, compressors, and fuel systems; and onboard auxiliary power plants for aircraft. For related information see also 20 Spacecraft Propulsion and Power; 28 Propellants and Fuels; and 44 Energy Production and Conversion.

20060055763 Naval Postgraduate School, Monterey, CA USA

Unsteady Casewall Pressure Measurements in a Transonic Compressor during Steam Induced Stall

Levis, William R; Jun 2006; 111 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457532; No Copyright; Avail.: Defense Technical Information Center (DTIC)

During launch of aircraft off of a carrier deck, steam leakage is sometimes ingested into the aircraft's engine and may cause a compressor stall or pop-stall . As the US Navy prepares to field the single engine F-35C Joint Strike Fighter, it becomes necessary to investigate the phenomenon known as pop-stall . In the present study, steady-state as well as transient measurements prior to and during a steam induced rotating stall were taken. Changes to the honeycomb altered the performance characteristics of the Transonic Compressor Rig and needed to be remapped in order to determine a new stall line as well as a peak performance criterion. Data was taken at 90 percent design speed as well as during a 70 percent steam induced stall with the aide of 9 Kulites at varying positions along the case wall. Data was reduced and analyzed through the use of a data acquisition and data reduction system.

DTIC

Aircraft Engines; Compressors; Pressure Measurement; Steam; Transonic Compressors

20060056194 NASA Glenn Research Center, Cleveland, OH, USA

Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications

Mital, Subodh K.; Gyekenyesi, John Z.; Arnold, Steven M.; Sullivan, Roy M.; Manderscheid, Jane M.; Murthy, Pappu L. N.; October 2006; 50 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): WBS 489.02.07.03

Report No.(s): NASA/TM-2006-214346; E-15621; Copyright; Avail.: CASI: A03, Hardcopy

Due to its high specific energy content, liquid hydrogen (LH2) is emerging as an alternative fuel for future aircraft. As a result, there is a need for hydrogen tank storage systems, for these aircraft applications, that are expected to provide sufficient capacity for flight durations ranging from a few minutes to several days. It is understood that the development of a large, lightweight, reusable cryogenic liquid storage tank is crucial to meet the goals of and supply power to hydrogen-fueled aircraft, especially for long flight durations. This report provides an annotated review (including the results of an extensive literature review) of the current state of the art of cryogenic tank materials, structural designs, and insulation systems along with the identification of key challenges with the intent of developing a lightweight and long-term storage system for LH2. The broad classes of insulation systems reviewed include foams (including advanced aerogels) and multilayer insulation (MLI) systems with vacuum. The MLI systems show promise for long-term applications. Structural configurations evaluated include single- and double-wall constructions, including sandwich construction. Potential wall material candidates are monolithic metals as well as polymer matrix composites and discontinuously reinforced metal matrix composites. For short-duration flight applications, simple tank designs may suffice. Alternatively, for longer duration flight applications, a double-wall construction with a vacuum-based insulation system appears to be the most optimum design. The current trends in liner material development are reviewed in the case that a liner is required to minimize or eliminate the loss of hydrogen fuel through permeation.

Author

Liquid Hydrogen; Cryogenics; Storage Tanks; Multilayer Insulation; Aerogels; Polymer Matrix Composites; Sandwich Structures; Structural Design

20060056247 NASA Glenn Research Center, Cleveland, OH, USA

Evaluation of an Outer Loop Retrofit Architecture for Intelligent Turbofan Engine Thrust Control

Litt, Jonathan S.; Sowers, T. Shane; October 2006; 34 pp.; In English; 42nd Joint Propulsion Conference and Exhibit, 9-12 Jul. 2006, Sacramento, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 581.02.01.03.03

Report No.(s): NASA/TM-2006-214460; E-15724; ARL-TR-3880; AIAA Paper 2006-5103; Copyright; Avail.: CASI: A03, Hardcopy

The thrust control capability of a retrofit architecture for intelligent turbofan engine control and diagnostics is evaluated. The focus of the study is on the portion of the hierarchical architecture that performs thrust estimation and outer loop thrust control. The inner loop controls fan speed so the outer loop automatically adjusts the engine's fan speed command to maintain thrust at the desired level, based on pilot input, even as the engine deteriorates with use. The thrust estimation accuracy is assessed under nominal and deteriorated conditions at multiple operating points, and the closed loop thrust control performance is studied, all in a complex real-time nonlinear turbofan engine simulation test bed. The estimation capability, thrust response, and robustness to uncertainty in the form of engine degradation are evaluated.
Author
Thrust Control; Turbofan Engines; Retrofitting; Artificial Intelligence; Engine Tests

20060056313 NASA Glenn Research Center, Cleveland, OH, USA
Rate-Based Model Predictive Control of Turbofan Engine Clearance
DeCastro, Jonathan A.; November 2006; 21 pp.; In English; 42nd AIAA Joint Propulsion Conference and Exhibit, 9-12 Jul. 2006, Sacramento, CA, USA
Contract(s)/Grant(s): NAS3-00145
Report No.(s): NASA/CR-2006-214419; E-15692; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056313;
Avail.: CASI: A03, Hardcopy

An innovative model predictive control strategy is developed for control of nonlinear aircraft propulsion systems and sub-systems. At the heart of the controller is a rate-based linear parameter-varying model that propagates the state derivatives across the prediction horizon, extending prediction fidelity to transient regimes where conventional models begin to lose validity. The new control law is applied to a demanding active clearance control application, where the objectives are to tightly regulate blade tip clearances and also anticipate and avoid detrimental blade-shroud rub occurrences by optimally maintaining a predefined minimum clearance. Simulation results verify that the rate-based controller is capable of satisfying the objectives during realistic flight scenarios where both a conventional Jacobian-based model predictive control law and an unconstrained linear-quadratic optimal controller are incapable of doing so. The controller is evaluated using a variety of different actuators, illustrating the efficacy and versatility of the control approach. It is concluded that the new strategy has promise for this and other nonlinear aerospace applications that place high importance on the attainment of control objectives during transient regimes.
Author
Active Control; Aircraft Control; Linear Parameter-Varying Control; Blade Tips; Clearances; Controllers; Actuators; Control Theory

20060056339 Armstrong Teasdale, LLP, Saint Louis, MO, USA
Methods and Apparatus to Reduce Turbine Engine Nozzle Basesheet Stresses
Senile, D. G.; Burkeper, C. M.; Renggli, B. J.; Amneus, J. S.; 29 Oct 03; 7 pp.; In English
Contract(s)/Grant(s): F336957-99-D-2050
Patent Info.: Filed Filed 29 Oct 03; US-Patent-Appl-SN-10-696 319
Report No.(s): PB2007-100800; No Copyright; Avail.: CASI: A02, Hardcopy

This invention relates generally to gas turbine engine exhaust nozzles and more particularly, to methods and apparatus for reducing turbine engine exhaust nozzle basesheet stresses.
NTIS
Turbine Engines; Nozzle Design

08
AIRCRAFT STABILITY AND CONTROL

Includes flight dynamics, aircraft handling qualities, piloting, flight controls, and autopilots. For related information see also 05 Aircraft Design, Testing and Performance; and 06 Avionics and Aircraft Instrumentation.

20060056401 NASA Langley Research Center, Hampton, VA, USA
Gain-Scheduled Fault Tolerance Control Under False Identification
Shin, Jong-Yeob; Belcastro, Christine, Technical Monitor; October 2006; 25 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): NCC1-02043

Report No.(s): NASA/CR-2006-213925; NIA-Report-2005-07; No Copyright; ONLINE:
http://hdl.handle.net/2060/20060056401; Avail.: CASI: A03, Hardcopy

An active fault tolerant control (FTC) law is generally sensitive to false identification since the control gain is reconfigured for fault occurrence. In the conventional FTC law design procedure, dynamic variations due to false identification are not considered. In this paper, an FTC synthesis method is developed in order to consider possible variations of closed-loop dynamics under false identification into the control design procedure. An active FTC synthesis problem is formulated into an LMI optimization problem to minimize the upper bound of the induced-L2 norm which can represent the worst-case performance degradation due to false identification. The developed synthesis method is applied for control of the longitudinal motions of FASER (Free-flying Airplane for Subscale Experimental Research). The designed FTC law of the airplane is simulated for pitch angle command tracking under a false identification case.

Author

Active Control; Fault Tolerance; Feedback Control; Linear Parameter-Varying Control; Longitudinal Control; Control Systems Design; Flight Control

12
ASTRONAUTICS (GENERAL)

Includes general research topics related to space flight and manned and unmanned space vehicles, platforms or objects launched into, or assembled in, outer space; and related components and equipment. Also includes manufacturing and maintenance of such vehicles or platforms. For specific topics in astronautics see *categories 13 through 20*. For extraterrestrial exploration see *91 Lunar and Planetary Science and Exploration*.

20060055593 Naval Postgraduate School, Monterey, CA USA

Low-Power Fault Tolerance for Spacecraft FPGA-Based Numerical Computing

Snodgrass, Joshua D; Sep 2006; 247 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457214; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Fault tolerance is explored for spacecraft computers employing Field-Programmable Gate Arrays (FPGAs). Techniques are investigated for tolerating Single Event Upsets (SEUs) caused by radiation in the space environment. A new architectural approach is proposed for achieving SEU tolerance that minimizes power and size overhead costs by reducing the precision with which error checking is done. This Reduced Precision Redundancy (RPR) approach is compared to the traditional Triple Modular Redundancy (TMR) method. A methodology is presented for quantifying the costs and benefits of various performance factors, and thereby determining optimal design solutions. This methodology considers reliability as a performance factor that can be traded-off against factors such as power, size and speed. An SEU simulation system is developed for studying the effect of SEUs on actual FPGA circuits. Live proton radiation testing and computer-controlled fault injection simulations demonstrate the effectiveness of RPR and TMR. Computer simulations of power usage demonstrate the savings achieved with RPR. RPR is as reliable as TMR while requiring 1/3 to 1/2 as much power. The effect of imprecise computations that may be produced by an RPR system is studied. An image processing application illustrates the type of problems for which RPR can be applied effectively.

DTIC

Computer Programming; Fault Tolerance; Field-Programmable Gate Arrays

20060055649 Library of Congress, Washington, DC USA

China's Space Program: An Overview

Smith, Marcia S; Oct 18, 2005; 7 pp.; In English

Report No.(s): AD-A457317; CRS-RS21641; No Copyright; Avail.: CASI: A02, Hardcopy

The People's Republic of China successfully completed its second human space flight mission on October 17, 2005. China is only the third country, after Russia and the USA, able to launch people into space. Its first human space flight was in 2003 when a single astronaut, or 'taikonaut,' made a flight lasting slightly less than a day. The 2005 flight lasted 5 days, and involved two taikonauts. As the USA embarks upon President Bush's 'Vision for Space Exploration' to return astronauts to the Moon by 2020 and someday send them to Mars, some may view China's entrance into the human exploration of space as a competitive threat, while others may view China as a potential partner. This report will be updated as warranted.

DTIC

Artificial Satellites; China; Chinese Space Program; Commerce; Manned Spacecraft; Military Technology; Space Exploration; Space Missions

20060055679 Advanced Thermal and Environmental Concepts, Inc., College Park, MD USA
A Novel Method for Measurement of Total Hemispherical Emissivity
Moghaddam, Saeed; Lawler, John; Currano, Joseph; Kim, Jungho; Jun 2006; 15 pp.; In English
Contract(s)/Grant(s): FA8650-05-C-5045; Proj-3005
Report No.(s): AD-A457389; No Copyright; Avail.: CASI: A03, Hardcopy

This report was developed under a SBIR contract. This paper describes a heat flux-based method for measuring emissivity of a surface. In this method the emissivity of a surface is calculated using direct measurement of the heat flux passing through the surface. Unlike storage-based calorimetric methods, this method does not require application of known amounts of heat to the surface or the temperature history of a known amount of thermal mass to calculate the surface emissivity. Application and operation of this method is much simpler than calorimetric methods as it does not require careful thermal insulation of the heat radiating body from the surroundings. This technique allows emissivity measurements of the newly developed variable emissivity surfaces with significantly lighter and energy efficient measurement equipment that can operate for long term space missions. In this study, a commercially available thermopile heat flux sensor was used to measure the emissivity of a black paint and a variable emissivity surface, Electrostatic Switched Radiator (ESR). This paper details the concept, experimental setup, and the experiment results.
DTIC
Emissivity; Heat Flux; Hemispherical Shells; Measurement

20060055833 Atmospheric and Environmental Research, Inc., Lexington, MA USA
Aspects of Spacecraft Charging in Sunlight
Lai, Shu T; Tautz, Maurice F; Oct 2006; 10 pp.; In English
Contract(s)/Grant(s): F19628-00-C-0089; Proj-5021
Report No.(s): AD-A457648; No Copyright; Avail.: CASI: A02, Hardcopy

This paper is an overview of spacecraft charging in sunlight. The daylight photoelectron flux emitted from spacecraft surfaces normally exceeds the ambient electron flux. As a result, charging of spacecraft surfaces to positive voltage is expected to occur in sunlight. Indeed, spacecraft are often observed to charge to low positive voltages in sunlight. However, spacecraft can charge to high-level (kilo-electron-volts) negative voltages in sunlight. Why do spacecraft charge negatively in sunlight? One chief reason concerns differential charging between the sunlit and dark sides. For a satellite with dielectric surfaces, an electric field builds up on the shaded surfaces and then wraps around to the sunlit side to form a potential barrier that suppresses the photoemission. A monopole-dipole (for zero spin) or monopole-quadrupole model (for fast spin) describes the differential charging potential distribution due to blocked photoelectrons. It is shown that these cases are similar to a more general multipole potential field in that the surface node potentials satisfy an approximate linear relation. These cases are all driven by the shade side charging so that the onset for charging is approximately the same in sunlight or eclipse if conduction currents through the spacecraft can be neglected.
DTIC
Spacecraft Charging; Sunlight

20060055834 Atmospheric and Environmental Research, Inc., Lexington, MA USA
Analytic Models for a Spherical Satellite Charging in Sunlight at any Spin Rate
Tautz, Maurice F; Lai, Shu T; Oct 2006; 13 pp.; In English
Contract(s)/Grant(s): F19628-00-C-0089; Proj-5021
Report No.(s): AD-A457649; No Copyright; Avail.: CASI: A03, Hardcopy

We present analytic models for the steady state potential distributions surrounding a spinning, dielectric-coated, spherical spacecraft charging in sunlight. The sun direction is assumed to lie in the satellite bellyband plane, perpendicular to the spin axes. The models are based on a multipole expansion of Laplacian potentials external to the spacecraft surface. The combination of monopole potentials along with the dipole or quadrupole contributions produce potential barriers which form at the satellite surface. These barriers can block escaping photoelectrons and lead to current balance, allowing sunlight charging to high negative levels. In a previous treatment, analytic models were limited to fast spin relative to differential charging rates so that the solutions had azimuthal symmetry around the spin axes. By introducing an associated Legendre term into the potential expansion, the azimuthal symmetry is removed, and the models can be developed to encompass any spin rate. The analysis turns up three functions of spin rate which are only known at the spin limits, but the characteristics of the charging of a rotating sphere can be explored using approximate forms which represent the basic trends.
DTIC
Mathematical Models; Spacecraft Charging; Sunlight

20060056307 Knolls Atomic Power Lab., Schenectady, NY, USA
Haynes 230 Mini-Can Welding to Support Planned Irradiation Testing of Candidate Space Fuel Materials
Jordan, C.; D'Amore, L.; Johnson, N.; Knorr, D.; Jan. 17, 2006; 128 pp.; In English
Report No.(s): DE2006-883655; No Copyright; Avail.: Department of Energy Information Bridge
No abstract available
Dioxides; Reactor Materials; Space Power Reactors; Spacecraft Construction Materials; Uranium

20060056418 Wyle Labs., Inc., Houston, TX, USA
Moving from Bilateral to Multilateral Medical Operations
Roden, S.; Polk, J. D.; Janney, R. P.; Volpe, M. A.; [2006]; 1 pp.; In English; Aerospace Medicine Association Annual Conference, 6-10 May 2006, New Orleans, LA, USA
Contract(s)/Grant(s): NAS9-02078; No Copyright; Avail.: Other Sources; Abstract Only
When the ISS Integrated Medical Group moved to a multilateral configuration for the ASTROLAB mission, several challenges were encountered and overcome that allowed for a streamlined operational experience. Dating back to the early 1990s, the European Space Agency (ESA) has sent flight surgeon and Biomedical Engineering (BME) personnel to NASA-JSC and Russia to train for space flight operational support. This training was tailored towards the needs of particular Shuttle/Soyuz missions, and more generally for eventual ISS support. With the announcement of the ASTROLAB mission, NASA and ESA personnel worked together to develop a detailed training template for ESA BMEs to ensure successful support of the mission from the European Astronaut Center (EAC). This training included the deployment of ESA BMEs to JSC, as well as the development of a rotation of ISS-certified NASA BMEs to the EAC. In addition to training, NASA, ESA, and the Russian Federal Space Agency (FSA) worked together preflight to develop multilateral flight control support concepts and implementation plans. This resulted in flight control support schedules, operational rules of engagement, and the delineation of responsibilities. NASA also assisted ESA with the development and deployment of workstation displays to allow the ESA medical flight control team to monitor ISS telemetry from the EAC. The goal of this presentation is to provide details of the preflight preparation and in-flight support of the ASTROLAB mission by the ESA, NASA, and FSA medical support teams. In addition, it will identify lessons learned that will be implemented for future multilateral endeavors.
Author
International Space Station; Mission Planning; International Cooperation; Space Flight Training; Bioengineering

14
GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and test chambers and simulators. Also includes extraterrestrial bases and supporting equipment. For related information see also *09 Research and Support Facilities (Air)*.

20060055756 Air Force Flight Test Center, Edwards AFB, CA USA
Limited Evaluation of an 802.11b Air-to-Ground Wireless Datalink (Project 'HAVE HALO'
Dooley, Michael J; Spinelli, Chris J; Durham, Laura M; Schwartz, George N; Welker, Troy C; Jun 2006; 69 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457521; AFFTC-TIM-06-03; No Copyright; Avail.: CASI: A04, Hardcopy
This report presents the results of the limited evaluation of an 802.11b wireless air-to-ground datalink between a ground station and a C-12C aircraft. Testing occurred between 10 April and 2 May 2006. This test program demonstrated the 802.11b wireless datalink reception range when transmitting at 4 Watts effective isotropic radiated power. The test team also demonstrated the utility of high resolution imagery and streaming video transmitted across the datalink. The test team identified deficiencies in operating system employment during high resolution imagery and streaming video transmissions.
DTIC
Data Links; Flight Tests; Ground Stations; Wireless Communication

15
LAUNCH VEHICLES AND LAUNCH OPERATIONS

Includes all classes of launch vehicles, launch/space vehicle systems, and boosters; and launch operations. For related information see also *18 Spacecraft Design, Testing and Performance*; and *20 Spacecraft Propulsion and Power*.

20060055387 NASA Langley Research Center, Hampton, VA, USA
Simulation and Analyses of Multi-Body Separation in Launch Vehicle Staging Environment
Pamadi, Bandu N.; Hotchko, Nathaniel J.; Samareh, Jamshid; Covell, Peter F.; Tartabini, Paul V.; [January 2006]; 40 pp.; In English; Quality Research Development and Consulting, Inc., 6-9 Nov. 2006, Canberra, Australia; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 905.02.04.04.01
Report No.(s): AIAA Paper 2006-8033; No Copyright; ONLINE: http://hdl.handle.net/2060/20060055387; Avail.: CASI: A03, Hardcopy

The development of methodologies, techniques, and tools for analysis and simulation of multi-body separation is critically needed for successful design and operation of next generation launch vehicles. As a part of this activity, ConSep simulation tool is being developed. ConSep is a generic MATLAB-based front-and-back-end to the commercially available ADAMS. solver, an industry standard package for solving multi-body dynamic problems. This paper discusses the 3-body separation capability in ConSep and its application to the separation of the Shuttle Solid Rocket Boosters (SRBs) from the External Tank (ET) and the Orbiter. The results are compared with STS-1 flight data.
Author
Launch Vehicles; Space Shuttle Boosters; Simulation; External Tanks

20060055536 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
A Discrete-Event Simulation Model for Evaluating Air Force Reusable Military Launch Vehicle Post-Landing Operations
Martindale, Michael; Jun 2006; 84 pp.; In English
Report No.(s): AD-A457121; AFIT/ENS/06/09; No Copyright; Avail.: CASI: A05, Hardcopy

The purpose of this research was to develop a discrete-event computer simulation model of the post-landing vehicle recoveoperations to allow the Air Force Research Laboratory, Air Vehicles Directorate to evaluate design and process decisions and their impact on RMLV regeneration time in the early phases of the acquisition process. The model is based primarily on the post-landing vehicle recovery process for the only reusable space vehicle in the world, the Space Shuttle Orbiter. However, it does contain some elements from the aircraft recovery process for the F-16 fighter aircraft.
DTIC
Mathematical Models; Reusable Launch Vehicles; Simulation

20060055573 Naval Postgraduate School, Monterey, CA USA
A Study on Improving USA Air Force Space Systems Engineering and Acquisition
Stahr, Jeremiah B; Sep 2006; 107 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457177; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Systems engineering is a vital element of systems acquisition, and yet, as a result of previous Department of Defense (DoD) and USA Air Force (USAF) policies and practices, many government systems engineers today lack the systems engineering/management skills required to successfully execute national security space programs. The purpose of this thesis is to study and understand common issues that have impacted the ability of the USAF to cost-effectively acquire satellite systems. The research performed here involves an analysis of the differences between traditional DoD systems acquisition and the national security space systems acquisition processes and an investigation of previous national efforts to improve these processes. The analysis results, together with the findings from a review of successful and struggling space programs, are then used to discover trends that aid in the formulation of the recommendations in this thesis. Specifically, to improve USAF systems engineering management skills and thereby improve the national security space systems acquisition process, the role of the government systems engineer should be defined as one of risk management, and the government systems engineers should be trained, equipped, and tracked so as to efficiently perform systems engineering in support of the space systems acquisition process. Finally, the research findings will provide a foundation for future researchers to expand upon the

recommendations and make steady progress toward improving DoD and USAF space systems engineering expertise.
DTIC
Aerospace Engineering; Aerospace Systems; Artificial Satellites; Procurement; Project Management; Systems Engineering; United States

20060055662 Naval Postgraduate School, Monterey, CA USA
Thermo-mechanical Analysis of Ground-based Directed Energy Weapons on Satellites and Intercontinental Ballistic Missiles
Mantzouris, Georgios; Sep 2006; 122 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457351; No Copyright; Avail.: CASI: A06, Hardcopy

Thermo mechanical modeling and simulation of a satellite and intercontinental ballistic missile assumes importance due to the increased interest in assessing the potential of such attacks. Effective and innovative methods are sought in assessing the structural integrity of such structural components. In this study, we present modeling and simulation aspects of two generic models loaded by high energy laser beam. We present an application of MSC software in modeling thermo-mechanical behavior, both steady state and transient behavior of satellite and missile structures. Thermal energies used for simulation correspond to high energy laser flux available at low earth orbits as reported in literature. A brief review of the concepts involved is outlined. The analysis is performed under several scenarios that include thermal failures due to steady state as well as transient thermal exposures. The thermal exposure times and locations are varied to assess typical failure modes of the structure. Analysis is done in order to define suitable material thicknesses that will make a satellite or a ballistic missile hardened enough to withstand these specific amounts of energy. Other parameters of interest pertaining to this study are the pulse width, and resulting transient phenomena affecting the behavior. Temperature gradients as well as resulting thermal stresses and thermal deformations are reported in this study.
DTIC
Artificial Satellites; Intercontinental Ballistic Missiles; Laser Beams; Radiation Effects; Thermal Analysis; Thermodynamics; Weapon Systems

20060055707 Naval Observatory, Washington, DC USA
On Optimizing the Configuration of Time-Transfer Links Used to Generate TAI
Matsakis, D; Arias, F; Bauch, A; Davis, J; Gotoh, T; Hosokawa, M; Piester, D; Jan 2006; 8 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457433; No Copyright; Avail.: CASI: A02, Hardcopy

Recent work on the uncertainties of [UTC-UTC(kappa)] has made it possible to quantify the effects of different configurations of the time-transfer links used to generate International Atomic Time (TAI). The optimal topology depends upon the magnitude and character of the time-transfer noise of the relevant systems, the correlations between the time-transfer links, the required degree of robustness, the operational practices and equipment at pivot and crossover sites, and the operational complexity of generating TAI on a routine basis. The authors are members of a study group of the Consultative Committee for Time and Frequency (CCTF) Working Group on TAI that is studying these issues, and this paper will present considerations relevant to the problem.
DTIC
Atoms; Communication Satellites; Optimization

20060056118 Naval Postgraduate School, Monterey, CA USA
Beam Control of Extremely Agile Relaying Laser Source for Bifocal Relay Mirror Spacecraft
Johnson, Scott L; Sep 2006; 109 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457348; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The concept of controlling optical laser beams on spacecraft for acquisition, tracking and pointing purposes is quickly becoming a reality. As a result, fine pointing of laser beams is turn out to be an increasingly important research topic. A unique testbed was constructed in order to study and develop new methods for laser beam control. This testbed, the Moving Target-Source Test Fixture (MTSTF), hosts a laser source, the Extremely Agile Relaying Laser Source (EARLS), which has the capability of automatically acquiring and directing a laser beam onto a satellite simulator while in motion. The purpose of this thesis is to make the EARLS platform operational by developing a tracking control system. The ultimate goal is to point

the laser beam at the satellite simulator's receiving telescope and maintain the laser within the telescope s limits in the presence of structural disturbance induced by the EARLS motion.
DTIC
Artificial Satellites; Laser Outputs; Mirrors; Simulators

16
SPACE TRANSPORTATION AND SAFETY

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques. For related information see also *03 Air Transportation and Safety; 15 Launch Vehicles and Launch Operations*; and *18 Spacecraft Design, Testing and Performance*. For space suits see *54 Man/System Technology and Life Support*.

20060055234 NASA Johnson Space Center, Houston, TX, USA
The Logistic Path from the International Space Station to the Moon and Beyond
Watson, J. K.; Dempsey, C. A.; Butina, A. J., Sr.; Logistics Spectrum: The International Society of Logistics; October 2005; 7 pp.; In English; Original contains black and white illustrations; No Copyright; ONLINE:
http://hdl.handle.net/2060/20060055234; Avail.: CASI: A02, Hardcopy

The period from the loss of the Space Shuttle Columbia in February 2003 to resumption of Space Shuttle flights, planned for May 2005, has presented significant challenges to International Space Station (ISS) maintenance operations. Sharply curtailed upmass capability has forced NASA to revise its support strategy and to undertake maintenance activities that have significantly expanded the envelope of the ISS maintenance concept. This experience has enhanced confidence in the ability to continue to support ISS in the period following the permanent retirement of the Space Shuttle fleet in 2010. Even greater challenges face NASA with the implementation of the Vision for Space Exploration that will introduce extended missions to the Moon beginning in the period of 2015 - 2020 and ultimately see human missions to more distant destinations such as Mars. The experience and capabilities acquired through meeting the maintenance challenges of ISS will serve as the foundation for the maintenance strategy that will be employed in support of these future missions.
Derived from text
International Space Station; Moon; Logistics; Spacecraft Maintenance

20060055384 NASA Johnson Space Center, Houston, TX, USA
ISS Commercial Cargo Service: Requirements and Constraints Summary
Thorn, Valin; Lemmons, Neil; Scheutz, Matt; April 25, 2005; 28 pp.; In English; ISS Commercial Cargo Service: NASA Industry Day, 25 Apr. 2005, Houston, TX, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

A viewgraph presentation describing the fundamental requirements and constraints necessary to begin the acquisition of an International Space Station commercial cargo service is presented. The topics include: 1) Background; 2) Philosophy; 3) Cargo Balance; 4) Cargo Types; 5) ICCS Flight Rate; 6) Late and Early Access; 7) Power to Payloads; 8) Mating Locatin Options; 9) ISS Docking and Berthing; 10) Vehicle Stay Time; 11) ISS Resource Availability; 12) Robotic and EVA Compatability; 13) Return Cargo; and 14) Key Requirements Summary.
CASI
Cargo; International Space Station; Constraints; Requirements; Commercialization

20060055389 NASA Johnson Space Center, Houston, TX, USA
Public Risk Assessment of Off-Nominal Genesis Entries
Mendeck, Gavin F.; Kadwa, Binaifer; 2006; 1 pp.; In English; Spaceflight Mechanics Conference, 23-27 Jan. 2005, Copper Mountain Resort, CO, USA
Contract(s)/Grant(s): WBS 72.729.22.AA
Report No.(s): AAS 05-224; No Copyright; Avail.: Other Sources; Abstract Only

Public risk estimations were among the preparations for the entry of the Genesis sample return capsule. Personnel at the Johnson Space Center were requested to provide estimates of the public risk of off-nominal entries. These scenarios dealt with an incomplete trajectory maneuver that would result in the capsule landing outside of the controlled Utah Test and Training

Range. Using a conservative approach to the inputs and assumptions, such off-nominal entries were demonstrated to fall within the project risk limits.
Author
Risk; Genesis Mission; Sample Return Missions; Atmospheric Entry

20060056115 NASA Johnson Space Center, Houston, TX, USA
Orbiter Repair Maneuver Contingency Separation Methods and Analysis
Machula, Michael; [2005]; 1 pp.; In English; AIAA Guidance. Navigation. and Control Conference and Exhibit, 15-18 Aug. 2005, San Francisco, CA, USA; No Copyright; Avail.: Other Sources; Abstract Only

Repairing damaged thermal protection system tile requires the Space Shuttle to be oriented such that repair platform access from the International Space Station (ISS) is possible. To do this, the Space Shuttle uses the Orbiter Repair Maneuver (ORM), which utilizes the Shuttle Remote Manipulator System (SRMS) to rotate the Space Shuttle in relation to the ISS, for extended periods of time. These positions cause difficulties and challenges to performing a safe separation (no collision or thruster plume damage to sensitive ISS structures) should an inadvertent release occur or a contingency procedure require it. To help protect for an SRMS failure or other failures, a method for separating without collision and the ability to redock to ISS from the ORM configuration was needed. The contingency ORM separation solution elegantly takes advantage of orbital mechanics between ISS and the separating Space Shuttle. By pitching the ISS down approximately 45 degrees, in a majority of the ORM repair positions, the altitude difference between the ISS and Space Shuttle center of gravity is maximized. This altitude difference results in different orbital energies (orbital periods) causing objects to separate from each other without requiring translational firings. Using this method, a safe contingency ORM separation is made possible in many odd positions even though some separation positions point high powered thrusters directly at fragile ISS and Soyuz solar arrays. Documented in this paper are the development simulations and procedures of the contingency ORM separation and the challenges encountered with large constraints to work around. Lastly, a method of returning to redock with the ISS to pick up the stranded crew members (or transfer the final crew members) is explained as well as the thruster and ISS loads analysis.
Author
International Space Station; Damage; Thermal Protection; Tiles; Maintenance; Failure

20060056240 NASA Johnson Space Center, Houston, TX, USA
The Disposal of Spacecraft and Launch Vehicle Stages in Low Earth Orbit
Johnson, Nicholas L.; [2006]; 1 pp.; In English; 2nd International Association for Advancement of Space Safety, 14-16 May 2007, Chicago, IL, USA; No Copyright; Avail.: Other Sources; Abstract Only

As a result of the increasing number of debris in low Earth orbit (LEO), numerous national and international orbital debris mitigation guidelines recommend the removal of spacecraft and launch vehicle stages from LEO within 25 years after mission termination. The primary purpose of this action is to enhance space safety by significantly limiting the potential of future accidental collisions resulting in the creation of large numbers of new orbital debris. Likewise, the passivation of these objects, i.e., the removal of residual stored energies, while they remain in orbit is important to prevent the generation of debris via self-induced explosions. Characteristics and trends in the growth of the derelict spacecraft and launch vehicle stage populations in LEO are examined. Depending upon the final operational altitude of the vehicle, achieving the goal of orbital lifetime reduction can influence the design and deployment philosophy of a new space system. Some spacecraft and launch vehicle stages have combined their end-of-mission passivation operations with maneuvers to vacate long-lived orbital regimes. Perhaps the most dramatic demonstration of this type occurred in 2006 when a U.S. Delta IV second stage executed an unprecedented controlled-reentry maneuver from a circular orbit at an altitude near 850 km. For space systems in orbital regimes near the upper regions of LEO (i.e., between 1400 km and 2000 km altitude), maneuvers to place the vehicle above LEO might be more attractive than attempting to ensure an atmospheric reentry within 25 years, and at least one space system operator has selected this option. In some cases, careful consideration of natural orbital perturbations can also lead to reduced orbital lifetimes, although new launch constraints might need to be imposed.
Author
Space Debris; Launch Vehicles; Low Earth Orbits; Spacecraft Launching; Atmospheric Entry; Collisions; Accidents

20060056285 NASA Johnson Space Center, Houston, TX, USA
Internal Cargo Integration
Hart, Angela; [2006]; 36 pp.; In English; NASA Industry Day, 25 Apr. 2005, Houston, TX, USA; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056285; Avail.: CASI: A03, Hardcopy

A description of internal cargo integration is presented. The topics include: 1) Typical Cargo for Launch/Disposal; 2) Cargo Delivery Requirements; 3) Cargo Return Requirements; and 4) Vehicle On-Orbit Stay Time.
CASI
Cargo; Logistics; International Space Station; Mission Planning; Systems Integration

20060056382 NASA Johnson Space Center, Houston, TX, USA
CFD Simulation of the Space Shuttle Launch Vehicle with Booster Separation Motor and Reaction Control Plumes
Gea, L. M.; Vicker, D.; January 2006; 1 pp.; In English; International Conference on Computational Fluid Dynamics, 12-16 Jul. 2004, Toronto, Canada; Copyright; Avail.: Other Sources; Abstract Only

The primary objective of this paper is to demonstrate the capability of computational fluid dynamics (CFD) to simulate a very complicated flow field encountered during the space shuttle ascent. The flow field features nozzle plumes from booster separation motor (BSM) and reaction control system (RCS) jets with a supersonic incoming cross flow at speed of Mach 4. The overset Navier-Stokes code OVERFLOW, was used to simulate the flow field surrounding the entire space shuttle launch vehicle (SSLV) with high geometric fidelity. The variable gamma option was chosen due to the high temperature nature of nozzle flows and different plume species. CFD predicted Mach contours are in good agreement with the schlieren photos from wind tunnel test. Flow fields are discussed in detail and the results are used to support the debris analysis for the space shuttle Return To Flight (RTF) task.
Author
Flow Distribution; Computational Fluid Dynamics; Ascent; Space Shuttles; Nozzle Flow; Plumes; Booster Rocket Engines; Launch Vehicles; Spacecraft Launching

20060056490 NASA Johnson Space Center, Houston, TX, USA
International Space Station: Introduction and ISS Familiarization
April 25, 2005; 20 pp.; In English; NASA Industry Day, 25 Apr. 2005, Johnson Space Center, Houston, TX, USA; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056490; Avail.: CASI: A03, Hardcopy

This viewgraph presentation provides an overview of the latest complete set of International Space Station (ISS) cargo transportation requirements, and the infrastructure supporting transportation, such as cargo bags, and flight support equipment. The aim of this presentation is also to give industry representatives the requirements for commercial support of the cargo handling operations for the ISS, and give the industry representatives an opportunity to exchange ideas.
CASI
Cargo; International Space Station; Materials Handling; Commercialization

20060056491 NASA Johnson Space Center, Houston, TX, USA
ISS Payloads Office Utilization/Research Cargo Familiarization
Horkachuck, Mike; April 2005; 28 pp.; In English; NASA Industry Day, 25 Apr. 2005, Johnson Space Center, Houston, TX, USA; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056491; Avail.: CASI: A03, Hardcopy

This viewgraph presentation reviews NASA's requirements for storage for launch to and return from the International Space Station. Particular emphasis is on cold storage equipment.
CASI
Cargo; Space Shuttle Payloads; Cryogenic Equipment; Refrigerating Machinery

17
SPACE COMMUNICATIONS, SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes space systems telemetry; space communications networks; astronavigation and guidance; and spacecraft radio blackout. For related information see also *04 Aircraft Communications and Navigation*; and *32 Communications and Radar*.

20060054210 NASA Ames Research Center, Moffett Field, CA, USA
A Security Model for Space Based Communication
Stone, Thom; Freeman, Kenneth; Gilstrap, Raymond; [2006]; 22 pp.; In English; Space Internetworking Workshop (SIW-5), 12-14 Sept. 2006, Hanover, Md, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

This viewgraph presentation reviews the security requirements for space based communications and the tools which can be used in the design of space based communications systems.
CASI
Telecommunication; Space Communication; Computer Security; Spacecraft Communication; Protocol (Computers); Data Transmission

20060055232 NASA Johnson Space Center, Houston, TX, USA
Space Shuttle Underside Astronaut Communications Performance Evaluation
Hwu, Shian U.; Dobbins, Justin A.; Loh, Yin-Chung; Kroll, Quin D.; Sham, Catherine C.; [2005]; 7 pp.; In English; 2005 IEEE International Conference on Networking, Sensing, and Control, 19-22 Mar. 2005, Tucson, AZ, USA; Original contains black and white illustrations
Contract(s)/Grant(s): NAS9-19100; Copyright; Avail.: CASI: A02, Hardcopy

The Space Shuttle Ultra High Frequency (UHF) communications system is planned to provide Radio Frequency (RF) coverage for astronauts working underside of the Space Shuttle Orbiter (SSO) for thermal tile inspection and repairing. This study is to assess the Space Shuttle UHF communication performance for astronauts in the shadow region without line-of-sight (LOS) to the Space Shuttle and Space Station UHF antennas. To insure the RF coverage performance at anticipated astronaut worksites, the link margin between the UHF antennas and Extravehicular Activity (EVA) Astronauts with significant vehicle structure blockage was analyzed. A series of near-field measurements were performed using the NASA/JSC Anechoic Chamber Antenna test facilities. Computational investigations were also performed using the electromagnetic modeling techniques. The computer simulation tool based on the Geometrical Theory of Diffraction (GTD) was used to compute the signal strengths. The signal strength was obtained by computing the reflected and diffracted fields along the propagation paths between the transmitting and receiving antennas. Based on the results obtained in this study, RF coverage for UHF communication links was determined for the anticipated astronaut worksite in the shadow region underneath the Space Shuttle.
Author
Ultrahigh Frequencies; Space Shuttles; Communication Networks; Radio Frequencies; Performance Tests; Line of Sight; Extravehicular Activity; Near Fields; Computerized Simulation

20060056116 NASA Johnson Space Center, Houston, TX, USA
Entry Abort Determination using Non-adaptive Neural Networks for Mars Precision Landers
Graybeal, Sarah R.; Kranzusch, Kara M.; [2005]; 1 pp.; In English; 2005 AIAA Guidance, Navigation and Controls Conference, 15-18 Aug. 2005, San Francisco, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

The 2009 Mars Science Laboratory (MSL) will attempt the first precision landing on Mars using a modified version of the Apollo Earth entry guidance program. The guidance routine, Entry Terminal Point Controller (ETPC), commands the deployment of a supersonic parachute after converging the range to the landing target. For very dispersed cases, ETPC may not converge the range to the target and safely command parachute deployment within Mach number and dynamic pressure constraints. A full-lift up abort can save 85% of these failed trajectories while abandoning the precision landing objective. Though current MSL requirements do not call for an abort capability, an autonomous abort capability may be desired, for this mission or future Mars precision landers, to make the vehicle more robust. The application of artificial neural networks (NNs) as an abort determination technique was evaluated by personnel at the National Aeronautics and Space Administration (NASA) Johnson Space Center (JSC). In order to implement an abort, a failed trajectory needs to be recognized in real time. Abort determination is dependent upon several trajectory parameters whose relationships to vehicle survival are not well understood, and yet the lander must be trained to recognize unsafe situations. Artificial neural networks (NNs) provide a way to model these parameters and can provide MSL with the artificial intelligence necessary to independently declare an abort. Using the 2009 Mars Science Laboratory (MSL) mission as a case study, a non-adaptive NN was designed, trained and tested using Monte Carlo simulations of MSL descent and incorporated into ETPC. Neural network theory, the development history of the MSL NN, and initial testing with severe dust storm entry trajectory cases are discussed in Reference 1 and will not be repeated here. That analysis demonstrated that NNs are capable of recognizing failed descent trajectories and can significantly increase the survivability of MSL for very dispersed cases. NN testing was then broadened to evaluate fully dispersed entry trajectories. The NN correctly classified 99.7% of descent trajectories as abort or nonabort and reduced the probability of an unsafe parachute deployment by 83%. This second, broader testing phase is discussed in this paper.
Author
Abort Trajectories; Descent Trajectories; Atmospheric Entry; Controllers; Mach Number; Neural Nets; Mars Landing

18
SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and spacecraft control and stability characteristics. For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance; 39 Structural Mechanics*; and *16 Space Transportation and Safety*.

20060056070 NASA Langley Research Center, Hampton, VA, USA

Mars Aerocapture Systems Study

Wright, Henry S.; Oh, David Y.; Westhelle, Carlos H.; Fisher, Jody L.; Dyke, R. Eric; Edquist, Karl T.; Brown, James L.; Justh, Hilary L.; Munk, Michelle M.; November 2006; 87 pp.; In English; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS 620.02.01.04.07.01

Report No.(s): NASA/TM-2006-214522; L-19290; Copyright; Avail.: CASI: A05, Hardcopy

Mars Aerocapture Systems Study (MASS) is a detailed study of the application of aerocapture to a large Mars robotic orbiter to assess and identify key technology gaps. This study addressed use of an Opposition class return segment for use in the Mars Sample Return architecture. Study addressed mission architecture issues as well as system design. Key trade studies focused on design of aerocapture aeroshell, spacecraft design and packaging, guidance, navigation and control with simulation, computational fluid dynamics, and thermal protection system sizing. Detailed master equipment lists are included as well as a cursory cost assessment.

Author

Aerocapture; Mars Atmosphere; Mars Sample Return Missions; Thermal Protection; Aeroshells; Computational Fluid Dynamics

20060056201 NASA Johnson Space Center, Houston, TX, USA

Parachute Testing for the NASA X-38 Crew Return Vehicle

Stein, Jenny M.; [2005]; 25 pp.; In English; 36th Annual International Symposium, 3-6 Oct. 2005, Fort Worth, TX, USA; Original contains color illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056201; Avail.: CASI: A03, Hardcopy

NASA's X-38 program was an in-house technology demonstration program to develop a Crew Return Vehicle (CRV) for the International Space Station capable of returning seven crewmembers to Earth when the Space Shuttle was not present at the station. The program, managed out of NASA's Johnson Space Center, was started in 1995 and was cancelled in 2003. Eight flights with a prototype atmospheric vehicle were successfully flown at Edwards Air Force Base, demonstrating the feasibility of a parachute landing system for spacecraft. The intensive testing conducted by the program included testing of large ram-air parafoils. The flight test techniques, instrumentation, and simulation models developed during the parachute test program culminated in the successful demonstration of a guided parafoil system to land a 25,000 Ib spacecraft. The test program utilized parafoils of sizes ranging from 750 to 7500 p. The guidance, navigation, and control system (GN&C) consisted of winches, laser or radar altimeter, global positioning system (GPS), magnetic compass, barometric altimeter, flight computer, and modems for uplink commands and downlink data. The winches were used to steer the parafoil and to perform the dynamic flare maneuver for a soft landing. The laser or radar altimeter was used to initiate the flare. In the event of a GPS failure, the software navigated by dead reckoning using the compass and barometric altimeter data. The GN&C test beds included platforms dropped from cargo aircraft, atmospheric vehicles released from a 8-52, and a Buckeye powered parachute. This paper will describe the test program and significant results.

Author

X-38 Crew Return Vehicle; NASA Space Programs; Parachutes; International Space Station; Flight Tests

20060056318 NASA Glenn Research Center, Cleveland, OH, USA

Experimental Results of Thin-Film Photovoltaic Cells in a Low Density LEO Plasma Environment: Ground Tests

Galofaro, Joel T.; Vayner, Boris V.; November 2006; 22 pp.; In English; Fourth World Conference on Photovoltaic Energy Conversion, 7-12 May 2006, Wakikoloa, HI, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 22R-612-50-81-0414-01

Report No.(s): NASA/TM-2006-214430; E-15707; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056318; Avail.: CASI: A03, Hardcopy

Plasma ground testing results, conducted at the Glenn Research Center (GRC) National Plasma Interaction (N-PI) Facility, are presented for a number of thin-film photovoltaic cells. The cells represent a mix of promising new technologies

identified by the Air Force Research Laboratory (AFRL) under the CYGNUS Space Science Technology Experiment (SSTE-4) Program. The current ground tests are aimed at characterizing the performance and survivability of thin film technologies in the harsh low earth orbital space environment where they will be flown. Measurements of parasitic current loss, charging/dielectric breakdown of cover-slide coatings and arcing threshold tests are performed for each individual cell. These measurements are followed by a series of experiments designed to test for catastrophic arc failure mechanisms. A special type of power supply, called a solar array simulator (SAS) with adjustable voltage and current limits on the supply s output, is employed to bias two adjacent cells at a predetermined voltage and current. The bias voltage is incrementally ramped up until a sustained arc results. Sustained arcs are precursors to catastrophic arc failure where the arc current rises to a maximum value for long timescales often ranging between 30 to 100 sec times. Normal arcs by comparison, are short lived events with a timescale between 10 to 30 sec. Sustained arcs lead to pyrolization with extreme cell damage and have been shown to cause the loss of entire array strings in solar arrays. The collected data will be used to evaluate the suitability of thin-film photovoltaic technologies for future space operations.
Author
Plasmas (Physics); Ground Tests; Low Earth Orbits; Thin Films; Space Technology Experiments; Solar Arrays; Research and Development; Photovoltaic Cells

20060056410 NASA, Washington, DC, USA
Reference Guide to the International Space Station
Kitmacher, Gary H.; 2006; 110 pp.; In English; Original contains color illustrations
Report No.(s): NASA/SP-2006-557; NP-2006-06-436-HQ; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056410; Avail.: CASI: A06, Hardcopy

The International Space Station (ISS) is a great international, technological, and political achievement. It is the latest step in humankind s quest to explore and live in space. The research done on the ISS may advance our knowledge in various areas of science, enable us to improve life on this planet, and give us the experience and increased understanding that can eventually equip us to journey to other worlds. As a result of the Station s complexity, few understand its configuration, its design and component systems, or the complex operations required in its construction and operation. This book provides high-level insight into the ISS. The ISS is in orbit today, operating with a crew of three. Its assembly will continue through 2010. As the ISS grows, its capabilities will increase, thus requiring a larger crew. Currently, 16 countries are involved in this venture.
CASI
International Space Station; Space Station Modules; Spacecraft Components; Space Station Structures

20
SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources. For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 15 Launch Vehicles and Launch Operations*, and *44 Energy Production and Conversion*.

20060056175 Naval Postgraduate School, Monterey, CA USA
Reactive Shear Layer Mixing and Growth Rate Effects on Afterburning Properties for Axisymetric Rocket Engine Plumes
Hartsfield, Carl R; Sep 2006; 179 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457201; No Copyright; Avail.: CASI: A09, Hardcopy

A semi-empirical model was developed for predicting the afterburning ignition location of film cooled rocket engines. The model is based on two characteristic distances, the distance required for turbulent mixing to generate a combustible mixture with the reactive film layer and the distance traveled during the ignition delay. The mixing length is affected by the mass flow, composition of the film cooling layer and the fuel-rich air to fuel ratio required to support combustion. The ignition delay is determined by the composition directly through the auto-ignition reaction time. Both distances are affected by the velocity and temperature of the rocket core and air. This model was experimentally verified over a range of co-flow air velocities using a liquid rocket engine of approximately 440 N thrust, varying amounts of reactive film cooling and compositions of film coolant, and a co-axial annular airflow generator producing airflow at velocities up to nearly 200 m/s. Mean ignition locations experimentally observed were between 3.8 and 9.8 centimeters from the nozzle lip and varied due to the airstream velocity,

and film coolant composition and mass flow. All model predictions were within the standard deviation of the experimentally observed ignition points.
DTIC
Afterburning; Exhaust Gases; Plumes; Reactivity; Rocket Engines; Shear Layers

20060056310 NASA Glenn Research Center, Cleveland, OH, USA
Performance and Operational Characteristics for a Dual Brayton Space Power System With Common Gas Inventory
Johnson, Paul K.; Mason, Lee S.; November 2006; 16 pp.; In English; Fourth International Energy Conversion Engineering Conference and Exhibit (IECEC), 26-29 Jun. 2006, San Diego, CA, USA
Contract(s)/Grant(s): WBS 463169.04.03
Report No.(s): NASA/TM-2006-214393; E-15671; AIAA Paper-2006-4167; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056310; Avail.: CASI: A03, Hardcopy

This paper provides an analytical evaluation on the operation and performance of a dual Brayton common gas system. The NASA Glenn Research Center in-house computer program Closed Cycle System Simulation (CCSS) was used to construct a model of two identical 50 kWe-class recuperated closed-Brayton-cycle (CBC) power conversion units that share a common gas inventory and single heat source. As operating conditions for each CBC change, the total gas inventory is redistributed between the two units and overall system performance is affected. Several steady-state off-design operating points were analyzed by varying turbine inlet temperature and turbo-alternator shaft rotational speed to investigate the interaction of the two units.
Author
Closed Cycles; Brayton Cycle; AC Generators; Turbogenerators; Spacecraft Power Supplies; Solar Generators; Heat Sources; Inlet Temperature

20060056311 Analex Corp., Brook Park, OH, USA
A Method for Calculating Viscosity and Thermal Conductivity of a Helium-Xenon Gas Mixture
Johnson, Paul K.; November 18, 2006; 20 pp.; In English
Contract(s)/Grant(s): NAS3-00145; WBS 463169.04.03
Report No.(s): NASA/CR-2006-214394; E-15672; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056311; Avail.: CASI: A03, Hardcopy

A method for calculating viscosity and thermal conductivity of a helium-xenon (He-Xe) gas mixture was employed, and results were compared to AiResearch (part of Honeywell) analytical data. The method of choice was that presented by Hirschfelder with Singh's third-order correction factor applied to thermal conductivity. Values for viscosity and thermal conductivity were calculated over a temperature range of 400 to 1200 K for He-Xe gas mixture molecular weights of 20.183, 39.94, and 83.8 kg/kmol. First-order values for both transport properties were in good agreement with AiResearch analytical data. Third-order-corrected thermal conductivity values were all greater than AiResearch data, but were considered to be a better approximation of thermal conductivity because higher-order effects of mass and temperature were taken into consideration. Viscosity, conductivity, and Prandtl number were then compared to experimental data presented by Taylor.
Author
Gas Mixtures; Helium; Xenon; Thermal Conductivity; Temperature Effects; Gas Viscosity

20060056314 NASA Glenn Research Center, Cleveland, OH, USA
Ion Beam Characterization of a NEXT Multi-Thruster Array Plume
Pencil, Eric J.; Foster, John E.; Patterson, Michael J.; Diaz, Esther M.; Van Noord, Jonathan L.; McEwen, Heather K.; November 2006; 27 pp.; In English; 42nd Joint Propulsion Conference and Exhibit, 9-12 Jul. 2006, Sacramento, CA, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 346620.04.05.03.01
Report No.(s): NASA/TM-2006-214423; E-15700; AIAA Paper-2006-5182; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056314; Avail.: CASI: A03, Hardcopy

Three operational, engineering model, 7-kW ion thrusters and one instrumented, dormant thruster were installed in a cluster array in a large vacuum facility at NASA Glenn Research Center. A series of engineering demonstration tests were performed to evaluate the system performance impacts of operating various multiple-thruster configurations in an array. A suite of diagnostics was installed to investigate multiple-thruster operation impact on thruster performance and life, thermal interactions, and alternative system modes and architectures. The ion beam characterization included measuring ion current

density profiles and ion energy distribution with Faraday probes and retarding potential analyzers, respectively. This report focuses on the ion beam characterization during single thruster operation, multiple thruster operation, various neutralizer configurations, and thruster gimbal articulation. Comparison of beam profiles collected during single and multiple thruster operation demonstrated the utility of superimposing single engine beam profiles to predict multi-thruster beam profiles. High energy ions were detected in the region 45 off the thruster axis, independent of thruster power, number of operating thrusters, and facility background pressure, which indicated that the most probable ion energy was not effected by multiple-thruster operation. There were no significant changes to the beam profiles collected during alternate thruster-neutralizer configurations, therefore supporting the viability of alternative system configuration options. Articulation of one thruster shifted its beam profile, whereas the beam profile of a stationary thruster nearby did not change, indicating there were no beam interactions which was consistent with the behavior of a collisionless beam expansion.
Author
Ion Engines; Electric Propulsion; Systems Engineering; Current Density; Characterization; Beam Interactions; Ion Currents

20060056315 NASA Glenn Research Center, Cleveland, OH, USA
Update on Extended Operation of Stirling Convertors in Thermal Vacuum at NASA Glenn Research Center
Oriti, Salvatore M.; November 2006; 16 pp.; In English; Fourth International Energy Conversion Engineering Conference and Exhibit (IECEC), 26-29 Jun. 2006, San Diego, CA, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 138494.04.01.01
Report No.(s): NASA/TM-2006-214424; E-15701; AIAA Paper-2006-4062; No Copyright; ONLINE:
http://hdl.handle.net/2060/20060056315; Avail.: CASI: A03, Hardcopy

The U.S. Department of Energy (DOE), Lockheed Martin Space Systems (LMSS), Infinia Corporation, and NASA Glenn Research Center (GRC) have been developing a Stirling Radioisotope Generator (SRG) for use as a power system on space science missions. This generator would make use of Stirling cycle energy conversion to achieve higher efficiency than currently used alternatives. A test has been initiated at GRC to demonstrate functionality of Stirling conversion in a thermal vacuum environment over an extended period of time. The test article resembles the configuration of the SRG, but was designed without the requirement of low mass. Throughout the 8700 cumulative hours of operation, modifications to the supporting hardware were required to attain the desired operating conditions. These modifications, the status of testing, and the data recorded will be discussed in this paper.
Author
Stirling Cycle; Thermal Environments; Energy Conversion Efficiency; Aerospace Systems; Energy Conversion

23
CHEMISTRY AND MATERIALS (GENERAL)

Includes general research topics related to the composition, properties, structure, and use of chemical compounds and materials as they relate to aircraft, launch vehicles, and spacecraft. For specific topics in chemistry and materials see *categories 25 through 29*. For astrochemistry see category *90 Astrophysics*.

20060054225 International Trade Commission, Washington, DC USA
Cased Pencils from China. Investigation No. 731-TA-669 (Second Review)
Nov. 2005; 53 pp.; In English
Report No.(s): PB2007-101157; USITC/PUB-3820; No Copyright; Avail.: CASI: A04, Hardcopy

On the basis of the record developed in the subject five-year review, the USA International Trade Commission (Commission) determines, pursuant to section 751(c) of the Tariff Act of 1930 (19 U.S.C. Section 1675(c)) (the Act), that revocation of the antidumping duty order on cased pencils from China would be likely to lead to continuation or recurrence of material injury to an industry in the USA within a reasonably foreseeable time.
NTIS
China; International Trade

20060054236 Department of Energy, Washington, DC USA
Prometheus Hot Leg Piping Concept
Girbik, A. M.; DiLorenzo, P. A.; Jan. 24, 2006; 18 pp.; In English
Report No.(s): DE2006-881289; No Copyright; Avail.: Department of Energy Information Bridge

The Naval Reactors Prime Contractor Team (NRPCT) recommended the development of a gas cooled reactor directly

coupled to a Brayton energy conversion system as the Space Nuclear Power Plant (SNPP) for NASA's Project Prometheus. The section of piping between the reactor outlet and turbine inlet, designated as the hot leg piping, required unique design features to allow the use of a nickel superalloy rather than a refractory metal as the pressure boundary. The NRPCT evaluated a variety of hot leg piping concepts for performance relative to SNPP system parameters, manufacturability, material considerations, and comparison to past high temperature gas reactor (HTGR) practice. Manufacturability challenges and the impact of pressure drop and turbine entrance temperature reduction on cycle efficiency were discriminators between the piping concepts. This paper summarizes the NRPCT hot leg piping evaluation, presents the concept recommended, and summarizes developmental issues for the recommended concept.
NTIS
Nuclear Power Plants; Pipes (Tubes); Prometheus

20060054238 Pacific Northwest National Lab., Richland, WA, USA
Radiation Effects in Nuclear Waste Materials
Weber, W. J.; January 2006; 12 pp.; In English
Report No.(s): DE2006-881101; PNLL-15387; No Copyright; Avail.: Department of Energy Information Bridge

The objective of this project is to develop a fundamental understanding of radiation effects in glasses and ceramics, as well as the influence of solid-state radiation effects on aqueous dissolution kinetics, which may impact the performance of nuclear waste forms and stabilized nuclear materials. This work provides the underpinning science to develop improved glass and ceramic waste forms for the immobilization and disposition of high-level tank waste, excess plutonium, plutonium residues and scrap, other actinides, and other nuclear waste streams. Furthermore, this work is developing develop predictive models for the performance of nuclear waste forms and stabilized nuclear materials. Thus, the research performed under this project has significant implications for the immobilization of High-Level Waste (HLW) and Nuclear Materials, two mission areas within the Office of Environmental Management (EM).
NTIS
Radiation Effects; Radioactive Materials; Radioactive Wastes

20060055448 Army Tank-Automotive and Armaments Command, Warren, MI USA
Automated Thermal Camouflage Generation Program Status
Thomas, David J; Dec 1, 2005; 45 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457097; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457097; Avail.: CASI: A03, Hardcopy

No abstract available
Algorithms; Camouflage; Deception; Paints; Thermodynamic Properties

20060055543 Defence Science and Technology Organisation, Canberra, Australia
The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-2: Areal Coverage Using Friction Surfacing
Lambrineas, Peter; Jewsbury, Peter; Sep 1991; 13 pp.; In English
Report No.(s): AD-A457132; NSRP-0340; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Areal coatings of 304 and 316 marine grade stainless steel were made on flat mild steel substrates using a low-pressure friction surfacing technique and various deposition configurations. The maximum through thickness tensile bond strength obtained for such coatings was 890MPa (1.3 x 105 psi). Gaps and/or cracks between strips of deposited material were not eliminated completely during the manufacture of these coatings. Consequently, the overlay coatings described in this paper which were made using a range of overlapping and nonoverlapping deposition configurations, are primarily suitable for applications in non-corrosive environments.
DTIC
Coatings; Conferences; Friction; Marine Technology; Ships; Stainless Steels

20060055608 Rutgers - The State Univ., New Brunswick, NJ USA
Metal Cation Mediated Hydrolysis of Phosphono-Formate Diesters: Chemoselectivity and Catalysis
Moss, Robert A; Morales-Rojas, Hugo; Viayaraghavan, Saketh; Nov 19, 2003; 18 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457240; No Copyright; Avail.: CASI: A03, Hardcopy

SUMMARY: 1 . Ce4+, Th4+ , Zr4+, and Hf4+ ions accelerate the hydrolysis of phosphonoformate diesters. 2. With identical C-OR and P-OR leaving groups, Zr4+ and Hf4+ direct scission to the P-O ester site, whereas Ce4+ and Th4+ mediate attack at the C-O site. 3 . Leaving group efficiency (PhO \g MeO) can modulate the chemoselectivity. 4 . P-O selectivity is associated with tetrameric or octameric forms of Zr4+ or Hf4+ aqueous complexes . 5. C-O selectivity is associated with dinuclear or mononuclear forms of Ce4+ or Th4+.
DTIC
Catalysis; Cations; Formates; Hydrolysis

20060055719 Auburn Univ., AL USA
Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin
Kou, L; Liang, J; Worley, S D; Lee, J; Broughton, R M; Huang, T S; Aug 2006; 24 pp.; In English
Contract(s)/Grant(s): F08637-02-C-7020; Proj-ARMT
Report No.(s): AD-A457450; No Copyright; Avail.: CASI: A03, Hardcopy

A new N-halamine precursor, 5-methyl-5-aminomethylhydantoin (AH), was synthesized. This N-halamine precursor can be coated onto cotton surfaces with addition of the cross-linking agent butanetetracarboxylic acid (BTCA) and rendered biocidal by exposure to halogen solutions either before or after curing the coating or material. Standard washing tests show that covalently bound AH/BTCA on the cotton swatches can survive repeated washing cycles. After 50 washing cycles, chlorinated cotton swatches had lost 98.7% of oxidative C1+, but after rechlorination, almost 43.5% of C1+ was regained. Biocidal tests indicated that the cotton swatches coated with chlorinated AB/BTCA were effective against Gram positive Staphyloccus aureus and Gram negative Escherichil coli.
DTIC
Antibiotics; Antiinfectives and Antibacterials; Cellulose; Methyl Compounds; Microorganisms; Pesticides

20060056191 Environmental Protection Agency, Washington, DC USA
Estimating 'Concern Levels' for Concentrations of Chemical Substances in the Environment
Feb. 1984; 49 pp.; In English
Report No.(s): PB2007-102105; No Copyright; Avail.: CASI: A03, Hardcopy

In evaluating PMNs, the Environmental Effects Branch attempts to estimate levels of a given compound which, if met or exceeded in the environment, could cause adverse effects. The data set from which such concentrations are estimated may run the gamut from fairly complete packages, containing both acute and chronic test data, to only the structure of the chemical itself. The purpose of this position document is to describe the procedure and rationale followed to estimate environmental concentrations of concern for a particular chemical. The methodology described should identify (at least 95% of the time) concentration concern levels for TSCA chemicals which may cause adverse environmental effects.
NTIS
Estimating; Magnesium; Niobates; Toxicity; Environment Effects

20060056333 Gates and Cooper, Los Angeles, CA, USA
Method of Processing a Substrate
Babayan, S. E.; Hicks, R. F.; 5 Nov 04; 27 pp.; In English
Contract(s)/Grant(s): DEF5607-96ER-45621
Patent Info.: Filed Filed 5 Nov 04; US-Patent-Appl-SN-10-982-120
Report No.(s): PB2007-100819; No Copyright; Avail.: CASI: A03, Hardcopy

The invention is embodied in a plasma flow device or reactor having a housing that contains conductive electrodes with openings to allow gas to flow through or around them, where one or more of the electrodes are powered by an RF source and one or more are grounded, and a substrate or work piece is placed in the gas flow downstream of the electrodes, such that said substrate or work piece is substantially uniformly contacted across a large surface area with the reactive gases emanating therefrom. The invention is also embodied in a plasma flow device or reactor having a housing that contains conductive electrodes with openings to allow gas to flow through or around them, where one or more are grounded, and one of the grounded electrodes contains a means of mixing in other chemical precursors to combine with the plasma stream, and a substrate or work piece placed in the gas flow downstream of the electrodes, such that said substrate or work piece is contacted by the reactive gases emanating therfrom. In on embodiment, the plasma flow device removes organic materials from a substrate or work piece, and is a stripping or cleaning device. In another embodiment, the plasma flow device kills biological microorganisms on a substrate or work piece, and is a sterilization device. In another embodiment, the plasma flow device

activates the surface of a substrate or work piece, and is a surface activation device. In another embodiment, the plasma flow device etches materials from a substrate or work piece, and is a plasma etcher. In another embodiment, the plasma flow device deposits thin films onto a substrate or work piece, and is a plasma-enhanced chemical vapor deposition device or reactor.
NTIS
Patent Applications; Substrates

20060056359 Loyola Coll., Baltimore, MD, USA
WTEC Panel Report on Nanostructure Science and Technology: R and D Status and Trends in Nanoparticles, Nanostructured Materials, and Nanodevices
Siegel, R. W.; Hu, E.; Cox, D. M.; Goronkin, H.; Jelinski, L.; Dec. 1988; 364 pp.; In English
Contract(s)/Grant(s): NSF-ENG-9707092
Report No.(s): PB2007-102142; Copyright; Avail.: National Technical Information Service (NTIS)

This report reviews the status of research and development in nanoparticles, nanostructured materials, and nanodevices worldwide, with particular focus on comparisons between the USA and other leading industrialized countries. Topics covered include particle synthesis and assembly, dispersions and coatings of nanoparticles, high surface area materials, functional nanoscale devices, bulk behavior of nanostructured materials, and biological methods and applications. The final chapter is a review of related government funding programs around the world. The report also includes site reports for visits conducted by the panel to leading research laboratories in Japan and Europe. The panel held workshops in the USA, Germany, Sweden, and Russia to gather additional information for this report on activities in those countries.
NTIS
Nanoparticles; Nanostructure (Characteristics); Nanostructures (Devices); Nanotechnology; Trends

20060056409 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA, USA
Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix
Park, Taigyoo; OBrien, Emmett; Lizotte, Jeremy R.; Glass, Thomas E.; Ward, Thomas C.; Long, Timothy E.; Leo, Donald J.; Polymer; 2006; ISSN 0032-3861; Volume 47, pp. 4218-4229; In English
Contract(s)/Grant(s): NAG1-03026; NAG1-03052; Copyright; Avail.: Other Sources

The dielectric relaxation behavior of poly(acrylonitrile-co-methacrylonitrile) dispersed in a cured polydimethyl siloxane (PDMS) matrix as microcapsules was investigated over multiple thermal cycles and at varying concentrations. The copolymer microcapsules contained an isopentane core. In the PDMS matrix this copolymer displayed a pronounced relaxation signal at temperatures above the glass transition of the copolymers due to Maxwell-Wagner-Sillars (MWS) relaxation. The mechanism of MWS relaxation interpreted by the Havriliak-Negami and Kohlrausch-Williams-Watts relaxation functions was found to be very similar to previous studies of neat polyacrylonitrile and its copolymer. The activation energy of the relaxation decreased over successive thermal cycling coincident with a decreasing strength of the relaxation. These observations were attributed to the decreasing concentration of nitrile groups due to intramolecular cyclizations.
Author
Methyl Polysiloxanes; Dielectric Properties; Thermal Cycling Tests; Activation Energy; Copolymers; Cycles; Polyacrylonitrile

20060056463 Oak Ridge National Lab., TN USA
Improved Materials for High-Temperature Black Liquor Gasification
Keiser, J. R.; Hemrick, J. G.; Gorog, J. P.; Leary, R.; Jun. 2006; 56 pp.; In English
Report No.(s): DE2006-885152; ORNL/TM-2006/71; No Copyright; Avail.: National Technical Information Service (NTIS)

The laboratory immersion test system built and operated at ORNL was found to successfully screen samples from numerous refractory suppliers, including both commercially available and experimental materials. This system was found to provide an accurate prediction of how these materials would perform in the actual gasifier environment. Test materials included mullites, alumino-silicate bricks, fusion-cast aluminas, alumina-based and chrome-containing mortars, phosphate-bonded mortars, coated samples provided under an MPLUS-funded project, bonded spinels, different fusion-cast magnesia-alumina spinels with magnesia content ranging from 2.5% to about 60%, high-MgO castable and brick materials, spinel castables, and alkali-aluminate materials. This testing identified several candidate material systems that perform well in the New Bern gasifier. Fusion-cast aluminas were found to survive for nearly one year, and magnesia-alumina spinels have

operated successfully for 18 months and are expected to survive for two years. Alkali-aluminates and high-MgO-content materials have also been identified for backup lining applications. No other material with a similar structure and chemical composition to that of the fusion-cast magnesium-aluminum spinel brick currently being used for the hot-face lining is commercially available. Other materials used for this application have been found to have inferior service lives, as previously discussed.
NTIS
Gasification; High Temperature; Chemical Composition; Laboratory Equipment

20060056487 Case Western Reserve Univ., Cleveland, OH USA
Effect of Crevice Former on Corrosion Damage Propagation
January 2006; 28 pp.; In English
Report No.(s): DE2006-884897; No Copyright; Avail.: National Technical Information Service (NTIS)

The objectives of this report are: (1) To determine the effect of the crevice former on the localized corrosion damage propagation; (2) FOCUS on post initiation stage, crevice propagation and arrest processes; (3) Determine the evolution of damage--severity, shape, location/distribution, damage profile; and (4) Model of crevice corrosion propagation, i.e. the evolution of the crevice corrosion damage profile.
NTIS
Corrosion; Corrosion Prevention; Cracks; Damage

20060056488 Lawrence Livermore National Lab., Livermore, CA USA, Case Western Reserve Univ., Cleveland, OH USA
Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository
Payer, J. H.; Carroll, S. A.; Gdowski, G. E.; Rebak, R. B.; January 2006; 12 pp.; In English
Report No.(s): DE2006-884901; No Copyright; Avail.: National Technical Information Service (NTIS)

The proposed Yucca Mountain Repository presents a familiar materials performance application that is regularly encountered in energy, transportation and other industries. The widely accepted approach to dealing with materials performance is to identify the performance requirements, to determine the operating conditions to which materials will be exposed and to select materials of construction that perform well in those conditions. A special feature of the proposed Repository is the extremely long time frame of interest, i.e. 10,000's of years and longer. Thus, the time evolution of the environment in contact with waste package surfaces and the time evolution of corrosion damage that may result are of primary interest in the determination of expected performance. An approach is presented to the analysis of localized corrosion during a time period when it is possible for waters from drips and seepage to contact the waste package surfaces, and the analysis is demonstrated for the water chemistry of mixed salt solutions and a set of time-temperature-relative humidity profiles for a hot, mid and cool temperature waste package. Based on the analysis, there are large time periods when localized corrosion can not be supported, and no corrosion damage will occur. Further analysis can then focus on time periods when it is possible for localized corrosion to occur and the determination of the evolution of any corrosion damage.
NTIS
Corrosion; Materials Selection; Radioactive Wastes; Waste Disposal; Hazardous Wastes; Storage Tanks

24
COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

20060055382 NASA Glenn Research Center, Cleveland, OH, USA
Low-Velocity Impact Response of Sandwich Beams with Functionally Graded Core
Apetre, N. A.; Sankar, B. V.; Ambur, D. R.; International Journal of Solids and Structures; July 20, 2006; ISSN 0020-7683; Volume 43, pp. 2479-2496; In English; Original contains black and white illustrations
Contract(s)/Grant(s): NAG1-1887; NCC3-994; WBS 759.03.01.03.08; Copyright; Avail.: Other Sources

The problem of low-speed impact of a one-dimensional sandwich panel by a rigid cylindrical projectile is considered. The core of the sandwich panel is functionally graded such that the density, and hence its stiffness, vary through the thickness. The problem is a combination of static contact problem and dynamic response of the sandwich panel obtained via a simple nonlinear spring-mass model (quasi-static approximation). The variation of core Young's modulus is represented by a polynomial in the thickness coordinate, but the Poisson's ratio is kept constant. The two-dimensional elasticity equations for the plane sandwich structure are solved using a combination of Fourier series and Galerkin method. The contact problem is

solved using the assumed contact stress distribution method. For the impact problem we used a simple dynamic model based on quasi-static behavior of the panel - the sandwich beam was modeled as a combination of two springs, a linear spring to account for the global deflection and a nonlinear spring to represent the local indentation effects. Results indicate that the contact stiffness of thc beam with graded core Increases causing the contact stresses and other stress components in the vicinity of contact to increase. However, the values of maximum strains corresponding to the maximum impact load arc reduced considerably due to grading of thc core properties. For a better comparison, the thickness of the functionally graded cores was chosen such that the flexural stiffness was equal to that of a beam with homogeneous core. The results indicate that functionally graded cores can be used effectively to mitigate or completely prevent impact damage in sandwich composites. Author

Dynamic Models; Impact Damage; Stiffness; Sandwich Structures; Composite Materials; Rigid Structures

20060056246 NASA Glenn Research Center, Cleveland, OH, USA

Performance Evaluations of Ceramic Wafer Seals

Dunlap, Patrick H., Jr.; DeMange, Jeffrey J.; Steinetz, Bruce M.; December 2006; 20 pp.; In English; 42nd Joint Propulsion Conference and Exhibit, 9-12 Jul. 2006, Sacramento, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 489.02.07.03.06

Report No.(s): NASA/TM-2006-214416; E-15696; AIAA Paper 2006-4934; Copyright; Avail.: CASI: A03, Hardcopy

Future hypersonic vehicles will require high temperature, dynamic seals in advanced ramjet/scramjet engines and on the vehicle airframe to seal the perimeters of movable panels, flaps, and doors. Seal temperatures in these locations can exceed 2000 F, especially when the seals are in contact with hot ceramic matrix composite sealing surfaces. NASA Glenn Research Center is developing advanced ceramic wafer seals to meet the needs of these applications. High temperature scrub tests performed between silicon nitride wafers and carbon-silicon carbide rub surfaces revealed high friction forces and evidence of material transfer from the rub surfaces to the wafer seals. Stickage between adjacent wafers was also observed after testing. Several design changes to the wafer seals were evaluated as possible solutions to these concerns. Wafers with recessed sides were evaluated as a potential means of reducing friction between adjacent wafers. Alternative wafer materials are also being considered as a means of reducing friction between the seals and their sealing surfaces and because the baseline silicon nitride wafer material (AS800) is no longer commercially available.

Author

Wafers; Seals (Stoppers); Mechanical Engineering; Ceramic Matrix Composites; Hypersonic Vehicles; Propulsion System Performance

20060056392 NASA Langley Research Center, Hampton, VA, USA

Influence of Finite Element Software on Energy Release Rates Computed Using the Virtual Crack Closure Technique

Krueger, Ronald; Goetze, Dirk; Ransom, Jonathon, Technical Monitor; October 2006; 54 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): NAS1-02117

Report No.(s): NASA/CR-2006-214523; NIA Reprt No. 2006-06; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056392; Avail.: CASI: A04, Hardcopy

Strain energy release rates were computed along straight delamination fronts of Double Cantilever Beam, End-Notched Flexure and Single Leg Bending specimens using the Virtual Crack Closure Technique (VCCT). The results were based on finite element analyses using ABAQUS# and ANSYS# and were calculated from the finite element results using the same post-processing routine to assure a consistent procedure. Mixed-mode strain energy release rates obtained from post-processing finite element results were in good agreement for all element types used and all specimens modeled. Compared to previous studies, the models made of solid twenty-node hexahedral elements and solid eight-node incompatible mode elements yielded excellent results. For both codes, models made of standard brick elements and elements with reduced integration did not correctly capture the distribution of the energy release rate across the width of the specimens for the models chosen. The results suggested that element types with similar formulation yield matching results independent of the finite element software used. For comparison, mixed-mode strain energy release rates were also calculated within ABAQUS#/Standard using the VCCT for ABAQUS# add on. For all specimens modeled, mixed-mode strain energy release rates obtained from ABAQUS# finite element results using post-processing were almost identical to results calculated using the VCCT for ABAQUS# add on.

Author

Finite Element Method; Strain Energy Release Rate; Crack Closure; Delaminating

20060056492 NASA Johnson Space Center, Houston, TX, USA

Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material

Kikolaev, P.; Stackpoole, M.; Fan, W.; Cruden, B. A.; Waid, M.; Moloney, P.; Arepalli, S.; Arnold, J.; Partridge, H.; Yowell, L.; [2006]; 15 pp.; In English; Materials Research Society Fall 2006 Meeting, 27 Nov. - 1 Dec. 2006, Boston, MA, USA; Original contains color and black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056492; Avail.: CASI: A03, Hardcopy

This viewgraph presentation reviews the use of PICA (phenolic impregnated carbon ablator) as the selected material for heat shielding for future earth return vehicles. It briefly reviews the manufacturing of PICA and the advantages for the use of heat shielding, and then explains the reason for using Carbon Nanotubes to improve strength of phenolic resin that binds carbon fibers together. It reviews the work being done to create a carbon nanotube enhanced PICA. Also shown are various micrographic images of the various PICA materials.

CASI

Ablative Materials; Carbon Nanotubes; Phenolic Resins; Materials Selection; Thermal Protection; Carbon-Phenolic Composites; Reentry Shielding; Heat Shielding; Reusable Heat Shielding

25
INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY

Includes the analysis, synthesis, and use of inorganic and organic compounds; combustion theory; electrochemistry; and photochemistry. For related information see category *34 Fluid Dynamics and Thermodynamics*. For astrochemistry see category *90 Astrophysics*.

20060054273 Oklahoma State Univ., Stillwater, OK, USA

Theoretical Chemical Dyamics Studies of Elementary Combustion Reactions

January 2006; 18 pp.; In English

Report No.(s): DE2006-881673; No Copyright; Avail.: Department of Energy Information Bridge

The purpose of this research was the development and application of theoretical/computational methods for accurate predictions of the rates of reactions in many-atom systems. The specific aim was to improve computational methods for studying the chemical dynamics of large, complex systems and to obtain a better understanding of the chemical reactions involving large polyatomic molecules and radicals. The focus was on the development an automatic potential energy surface generation algorithm that takes advantage of high-performance computing environments; e.g., software for rate calculations that direct quantum chemistry codes to produce ab initio predictions of reaction rates and related dynamics quantities. Specifically, we developed interpolative moving least-squares (IMLS) methods for accurately fitting ab initio energies to provide global PESs and for use in direct dynamics simulations.

NTIS

Chemical Reactions; Combustion; Potential Energy

20060055413 Army Research Lab., Aberdeen Proving Ground, MD USA

Dynamic Response of an Alternative Tissue Simulant, Physically Associating Gels (PAG)

Moy, Paul; Weerasooriya, Tusit; Juliano, Thomas F; VanLandingham, Mark R; Chen, Wayne; Sep 2006; 14 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457037; ARL-RP-136; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457037; Avail.: CASI: A03, Hardcopy

Recent work on formulating alternatives to ballistic gelatin, a soft tissue simulant, has lead to the development of physically associating gels (PAG). Ballistic gelatin impact response has been traditionally used to test and evaluate firearms and bullets but it does have some drawbacks, such as lacking consistency in its viscoelastic properties due to variability during the fabrication process, short shelf-life, and deterioration under prolonged usage at room temperature. PAG offers advantages such as the ability to tailor desired properties, a narrow range of viscoelastic properties, storage at room temperature, and superior environmental stability compared to ballistic gelatin. However, like ballistic gelatin, the material response and failure behavior at high rates are still not completely understood. High rate (~2500/s) compression experiments were conducted on ballistic gelatin and two types of PAG using a modified split-Hopkinson bar under dynamic equilibrium at constant strain rates using a pulse-shaping technique. Aside from these experimental conditions, considerations have been taken regarding the radial inertia effects that are typically observed during Hopkinson bar experiments of compliant materials such as gels. In addition to high rate experiments, stress-strain behavior of these materials at an intermediate strainrate (1/s) was also obtained.

In this report, the test methodology used for the split-Hopkinson bar experiments is discussed, and the stress-strain behavior of ballistic gelatin and PAG are presented and compared.
DTIC
Ballistics; Dynamic Response; Gelatins; Gels

20060055415 Army Research Lab., Aberdeen Proving Ground, MD USA
Dual Control Cell Reaction Ensemble Molecular Dynamics: A Method for Simulations of Reactions and Adsorption in Porous Materials
Lisal, Martin; Brennan, John K; Smith, William R; Siperstein, Flor R; Sep 2006; 18 pp.; In English
Contract(s)/Grant(s): Proj-H4311
Report No.(s): AD-A457039; ARL-RP-146; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457039; Avail.:
CASI: A03, Hardcopy

We present a simulation tool to study fluid mixtures that are simultaneously chemically reacting and adsorbing in a porous material. The method is a combination of the reaction ensemble Monte Carlo method and the dual control volume grand canonical molecular dynamics technique. The method, termed the dual control cell reaction ensemble molecular dynamics method, allows for the calculation of both equilibrium and nonequilibrium transport properties in porous materials such as diffusion coefficients, permeability, and mass flux. Control cells, which are in direct physical contact with the porous solid, are used to maintain the desired reaction and flow conditions for the system. The simulation setup closely mimics an actual experimental system in which the thermodynamic and flow parameters are precisely controlled. We present an application of the method to the dry reforming of methane reaction within a nanoscale reactor model in the presence of a semi-permeable membrane that was modeled as a porous material similar to silicalite. We studied the effects of the membrane structure and porosity on the reaction species permeability by considering three different membrane models. We also studied the effects of an imposed pressure gradient across the membrane on the mass flux of the reaction species. Conversion of syngas (H2/CO) increased significantly in all the nanoscale membrane reactor models considered. A brief discussion of further potential applications is also presented.
DTIC
Adsorption; Chemical Reactions; Molecular Dynamics; Porous Materials; Simulation

20060055416 Army Research Lab., Aberdeen Proving Ground, MD USA
Reaction Ensemble Molecular Dynamics: Direct Simulation of the Dynamic Equilibrium Properties of Chemically Reacting Mixtures
Brennan, John K; Lisal, Martin; Gubbins, Keith E; Rice, Betsy M; Sep 2006; 10 pp.; In English
Contract(s)/Grant(s): Proj-H4311
Report No.(s): AD-A457040; ARL-RP-144; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457040; Avail.:
CASI: A02, Hardcopy

A molecular simulation method to study the dynamics of chemically reacting mixtures is presented. The method uses a combination of stochastic and dynamic simulation steps, allowing for the simulation of both thermodynamic and transport properties. The method couples a molecular dynamics simulation cell (termed dynamic cell) to a reaction mixture simulation cell (termed control cell) that is formulated upon the reaction ensemble Monte Carlo (RxMC) method, hence the term reaction ensemble molecular dynamics. Thermodynamic and transport properties are calculated in the dynamic cell by using a constant-temperature molecular dynamics simulation method. RxMC forward and reverse reaction steps are performed in the control cell only, while molecular dynamics steps are performed in both the dynamic cell and the control cell. The control cell, which acts as a sink and source reservoir, is maintained at reaction equilibrium conditions via the RxMC algorithm. The reaction ensemble molecular dynamics method is analogous to the grand canonical ensemble molecular dynamics technique, while using some elements of the osmotic molecular dynamics method, and so simulates conditions that directly relate to real, open systems.
DTIC
Chemical Reactions; Dynamic Characteristics; Molecular Dynamics; Simulation

20060055433 Army Research Lab., Aberdeen Proving Ground, MD USA
Molecular Simulation of the Vapor-Liquid Phase Behavior of Lennard-Jones Mixtures in Porous Solids
Brennan, John K; Dong, Wei; Sep 2006; 12 pp.; In English

Report No.(s): AD-A457067; ARL-RP-143; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457067; Avail.: CASI: A03, Hardcopy

We present vapor-liquid phase coexistence curves for binary fluid mixtures in a disordered porous solid. The porous material is modeled as a collection of randomly dispersed hard spheres. A variant of the Monte Carlo Gibbs ensemble method [J. K. Brennan and W. Dong, J. Chem. Phys. 116, 8948 (2002)] is used to simulate Lennard-Jones fluid mixtures at several porosities: 0.9, 0.95, and 0.975. Effects based on the size and the energetics of the mixture components are studied. Pressure-composition and pressure-density phase diagrams at reduced temperatures of 0.75 and 1.0 are reported. Compared to the bulk fluid behavior, dramatic shifts in the phase envelope were found for even highly porous structures. Both the Lennard-Jones size and energy mixture parameters were found to strongly influence the resulting shape of the phase envelope. DTIC

Lennard-Jones Potential; Physical Chemistry; Porosity; Simulation; Solids

20060055434 Army Research Lab., Aberdeen Proving Ground, MD USA

Cavity-Bias Sampling in Reaction Ensemble Monte Carlo Simulation

Brennan, John K; Sep 2006; 14 pp.; In English

Contract(s)/Grant(s): Proj-H4311

Report No.(s): AD-A457068; ARL-RP-142; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457068; Avail.: CASI: A03, Hardcopy

A methodology is presented to sample efficiently configurations of reacting mixtures in the reaction ensemble Monte Carlo simulation technique. A cavity-biasing scheme is used, which more effectively samples configurations than conventional random sampling. Akin to other biasing schemes that are implemented into insertion-based Monte Carlo methods such as Gibbs ensemble Monte Carlo, the method presented here searches for space in the reacting mixture whereby the insertion of a product molecule is energetically favoured. This sampling bias is then corrected in the acceptance criteria. The approach allows for the study of reacting mixtures at high density as well as for polyatomic molecular species. For some cases, the method is shown to increase the efficiency of the reaction steps by a factor greater than 20. The approach is shown to be readily generalized to other biasing schemes such as orientational-biasing of polar molecules and configurational-biasing of chain-like molecules.

DTIC

Bias; Cavities; Chemical Reactions; Monte Carlo Method; Sampling

20060055577 SRI International Corp., Menlo Park, CA USA

Enhancement of an Analytical Method for the Determination of Squalene in Anthrax Vaccine Absorbed Formulations

Spanggord, Ronald J; Sun, Meg; Lim, Peter; Ellis, William Y; Apr 20, 2006; 7 pp.; In English

Report No.(s): AD-A457188; No Copyright; Avail.: CASI: A02, Hardcopy

Specific lots of anthrax vaccine adsorbed administered to members of the U.S. Armed Forces have been alleged to contain squalene, a chemical purported to be associated with illnesses of Gulf War veterans. A method of enhanced sensitivity for determining squalene in anthrax vaccine adsorbed using high-performance liquid chromatography with photodiode array detection has been developed, validated, and applied to 44 bottles of 38 lots of anthrax vaccine. In 43 bottles of 37 lots, no squalene was detected within a detection limit of 1 ng/0.5 ml dose (2 parts-per-billion). One lot, FAV008, was found to contain trace amounts of squalene at 7, 9, and 1 microgram 1(exp-1) 1, levels considerably below normal human plasma levels (290 microngram 1(exp-1)). The overall results of this investigation provide direct evidence for the absence of squalene in nearly all of anthrax vaccine preparations tested.

DTIC

Augmentation; Infectious Diseases; Liquid Chromatography; Vaccines

20060055601 Virginia Univ., Charlottesville, VA USA

Optimizing Mechanical Properties and Thermal Stability of Age Hardenable Aluminum Alloys Through Theoretical Modeling, Alloy Modification and Thermal Mechanical Processing

Starke, E A; Shiflet, G J; Jun 30, 2005; 20 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA9550-04-1-0027

Report No.(s): AD-A457228; No Copyright; Avail.: CASI: A03, Hardcopy

This proposal was to design and test an Al-Cu-Mg (Ag) alloy for moderate temperatures (up to 150 degrees C) application. A significant improvement in the creep resistance was primarily pursued in the program through enhancement of the yield

strength and the thermal stability of the age-hardenable alloy. Major tasks have been finished as planned: 1) We identified the optimum structures of complex multiple secondary phase precipitates using dislocation slip simulation methods that we developed; focusing on Al-Cu-Mg based alloys with Cu: Mg ratios, vs. determined the omega phase as the main strengthening precipitate phase. 2) We constructed a special thermodynamic database (incorporating the metastable omega phase) to determine the absolute Cu and Mg concentration for optimum chemical driving forces of omega phase nucleation. 3) To control the formation (nucleation) of competing precipitate phases, we developed an effective and efficient approach to characterize effects of alloying elements. The computational tools, combining the state-of-the- art across-scale computational methods from first principles calculations to clustering strain analysis. We demonstrated how trace amounts of Mg and Ag additional catalyze omega phase nucleation and identified Si to be deleterious and that it must be eliminated. 4) We accordingly designed new alloys with compositions: Al -(4 to 5) Cu-(O.4 to 0.6) Mg-(O.4 to 0.06) Ag (wt%)with minimal Si content for the optimum strength and second phase thermal stabilities.
DTIC
Alloys; Aluminum Alloys; Mathematical Models; Mechanical Properties; Precipitation Hardening; Thermal Stability

20060055619 Loughborough Univ. of Technology, UK
Fluid and Electrolyte Needs for Preparation and Recovery From Training and Competition
Shirreffs, Susan M; Armstrong, Lawrence E; Cheuvront, Samuel N; Jan 2004; 8 pp.; In English
Report No.(s): AD-A457255; MISC-03-10; No Copyright; Avail.: CASI: A02, Hardcopy

For a person undertaking regular exercise, any fluid deficit trial is incurred during one exercise session can potentially compromise the next exercise session if adequate fluid replacement does not occur. Fluid replacement after exercise can, therefore, frequently be thought of as hydration before the next exercise bout. The importance of ensuring euhydration before exercise and the potential benefits of temporary hyperhydration with sodium salts or glycerol solutions are also important issues Post-exercise restoration of fluid balance after sweat-induced dehydration avoids the detrimental effects of a body water deficit on physiological function and subsequent exercise performance. For effective restoration of fluid balance, the consumption of a volume of fluid in excess of the sweat loss and replacement of electrolyte, particularly sodium, losses are essential. Intravenous fluid replacement after exercise has been investigated to a lesser extent and its role for fluid replacement in the dehydrated but otherwise well athlete remains equivocal.
DTIC
Body Fluids; Competition; Education; Electrolytes; Hydration

20060055630 Army Tank-Automotive and Armaments Command, Warren, MI USA
The Effects of Colloidal Processing on the Densification of Titanium Diboride (TiB2) - Alumina (Al2O3) Composites
Franks, Lisa P; Crimp, Melissa J; Chin, Ernest; Gilde, Gary; Mar 2000; 25 pp.; In English
Report No.(s): AD-A457276; No Copyright; Avail.: CASI: A03, Hardcopy

Titanium diboride/Alumina (TiB2/Al2O3) powders produced using self-propagating high-temperature synthesis (SHS) can be hot pressed into armor tiles that exhibit superior resistance to penetration as compared to TiB2, SiC, B4C or Al2O3. As with other advanced ceramics however, difficulties in processing TiB2/Al2O3 arise from the inability to reproduce specimens having identical microstructure and properties. Since the SHS powders are available commercially, the interactions between TiB2 and Al2O3 have been analyzed with respect to their colloidal properties, as measured by their respective zeta potentials, density, volume fraction, and particle size. A comparison of colloidal properties, green and sintered densities and microstructure of Composite SHS TiB2/Al2O3 and SHS TiB2 with commercially available Aluminas has been completed. Although SuspensionStability(copyright) predicts the colloidal behavior of SHS TiB2 in Alumina, the SHS Composite powders seem to be insensitive to colloidal processing, and the continuous microstructure associated with penetration resistance is predominantly characteristic of SHS Composite TiB2/Al2O3 starting powders.
DTIC
Aluminum Oxides; Borides; Ceramics; Colloids; Densification; Titanium; Titanium Borides

20060055632 Florida Univ., Gainesville, FL USA
Optical and magnetic properties of Eu-doped GaN
Hite, J; Thaler, G T; Khanna, R; Abernathy, C R; Pearton, S J; Park, J H; Steckl, A J; Zavada, J M; Sep 29, 2006; 4 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911-NG-04-10296; DMR-0400416
Report No.(s): AD-A457284; No Copyright; Avail.: Defense Technical Information Center (DTIC)

GaN films were doped with Eu to a concentration of ~0.12 at. % during growth at 800 C by molecular beam epitaxy, with the Eu cell temperature held constant at 470 C. All samples were postannealed at 675 C. The films exhibited strong photoluminescence PL in the red 622 nm whose absolute intensity was a function of the Ga flux during growth, which ranged from 3.0 10 7 to 5.4 10 7 Torr. The maximum PL intensity was obtained at a Ga flux of 3.6 10 7 Torr. The samples showed room temperature ferromagnetism with saturation magnetization of 0.1 0.45 emu/cu cm, consistent with past reports where the Eu was found to be predominantly occupying substitutional Ga sites. There was an inverse correlation between the PL intensity and the saturation magnetization in the films. X-ray diffraction showed the presence of EuGa phases under all the growth conditions but these cannot account for the observed magnetic properties.
DTIC
Doped Crystals; Gallium Nitrides; Magnetic Properties; Molecular Beam Epitaxy; Optical Properties; Rare Earth Compounds; X Ray Diffraction

20060055677 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA
Decomposition of GD on CeO2/Alumina Adsorbents in a Gas Chromatograph On-Column Injector Tube Reactor
Bartram, Phillip W; Lochner, Michael J; Rohrbaugh, Dennis K; Ellzy, Michael W; Oct 2006; 16 pp.; In English
Contract(s)/Grant(s): Proj-206023-84BPO/CB2
Report No.(s): AD-A457384; ECBC-TR-518; No Copyright; Avail.: CASI: A03, Hardcopy

The decomposition of GD on alumina supported CeO2 was determined at 25 degrees C in a quasi micro-reactor. One microliter of GD solution (50% by weight in carbon tetrachioride) was injected into a CeO2/alumina (-40 mg) packed inlet tube of a Perkin Elmer Auto M Gas Chromatograph and maintained at 30 degrees C. A Nicolet 800 Bench Spectrometer with a mercury cadmium-telluride detector (11,700 to 600 /cm) was used to monitor the effluent. An injection was made approximately every hour until GD was detected. The adsorbent was then extracted with acetonitrile and the solution treated with BSTFA to esterify any hydrolysate; the mixture was assayed by GC/MS. The GD (521 micromol/g) was decomposed on CeO2/alumina; the major products were pinacolyl methylphosphonic acid, methyl phosphonic acid, and dipinacolyl methylphosphonate. The decomposition of GD on alumina supported CeO2 was determined at 25 degrees C in a quasi micro-reactor. One microliter of GD solution (50% by weight in carbon tetrachioride) was injected into a CeO2/alumina % 40 mg) packed inlet tube of a Perkin Elmer Auto M Gas Chromatograph and maintained at 30 degrees C. A Nicolet 800 Bench Spectrometer with a mercury cadmium-telluride detector (11,700 to 600 cm(exp -1) was used to monitor the effluent. An injection was made approximately every hour until GD was detected. The adsorbent was then extracted with acetonitrile and the solution treated with BSTFA to esterify any hydrolysate; the mixture was assayed by GC/MS. The GD (521 umo1/g) was decomposed on CeO2/alumina; the major products were pinacolyl methylphosphonic acid, methyl phosphonic acid, and dipinacolyl methylphosphonate.
DTIC
Adsorbents; Aluminum Oxides; Cerium Oxides; Decomposition; Gas Chromatography; Injectors

20060055716 Air Force Research Lab., Wright-Patterson AFB, OH USA
Hysteretic Loss Reduction in Striated YBCO
Cobb, Coleman B; Barnes, Paul N; Haugan, Timothy J; Tolliver, Justin; Lee, Eungkuk; Sumption, Michael; Collings, Edward; Oberly, Charles E; Apr 2006; 7 pp.; In English
Contract(s)/Grant(s): Proj-3145
Report No.(s): AD-A457447; No Copyright; Avail.: CASI: A02, Hardcopy

Magnetization vs. applied field measurements (M-H loops) were taken on short samples of YBa2Cu3O7-delta (YBCO) thin films which were divided into narrow filaments. The YBCO was deposited using pulsed laser deposition onto single-crystal LaA1O3 substrates, with a range of film thicknesses from 0.25 to 0.33 um. Using a YAG laser, the thin films were patterned into linear striations by removing strips of the superconductor by laser ablation. The resulting striated filamentary structure serves to reduce the effective width of the YBCO films and hence the hysteresis loss in the superconducting samples. The magnetization measurements were taken over the temperature range of 4.2-77 K in applied fields of 0-17 kOe using a vibrating sample magnetometer. The measured hysteresis losses show a highly linear relationship between superconductor filament width and hysteresis loss as anticipated. However, the laser ablation process did result in the redeposition of YBCO along the edges of individual filaments. Degradation of Tc and Jc due to the ablation process is discussed.
DTIC
Hysteresis; Losses; Striation; YAG Lasers; YBCO Superconductors

20060055728 Geo-Centers, Inc., Aberdeen Proving Ground, MD USA

Characteristics and Sampling Efficiency of Eight-Unit Linear Slot Impactor (EULSI)

Kesavan, Jana S; Oct 2006; 17 pp.; In English

Report No.(s): AD-A457463; ECBC-TN-025; No Copyright; Avail.: CASI: A03, Hardcopy

The aerosol sampling efficiency was determined for an Eight-Unit Linear Slot Impactor (EULSI) developed at the Texas A&M University (College Station, TX). EULSI is a virtual impactor that has one concentration stage consisting of eight parallel linear accelerating and eight matching receiving jets. Sampling efficiency was determined using 1 - and 3-mum fluorescent polystyrene latex (PSL) microspheres; 5-, 7-, 9-, and 12-mum fluorescent oleic acid particles; and dry Bacillus subtilis vat. niger [Bacillus globigii (Bg)]. The results show a broad maximum sampling efficiency response of 35-37% between 3 and 7 mum. The efficiency drops off slightly at 9 and 12 mum, but only to 32 and 28%, respectively. The l-mum PSL and Bg particles yielded a sampling efficiency of 2l% + 3 and 17% + 12 respectively. The standard deviation for the measured sampling efficiency of the Bg particles was higher (+ 12) compared to the standard deviation of the non-biological particles due to culturing variability.

DTIC

Aerosols; Impactors; Samplers; Sampling; Slots

20060055729 Mitretek Systems, Inc., Fall Church, VA USA

Characteristics and Sampling Efficiencies of OMNI 3000 Aerosol Samplers

Kesavan, Jana S; Schepers, Deborah R; Oct 2006; 17 pp.; In English

Report No.(s): AD-A457464; ECBC-TN-028; No Copyright; Avail.: CASI: A03, Hardcopy

Characteristics and aerosol sampling efficiencies of four Omni 3000 aerosol samplers (Sceptor Industries, Inc., Kansas, MO) were determined at ECBC. These samplers have nontraditional wetted-wall cyclones to collect and concentrate aerosols into liquid. The sampling efficiency tests were conducted with monodisperse 0.5-, 1-, 3-, and 5-mum fluorescent polystyrene latex (PSL) microsperes and 2.9-, 5.8-, and 8-mum fluorescent oleic acid particles. The results showed the highest sampling efficiency of 91% for 3-mum particles using the fluorescent PSL microspheres and 70% for 2.9-mum liquid fluorescent oleic acid particles. Omni aerosol samplers have approximately 277 L/min of air flowrate, use 83 W of power, depending on the attachments, and they are small in size. They give approximately 11 mL of liquid after each sampling. These samplers are portable, battery operated, and easy to use and decontaminate.

DTIC

Aerosols; Efficiency; Samplers; Sampling

20060055803 Bari Univ., Italy

Assessing the Effect of Humic Acids on Germinating a Native American Plant

Nicola, Senesi; Oct 2004; 26 pp.; In English

Contract(s)/Grant(s): N62558-03-M-0010

Report No.(s): AD-A457591; No Copyright; Avail.: CASI: A03, Hardcopy

Slickspot peppergrass (Lepidium papilliferum) is a reported rare ephemeral endemic plant found in the USA in Southwest Idaho's high desert (Idaho Natural Heritage Program). The main objective of this research was to identifying and evaluating the effects of several naturally occurring humic acids (HAs) in Idaho soils on seed germination and seedling early-growth of slickspot peppergrass, and their possible relations to the compositional, structural and functional characteristics of humic acids. For this purpose, a total of n. 61 HAs isolated from various layers of a number of Idaho soils were characterized for their elemental (C, H, N, S, O) composition and structural and functional properties by using Fourier transform infrared (FT IR), bi-dimensional (emission-excitation matrix (EEM)) fluorescence and electron spin resonance (ESR) spectroscopies. The main germination and early plant growth experiments were then performed using three concentrations of: (a) two HAs originated from two Idaho soils (sites # 4 and #5) (HA4 and HA5) (each HA sample was obtained by mixing three corresponding HA subsamples from three layers (0-1 , 1-2 , and 2-3) of the two Idaho soils); and (b) three HAs isolated from three mixed layers labeled silt in/out , vesicular in/out , and clay in/out , of an Idaho soil (soil # 4, Series II) (HA4-IIs, HA4-IIv, and HA4-IIc). A preliminary objective was to test: (a) four well characterized standard HAs originated from (1) an Orthic Podzol under a coniferous forest (OHA); (2) the mollic horizon of the Elliot silt loam soil sampled near Joliet, IL, USA, (SHA); (3) the Pahokee peat sampled at Ocachobee in the Everglades, FL, USA, (PHA); and (4) a leonardite sampled at the Gascoyne mine, Bowman County, ND, USA, (LHA); and (b) three additional plant species, western wheatgrass and bluebunch wheatgrass (Pseudoroegneria spicata) and basin wildrye (Leymus cinereus).

DTIC

American Indians; Germination; Seeds; Soil Pollution; Soils; Vegetation Growth

20060055830 Naval Postgraduate School, Monterey, CA USA

Performance of a Liquid Flow Ultra-Compact Heat Exchanger

Sammataro, Michael A; Jun 2006; 65 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457642; No Copyright; Avail.: CASI: A04, Hardcopy

A numerical analysis of the performance of compact pin-fin array heat exchangers was carried out using water and JP-4 fuel as the working fluids. Three different configurations were used with hydraulic diameters ranging from 0.137 to 0.777 mm and volumetric area densities varying between 4.5 and 14.5 mm2/mm3. Numerical simulations were carried out to determine the performance of each heat exchanger over a series of Reynolds numbers in both the laminar and turbulent flow regimes. It was found that very large heat transfer coefficients (in the kW1m2K range) can be achieved compared to air for the same footprint. In addition the simulations were used to predict the Reynolds number range for transition from laminar to turbulent flow which was found to vary depending on the compactness of the heat exchanger configuration. As a final point this study also investigated the effects of boiling of the liquid within the heat exchanger on its performance. It was found that despite improved heat transfer rates due to latent heat removal vapor formation and resulting fluid expansion effects could result in undesirable flow patterns at low Reynolds numbers. The results from this study would be useful in the design of micro-scale heat exchangers for applications in the micro-electronic and gas turbine industries.

DTIC

Heat Exchangers; Jet Engine Fuels; Liquid Flow

20060055831 Naval Postgraduate School, Monterey, CA USA

Three-Dimensional Analysis of Azimuthal Dependence of Sound Propagation through Shallow-Water Internal Solitary Waves

Roush, Douglas L; Jun 2006; 62 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457643; No Copyright; Avail.: CASI: A04, Hardcopy

Results from shallow-water observational studies have shown acoustic field fluctuations in excess of 10 dB due primarily to non-linear internal solitary waves (ISWs). This work concentrates on three limitations ISWs pose to shallow-water acoustic propagation: anisotropy, quasi-deterministic-stochastic nature, and frequency dependence. These aspects are explored for low frequencies of 75 and 150 Hz through the development of a full-wave three-dimensional parabolic equation model in which a single ISW is introduced and rotated to achieve differing geometries between the ISW and acoustic transmission path. Two acoustic scattering regimes were found to exist: A horizontal refractive regime that generates very intense acoustic energy focusing and shadow zones near the ISW at range when the acoustic transmission path is nearly parallel to the ISW crest, and a vertical mode coupling regime producing moderate to strong acoustic energy focusing and shadow zones for all geometries. These three-dimensional patterns are similar for each frequency, but more intense for 150 Hz. The results dramatically show ISWs focus acoustic energy, dependent upon frequency and geometry, which may be exploitable in both a sonar performance and ambient noise modeling sense.

DTIC

Acoustic Scattering; Azimuth; Internal Waves; Shallow Water; Signal Transmission; Solitary Waves; Sound Propagation; Sound Transmission; Sound Waves; Water Waves

20060056186 Environmental Protection Agency, Cincinnati, OH USA

Workshop on Assessing and Managing Mercury from Historic and Current Mining Activities, Proceedings and Summary Report

Aug. 2003; 253 pp.; In English

Report No.(s): PB2007-101962; EPA/625/R-04/102; No Copyright; Avail.: National Technical Information Service (NTIS)

The purpose of this workshop was three-fold: 1. to convey public, nonprofit and private sector perspectives on the assessment and management of mercury associated with mining processes, residuals, and environmental impacts, 2. to present past, present, and future efforts that address mercury production, contaminant reduction, and site remediation associated with mining and waste disposal practices, and 3. to identify data gaps and information needs to improve mercury risk assessment and management practices associated with mining and environmental restoration activities.

NTIS

Conferences; Deposits; Mining

20060056250 NASA Ames Research Center, Moffett Field, CA, USA

CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy

Kim, J. S.; Rao, M. V. V. S.; Cappelli, M. A.; Sharma, S. P.; [1999]; 1 pp.; In English; 52nd Annual Gaseous Electronics Conference, 5-8 Oct. 1999, Norfolk, VA, USA

Contract(s)/Grant(s): RTOP 632-10-01; No Copyright; Avail.: Other Sources; Abstract Only

CFx radicals, in particular CF2, are instrumental in anisotropic etching of SiO2. In order to optimize the CFx radical population in a given process environment, it is imperative that we understand their production mechanism. Towards this goal, we have conducted a series of quantitative measurements of CF2 radicals in low pressure RF plasmas similar to those used in SiO2 etching. In this study, we present preliminary results for Ar/CHF3 plasmas operating at pressures ranging from 10-50 mTorr and powers ranging from 100-500 W in the GEC reference cell, modified for inductive (transformer) coupling. Fourier transform infrared (FTIR) spectroscop) is used to observe the absorption features of the CF2 radical in the 1114 cm-1 and 1096 cm-1 spectral regions. The FTIR spectrometer is equipped with a high-sensitivity mercury cadmium telluride (MCT) detector and has afixed resolution of 0.125 cm- 1. The CF2 concentrations are measured for a range of operating pressures and discharge power levels, and are compared to measurements of the relative CF2 concentrations made by mass spectrometry using the method of appearance potential for radical selectivity.

Author

Fourier Transformation; Infrared Spectroscopy; Radio Frequencies; Detection; Argon; Halogens; Alkanes; Fluoro Compounds

20060056287 NASA Langley Research Center, Hampton, VA, USA

Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix

Park, Taigyoo; O'Brien, Emmett; Lizotte, Jeremy R.; Glass, Thomas E.; Ward, Thomas C.; Long, Timothy E.; Leo, Donald J.; January 2006; 13 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NAG1-03026; NAG1-03052; Copyright; Avail.: Other Sources

The dielectric relaxation behavior of poly(acry1onitrile-co-methacrylonitrile) dispersed in a cured polydimethyl siloxane (PDMS) matrix as microcapsules was investigated over multiple thermal cycles and at varying concentrations. The copolymer microcapsules contained an isopentane core. In the PDMS matrix this copolymer displayed a pronounced relaxation signal at temperatures above the glass transition of the copolymers due to Maxwell-Wagner-Sillars (MWS) relaxation. The mechanism of MWS relaxation interpreted by the Havriliak-Negami and Kohlrausch-Williams-Watts relaxation functions was found to be very similar to previous studies of neat polyacrylonitrile and its copolymer. The activation energy of the relaxation decreased over successive thermal cycling coincident with a decreasing strength of the relaxation. These observations were attributed to the decreasing concentration of nitrile groups due to intramolecular cyclizations.

Author

Silicones; Dielectrics; Polyacrylonitrile; Copolymers; Methyl Polysiloxanes; Molecular Relaxation

20060056346 Savannah River National Lab., Aiken, SC, USA

Statistical Review of Cesium Carbonate Fusion Measurements of Archived Glass Samples from the DWPF Process

Edwards, T. B.; Jul. 2006; 70 pp.; In English

Report No.(s): DE2006-891683; WSRC-STI-2006-00069; No Copyright; Avail.: National Technical Information Service (NTIS)

This technical report provides a statistical review of measurements that the Defense Waste Processing Facility (DWPF) Laboratory (Lab) generated by Inductively-Coupled Plasma - Atomic Emission Spectroscopy (ICP-AES) for samples of archived Slurry Mix Evaporator (SME) glass that were prepared using a cesium carbonate fusion dissolution method. Measurements were generated by both of the Lab's ICPs, which are designated as M-13 and M-14. Comparisons between the two ICPs suggest that for the ARG-1 measurements the M-14 provided lower (on average) concentration measurements for about 13 of the 16 elements reported by DWPF with Cr, Mn, Ni, and Zr being statistically lower (at a 5% significance level) for the ARG-1 samples. One of the three exceptions is Li, for which the M-14 yielded (on average) higher concentration measurements than the M-13. For the SME samples, the M-14 and M-13 measurements had statistically different (at the 5% significance level) means for B, Ca, Cr, Cu, Fe, Li, Mg, Mn, Na, Ni, Si, Ti, U, and Zr with the M- 14 being lower than the M-13 for all of these elements except for Li.

NTIS

Carbonates; Cesium; Glass; Radioactive Wastes

20060056357 Washington Univ., Seattle, WA, USA, Swiss Federal Inst. of Technology, Zurich, Switzerland, Cornell Univ., Ithaca, NY, USA

Nanobiotechnology: Report of the National Nanotechnology Initiative Workshop. Held in Arlington, Virginia on October 9-11, 2003

Vogel, V.; Baird, B.; Oct. 2003; 106 pp.; In English; Nanobiotechnology: Report of the National Nanotechnology Initiative Workshop., October 9 - 11, 2003, Arlington, Virginia

Report No.(s): PB2007-102134; No Copyright; Avail.: National Technical Information Service (NTIS)

The National Nanotechnology Initiative Workshop on Nanobiotechnology was held on October 9-11, 2003, in Arlington, Virginia. Scientists, engineers, and physicians assembled to identify groundbreaking scientific opportunities for research at the intersection of nanotechnology and biology. The workshop was sponsored by the National Science Foundation, the National Institutes of Health, and (through the National Nanotechnology Coordination Office) the other member agencies of the Nanoscale Science, Engineering, and Technology (NSET) Subcommittee of the National Science and Technology Council's Committee on Technology.

NTIS

Biotechnology; Nanotechnology

20060056477 Notre Dame Univ., IN, USA

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides

Maginn, E. J.; January 2006; 8 pp.; In English

Report No.(s): DE2006-884869; No Copyright; Avail.: Department of Energy Information Bridge

The basic science goal in this project identifies structure/affinity relationships for selected radionuclides and existing sorbents. The task will apply this knowledge to the design and synthesis of new sorbents that will exhibit increased cesium, strontium and actinide removal. The target problem focuses on the treatment of high-level nuclear wastes. The general approach can likewise be applied to non-radioactive separations. The project involves a collaboration among four organizations, with each focused on a different aspect of the problem. This document is the final report on the three years of activities conducted at the University of Notre Dame, where the research focus was on the use of molecular modeling to understand ion exchange selectivity in titanosilicates and polyoxoniobate materials.

NTIS

Actinide Series; Cesium; Ion Exchanging; Radioactive Isotopes; Radioactive Wastes; Sorbents; Strontium; Radiation Chemistry

20060056485 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA, USA, Pennsylvania State Univ., University Park, PA, USA, SRI International Corp., Menlo Park, CA, USA, Princeton Univ., NJ, USA

Development of High Temperature Membranes and Improved Cathode Catalysts

January 2006; 38 pp.; In English

Report No.(s): DE2006-884893; No Copyright; Avail.: National Technical Information Service (NTIS)

Objectives: Develop and demonstrate advanced high concentration platinum cathode catalysts that will enable the reduction of Pt loading according to the DoE's technical targets and meet DOE's goals for performance. Develop and demonstrate ion-exchange membranes capable of operating at 100 degrees C and 25%RH. Understand the issues connected to the operation of PEM fuel cell in the temperature range of 100-120 degrees C and reduced RH%. Understand the impact of operating conditions on advanced polymeric membrane, catalyst, catalyst support, etc.

NTIS

Catalysts; Cathodes; Membranes; Platinum

26
METALS AND METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals and metallic materials; and metallurgy.

20060054222 International Trade Commission, Washington, DC USA

Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission

Oct. 2002; 58 pp.; In English

Report No.(s): PB2007-101162; USITC/PUB-3546; No Copyright; Avail.: CASI: A04, Hardcopy

On the basis of the record developed in the subject investigations, the USA International Trade Commission determines, pursuant to section 705(b) of the Tariff Act of 1930 (19 U.S.C. section 1671d(b)) (the Act), that an industry in the USA is materially injured by reason of imports from Brazil and Canada of carbon and certain alloy steel wire rod that have been found by the Department of Commerce (Commerce) to be subsidized by the Governments of Brazil and Canada. The Commission also determines, pursuant to section 735(b) of the Act (19 U.S.C. section 1673d(b)), that an industry in the USA is materially injured by reason of imports from Brazil, Canada, Indonesia, Mexico, Moldova, Trinidad and Tobago, and Ukraine of carbon and certain alloy steel wire rod that have been found by Commerce to be sold in the USA at less than fair value (LTFV). The Commission further determines, pursuant to section 771(24)(A) of the Act (19 U.S.C. section 1677(24)(A)) that imports of carbon and certain alloy steel wire rod from Germany that have been found by Commerce to be subsidized by the Government of Germany and sold in the USA at LTFV are negligible, and its investigations with regard to that country are thereby terminated pursuant to sections 705(b) and 735(b) of the Act.

NTIS

Brazil; Canada; Carbon; Carbon Steels; Germany; Indonesia; International Trade; Moldova; Rods; Steels; Trinidad and Tobago; Ukraine; Wire

20060054226 International Trade Commission, Washington, DC USA

Prestressed Concrete Steel Wire Strand from Japan. Investigation No. AA1921-188 (Second Review)

Jun. 2004; 51 pp.; In English

Report No.(s): PB2007-101154; USITC/PUB-3699; No Copyright; Avail.: CASI: A04, Hardcopy

On the basis of the record developed in the subject five-year review, the USA International Trade Commission determines, pursuant to section 751(c) of the Tariff Act of 1939 (19 U.S.C. Section 1675(c)) (the Act), that revocation of the antidumping finding on prestressed concrete steel wire strand from Japan would be likely to lead to continuation or recurrence of material injury to an industry in the USA within a reasonably foreseeable time.

NTIS

Concretes; International Trade; Japan; Prestressing; Steels; Strands; Wire

20060054228 International Trade Commission, Washington, DC USA

Corrosion-Resistant Carbon Steel Flat Products from France and Germany. Investigations Nos. 701-TA-348-349 and 731-TA-615 (Review) (Remand). Determination and Views of the Commission

Sep. 2002; 44 pp.; In English

Report No.(s): PB2007-101151; USITC/PUB-3539; No Copyright; Avail.: CASI: A03, Hardcopy

By opinion and order dated July 19, 2002, Judge Evan J. Wallach of the U.S. Court of International Trade remanded the Commissions determinations involving subject imports of corrosionresistant carbon steel flat products from France and Germany. Upon consideration of the remand order, we determine that the revocation of the antidumping and countervailing duty orders on corrosion-resistant steel from France and Germany would be likely to lead to the continuation or recurrence of material injury to an industry in the USA within a reasonably foreseeable time.

NTIS

Carbon Steels; Corrosion Resistance; France; Germany; International Trade

20060054229 International Trade Commission, Washington, DC USA

Ferrovanadium from China and South Africa. Investigations Nos. 731-TA-986 and 987 (Final). Determinations and Views of the Commission

Jan. 2003; 41 pp.; In English

Report No.(s): PB2007-101149; USITC/PUB-3570; No Copyright; Avail.: CASI: A03, Hardcopy

On the basis of the record1 developed in the subject investigations, the USA International Trade Commission (Commission) determines, pursuant to section 735(b) of the Tariff Act of 1930 (19 U.S.C. Section 1673d(b)) (the Act), that an industry in the USA is materially injured by reason of imports from China and South Africa of ferrovanadium, provided for in subheading 7202.92.00 of the Harmonized Tariff Schedule of the USA, that have been found by the Department of Commerce (Commerce) to be sold in the USA at less than fair value (LTFV). The Commission instituted these investigations effective November 26, 2001, following receipt of a petition filed with the Commission and Commerce by The Ferroalloys Association Vanadium Committee and its following members: Bear Metallurgical Co., Butler, PA; Shieldalloy Metallurgical

Corp., Cambridge, OH; Gulf Chemical & Metallurgical Corp., Freeport, TX; U.S. Vanadium Corp., Danbury, CT; and CS Metals of Louisiana, Convent, LA.
NTIS
China; International Trade; Republic of South Africa

20060055404 Army Research Lab., Aberdeen Proving Ground, MD USA
Modeling Dynamic Plasticity and Spall Fracture in High Density Polycrystalline Alloys
Clayton, J D; Sep 2006; 34 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457027; ARL-RP-150; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457027; Avail.: CASI: A03, Hardcopy

The dynamic thermomechanical response of a tungsten heavy alloy is investigated via modeling and numerical simulation. The material of study consists of relatively stiff pure tungsten grains embedded within a more ductile matrix alloy comprised of tungsten, nickel, and iron. Constitutive models implemented for each phase account for finite deformation, heat conduction, plastic anisotropy, strain-rate dependence of flow stress, thermal softening, and thermoelastic coupling. The potentially nonlinear volumetric response in tungsten at large pressures is addressed by a pressure-dependent effective bulk modulus. Our framework also provides a quantitative prediction of the total dislocation density, associated with cumulative strain hardening in each phase, and enables calculation of the fraction of plastic dissipation converted into heat energy. Cohesive failure models are employed to represent intergranular fracture at grain and phase boundaries. Dynamic finite element simulations illustrate the response of realistic volume elements of the polycrystalline microstructure subjected to compressive impact loadings, ultimately resulting in spallation of the material. The relative effects of mixed-mode interfacial failure criteria, thermally-dependent fracture strengths, and grain shapes and orientations upon spall behavior are weighed, with interfacial properties exerting a somewhat larger influence on the average pressure supported by the volume element than grain shapes and initial lattice orientations within the bulk material. Spatially resolved profiles of particle velocities at the free surfaces of the volume elements indicate the degree to which the incident and reflected stress waves are altered by the heterogeneous microstructure.
DTIC
Microstructure; Plastic Properties; Polycrystals; Spallation; Strain Rate; Tungsten Alloys

20060055424 National Steel and Shipbuilding Co., San Diego, CA USA
Weld Shrinkage Study
Doersksen, R E; Malmquist, David L; Dec 1993; 103 pp.; In English
Report No.(s): AD-A457049; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457049; Avail.: CASI: A06, Hardcopy

Inherent in the ship hull construction during assembly of interim products is weld shrinkage. Shipbuilder have recognized this fact and they realize the necessity of planning added material into the design phase to compensate for weld shrinkage. The traditional method to compensate for shrinkage has been to add excess material, usually 1' of material on two sides of a block, that would be trimmed at the erection stage. Normally, this 1' of material would be adequate to compensate for any weld shrinkage incurred during block assembly. It is however, a commitment to rework. Modern shipbuilders, employing New Construction Building Techniques, are attempting to eliminate this commitment to rework. By adding just enough material to compensate for weld shrinkage at each of the interim processes, a neat hull block can be built. In order to accomplish this task, extensive data gathering of shrinkage at each interim process must be conducted. Results of the data gathering will then be analyzed and shrinkage factors for each of the interim processes will be developed. These shrinkage factors will then be communicated to the Hull Engineering Department for inclusion into the detailed hull block design. Shrinkage factors for interim processes may vary from shipyard to shipyard due to facilities, welding equipment, joint design, welding sequence, ambient temperature, and type of material. Establishing and maintaining shrinkage factors is an investment shipyards make in improving productivity. Through this study, the process of deriving shrinkage factors will be identified; from the development of check sheets, to establishing checking procedures, data gathering, and the statistical analysis of data. Remembering that a variety of variables can effect the determination of a shrinkage factor, emphasis will be placed on the How to of the process.
DTIC
Ship Hulls; Shrinkage; Welded Joints

20060055544 Massachusetts Inst. of Tech., Cambridge, MA USA

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-3. Recent MIT Research on Residual Stresses and Distortion in Welded Structures

Masabuchi, Koichi; Sep 1991; 19 pp.; In English

Report No.(s): AD-A457133; NSRP-0340; No Copyright; Avail.: CASI: A03, Hardcopy

This paper presents a summary of recent efforts by the Welding Research Group at the Department of Ocean Engineering, M.I.T. The major thrust of the efforts has been to develop technologies of reducing residual stresses and distortion through in-process control. Part I discusses (a) reduction of longitudinal bending distortion of built-up beams, (b) reduction of radial distortion and residual stresses in girthwelded pipes, (c) reduction of forces acting on tack welds during butt welding, and (d) reduction of residual stresses and distortion in high-strength steel weldments. Part II presents a brief summary of other studies including (e) forming of steel plates by line heating with a high-power laser beam, (f) an intelligent system for flame straightening of panel structures, and (g) a knowledge-based system for minimizing out-of-plane distortion of welded panel structures.

DTIC

Conferences; Distortion; Marine Technology; Residual Stress; Ships; Welded Joints; Welded Structures

20060055545 Litton Industries, Pascagoula, MS USA

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-4. Shipyard Aluminum/Steel Welded Transition Joints

Gaines, Edward; Banker, John; Sep 1991; 10 pp.; In English

Report No.(s): AD-A457134; NSRP-0340; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Aluminum to steel explosion welded transition joints are used in shipbuilding to attach aluminum superstructures to steel hulls. This paper summarizes long term studies to determine causes of separations and describes actions to prevent separations. The aluminum/steel transition joints are manufactured by the explosion welding process and tested in accordance with MIL-J-24445. Traditional transition joints consist of alloyed aluminum bonded (by the explosion weld) to mild steel with an interlayer of low alloy aluminum. In 1989, production began using an improved transition joint product with the addition of a titanium interlayer between the steel and the low alloy aluminum. Laboratory testing showed the improved product had greater strength and temperature resistance. However, when this product was put into production, disbonding occurred at an alarming rate. As a result, it was discovered that bond notch toughness is a critical property even though it was not required to be measured by MIL-J- 24445. To improve the notch toughness while preserving earlier beneficial improvements, a ductile copper nickel (CUNI) interlayer was added between the steel and the titanium. This paper describes the study results and the development of the latest generation of aluminum steel structural transition.

DTIC

Aluminum; Aluminum Alloys; Conferences; Marine Technology; Metal Joints; Ships; Shipyards; Steels; Welded Joints

20060055588 Naval Postgraduate School, Monterey, CA USA

Thermomechanical Cycling Investigation of Cu and Niti Reinforced Lead-Free Solder

Horton, W S; Sep 2006; 75 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457206; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In today,s Flip Chip (FC) and Ball Grid Array (BGA) electronic packages solder joints provide both the electrical as well as the mechanical connections between the silicon chip and the substrate. Due to coefficient of thermal expansion (CTE) differences between the chip and substrate the solder joints undergo thermomechanical stresses and strains as an electronic package is heated and cooled with power on/off cycles. Advances in chip designs result in chips that are larger, run hotter and demand improved resistance to creep and low-cycle fatigue in the solder joints. In this study the strengthening of these joints with two different reinforcements is explored: a hard particulate and a shape memory alloy (SMA) single fiber composite (SFC). A baseline is established with a SnAgCu solder that is then compared to test runs on the same solder matrix with Copper particles and then the SMA, Nickel- Titanium wire as reinforcements.

DTIC

Binary Alloys; Cycles; Nickel Alloys; Reinforcing Materials; Soldered Joints; Solders; Thermodynamics; Titanium Alloys

20060055644 Air Force Research Lab., Wright-Patterson AFB, OH USA

Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors

Varanasi, Chakrapani V; Barnes, Paul N; Yust, Nicholas A; Aug 2005; 13 pp.; In English

Contract(s)/Grant(s): Proj-3145

Report No.(s): AD-A457309; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Copper and Cu?Fe (Fe ~ 2.35 wt%) alloy substrates were thermo-mechanically processed and the biaxial texture development, magnetic properties, yield strength, and electrical resistivity were studied and compared to determine their suitability as substrates for high-temperature superconducting coated conductor applications. Average full width half maximum (FWHM) of 5.5 in Phi scans (in-plane alignment), and 6.6 in omega scans (out-of-plane alignment) was obtained in copper samples. Cu-Fe samples showed 5.9 FWHM in Phi scans and 5.9 in omega scans. Even with the presence of 2.35% Fe in the Cu-alloy, the saturation magnetization (Msat) value was found to be 4.27 emu g(exp -1) at 5 K, which is less than in Ni samples by an order of magnitude and comparable to that of Ni-9 at.% W substrates. The yield strength of the annealed Cu-Fe alloy substrate was found to be at least two times higher than that of similarly annealed copper substrates. The electrical resistivity of Cu-Fe alloy was found to be an order of magnitude higher than that of pure copper at 77 K.
DTIC
Axial Stress; Coatings; Conductors; Copper; Copper Alloys; Electrical Resistance; Iron Alloys; Substrates; Superconductors (Materials); Textures; YBCO Superconductors

20060055664 Naval Postgraduate School, Monterey, CA USA
Mathematical Modeling of Rail Gun
Pratikakis, Nikolaos; Sep 2006; 99 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457354; No Copyright; Avail.: CASI: A05, Hardcopy

The exit velocity of the launch object along with the values of electric and thermal conductivity at the interfaces between the rails and the armature of a rail gun are critical issues. This thesis, using finite element method, estimates the former by solving the proper multiphysics governing equations along with exploiting the contact theory between flat surfaces. A parametric analysis in the vicinity of the standard deviation of the normalized distance between the references planes of the rough surfaces was made for a variety of materials and textures at the interfaces. Furthermore, the amount of ohmic heat that is generated due to the application of the electric potential and the resistance of materials is estimated along with the average temperature at the interfaces. Finally, thermal stresses were also studied.
DTIC
Mathematical Models; Rails; Textures

20060055704 Michigan Univ., Ann Arbor, MI USA
The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IIIB-2: Permanent Composite Cladding of Deteriorating Steel Hulls
Horsmon, Jr, Albert W; Sep 1991; 11 pp.; In English
Report No.(s): AD-A457427; NSRP-0340; No Copyright; Avail.: CASI: A03, Hardcopy

The 42.7 m (140 ft) steel steam yacht (S/Y) MEDEA was nearly condemned in 1988 because of deteriorating steel hull plate. However, it was recently restored with a structural foam and composite skin bonded to the outside of the remaining steel structure. The composite repair was completed at a cost of $220,000 compared to the $1.7 million estimated to crop and replace the wasted steel plate. The repair, the events leading up to the repair, including U.S. Coast Guard approval, the structural and production decision making processes involved, and the projected use of an integrated production system for similar future applications are described in this paper. The use of similar processing technology to apply the glass epoxy composite coating on the wooden coastal minehunters (MHCs) is also discussed.
DTIC
Cladding; Conferences; Deterioration; Hulls (Structures); Marine Technology; Ship Hulls; Ships; Steels

20060056212 Lawrence Livermore National Lab., Livermore, CA USA
Mechanical and Thermal Properties of Ultra-High Carbon Steel Containing Aluminum
Syn, C. K.; Lesuer, D. R.; Goldberg, A.; Tsai, H. C.; Sherby, O. D.; Oct. 03, 2005; 8 pp.; In English
Report No.(s): DE2006-891732; UCRL-PROC-215848; No Copyright; Avail.: Department of Energy Information Bridge

The properties of ultrahigh carbon steels (UHCS) are strongly influenced by aluminum additions. Hardness studies of quenched UHCS-Al alloys reveal that the temperature for the start of transformation increases with increases in aluminum content. It is shown that this change is a function of the atomic percent of solute and of the valence state when comparisons are made with UHCSs containing silicon and tin as solutes. The thermal expansion of UHCSs with dilute aluminum additions shows no discontinuity in the vicinity of the ferrite-austenite transformation temperature. This is the result of a three phase region of ferrite, carbides and austenite. The slope of the expansion curve is higher in the austenite range than in the ferrite range as a result of the dissolution of carbon in austenite with temperature. Processing to achieve a fine grain size in UHCS-Al

alloys was principally by hot and warm working (HWW) followed by isothermal warm working (IWW).
NTIS
Aluminum; Aluminum Alloys; Carbon Steels; Mechanical Properties; Thermodynamic Properties

20060056222 Knolls Atomic Power Lab., Schenectady, NY, USA
Space Shielding Materials for Prometheus Application
Jan. 20, 2006; 32 pp.; In English
Report No.(s): DE2006-883693; No Copyright; Avail.: Department of Energy Information Bridge

At the time of Prometheus program restructuring, shield material and design screening efforts had progressed to the point where a down-selection from approximately eighty-eight materials to a set of five ''primary'' materials was in process. The primary materials were beryllium (Be), boron carbide (B(sub 4)C), tungsten (W), lithium hydride (LiH), and water (H(sub 2)O). The primary materials were judged to be sufficient to design a Prometheus shield--excluding structural and insulating materials, that had not been studied in detail. The foremost preconceptual shield concepts included: (1) a Be/B(sub 4)C/W/LiH shield; (2) a Be/B(sub 4)C/W shield; (3) and a Be/B(sub 4)C/H(sub 2)O shield. Since the shield design and materials studies were still preliminary, alternative materials (e.g., (sup nal)B or (sup 10)B metal) were still being screened, but at a low level of effort. Two competing low mass neutron shielding materials are included in the primary materials due to significant materials uncertainties in both. For LiH, irradiation-induced swelling was the key issue, whereas for H(sub 2)O, containment corrosion without active chemistry control was key, Although detailed design studies are required to accurately estimate the mass of shields based on either hydrogenous material, both are expected to be similar in mass, and lower mass than virtually any alternative. Unlike Be, W, and B(sub 4)C, which are not expected to have restrictive temperature limits, shield temperature limits and design accommodations are likely to be needed for either LiH or H(sub 2)O. The NRPCT focused efforts on understanding swelting of LiH, and observed, from approximately fifty prior irradiation tests, that either casting ar thorough out-gassing should reduce swelling. A potential contributor to LiH swelling appears to be LiOH contamination due to exposure to humid air, that can be eliminated by careful processing. To better understand LiH irradiation performance and mitigate the risks in LiH development for a project with an aggressive schedule like JIMO, some background or advanced development effort for LiH should be considered for future space reactor projects.
NTIS
Lithium Hydrides; Prometheus; Shielding; Spacecraft Construction Materials

20060056248 NASA Glenn Research Center, Cleveland, OH, USA
Burst Testing and Analysis of Superalloy Disks With a Dual Grain Microstructure
Gayda, John; Kantzos, Pete; October 2006; 21 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): WBS 259.02.07.03
Report No.(s): NASA/TM-2006-214462; E-15726; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056248; Avail.: CASI: A03, Hardcopy

Elastic-plastic finite element analyses of room temperature burst tests on four superalloy disks were conducted and reported in this paper. Two alloys, Rene 104 (General Electric Aircraft Engines) and Alloy 10 (Honeywell Engines & Systems), were studied. For both alloys an advanced dual microstructure disk, fine grain bore and coarse grain rim, were analyzed and compared with conventional disks with uniform microstructures, coarse grain for Rene 104 and fine grain for Alloy 10. The analysis and experimental data were in good agreement up to burst. At burst, the analysis underestimated the speed and growth of the Rene 104 disks, but overestimated the speed and growth of the Alloy 10 disks. Fractography revealed that the Alloy 10 disks displayed significant surface microcracking and coalescence in comparison to Rene 104 disks. This phenomenon may help explain the differences between the Alloy 10 disks and the Rene 104 disks, as well as the observed deviations between analytical and experimental data at burst.
Author
Burst Tests; Heat Resistant Alloys; Microstructure; Engine Design; Disks (Shapes); Grains

20060056306 Bettis Atomic Power Lab., West Mifflin, PA, USA
Specifications, Pre-Experimental Predictions, and Test Plate Characterization Information for the Prometheus Critical Experiments
Zerkie, M. L.; Meyers, M. E.; Tarves, S. M.; Powers, J. J.; Apr. 2006; 422 pp.; In English
Report No.(s): DE2006-883627; B-TM-1639; No Copyright; Avail.: National Technical Information Service (NTIS)

This report provides specifications, pre-experimental predictions, and test plate characterization information for a series

of molybdenum (Mo), niobium (Nb), rhenium (Re), tantalum (Ta), and baseline critical experiments that were developed by the Naval Reactors Prime Contractor Team (NRPCT) for the Prometheus space reactor development project. In March 2004, the Naval Reactors program was assigned the responsibility to develop, design, deliver, and operationally support civilian space nuclear reactors for NASA's Project Prometheus. The NRPCT was formed to perform this work and consisted of engineers and scientists from the Naval Reactors (NR) Program prime contractors: Bettis Atomic Power Laboratory, Knolls Atomic Power Laboratory (KAPL), and Bechtel Plant Machinery Inc (BPMI). The NRPCT developed a series of clean benchmark critical experiments to address fundamental uncertainties in the neutron cross section data for Mo, Nb, Re, and Ta in fast, intermediate, and mixed neutron energy spectra. These experiments were to be performed by Los Alamos National Laboratory (LANL) using the Planet vertical lift critical assembly machine and were designed with a simple, geometrically clean, cylindricat configuration consisting of alternating layers of test, moderator/reflector, and fuel materials. Based on reprioritization of missions and funding within NASA, Naval Reactors and NASA discontinued their collaboration on Project Prometheus in September 2005. One critical experiment and eighteen subcritical handstacking experiments were completed prior to the termination of work in September 2005. Information on the Prometheus critical experiments and the test plates produced for these experiments are expected to be of value to future space reactor development programs and to integral experiments designed to address the fundamentat neutron cross section uncertainties for these refractory metals. This information is being provided as an orderly closeout of NRPCT work on Project Prometheus.
NTIS
Characterization; Critical Experiments; Prometheus

20060056347 Savannah River National Lab., Aiken, SC, USA
Effect of Tritium and Decay Helium On Weldment Fracture Toughness
Morgan, M. J.; West, S. L.; Tosten, M. H.; January 2006; 6 pp.; In English
Report No.(s): DE2006-891685; WSRC-STI-2006-00186; No Copyright; Avail.: Department of Energy Information Bridge
Welded stainless steel vessels are used for the containment of tritium gas. Weldments have not been well-characterized with respect to embrittlement by tritium and its radioactive decay product and fracture toughness properties are needed to assess the long-term effects of tritium on crack nucleation and growth in tritium reservoirs. The purpose of this work was to measure the fracture toughness properties of tritium-exposed-and-aged weldments and compare them to base metal toughness. This paper is a summary of a more comprehensive SRNL report issued in July of 2006.
NTIS
Fracture Strength; Helium; Pressure Vessels; Tritium; Welded Joints

27
NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials. For composite materials see *24 Composite Materials*.

20060054223 International Trade Commission, Washington, DC USA
Pressure Sensitive Plastic Tape from Italy. Investigation No. AA1921-167 (Second Review)
Jun. 2004; 55 pp.; In English
Report No.(s): PB2007-101159; USITC/PUB-3698; No Copyright; Avail.: CASI: A04, Hardcopy
On the basis of the record developed in the subject five-year review, the USA International Trade Commission determines, pursuant to section 751(c) of the Tariff Act of 1930 (19 U.S.C. section 1675(c)) (the Act), that revocation of the antidumping finding on pressure sensitive plastic tape from Italy would be likely to lead to continuation or recurrence of material injury to an industry in the USA within a reasonably foreseeable time.
NTIS
Extruding; International Trade; Italy; Plastic Tapes; Sensitivity

20060054224 International Trade Commission, Washington, DC USA
Polyethylene Terephthalate (PET) Film from Korea. Investigation No. 731-TA-459 (Second Review)
Sep. 2005; 54 pp.; In English
Report No.(s): PB2007-101158; USITC/PUB-3800; No Copyright; Avail.: CASI: A04, Hardcopy
On the basis of the record developed in the subject five-year review, the USA International Trade Commission determines, pursuant to section 751(c) of the Tariff Act of 1930 (the Act), that revocation of the antidumping duty order on PET film from

Korea would be likely to lead to continuation or recurrence of material injury to an industry in the USA within a reasonably foreseeable time.
NTIS
International Trade; Korea; Polyethylene Terephthalate

20060054227 International Trade Commission, Washington, DC USA
Automotive Replacement Glass Windshields from China. Investigation No. 731-TA-922 (Final). Determination and Views of the Commission
Mar. 2002; 36 pp.; In English
Report No.(s): PB2007-101143; USITC/PUB-3494; No Copyright; Avail.: CASI: A03, Hardcopy

The Commission instituted this investigation on March 20, 2001, following receipt of a petition filed with the Commission and the Department of Commerce by PPG Industries, Inc., Pittsburgh, PA; Safelite Glass Corp., Columbus, OH; and Apogee Enterprises, Inc., Minneapolis, MN. The final phase of the investigation was scheduled by the Commission following notification of a preliminary determination by the Department of Commerce that imports of automotive replacement glass windshields from China were being sold at Less Than Fair Value (LTFV) within the meaning of section 733(b) of the Act (19 U.S.C. Section 1673b(b)). On the basis of the record developed in the subject investigation, the USA International Trade Commission determines, pursuant to section 735(b) of the Tariff Act of 1930 (19 U.S.C. Section 1673d(b)) (the Act), that an industry in the USA is materially injured by reason of imports of automotive replacement glass windshields from China, provided for in subheading 7007.21.10 of the Harmonized Tariff Schedule of the USA, that have been found by the Department of Commerce to be sold in the USA at less than fair value (LTFV). The Commission further determines that critical circumstances do not exist with regard to those imports of the subject merchandise from China that were subject to the affirmative critical circumstances determination by the Department of Commerce.
NTIS
Automobiles; China; Glass; International Trade; Replacing; Windshields

20060054270 Knolls Atomic Power Lab., Schenectady, NY, USA
Initial Assessment of Environmental Barrier Coatings for the Prometheus Project
Frederick, M. J.; Dec. 15, 2005; 50 pp.; In English
Report No.(s): DE2006-883656; MDO-723-0018; No Copyright; Avail.: Department of Energy Information Bridge

Depending upon final design and materials selections, a variety of engineering solutions may need to be considered to avoid chemical degradation of components in a notional space nuclear power plant (SNPP). Coatings are one engineered approach that was considered. A comprehensive review of protective coating technology for various space-reactor structural materials is presented, including refractory metal alloys (molybdenum (Mo), tungsten (W), rhenium (Re), tantalum (Ta), and niobium (Nb), nickel (Ni)-base superalloys, and silicon carbide (Sic). A summary description of some common deposition techniques is included. A literature survey identified coatings based on silicides or iridium/rhenium as the primary methods for environmental protection of refractory metal alloys. Modified aluminide coatings have been identified for superalloys and multilayer ceramic coatings for protection of Sic. All reviewed research focused on protecting structural materials from extreme temperatures in highly oxidizing conditions. Thermodynamic analyses indicate that some of these coatings may not be protective in the high-temperature, impure-He environment expected in a Prometheus reactor system. Further research is proposed to determine extensibility of these coating materials to less-oxidizing or neutral environments.
NTIS
Nuclear Power Plants; Prometheus; Protective Coatings

20060055412 Army Research Lab., Aberdeen Proving Ground, MD USA
Multiscale Mechanical Characterization of Biomimetic Physically Associating Gels
Juliano, Thomas F; Forster, Aaron M; Drzal, Peter L; Weerasooriya, Tusit; Moy, Paul; VanLandingham, Mark R; Sep 2006; 16 pp.; In English
Contract(s)/Grant(s): Proj-AH7G
Report No.(s): AD-A457036; ARL-RP-134; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457036; Avail.: CASI: A03, Hardcopy

The mechanical response of living tissue is important to understanding the injury-risk associated with impact events. Often, ballistic gelatin or synthetic materials are developed to serve as tissue surrogates in mechanical testing. Unfortunately, current materials are not optimal and present several experimental challenges. Bulk measurement techniques, such as

compression and shear testing geometries, do not fully represent the stress states and rate of loading experienced in an actual impact event. Indentation testing induces deviatoric stress states as well as strain rates not typically available to bulk measurement equipment. In this work, a ballistic gelatin and two styrene-isoprene triblock copolymer gels are tested and compared using both macroscale and microscale measurements. A methodology is presented to conduct instrumented indentation experiments on materials with a modulus far below 1 MPa. The synthetic triblock copolymer gels were much easier to test than the ballistic gelatin. Compared to ballistic gelatin, both copolymer gels were found to have a greater degree of thermal stability. All of the materials exhibit strain-rate dependence, although the magnitude of dependence was a function of the loading rate and testing method.
DTIC
Ballistics; Biomimetics; Block Copolymers; Gels; Mechanical Properties

20060055592 Army Research Lab., Aberdeen Proving Ground, MD USA
Compressed Elastomer Method for Internal Pressure Testing
Carter, Robert; Sep 2006; 22 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457212; ARL-TR-3921; No Copyright; Avail.: CASI: A03, Hardcopy

The compressed elastomer likethod is a safe and easy technique for generating high internal pressure for tubular samples. The approach compresses a cylinder of an elastomeric numerial and uses the Poisson's expansion to generate internal pressure. The equations needed to convert the axial force to the internal pressure are derived and the procedure is verified using a steel control sample. To date. pressures have been generated in excess of 340 MPa (50 ksi).
DTIC
Elastomers; Internal Pressure

20060055813 Gordon Research Conferences, Inc., Kingston, RI USA
2006 Gordon Research Conference on Ceramics, Solid Studies In
Blendell, John E; Gray, Nancy R; Aug 18, 2006; 9 pp.; In English
Contract(s)/Grant(s): N00014-06-1-1041
Report No.(s): AD-A457605; No Copyright; Avail.: CASI: A02, Hardcopy

The Gordon Research Conference (GRC) on CERAMICS, SOLID STATE STUDIES IN was held at Proctor Academy from 8/13/2006 thru 8/18/2006. The Conference was well-attended with 101 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. In designing the formal speakers program, emphasis was placed on current unpublished research and discussion of the future target areas in this field. There was a conscious effort to stimulate lively discussion about the key issues in the field today. Time for formal presentations was limited in the interest of group discussions. In order that more scientists could communicate their most recent results, poster presentation time was scheduled. Attached is a copy of the formal schedule and speaker program and the poster program. In addition to these formal interactions, 'free time' was scheduled to allow informal discussions. Such discussions are fostering new collaborations and joint efforts in the field.
DTIC
Ceramics; Conferences; Microstructure

20060056122 Air Force Research Lab., Aberdeen Proving Ground, MD USA
Inactivation of Bacillus Anthracis Spores Delivered as Liquid Suspension or Aerosol to Self-Decontaminating Fabric
Prugh, Amber; Calomiris, Jon J; May 2006; 15 pp.; In English
Contract(s)/Grant(s): Proj-OSCB
Report No.(s): AD-A457612; No Copyright; Avail.: CASI: A03, Hardcopy

BACKGROUND: Military fabric amended with an antimicrobial compound could reduce the viability of biological agents that could be encountered during operations in contaminated environments. In this study, military fabric treated with a chlorine-based compound was evaluated for activity against the Bacillus anthracis spore delivered as an aerosol or a liquid suspension. METHODS: Military fabric samples with and without antimicrobial treatment were inoculated with B. anthracis spores from an aqueous suspension and incubated in an exposure chamber under controlled relative humidity (RH) and temperature. In addition, a stream of aerosolized B. anthracis spores was delivered to fabric samples under controlled conditions. After specified time intervals of exposure in the chamber or the aerosol system, spores were eluted from fabric samples and enumerated by cultivation on Nutrient Agar and direct microscopic count. Efficacy of the chlorine-based

compound was assessed by comparing cultivable percentages of spores eluted from the treated fabric to cultivable percentages of spores eluted from untreated fabrics or treated fabrics at the initial exposure time. CONCLUSIONS: B. anthracis spores can be killed during contact with military fabric amended with a chlorine-based compound. However, temperature and relative humidity are factors in the degree of inactivation.
DTIC
Activation (Biology); Aerosols; Bacillus; Bactericides; Chlorine; Deactivation; Decontamination; Fabrics; Spores

20060056462 Oak Ridge National Lab., TN USA
Comprehensive Creep and Thermophysical Performance of Refractory Materials
Ferber, M. K.; Weresczak, A. A.; Hemrick, J. G.; Jun. 2006; 86 pp.; In English
Report No.(s): DE2006-885151; ORNL/TM-2005-134; No Copyright; Avail.: Department of Energy Information Bridge

Furnace designers and refractory engineers recognize that optimized furnace superstructure design and refractory selection are needed as glass production furnaces are continually striving toward greater output and efficiencies. Harsher operating conditions test refractories to the limit, while changing production technology (such as the conversion to oxy-fuel from traditional air-fuel firing) can alter the way the materials perform. Refractories for both oxy- and air-fuel fired furnace superstructures are subjected to high temperatures that may cause them to creep excessively or subside during service if the refractory material is not creep resistant, or if it is subjected to high stress, or both. Furnace designers can ensure that superstructure structural integrity is maintained if the creep behavior of the refractory material is well understood and well represented by appropriate engineering creep models. Several issues limit the abilities of furnace designers to (1) choose the optimum refractory for their applications, (2) optimize the engineering design, or (3) predict the service mechanical integrity of their furnace superstructures.
NTIS
Creep Properties; Furnaces; Glass; Refractory Materials; Refractories; Thermophysical Properties

28
PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; their storage and handling procedures; and aircraft fuels. For nuclear fuels see *73 Nuclear Physics*. For related information see also *07 Aircraft Propulsion and Power; 20 Spacecraft Propulsion and Power*; and *44 Energy Production and Conversion*.

20060055562 United Technologies Research Center, East Hartford, CT USA
Advanced Fuel Development and Fuel Combustion. Delivery Order 0005: Mitigation of Particulates Using Fuel Additives
Colket, M B; Liscinsky, D S; True, B; Apr 2006; 63 pp.; In English
Contract(s)/Grant(s): F33615-97-D-2784-0005; Proj-3048
Report No.(s): AD-A457155; UTRC/06-5.100.0037-1; No Copyright; Avail.: CASI: A04, Hardcopy

The overall technical objective of the program was to develop an additive for JP-8, JP-5, and diesel fuels that will reduce both the mass Emissions Index (grams of PM2.5 emissions/kilogram of fuel) and the number density Emissions Index (particle number density of PM2.5 emissions/kilogram of fuel) in the exhaust of military gas turbine engines by 70 percent. This report summarizes the results of work performed at United Technologies Research Center. Baseline studies were performed with ethanol added to ethylene, as the method and procedures could be validated against the existing experimental database. Experiments were performed in laminar premixed burner-stabilized flat flames. Soot was reduced by factors of about 50% with ethanol. Subsequent tests were performed with mixtures of heptane/toluene/ethylene to provide a better simulation of real fuel chemistry. The most significant effects were observed with a proprietary additive which apparently contains a metal. The use of metals is not perceived to be an environmentally acceptable approach. The next most effective additive is a commercial fuel additive, Kleen, which contains a variety of oxygenated (nitro) compounds. Reductions of soot emissions on the order of 30% were observed. Mixed results were obtained with pyridine, and modeling results show negligible influence of this additive. Finally, advances to a fundamental soot formation model were accomplished by comparing simulations of coflow diffusion flames to experimental data sets. This work resulted in proposed changes to the gas-phase kinetics and soot inception models and identifying the importance of treating soot ageing and radiation losses. The overall goal of identifying an additive that can

reduce soot emissions by 70% was not achieved, without use of a metal-containing additive or with very high levels of the additive (\g10% by weight).
DTIC
Additives; Fuel Combustion; Particulates

20060055603 Mitre Corp., McLean, VA USA
Reducing DoD Fossil-Fuel Dependence
Dimotakis, Paul; Grober, Robert; Lewis, Nate; Sep 2006; 104 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457233; JSR-06-135; No Copyright; Avail.: CASI: A06, Hardcopy

In light of an increasing U.S. dependence on foreign oil, as well as rising fuel costs for the U.S. and the DoD, and implications with regard to national security and national defense, the JASONs were charged in 2006 by the DDR&E with assessing pathways to reduce DoD's dependence on fossil fuels. The study charge included the following tasks: A. Explore technology options to reduce the DoD dependence on fossil fuels and/or increase energy efficiency of our operating forces. This assessment will include an assessment of alternative fuels and energy sources at DoD-required energy densities, e.g., exotic alternate fuels, biomass/cellulosic biofuels, hydrogen, shale oil, oil sands, geothermal, etc., and an assessment of the potential of structural shaping, structural mechanical design, and novel materials application in enhancing the survivability of lightweight vehicles. B. Assess the viability of technologies to provide at least the performance required of current DoD platforms and effort to integrate the technology and achieve the desired level of performance. In particular, alternate fuels and energy sources are to be assessed in terms of multiple parameters, to include (but not limited to) stability, high & low temperature properties, water affinity, storage & handling. C. Assess blast and penetration resistance in lightweight vehicles. D. Analyze structures and materials designs that could be adapted for use on combat and utility vehicles, or other DoD platforms. E. In addition, JASON was asked to defer detailed analyses of USAF energy/fuel use.
DTIC
Defense Program; Fossil Fuels

20060055809 Naval Postgraduate School, Monterey, CA USA
Fuel Injection Strategy for a Next Generation Pulse Detonation Engine
Robbins, Tad J; Jun 2006; 79 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-06-WR2-0161
Report No.(s): AD-A457600; No Copyright; Avail.: CASI: A05, Hardcopy

The Pulse Detonation Engine offers the Department of Defense a new low cost, light weight, and efficient solution to supersonic flight on many of its small airborne platforms. In the past, both liquid fuel and gaseous fuel designs have been partially developed and tested. Several aspects of these configurations have led to the need for the development of a new design, in particular the reduction of total pressure losses, and the removal of auxiliary oxygen system previously required to initiate a detonation wave in fuel-air mixtures within practical distances. Furthermore, higher repetition rates are required for practical thrust levels, as well as the use of liquid fuels, as these are more attractive due to their higher energy densities. A new PDE configuration was designed to operate on the liquid fuel, JP-10. The fuel injection system was characterized using laser diagnostics so that the fuel injection strategy could be optimized for the specified operating conditions. The timing parameters for the fuel-air injection profile were characterized as well in order to deliver the desired amount and duration. This was a concurrent effort with computational simulations of the internal flow paths, design/integration of a novel transient plasma ignition system, and ongoing developments of a performance measurement test rig.
DTIC
Fuel Injection; Pulse Detonation Engines

20060056182 NASA Glenn Research Center, Cleveland, OH, USA
Metallized Gelled Propellants Combustion Experiments in a Pulse Detonation Engine
Palaszewski, Bryan; Jurns, John; Breisacher, Kevin; Kearns, Kim; October 2006; 26 pp.; In English; AIAA Joint Propulsion Conference, 11-14 Jul. 2004, Fort Lauderdale, FL, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 22.708.03.03
Report No.(s): NASA/TM-2006-214119; E-15454; AIAA Paper 2004-4191; Copyright; Avail.: CASI: A03, Hardcopy

A series of combustion tests were performed with metallized gelled JP 8/aluminum fuels in a Pulse Detonation Engine (PDE). Nanoparticles of aluminum were used in the 60 to 100 nanometer diameter. Gellants were also of a nanoparticulate type composed of hydrocarbon alkoxide materials. Using simulated air (a nitrogen-oxygen mixture), the ignition potential of

metallized gelled fuels with nanoparticle aluminum was investigated. Ignition of the JP 8/aluminum was possible with less than or equal to a 23-wt% oxygen loading in the simulated air. JP 8 fuel alone was unable to ignite with less than 30 percent oxygen loaded simulated air. The tests were single shot tests of the metallized gelled fuel to demonstrate the capability of the fuel to improve fuel detonability. The tests were conducted at ambient temperatures and with maximal detonation pressures of 1340 psia.
Author
Combustion; Gelled Propellants; Metallizing; Pulse Detonation Engines; JP-8 Jet Fuel

20060056348 Fluor Daniel Hanford, Inc., Richland, WA, USA
Closure Welding Radioactive Materials Containers at the Department of Energy (DOE) Hanford Site
Cannell, G. R.; Aug. 2006; 7 pp.; In English
Report No.(s): DE2006-891686; HNF-29195; No Copyright; Avail.: Department of Energy Information Bridge
The Department of Energy's (DOE) responsibility for the disposition of radioactive materials has given rise to several unique welding applications. Many of these materials require packaging into containers for either interim or long-term storage. It is not uncommon that final container fabrication, i.e., closure welding, is performed with these materials already placed into the container. Closure welding is typically performed remote to the container, and routine post-weld testing and nondestructive examination (NDE) are often times not feasible.
NTIS
Radioactive Materials; Welding

31
ENGINEERING (GENERAL)

Includes general research topics related to engineering and applied physics, and particular areas of vacuum technology, industrial engineering, cryogenics, and fire prevention. For specific topics in engineering see *categories 32 through 39*.

20060055595 Naval Research Lab., Washington, DC USA
Portable Precision Frequency Meter
Jensen, G K; McGeogh, James E; Sep 6, 1949; 30 pp.; In English
Report No.(s): AD-A457218; NRL-3527; No Copyright; Avail.: CASI: A03, Hardcopy
The portable frequency meter proposed in this report measures any frequency in the range of 5 Mc to 1407 Mc to an accuracy within three parts per million, 0.0003 percent. This self-contained frequency meter provides a stable comparison frequency of known calibration which is compared with the unknown frequency through a crystal mixer, video amplifier type receiver, and the unknown is identified by the use of the associated filter and indicator circuits. The stable oscillator is positioned by an automatic frequency control loop consisting primarily of a direct reading, four decade frequency divider, a phase discriminator, a reactance tube, and a temperature controlled crystal oscillator which provides a very stable control frequency at the phase discriminator. Frequency change of the positioned oscillator is made by switching of the four decade divider controls. The proposed frequency meter will require no external calibration curves or tables, but will present the frequency reading on the front panel in the form of a very simple frequency equation. Operation of the meter will be simple and direct.
DTIC
Frequencies; Frequency Measurement

20060055625 Army Defense Ammunition Center, McAlester, OK USA
40'x44' Metal Pallet With Metal Adapters With PA125 Metal Boxes, MIL-STD-1660 First Article Tests
Dugan, Jeffery L; Aug 2006; 29 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457267; DAC/VED-06-03; No Copyright; Avail.: CASI: A03, Hardcopy
The U.S. Army Defense Ammunition Center (DAC), Validation Engineering Division (SJMAC-DEV) conducted First Article Tests in accordance with MIL-STD-1660, 'Design Criteria for Ammunition Unit Loads' on the 40' x 48' metal pallet with metal adapters with PA125 metal boxes manufactured by Choctaw Manufacturing and Development Corporation (CDMC), from Hugo, Oklahoma. Six test units were tested. The test units were loaded and passed with a load of 2,560 lbs each for Test Units no. 1 and no. 2 and 2,565 lbs for Test Units no. 3 through no 6. The tests accomplished on Test Units no. 1, no. 2 and no. 3 were the stacking, vibration, drop, incline-impact, sling compatibility, forklift handling, and disassembly tests. Test Units no. 4, no. 5 and no. 6 were stack tested only. Test Units no. 1, no. 2 and no. 3 sustained minor damage on

the welds between the skids and the posts during testing. Test Units no. 1 and no. 2 had the middle post break through the deck. All damage was deemed minor in nature and not deemed a cause for failure. As a result of the performance of the 40' x 48' metal pallet with metal adapters with PA125 metal boxes manufactured by Choctaw Manufacturing and Development Corporation (CDMC), from Hugo, Oklahoma is recommended for use by the USA Army.
DTIC
Adapters; Evaluation; System Effectiveness

20060055700 Naval Postgraduate School, Monterey, CA USA
Testing Template and Testing Concept of Operations for Speaker Authentication Technology
Sipko, Marek M; Sep 2006; 119 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457420; No Copyright; Avail.: CASI: A06, Hardcopy

This thesis documents the findings of developing a generic testing template and supporting concept of operations for speaker verification technology as part of the Iraqi Enrollment via Voice Authentication Project (IEVAP). The IEVAP is an Office of the Secretary of Defense sponsored research project commissioned to study the feasibility of speaker verification technology in support of the Global War on Terrorism security requirements. The intent of this project is to contribute toward the future employment of speech technologies in a variety of coalition military operations by developing a pilot proof-of-concept system that integrates speaker verification and automated speech recognition technology into a mobile platform to enhance warfighting capabilities. In this phase of the IEVAP, NPS developed a generic testing template and supporting concept of operations for speaker authentication technology. The intent of this project was to contribute toward the future employment of speech technologies in a variety of coalition military operations by developing a testing template along with a concept of operations to conduct such testing.
DTIC
Computer Information Security; Evaluation; Security; Speech Recognition; System Effectiveness; Templates

20060055779 Naval Postgraduate School, Monterey, CA USA
Measuring the Value of Graduate Manpower Systems Analysis Education for Naval Officers
O'Sullivan, Lindsay M; Jun 2006; 101 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457550; No Copyright; Avail.: CASI: A06, Hardcopy

This thesis examines methods to assess the value of the Manpower Systems Analysis (MSA) Curriculum at the Naval Postgraduate School. What exactly does the Navy get in return from the MSA curriculum graduates? Is the return on investment simply an increase in 'Quality of Life,' thus increasing retention? Or does the MSA curriculum teach graduates the necessary skills for follow-on billets? Individuals in the private and public sections have tried to quantify the value of both training and education. However, currently most measures of effectiveness are based purely on financial aspects of the education. Little has been done to capture the result of the investments in human capital on any part of the organization. The result of this research is the creation of two surveys that will be used as vehicles to access the value of the MSA curriculum to the Navy and to the graduate. The surveys created are for MSA graduates and their immediate supervisors. This research identifies specific measures and survey techniques that can be used to evaluate education and training. In the future, this approach can be applied to other curricula.
DTIC
Education; Human Resources; Manpower; Surveys; Systems Analysis

32
COMMUNICATIONS AND RADAR

Includes radar; radio, wire, and optical communications; land and global communications; communications theory. For related information see also 04 Aircraft Communications and Navigation; and *17 Space Communications, Spacecraft Communications, Command and Tracking*; for search and rescue, see *03 Air Transportation and Safety*; and *16 Space Transportation and Safety*.

20060054147 Nippon Telegraph and Telephone Public Corp., Tokyo, Japan
NTT Technical Review, Volume 1, No. 4
July 2003; ISSN 1348-3447; 76 pp.; In English; See also 20060054148 - 20060054157; Original contains color illustrations; Copyright; Avail.: Other Sources

The Nippon Telegraph and Telephone (NTT) Technical Review is presented. The topics include: 1) IP Network Technologies for the Ubiquitous Era; 2) Trends in Research and Development of Software Defined Radio; 3) Software Defined

Radio Prototype (I) - System Design and Performance Evaluation; 4) Software Defined Radio Prototype (II) - Implementation and Evaluation of IEEE 802.11 Wireless LAN; 5) A Wideband RF Chipset for Multi-band Direct Conversion Transceivers; 6) High Availability Server Platform for Operations Support System; 7) Service Management System for IP Services; 8) Real-Time Application Traffic Monitoring System for Streaming Data Quality Evaluation; 9) Standardization Activities on Optical Networking; and 10) 'GMPLS Signaling Protocol Interoperability Test in Multilayer Network' - Toward a Global Standard for the Next-Generation Photonic Network.
CASI
Telegraph Systems; Communication Networks; Internets; Systems Engineering

20060054149 Nippon Telegraph and Telephone Public Corp., Yokosuka, Japan
Standardization Activities on Optical Networking
Nagatsu, Naohide; Oda, Kazuhiro; NTT Technical Review, Volume 1, No. 4; July 2003, pp. 65-68; In English; See also 20060054147; Copyright; Avail.: Other Sources

This article overviews global standardization activities on next-generation optical networking which has been propoted in ITU-TSG15/WP3. Work on OTN (Optical Transport Network) and Automatic Switched Optical Network (ASON) and their intended objectives are introduced, highlighting the relationship between ASON and GMPLS (Generalized MulitProtocol Label Switching) which is undergoing standardization in IETF (Internet Engineering Task Force)
Author
Internets; Optical Communication; Optical Interconnects; Standardization

20060054150 Nippon Telegraph and Telephone Public Corp., Japan
IP Network Technologies for the Ubiquitous Era
Seino, Kouichi; NTT Technical Review, Volume 1, No. 4; July 2003, pp. 4-9; In English; See also 20060054147; Copyright; Avail.: Other Sources

The Emerging communication Architecture project of NTT network service systems Laboratories has been promoting research in IP network platform technologies with a view toward the ubiquitous era for the past several years. Now that IPv6 is about to become a standard protocol, we spoke to Project Manager Kouichi Seino about the types of services that will become available and where this field is heading in the near future.
Author
Protocol (Computers); Internets; Technological Forecasting

20060054154 Nippon Telegraph and Telephone Public Corp., Yokosuka, Japan
A Wideband RF Chipset for Multi-band Direct Conversion Transceivers
Kawashima, Muenari; Nakagawa, Tadao; Hayashi, Hitoshi; Nishikawa, Kenjiro; NTT Technical Review, Volume 1, No. 4; July 2003, pp. 31-39; In English; See also 20060054147; Copyright; Avail.: Other Sources

In a software-defined radio, the RF (Radio-Frequency) front-end must cope with multi-band radio signals. Therefore, we developed a wideband RF chipset for multi-band direct conversion transceivers. The chipset consists of a wideband quadrature mixer, a wideband low-noise variable-gain amplifier (LNVGA), and a multi-band local oscillator. The mixer achieves its wideband performance through the incorporation of newly developed power dividers. The LNVGA attains its wideband performance with out the use of reactance elements. It also has high linearity due to a feedback circuit using two anti-series field-effect transistors. The local oscillator is able to cover the frequency bands of three systems, including a frequency-division duplexing system, while using only two voltage-controlled oscillators.
Author
Voltage Controlled Oscillators; Field Effect Transistors; Transmitter Receivers; Quadratures; Radio Frequencies; Radio Signals; Mixers; Broadband; Duplexers

20060054156 Nippon Telegraph and Telephone Public Corp., Yokosuka, Japan
Trends in Research and Development of Software Defined Radio
Uehara, Kazuhiro; Araki, Katsuhiko; Umehira, Masahiro; NTT Technical Review, Volume 1, No. 4; July 2003, pp. 10-14; In English; See also 20060054147; Copyright; Avail.: Other Sources

Software defined radio, which is constructed with programmable devices such as digital signal processors and field programmable gate arrays is an attractive technology that enables a single terminal to handle various kinds of wireless systems: the terminal's software is simply changed to reconfigure its functions. This paper reviews the background and trends

in the research and development of software defined radio and introduces NTT's recent activities.
Author
Signal Processing; Technological Forecasting; Technology Assessment; Radio Transmission

20060054170 National Inst. of Information and Communications Technology, Tokyo, Japan
Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1
Kuroiwa, Hiroshi, Editor; Tawara, Yasuo, Editor; Wakana, Hiromitsu, Editor; Fukanaga, Kaori, Editor; March 2006; ISSN 1349-3205; 169 pp.; In English; See also 20060054171 - 20060054186; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

Topics covered include: Research Activities on EMC in NICT; Use of Electromagnetic Energy and Resultant Noises; Uncertainty Estimation of Loop Antenna Calibration System in MF/HF Band; Evaluation of Uncertainty of Horn Antenna Calibration with the Frequency range of 1 GHz to 18 GHz; Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department; Development of the Measurement Technology of the Spurious Emission from Primary Radar; Total Radiated Power of Radio Transmitters Measured in a Reverberation Chamber; Electromagnetic Disturbance Measurement by Using Amplitude Probability Distribution for Protecting Digital Wireless Communication Systems; Power Measurement Emitted by UWB System in Time Domain; Effects of Spread Spectrum Clocking on Measured Noise Spectra; Studies on Dosimetry of Human-Body Exposure to Electromagnetic Field; Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines; Development of Exposure Systems and Exposure Assessment for Studies on Biological Effect of Electromagnetic Field; Electromagnetic Field Distribution Measurements using an Optically Scanning Probe System; A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope; and Software Defined Radio, its Programmable Signal-Processing Unit, and Central Control Signal-Processing Unit.
Derived from text
Electromagnetic Compatibility; Electromagnetic Fields; Information Systems; Microwave Frequencies; Radio Transmitters; Spread Spectrum Transmission; Wireless Communication; Telecommunication; Control Equipment; Electromagnetic Measurement

20060054171 National Inst. for Fusion Science, Japan
A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope
Den, Mitsue; Kuwabara, Takuhito; Ogawa, Tomoya; Tanaka, Takashi; Goncharnko, Igor; Amo, Hiroyoshi; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 151-157; In English; See also 20060054170; Copyright; Avail.: Other Sources

A three dimensional (3D) visualization system with a glassless stereoscope was developed for the real-time numerical simulator of interplanetary space-magnetosphere-ionosphere coupling system, adopting the 3D magneto-hydrodynamic (MHD) simulation code. The Earth magnetosphere simulator numerically reproduces the global response of the magnetosphere and ionosphere at real-time by the usage of real-time solar wind measurements obtained by the ACE spacecraft. Since November 2003, the simulator is capable visualizing on the Web two dimensional (2D) images of the global magnetosphere, updating every minute the images with one-hour forecast. The following 3D graphical techniques were implemented for standard and glassless stereo displays to visualize the simulated scalar and vector fields in 3D: volume and iso-surface rendering of colored slices and streamlines. A special fast interpolation method mapping the simulated data onto uniform rectilinear grids commonly utilized in computer graphics was developed for 3D monitoring of the simulated data in on-line mode.
Author
Real Time Operation; Computerized Simulation; Display Devices; Earth Magnetosphere; Magnetosphere-Ionosphere Coupling

20060054172 National Inst. of Information and Communications Technology, Tokyo, Japan
Total Radiated Power of Radio Transmitters Measured in a Reverberation Chamber
Harima, Katsushige; Yamanaka, Yukio; Sugiyama, Tsutomu; Shinozuka, Takashi; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 71-80; In English; See also 20060054170; Copyright; Avail.: Other Sources

A random electromagnetic field is created in a reverberation chamber by moving mechanical stirrers to vary the boundary condition. The received E-field strength caused by moving the stirrer is Rayleigh distributed and the field distribution is statistically uniform in an ideal reverberation chamber. The total radiated power of the EUT is obtained by the substitution

method from the average or median value of the E-field when the receiving antenna is placed so as to avoid the influence of the direct wave from the EUT. However, using the substitution method requires a great deal of time to measure the averaged received level for a broadband radiated source. The dimensions of the chamber and the structure of the stirrers affect the field uniformity in an actual chamber. The statistical characteristics of the spatial E-field distribution in a reverberation chamber are described, along with an efficient technique for measuring total radiated power ot broadband radiation sources and the statistical technique using a 63.2% value of the cumulative distribution that can reduce the influence of the direct wave.
Author
Electromagnetic Fields; Reverberation Chambers; Boundary Conditions; Field Strength; Broadband; Spatial Distribution

20060054173 National Inst. of Information and Communications Technology, Tokyo, Japan
Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department
Miki, Iwama; Katsumi, Fujii; Hiroshi, Masuzawa; Kunimasa, Koike; Makoto, Sakasai; Akira, Suzuki; Yoshiyuki, Miyazawa; Yukio, Yamanaka; Takashi, Shinozuka; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 43-58; In English; See also 20060054170; Copyright; Avail.: Other Sources

Wireless Communications Department / EMC Center started its attempt for obtaining the ISO/IEC17025 accreditation in 2004. The standard demands both good ability of calibration and proper resource for correct calibration. After we constructed our quality system, we applied for the accreditation to the National Institute of Technology and Evaluation in April 2005. The surveillance of papers and actual laboratory check was continuously performed during the year 2005. After a number of improvements and revisions of our systems, we were granted the accreditation for the JCSS and the ASNITE-CAL on 1 March 2006. In this paper the objective and motivation for ISO/IEC17025, the development of the system and calibration systems accredited are described.
Author
Calibrating; Wireless Communication; Radio Frequencies

20060054174 National Inst. of Information and Communications Technology, Tokyo, Japan
Electromagnetic Disturbance Measurement by Using Amplitude Probability Distribution for Protecting Digital Wireless Communication Systems
Gotoh, Kaoru; Matsumoto, Yasushi; Yamanaka, Yukio; Ishigami, Shinobu; Shinozuka, Takashi; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 81-90; In English; See also 20060054170; Copyright; Avail.: Other Sources

Digital wireless communication services spread rapidly in recent decades, and RF disturbance emitted from electric devices has higher frequency and wider bandwidth because of large increasing in clock speed of recent electric devices. However, the disturbance measurement methods specified in the international special committee on radion interference (CISPR) is unable to follow such situation at present. Amplitude probability distribution measurement which has been studied at CISPR as a new international standard, is known by the works of NICT that APD readings of disturbance correlate well with communication quality degradation of victim digital wireless communication systems. We report the latest findings in that studies and the situation of the international standardization and their application.
Author
Electromagnetic Measurement; Amplitude Distribution Analysis; Wireless Communication; Electromagnetic Noise

20060054175 National Inst. of Information and Communications Technology, Tokyo, Japan
Electromagnetic Field Distribution Measurements using an Optically Scanning Probe System
Takahasi, Masanori; Arai, KenIchi; Ota, Hiroyasu; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 143-150; In English; See also 20060054170; Copyright; Avail.: Other Sources

An optically scanning electromagnetic field probe system consisting of an electro-optic or magneto-optic crystal substrate and a galvano scanner has been developed for high speed and low-invasive electromagnetic field distribution measurements. In this report, we introduce some of the examples of measuring the electric field distribution using LiNbO3 or CdTe crystal substrate and the probe system. Furthermore, we have developed an optical magnetic field probe array for detecting magnetic fields in the gigahertz range. Using the probe array, we also measured the magnetic field distributions above a patch antenna working at 2.49 GHz.
Author
Electromagnetic Fields; Lithium Niobates; Magnetic Fields; Magneto-Optics; Electro-Optics; Detection; Cadmium Tellurides

20060054176 National Inst. of Information and Communications Technology, Tokyo, Japan
Development of the Measurement Technology of the Spurious Emission from Primary Radar
Sebata, Kouichi; Miyazawa, Yoshiyuki; Kitazawa, Hironori; Shiota, Sadaaki; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 59-70; In English; See also 20060054170; Copyright; Avail.: Other Sources

In order to facilitate efficient use of frequency spectrum, ITU-R recommends the reduction of all unwanted emissions in line with the agreed international recommendations of the ITU. The unwanted emission control recommendation, for Radars requires the measurement of all unwanted emissions by the radar antenna including that of the spurious in a defined method of measurement detailed in a recommendation. NICT have been conducting a research and development program to establish the required measurement site in Japan and the necessary measurement system. This paper will provide reviews of our activities at NICT on the project to date. In order to construct the measurement site that can meet the requirement of ITU-R M.1177, we have surveyed a number of potential sites in Japan and measured their electromagnetic environment. Radar emission measurement experiments were also conducted at each site to enable the selection of the best suitable site from the potential list. For the measurement system requirements, a theoretical evaluation was conducted using simulation techniques as well as performing real measurement experimentation.
Author
Radar Measurement; Site Selection; Frequency Distribution; Radar Antennas

20060054177 National Inst. of Information and Communications Technology, Tokyo, Japan
Evaluation of Uncertainty of Horn Antenna Calibration with the Frequency range of 1 GHz to 18 GHz.
Sakasai, Makoto; Fujii, Katsumi; Koike, Kunimasa; Masuzawa, Hiroshi; Suzuki, akira; Yamanaka, Yukio; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 29-42; In English; See also 20060054170; Copyright; Avail.: Other Sources

NICT performs an EMI antenna calibration based on the Radio Law. Recently, the uncertainty of the EMI antenna measurement was evaluated with the three antenna method with a frequency coverage of 1 GHz to 18 GHz. The type of antenna under calibration is a pyramidal standard gain horn antenna. The main measurement device of the traditional antenna calibration system was a signal generator with a high-power amplifier and a microwave receiver. However, it was changed to a network analyzer providing a high dynamic range. The study about the 14 error factors revealed that the expanded uncertainty (k=2) were +/-0.7 dB (1 to 5.85 GHz) and +/-1.1 (5.85 to 18 GHz)
Author
Calibrating; Horn Antennas; Microwave Frequencies

20060054178 National Inst. of Information and Communications Technology, Japan
Uncertainty Estimation of Loop Antenna Calibration System in MF/HF Band
Suzuki, Akira; Koike, Kunimasa; Sakasai, Makoto; Masuzawa, Hiroshi; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 19-28; In English; See also 20060054170; Copyright; Avail.: Other Sources

The MF/HF band loop antenna calibration is performed by the standard magnetic field method in NICT. For the establishment of the standard magnetic field intensity, there are two methods: LC (Loop Current method and AF (Antenna Factor) method. In the LC method, the current on the loop antenna has to be controlled very accurately to generate the standard field. While the AF method hasn't been officially used for calibration service in NICT, it has an advantage that the real loop current is not needed, which is very difficult to monitor in the actual calibration and is a major factor to to increase the calibration uncertainty. In the AF method, however, the antenna factors have to be determined precisely, which can be done by the three antenna method. The purpose of this paper is to investigate and compare the AF method and the LC method from the viewpoint of the loop antenna calibration accuracy, and to show the feasibility of the AF method for the actual use for the calibration service in NICT.
Author
Uncertain Systems; Loop Antennas; Calibrating; Antenna Design

20060054179 National Inst. of Information and Communications Technology, Tokyo, Japan
Research Activities on EMC in NICT
Suzuki, Yoshiaki; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 1-4; In English; See also 20060054170; Copyright; Avail.: Other Sources

In the ubiquitous network age when a lot of equipment equip wireless function, interference between a certain wireless system and other communication systems, performance degradation of a telecommunications system or malfunction of an electronic equipment may occur. Uneasiness concerning adverse effect that electromagnetic wave possibly causes for human body may also increase more than before. Therefore, establishing EMC Electromagnetic Compatibility of various equipment and systems becomes very important. Furthermore, it is feared that the problems of the information leakage by the reception of the very low electromagnetic wave radiated from the telecommunication equipment occurs. To secure 'saftey and well being' of the ICT society which is one of the NICT missions, and to promote the harmonized use of the radio frequency spectrum, EMC units are providing various academic activity and services. In this text, the outline is introduced.
Author
Electromagnetic Compatibility; Electronic Equipment; Radio Frequencies; Telecommunication; Hazards

20060054180 Tohoku Univ., Japan
Use of Electromagnetic Energy and Resultant Noises
Sugiura, Akira; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 5-17; In English; See also 20060054170; Copyright; Avail.: Other Sources

Recently, the advent of the RF-ID systems and Power Line Communication (PLC) systems have raised a new problem of electromagnetic interference (EMI) between newly developed systems and other various systems including radio stations using the shortwave band. In this connection, EMI limits for a variety of equipment are reviewed and compared in terms of the radiated field strength. Investigations are extended to cover the environment noises, indicating the necessity for surveying recent noise environments in a large scale,
Author
Electromagnetic Interference; Field Strength; Radio Frequencies

20060054181 National Inst. of Information and Communications Technology, Tokyo, Japan
Power Measurement Emitted by UWB System in Time Domain
Ishigami, Shinobu; Gotoh, Kaoru; Yamanaka, Yukio; Matsumoto, Yasushi; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 91-99; In English; See also 20060054170; Copyright; Avail.: Other Sources

ULTRA-wideband (UWB) technology is a wireless communications technology that transmits data with a low power-spectrum density with a bandwidth of several gigahertz. The U.S. Federal Communications Commission (FCC) approved the commercial implementation of UWB, within limits, in 2002. In ITU-R, Task Group 1/8 (TG1/8) was established to consider UWB standardization. TG1/8 was held six times from January 2003 to October, 2005. and drew up drafts for new recommendation concerning the UWB characteristics, the impact to the other wireless communications, the spectrum management framework, and the measurement methods. The drafts will be published as new recommendations. Japanese administration had submitted 30 input documents through the entire meetings. The author delegated an expert to the TG1/8 except for the 1st meeting, and submitted seven contribution documents.
Author
Broadband; Wireless Communication; Bandwidth; Emittance; Power Spectra

20060054182 National Inst. of Information and Communications Technology, Tokyo, Japan
Studies on Dosimetry of Human-Body Exposure to Electromagnetic Field
Watanabe, Soichi; Nagaoka, Tomoaki; Wake, Kanako; Hanazawa, Masahiro; Pongpaibool, Pornanong; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 117-124; In English; See also 20060054170; Copyright; Avail.: Other Sources

Numerical simulations are required to estimate specific absorption rate (SAR) in a human body exposed to high-frequency electromagnetic fields in order to evaluate the safety of the exposure. Development and improvement of numerical human models to be used for such numerical simulations and improvement of numerical calculation techniques for complex exposure conditions have been studied in NICT. Dielectric properties of biological tissues in millimeter-wave band have furthermore been studies with development of measurement systems. These studies contribute to safety environment with convenient radiofrequency use.
Author
Dosimeters; Electromagnetic Fields; Exposure; Human Body; Numerical Analysis

20060054183 National Inst. of Information and Communications Technology, Tokyo, Japan

Development of Exposure Systems and Exposure Assessment for Studies on Biological Effect of Electromagnetic Field

Wake, Kanako; Nagaoka, Tomoaki; Kawai, Hiroki; Hanazawa, Masahiro; Pongpaibool, Pornanong; Watanabe, Soichi; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 133-141; In English; See also 20060054170; Copyright; Avail.: Other Sources

There have been several biological studies to test possibilities of biological effects of electromagnetic fields. In this paper, development of exposure systems and exposure assessment for the studies on biological effects of electromagnetic field are introduced.

Author

Biological Effects; Electromagnetic Fields; Exposure; Human Body

20060054184 National Inst. of Information and Communications Technology, Tokyo, Japan

Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines

Watanabe, Soichi; Wake, Kanako; Yamanaka, Yukio; Yamanaka, Yukio; Sugiyama, Tsutomu; Miyota, Yukihiro; Kurokawa, Hideo; Hamada, Lira; Fukunaga, Kaori; Suzuki, Akira, et al.; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 125-132; In English; See also 20060054170; Copyright; Avail.: Other Sources

Portable wireless terminals such as cellular phones are required to demonstrate their compliance to radio radiation protection guidelines in terms of local specific absorption rate (SAR). In this report, we show studies on SAR measurement methods used for compliance tests of cellular phones and on calibration methods of small isotropic E-field probes which used for the SAR measurement. These studies demonstrated that the international standard of the SAR measurement can appropriately be applicable to Japanese people and improved the repeatability and reliability of the compliance tests in Japan.

Author

Radiation Protection; Telephones; Wireless Communication; Radio Communication

20060054185 National Inst. of Information and Communications Technology, Tokyo, Japan

Effects of Spread Spectrum Clocking on Measured Noise Spectra

Matsumoto, Yasushi; Gotoh, Kaoru; Ishigami, Shinobu; Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 101-115; In English; See also 20060054170; Copyright; Avail.: Other Sources

Spread spectrum clocking (SSC, or clock FM) techniques have been widely used in electronic devices, such as personal computers, to reduce the spectral amplitude of clock harmonics measured in EMI tests. This paper describes how the amplitude reduction caused by SSC is related to clock FM parameters and resolution bandwidth in the spectrum measurement. Since SSC techniques do not reduce the actual power of clock harmonics, the apparent decrease in harmonic spectra must be carefully treated when evaluating the interference potential of harmonics noises to wireless systems.

Author

Noise Spectra; Spread Spectrum Transmission; Clocks; Harmonics; Bandwidth

20060054186 National Inst. of Information and Communications Technology, Tokyo, Japan

Software Defined Radio, its Programmable Signal-Processing Unit, and Central Control Signal-Processing Unit

Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1; March 2006, pp. 159-160; In English; See also 20060054170; Copyright; Avail.: Other Sources

The Software Defined Radio consists of a central control signal-processing unit (CPU board), a programmable signal-processing unit (FPGA board), and a wireless communication board (RF board). (See the figure below.) The CPU board consists of two or more CPUs, separate system buses corresponding to each CPU, and memory units connected to these system buses. The FPGA board consists of an FPGA providing a programmable electronic circuit structure and a rapid ADIDA converter. With the FPGA circuit and the CPU software provided for diverse communication systems, the Software Defined Radio can be used to implement any communication system that the user desires. Further, the device offers the significant feature of switching between different communication systems without interruption of communication. For example, when the user requests a switching operation or when the user begins to move out of the area covered by the communication system in current use, signal-processing switches from the main CPU to the sub CPU. This switching is performed after

communication is established in the sub CPU, so user communication is never interrupted.
Author
Signal Processing; Radio Frequencies; Wireless Communication; Field-Programmable Gate Arrays; Circuits; Memory (Computers)

20060054196 Carnegie-Mellon Univ., Pittsburgh, PA, USA
In-Flight Ratio Frequency Spectrum Measurements of Commercial Aircraft Cabins
Straus, B.; Morgan, M. G.; Sep. 2006; 76 pp.; In English
Contract(s)/Grant(s): 01-C-AW-CMU
Report No.(s): PB2007-101016; No Copyright; Avail.: National Technical Information Service (NTIS)

The focus on the risk posed by portable electronic devices carried onboard commercial flights has continued to intensify. Recent measurements and analyses have been useful in developing a better understanding of the issues, but has not allowed one to draw firm conclusions about what is happening in today's revenue flight environments. This report summarizes results of a program that developed an instrumentation package and performed in-flight radio frequency (RF) spectrum measurements in commercial aircraft cabins on revenue flights in select aviation critical and personal electronics frequency bands. Specific objectives were to identify cellular in-flight calls and activity rates, assess maximum levels of received power, and identify areas that deserve further research. Measurements were made on 38 flights over the period September 23 through November 19, 2003. These flights were on Boeing 737 (37 flights) and on Airbus 320 (1 flight) model aircraft. Two major U.S. airlines participated in the flight study. This study provided the first reported characterization of the RF environment in the cabins of commercial airline flights. The key conclusions were that (1) onboard cellular telephone calls were observed in-flight and activity is appreciable; (2) signal activity was observed in the aviation critical frequency bands at field strengths capable on causing interference to onboard avionics; and (3) onboard spectral activity was observed at flight critical phases. These findings carry implications for both future research and public policy. Before the industry moves forward with policy changes, significantly more field measurement and analysis of the potential for interference is urgently needed. These studies should include a consideration of the implications of having many onboard transmitters and the potential risks posed by intermodulation.
NTIS
Commercial Aircraft; Frequency Distribution; Radio Frequencies; Critical Frequencies; Aircraft Safety; Aircraft Communication

20060055398 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Graph Theoretical Analysis of Network Centric Operations Using Multi-Layer Models
Wong-Jiru, Ann; Sep 2006; 94 pp.; In English
Report No.(s): AD-A456873; AFIT/GSE/ENY/06-S01; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA456873; Avail.: CASI: A05, Hardcopy

As the Department of Defense continues its transformations to a network centric force, evaluating DoD's progression towards net-centricity remains a challenge. This research proposes to extend the Network Centric Operation Common Framework Version 2.0 (draft) with the metrics based in graph theory and, specifically addresses, among other metrics, the measurement of a net-centric force's mission effectiveness. The research incorporates the importance of understanding network topology for evaluating an environment for net-centricity and using network characteristics to help commanders assess the effects of network changes on mission effectiveness. The multi-layered model of Network Centric Operations and interlayer mapping are introduced to address the interdependent contributions of people, systems, and processes to the success of net-centric operations. A layered network model was populated with data derived from the 2006 Joint Expeditionary Forces Experiment (JEFX). Both static and dynamic network analyses were performed to characterize the network structures and to demonstrate how the interlayer mapping allows networks changes at one layer affects the networks characteristics of other layers. Thirty four excursions were performed on a three-layer model of JEFX network centric operations and the network characteristics were measured using twelve graph-theoretical metrics.
DTIC
Command and Control; Communication Networks; Graph Theory

20060055410 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Multilingual Phoneme Models for Rapid Speech Processing System Development
Hansen, Eric G; Sep 2006; 85 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457034; AFIT/GE/ENG/06-62; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457034; Avail.: CASI: A05, Hardcopy

Current speech recognition systems tend to be developed only for commercially viable languages. The resources needed for a typical speech recognition system include hundreds of hours of transcribed speech for acoustic models and 10 to 100 million words of text for language models; both of these requirements can be costly in time and money. The goal of this research is to facilitate rapid development of speech systems to new languages by using multilingual phoneme models to alleviate requirements for large amounts of transcribed speech. The Global Phone database, winch contains transcribed speech from 15 languages, is used as source data to derive multilingual phoneme models. Various bootstrapping processes arc used to develop an Arabic speech recognition system starting from monolingual English models, International Phonetic Association (IP based multilingual models, and data-driven multilingual models. The Kullback-Leibler distortion measure is used to derive data-driven phoneme clusters. It was found that multilingual bootstrapping methods outperform monolingual English bootstrapping methods on the Arabic evaluation data initially, and after three iterations of bootstrapping all systems show similar performance levels

DTIC

Phonemes; Speech Recognition; Systems Engineering

20060055428 Massachusetts Inst. of Tech., Cambridge, MA USA

Characterizing and Processing Robot-Directed Speech

Varchavskaia, Paulina; Fitzpatrick, Paul; Breazeal, Cynthia; Jan 2001; 10 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DABT63-00-C-10102

Report No.(s): AD-A457057; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457057; Avail.: CASI: A02, Hardcopy

Humanoid robots are more suited to being generalists rather than specialists. Hence when designing a speech interface, we need to retain that generality. But speech recognition is most successful in strongly circumscribed domains. We examine whether some useful properties of infant directed speech can be evoked by a robot, and how the robot's vocabulary can be adapted.

DTIC

Robots; Speech Recognition

20060055556 Naval Postgraduate School, Monterey, CA USA

Rapidly Deployable, Self Forming, Wireless Networks for Maritime Interdiction Operations

Stavroulakis, Georgios; Sep 2006; 103 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457147; No Copyright; Avail.: CASI: A06, Hardcopy

The term 'Maritime Interdiction Operations' usually refers to Visit, Board, Search and Seizure (VBSS) operations executed today all over the world. These operations are conducted as a part of the maritime law enforcement policy of each country inside their respective territorial waters or as a part of the homeland security requirements as they are mandated today by the global war against terrorism. Very often lately, they are conducted by allied maritime forces in international waters as well. Although such operations might seem quite simple in execution, the global war against terrorism has dramatically increased their level of complexity. In the past, searching cargo ships for illegal or contraband cargo was not that complicated or that important for national security, but now, searching for non-proliferation, radiological or bio-chemical material, as well as for possible terrorists among the crew members of a ship, is a very complex operation that cannot tolerate mistakes or omissions. This thesis examines the requirements posed by a boarding team, either from the navy or the law enforcement community, on information flow from and to them, in order to enhance their situational awareness and decision making capability during Maritime Interdiction Operations. That information flow is provided by several wireless network technologies, implemented during field trials, as part of the NPS CENETIX (Center for Network Innovation and Experimentation) lab s maritime subset of experimentation. During these field trials, a wireless extension of the internet is deployed to the sea, allowing the boarding team to access information and collaborate with remotely located experts and respective operational commands; the technical aspects, the benefits and shortcomings of the utilized technologies and collaborative tools are screened against the maritime war fighter's operational requirements.

DTIC

Communication Networks; Military Operations

20060055576 Naval Postgraduate School, Monterey, CA USA

Indian Nuclear Command and Control Dilemma

Kumar, Rakesh; Sep 2006; 143 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457184; No Copyright; Avail.: CASI: A07, Hardcopy

The aim of the thesis is to analyze India's nuclear weapons command and control system as it has evolved since the nation's 1998 nuclear weapons tests. The small size of India's nuclear weapons arsenal does not imply that its command and control structure is simple. It requires the same infrastructure, capabilities, and operating systems possessed by countries with larger arsenals of nuclear weapons, though perhaps on a smaller scale. A small arsenal is easier to control than a large one, but it is still vulnerable to attack, and hence the issue of command and control becomes more complex. India's No-First-Use (NFU) policy states that its nuclear weapons will only be used in retaliation against a nuclear attack on Indian territory or on Indian forces anywhere. India's NFU policy makes the command and control of its nuclear weapons look simple, affordable, and easy to implement, but this policy must be examined through the prism of peacetime, crisis, and wartime situations. The smooth transition from peacetime to crisis and, if required, to wartime demands a robust command and control system. This thesis examines the requirements of such a system and provides recommendations for a command and control structure for Indian nuclear operations. The thesis investigates the U.S. command and control system and uses it as a model for a suitable option for India. While NFU has many challenges, it can be effective, provided that India adopts an operational capability of Launch After Attack (LAA), which would require a significant upgrade of command and control structure and procedures. In particular, the thesis demonstrates the role that civilians and military personnel can play to strengthen 'minimum credible deterrence' within the established financial, political, and strategic parameters of India.

DTIC

Command and Control; India; Nuclear Weapons; United States; Vulnerability

20060055631 Naval Postgraduate School, Monterey, CA USA

Critical Infrastructure Protection: How to Assess and Provide Remedy to Vulnerabilities in Telecom Hotels

Ordonez, Michael A; Sep 2006; 109 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457279; No Copyright; Avail.: Defense Technical Information Center (DTIC)

America's open society includes a vast array of critical infrastructure and key resources that are vulnerable to terrorist attacks. While it is not possible to protect or eliminate vulnerabilities of all critical infrastructures in the USA, strategic improvements can be made to harden these assets and mitigate any damaging effects if an attack were to occur. Current network assessment methods and protective measures are inadequate. As a consequence, the need for a scientific methodology for implementation of critical infrastructure protection is required. A standardized vulnerability assessment/risk analysis tool needs to be developed and implemented for the Critical Infrastructure Protection Programs to analyze complex networks and examine critical nodes. This will help to prevent, deter, and mitigate the effects against terrorist attack in accordance with HSPD-7. This thesis examines ways in which vulnerability analysis is currently conducted and ways in which it could be improved to establish an all-encompassing methodology to identify, prioritize, and protect critical infrastructure. Based on analysis and research, the thesis recommends that the National Communications System under the Department of Homeland Security (DHS) establish the required policy initiatives to mandate the National Reliability and Interoperability Council's current and future best practices, and set a vulnerability assessment/analysis standard based on Model-Based Vulnerability Analysis (MBVA) and Joint Staff Integrated Vulnerability Assessment (JSIVA) methodologies.

DTIC

Policies; Protection; Risk; Telecommunication; Vulnerability

20060055633 Naval Postgraduate School, Monterey, CA USA

Shipboard Wireless Sensor Networks Utilizing Zigbee Technology

Zacot, Chimi; Sep 2006; 79 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457285; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This thesis studies the feasibility of utilizing Zigbee standard devices to create a shipboard wireless sensor network. Two primary methods were used to demonstrate feasibility. The first method demonstrated initial feasibility using a series of laboratory tests. The tests included range, reliability, and a battery life tests. In the second portion, a prototype pressure sensor was created by matching reliable low power pressure transducer to a Zigbee enabled mote via an integrated DAQ unit. Supporting software was generated using LabVIEW 6.0 to act as a server program and allow a remote Integrated Condition Assessment System (ICAS) program workstation to log-in via a TCP/IP connection and monitor sensor data. The expected contribution from the research effort would be a completely wireless sensor network which would result in a net savings in man hours required to maintain and monitor. The sensor network would be reliable, relatively inexpensive and entirely COTS

available. With an extended battery life of 18 to 24 months, even the battery replacement could be fit into a standard annual or bi-annual PMS cycle, minimizing the workload to maintain. Initial feasibility testing completed satisfactorily and the prototype sensor was successfully created and integrated to interface with the existing sensor infrastructure.
DTIC
Communication Networks; Computer Programs

20060055654 Army War Coll., Carlisle Barracks, PA USA
Landpower and Network-Centric Operations: How Information in Today's Battlespace can be Exploited
Murphy, Dennis; Groh, Jeffrey L; Jan 2006; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457327; No Copyright; Avail.: CASI: A03, Hardcopy

The concept and theories associated with Network Centric Warfare (NCW) have been bantered about since early in 1998. The data to support claims of increased mission effectiveness through robustly networked forces is now becoming available. This essay will examine the tenets of NCW in the context of the V Corps fight during Operation Iraqi Freedom (OIF). The Center for Strategic Leadership, U.S. Army War College, is scheduled to release a study for the Office of Force Transformation, Office of the Secretary of Defense, examining V Corps major combat operations during OIF sometime in mid-2006. The researchers conducted qualitative analysis of 50 personal interviews with participants of all ranks. Also, the research team gathered statistical data from over 500 survey responses. Although the study focused at the tactical level, the data will be used to articulate the enabling potential of NCW at the operational level of war. This essay will explore the implications of the NCW at the operational level of war by examining V Corps operations during the battle of the Karbala Gap. V Corps conducted network centric operations using a series of new technologies to command and control five simultaneous battles. The relationship between sensors, shooters, and command and control will highlight the benefits of a networked force in information age warfare. The journey toward achieving enhanced situational awareness to increase mission effectiveness is in its early stages. Additionally, the data acquired from the study points to several important recommendations to proceed with the implementation of NCW capabilities across the force.
DTIC
Command and Control; Situational Awareness; Warfare

20060055665 Naval Postgraduate School, Monterey, CA USA
Propagation Modeling of Wireless Systems on Shipboard External Decks
Gallo, Luis E; Sep 2006; 81 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457355; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Many on-board ship operations demand full radio coverage over the entire ship, not only indoor, but also from the interior spaces to the other decks. Onboard a ship, specifically in the upper decks, radio wave propagation is subjected to fading that would impede the quality and reliability of data links and communication. One example is the performance of unmanned aerial vehicle (UAV) data and communications links. The purpose of this thesis is to analyze, model, and simulate some communication scenarios that occur on naval ships using Urbana. Starting from known inputs (frequency, ship compartment geometry, material properties, propagation computation model, and antenna type), analytical results reflecting the propagation mechanisms and coverage area are presented. Variable inputs can then be optimized to achieve a desired signal distribution for a specific shipboard environment. The ship models were created by Rhino, a well-known Windows-based computer drawing software. The values of the signals received on the different points in the main deck are computed for different frequencies and powers. The results are used to draw conclusions of the deployment of antennas on the ship as well as operational aspects such as UAV flight paths.
DTIC
Radio Transmission; Radiotelephones; Telecommunication

20060055666 Evidence Based Research, Inc., Vienna, VA USA
A Network-Centric Operations Case Study: US/UK Coalition Combat Operations During Operation Iraqi Freedom
Mawby, David; McDougall, Ian; Boehmer, Greg; Mar 2, 2005; 105 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457357; No Copyright; Avail.: CASI: A06, Hardcopy

The purpose of the Network-Centric Operations Case Study Series is to provide a coherent body of knowledge that both describes how networked organizations operate and identifies the critical factors for organizations to transform to enable network-centric operations. Network-Centric Operations are a central element of the Department of Defense's ongoing transformation and an emerging American way of war. Broadly speaking, network-centric operations are characterized by the

ability of a networked organization to develop and exploit an information advantage to improve organizational performance. The concept of network-centric operations and the emerging network-enabled capabilities of U.S. and coalition forces were evident during Operations Iraqi Freedom. This case study, 'US/UK Coalition Combat Operations during Operation Iraqi Freedom,' describes how Coalition Forces were able to exploit the power of network-enabled capabilities to improve their operational effectiveness. Specifically, this study examines how U.S. and U.K. ground forces employed and exploited Force XXI Battle Command Brigade and Below (FBCB2)/Blue Force Tracker (BFT) in concert with existing C4 capabilities to conduct major combat operations. While the study demonstrates that FBCB2/BFT made a significant contribution to combat effectiveness, it also highlights disparities that existed between coalition forces in their ability to exploit the technology. It also underscores that it is not enough to field a new technology; units also must have time to train and develop tactics, techniques, and procedures to realize the full benefits of network-enabled capabilities. The Office of Force Transformation conducted this case study in collaboration with the UK's Ministry of Defense.
DTIC
Combat; Communication Networks; Military Operations; United Kingdom; United States

20060055667 California Univ., Santa Cruz, CA USA
Chapter 7. Node-Centric Hybrid Routing for Wireless Internetworking
Garcia-Luna-Aceves, J J; Roy, Soumya; Jan 2006; 27 pp.; In English
Contract(s)/Grant(s): F30602-97-2-0338; F49620-00-1-0330
Report No.(s): AD-A457358; No Copyright; Avail.: CASI: A03, Hardcopy

Multihop packet radio networks (or ad-hoc networks) consist of wire- less routers that interconnect attached hosts without the need of any pre-established communication infrastructure These networks play an important role in relief scenarios, battlefields and conference scenarios where there is no base infrastructure Table-driven or proactive routing protocols can incur excessive signaling overhead in large ad-hoc networks (e.g., networks with hundreds of nodes or more), because each node in the network must maintain routing information for every other network node, even if the node never needs to handle traffic destined for some nodes arid the path between any two nodes in a highly mobile environment changes frequently. Control overhead in proactive routing protocols increases with the size of the network and becomes redundant if the number of communicating peers is much less than the total number of nodes in the network.
DTIC
Communication Networks; Computerized Simulation; Radio Transmission; Telecommunication

20060055673 Army Tank-Automotive Systems Development Center, Warren, MI USA
Obstacle Marking and Vehicle Guidance Science and Technology Objective (OMVG-STO) Augmented Reality for Enhanced Command and Control and Mobility
Jaszlics, Sheila L; Sanders, Scot; Culkin, Andy; Jan 2006; 3 pp.; In English
Report No.(s): AD-A457374; No Copyright; Avail.: CASI: A01, Hardcopy

Advances in technology, improved communications and rapidly changing conditions create an operational environment in which decisions must be made quickly and momentum, once achieved, must be sustained. The increase in Joint and Combined operations has increased the need for real-time coordination among diverse units. This demanding environment requires new display paradigms that facilitate rapid decision making, movement and command and control. The OMVG-STO effort is creating a low-cost technology to enhance situational awareness by integrating the current tactical picture into real-world views in real time. The system provides additional, intuitive displays to support precision navigation around obstacles and through restricted terrain. The OMVG-STO system is equipped with a capability to realistically inject simulated enemy forces into realworld views to support mission rehearsal and gunnery training applications. Once fully developed, the technology will be transitioned to the Objective Force for integration into a variety of U.S. Army systems.
DTIC
Command and Control; Display Devices; Mobility; Real Time Operation; Research and Development; Technologies

20060055696 Naval Postgraduate School, Monterey, CA USA
Deployable Command and Control System for Over the Horizon Small Boat Operations
Seeger, Jr , William D; Sep 2006; 203 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457414; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Deployable Navigation System (DeNS) is a prototype system designed to facilitate Command and Control during over the horizon small boat operations. It is designed to allow small boats to deploy from their host ships with a Bluetooth

GPS (Global Positioning System) receiver and PDA (Personal Digital Assistant) running the appropriate software which provides a real time navigational picture in terms of position and relation to a predetermined track. This same data is shipped immediately back to the control ship via a wireless network and displayed on a laptop computer to allow the mission commander to monitor the small boat's progress and position, also in real time. The small boat's relation to the track is compared on every received fix and appropriate indicators are displayed to inform both users if a predetermined distance from track (track tolerance) has been exceeded. It utilizes jpg formatted maps that are derived directly from the Digital Nautical Chart (DNC) library overlaid with track information. Positions received from the GPS are converted to pixel coordinates that correspond to their original positions on the jpg chart and plotted, providing an electronic display that is very similar in appearance to the traditional plot maintained on paper charts.
DTIC
Boats; Command and Control; Communication Networks; Digital Systems; Global Positioning System; Horizon

20060055703 North Carolina State Univ., Raleigh, NC USA
Multi-User Performance Issues in Wireless Impulse Radio Networks
Lovelace, William M; Jan 2004; 117 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457426; No Copyright; Avail.: CASI: A06, Hardcopy

There has been a growing interest in Ultra Wide Band (UWB) communication technologies over the last ten years. Motivated by advances in narrow pulse generation techniques and the potential for VLSI digital receivers, much fundamental research has been devoted to UWB. Most of the research to date has been dedicated to the potential for dense multi-user environments, narrow band interference issues, and multi-path considerations. While Impulse Radio (IR) has shown tremendous potential for high throughput local area networks based on time domain separation techniques, the stringent parametric assumptions required for practical implementation have not been clearly evaluated. Specifically, two of the more common constraints required to meet the projected UWB performance measures are timing tolerances and multi-user interference control. The work here has addressed both of these critical issues. Our work is the first to quantify the effects of timing jitter and tracking on time-hopping UWBmulti-user performance. The investigations of these issues show that the performance of binary and 4-ary impulse radio is very sensitive to timing jitter and tracking errors. Supported multi-user performance is quantified through simulation and finds orthogonal pulse position modulation (PPM) out performed binary offset PPM at all jitter levels in thermal and pulse noise. We also compare accepted narrowband tracking techniques to an efficient error tracking method adapted to UWB.
DTIC
Broadband; Communication Networks; Impulses; Radiotelephones; Telecommunication

20060055705 Library of Congress, Washington, DC USA
State Department and Related Agencies: FY2006 Appropriations and FY2007 Request
Epstein, Susan B; Jul 13, 2006; 18 pp.; In English
Report No.(s): AD-A457429; CRS-RL31370; No Copyright; Avail.: CASI: A03, Hardcopy

State Department funding, formerly in the Commerce, Justice, State (CJS) appropriation, is now in the House's Science, State, Justice, Commerce (SSJC) Appropriation and in the Senate's State-Foreign Operations Appropriation. In addition, usually each Congress passes a foreign relations authorization bill that authorizes the Department of State to spend its appropriations. The first session of the 109th Congress did not pass the State Department authorization legislation, S. 600 and H.R. 2601. The President sent his FY2007 budget to Congress on February 6, 2006. Included was the Department of State FY2007 budget request for a total of $9,502.4 million (6.5% more than the FY2006 enacted level, including rescissions and supplementals) and the international broadcasting FY2007 budget request for $671.9 million (a 4.3% increase from the FY2006 level, including rescissions). The House Appropriations Committee reported its SSJC appropriation (H.R. 5672) on June 22, 2006. The House passed the bill on June 29, 2006, with numerous floor amendments. It included a total of $9,704.0 million for the Department of State and international broadcasting. The Senate Appropriations Committee reported its bill (H.R. 5522) on June 29, 2006. The Senate bill includes a total of $9,643.2 million for the Department of State and international broadcasting. As in the previous year, the week after the budget arrived on Capitol Hill, President Bush sent to Congress an emergency supplemental request. On March 13, 2006, Congressman Jerry Lewis introduced the Emergency Supplemental Appropriations Act for Defense, the Global War on Terror, and Hurricane Recovery, 2006 (H.R. 4939). The President signed H.R. 4939 into law (P.L. 109-234) on June 15, 2006. In mid-November 2005, Congress passed the FY2006 SSJC appropriation; the President signed it into law (P.L. 109-108) on November 22, 2005. The act provided $8,920.5 million for State and $644 million for international broadcasting, after rescissions.
DTIC
Appropriations; Broadcasting; Federal Budgets; International Relations; Law (Jurisprudence)

20060055735 Bolt, Beranek, and Newman, Inc., Cambridge, MA USA
Evaluation Results for the Talk'n'Travel System
Stallard, David; Jan 2001; 4 pp.; In English
Contract(s)/Grant(s): N66001-99-D-8615
Report No.(s): AD-A457471; No Copyright; Avail.: CASI: A01, Hardcopy

We describe and present evaluation results for Talk n Travel, a spoken dialogue language system for making air travel plans over the telephone. Talk n Travel is a fully conversational, mixed initiative system that allows the user to specify the constraints on his travel plan in arbitrary order, ask questions, etc., in general spoken English. The system was independently evaluated as part of the DARPA Communicator program and achieved a high success rate. This paper describes and presents evaluation results for Talk n Travel, a spoken language dialogue system for making complex air travel plans over the telephone. Talk n Travel is a research prototype system sponsored under the DARPA Communicator program (MITRE, 1999). Some other systems in the program are Ward and Pellom (1999), Seneff and Polifroni (2000) and Rudnicky et al (1999). The common task of this program is a mixed-initiative dialogue over the telephone, in which the user plans a multi-city trip by air, including all flights, hotels, and rental cars, all in conversational English over the telephone. A similar research program is the European ARISE project (Den Os et al, 1999). An earlier version of Talk n Travel was presented in (Stallard, 2000). The present paper presents and discusses results of an independent evaluation of Talk n Travel, recently conducted as part of the DARPA Communicator program.
DTIC
Speech Recognition; Voice Communication

20060055740 Boston Univ., Boston, MA USA
Recognition Using Classification and Segmentation Scoring
Kimball, Owen; Ostendorf, Mari; Rohlicek, Robin; Jan 1992; 6 pp.; In English
Contract(s)/Grant(s): NSF-IRI-8902124
Report No.(s): AD-A457477; No Copyright; Avail.: CASI: A02, Hardcopy

Traditional statistical speech recognition systems typically make strong assumptions about the independence of observation frames and generally do not make use of segmental information. In contrast, when the segmentation is known, existing classifiers can readily accommodate segmental information in the decision process. We describe an approach to connected word recognition that allows the use of segmental information through an explicit decomposition of the recognition criterion into classification and segmentation scoring. Preliminary experiments are presented, demonstrating that the proposed framework, using fixed length sequences of cepstral feature vectors for classification of individual phonemes, performs comparably to more traditional recognition approaches that use the entire observation sequence. We expect that performance gain can be obtained using this structure with additional, more general features.
DTIC
Classifications; Scoring; Segments; Speech Recognition

20060055743 BBN Systems and Technologies Corp., Cambridge, MA USA
The BBN Spoken Language System
Boisen, Sean; Chow, Yen-Lu; Haas, Andrww; Ingria, Robert; Roukos, Salim; Stallard, David; Jan 1989; 7 pp.; In English
Contract(s)/Grant(s): N00014-C-87-0085
Report No.(s): AD-A457481; No Copyright; Avail.: CASI: A02, Hardcopy

We describe HARC, a system for speech understanding that integrates speech recognition techniques with natural language processing. The integrated system uses statistical pattern recognition to build a lattice of potential words in the input speech. This word lattice is passed to a unification parser to derive all possible associated syntactic structures for these words. The resulting parse structures are passed to a multi-level semantics component for interpretation.
DTIC
Natural Language (Computers); Pattern Recognition; Speech; Speech Recognition

20060055753 Space and Naval Warfare Systems Command, Charleston, SC USA
Are DoD Network Centric Policies, Processes and Edge Organizations Sufficiently Adaptable to Adequately Respond to the Impact of Globalization?
Lenahan, Jack; Jan 2005; 18 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457518; No Copyright; Avail.: CASI: A03, Hardcopy

Can the DoD adapt quickly enough to ensure that its current military edge is not eroded by globalization? Does unchecked globalization threaten to enable the mass proliferation of capability and weaponry including nano super weapons at the expense of the American warfighter? Force multiplication, increased awareness, better quality of data, improved decision making are all well known aspects of the benefits of net centricity. But does not increased globalization threaten to permit adversaries to exploit their own Network Centric Warfare (NCW) capabilities and also use more accessible GRID supercomputational capabilities to accelerate advanced weapons systems development countering the U.S. advantage? This research concludes that the U.S. DoD needs the ability to rapidly create polices in response to globalization created changes. Thus, in order to provide these capabilities, I recommend the rapid development of composeable policy frameworks, policy semantics models, composeable data warehouses, and intelligent policy analysis agents, in order to provide the policy assessment tools needed to support the adaptability and superior decisions required to succeed in a Post-international, globalist environment. Specifically the paper recommends policy assessment and simulation composeable services targeting: Technical & Scientific Knowledge Base Maintenance, Globalization Impact Analysis for Mutual Defense Treaties, and Nano Weapon Defense Tactics Assessments and Simulations.
DTIC
Communication Networks; Organizations; Policies; Warfare

20060055755 Naval Postgraduate School, Monterey, CA USA
Extending the Tactical Wireless Internet in Support of USMC Distributed Operations
Henton, Glen C; Swick, Justin R; Sep 2006; 109 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457520; No Copyright; Avail.: CASI: A06, Hardcopy

This thesis will research, examine, and propose a Tactical Wireless Network Infrastructure Concept of Operations in Support of Distributed Operations. Research and analysis will include the capabilities and performance characteristics of the 802.16 equipment currently implemented as part of the Marine Corps Tactical Command and Control Architecture in support of Operation Iraqi Freedom. Current Distributed Operations doctrinal capabilities will be compared to a proposed Concept of Operations that incorporates the most current state of the art wireless technologies to maximize both capability and interoperability. The method for evaluation will incorporate COTS products and Marine Corps tactical communications devices installed and operated in both a laboratory setting as well as a tactical field environment. Key performance metrics captured include equipment throughput capacity, communications bandwidth, range and distance limitations, power consumption, communications security, and transmission security. Additional metrics evaluated include level of equipment operational complexity and degree of interoperability with current USMC command and control architecture.
DTIC
Command and Control; Internets; Radiotelephones; Warfare

20060055757 Assistant Secretary of Defense (Networks and Information Integration), Arlington, VA USA
Coalition Interoperability: A Modeled Approach
Christman, Gerard J; Postal, Mark; Jan 2006; 21 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457523; No Copyright; Avail.: CASI: A03, Hardcopy

Agenda: * History * Model * Systems * Approach * Results * Way Ahead
DTIC
Communication Networks; Interoperability; Models

20060055778 Industrial Coll. of the Armed Forces, Washington, DC USA
Network-Centric Railroading Utilizing Intelligent Railroad Systems
Ditmeyer, Steven R; Jun 2005; 22 pp.; In English
Report No.(s): AD-A457549; No Copyright; Avail.: CASI: A03, Hardcopy

Network-centric railroading and intelligent railroad systems represent a' unified theory of railroading' in which positioning systems, sensors, computers, advanced mathematical methods, and digital communications are used to collect, process, and disseminate information to improve the safety, security, and operational effectiveness of railroads. Intelligent Transportation Systems (ITS) for highways and mass transit are based on the same technologies, as are the National Airspace System and maritime vessel tracking systems. Major parcel delivery companies, pipeline operators, law enforcement, and emergency response services also use these technologies. Military services utilize these technologies for network-centric warfare; railroads will use them for network-centric railroading. Intelligent railroad systems can either be implemented as independent systems, in which case their benefits will be limited, or they can be implemented as integrated, networked

systems, in which case the benefits will be compounded. The railroad industry is urged to consider adopting an integrated approach when implementing these systems to achieve network-centric railroading.
DTIC
Command and Control; Rail Transportation

20060055785 Naval Postgraduate School, Monterey, CA USA
Implementation of a Modular Fly away Kits (FLAK) for C4ISR in order to counter Asymmetric Threats in the Coalition Riverine and Maritime Theatres
Hochstedler, Robert; Jun 2006; 145 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457565; No Copyright; Avail.: CASI: A07, Hardcopy

This research analyzes the design and implementation of a Maritime Command, Control, Computer, and Communications for Intelligence, Surveillance, and Reconnaissance (C4ISR) fly away kit (FLAK) in order to combat asymmetric threats in the coalition maritime environment. This FLAK will be modular, adaptable, scalable, and secure end to end, composed of routable networks, and built entirely from commercial off the shelf technologies (COTS). Basing measures of effectiveness (MOE) on the recently published Quadrennial Defense Report (QDR) and the Numbered Fleet Commanders Communication Message, these kits will be tested with the goal of fulfilling thirteen of the fifteen high priority short-falls in the modern USA CIV-MIL and Coalition Forces abilities to conduct multiple missions in the current brown (riverine), green (littoral), and blue (deep water) operational theatres. The Maritime FLAK will be designed with the intent of increasing the US forward presence and extending the C4ISR into restricted maritime theatres. Since US forces cannot intervene directly into regions like the Straits of Malacca, but can support coalition forces through advisors and technological adaptations, modular solutions to extend C4ISR into these maritime territories are needed. Furthermore, due to the adaptability and scalability of the technologies to be implemented into the maritime FLAK, these completed kits will be able to be used by the recently formed Naval Expeditionary Combat Command (NECC) in current operations in the Global War on Terrorism.
DTIC
Asymmetry; Command and Control; Emergencies; Kits; Management Methods; Telecommunication

20060055789 SRI International Corp., Menlo Park, CA USA
Data Collection and Analysis in the Air Travel Planning Domain
Kowtko, Jacqueline C; Price, Patti J; Jan 1989; 8 pp.; In English
Contract(s)/Grant(s): N00014-85-C-0013
Report No.(s): AD-A457573; No Copyright; Avail.: CASI: A02, Hardcopy

We have collected, transcribed and analyzed over 8 hours of human-human interactive problem solving dialogue in the air travel planning domain, including traveler-agent dialogues and the more constrained agent-airline dialogues. We have used this data to define and test an initial vocabulary, and to design an appropriate interface for the air travel planning domain. The initial interface design was tested via simulation, using 44 subjects solving air travel problems. Our data analysis reveals great differences between the traveler-agent interactions and the agent-airline interactions, with the traveler-simulation interactions falling somewhat in between.
DTIC
Air Transportation; Data Acquisition; Speech

20060056161 Bolt, Beranek, and Newman, Inc., Cambridge, MA USA
Speaker Adaptation Using Multiple Reference Speakers
Kubala, Francis; Schwartz, Richard; Barry, Chris; Jan 1989; 8 pp.; In English
Contract(s)/Grant(s): N00014-85-C-0279
Report No.(s): AD-A457475; No Copyright; Avail.: CASI: A02, Hardcopy

We introduce a new technique for using the speech of multiple reference speakers as a basis for speaker adaptation in large vocabulary continuous speech recognition. In contrast to other methods that use a pooled reference model, this technique normalizes the training speech from multiple reference speakers to a single common feature space before pooling it. The normalized and pooled speech can then be treated as if it came from a single reference speaker for training the reference hidden Markov model (HMM). Our usual prohabilistic spectrum transformation can be applied to the reference HMM to model a new (target) speaker. In this paper, we describe our baseline (single reference speaker) speaker-adaptation system and give current performance results from a recent formal evaluation of the system. We also describe our proposal for adapting from multiple

reference speakers and report on recent preliminary experimental results in support of the proposed technique.
DTIC
Speech Recognition; Targets; Mathematical Models

20060056164 Space and Naval Warfare Systems Center, San Diego, CA USA
Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions
Galdorisi, George; Goshorn, Rebekah; Sep 2006; 61 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457569; No Copyright; Avail.: CASI: A04, Hardcopy

A Process to Instantiate Maritime Domain Awareness (MDA): (1) The nature of the Maritime Domain Awareness challenge; (2) Maritime Domain Awareness: laws, policies, and operational concepts; (3) Functional and technical approaches to instantiating MDA for the total ship force.
DTIC
Security; Ships; Laws; Policies

20060056187 Government Accountability Office, Washington, DC, USA
Information Security: Coordination of Federal Cyber Security Research and Development
Sep. 2006; 34 pp.; In English
Report No.(s): PB2007-102011; GAO-06-811; No Copyright; Avail.: CASI: A03, Hardcopy

Research and development (R&D) of cyber security technology is essential to creating a broader range of choices and more robust tools for building secure, networked computer systems in the federal government and in the private sector. The National Strategy to Secure Cyberspace identifies national priorities to secure cyberspace, including a federal R&D agenda. GAO was asked to identify the (1) federal entities involved in cyber security R&D; (2) actions taken to improve oversight and coordination of federal cyber security R&D, including developing a federal research agenda; and (3) methods used for technology transfer at agencies with significant activities in this area. To do this, GAO examined relevant laws, policies, budget documents, plans, and reports.
NTIS
Coordination; Security

20060056195 Assistant Secretary of Defense (C3I/Command Control Research Program), Washington, DC, USA
Understanding Command and Control
Alberts, David S; Hayes, Richard E; Jan 2006; 240 pp.; In English
Report No.(s): AD-A457162; XD-ASD/C3I/CCRP; No Copyright; Avail.: CASI: A11, Hardcopy

'Understanding Command and Control' is the first in a new series of CCRP Publications that will explore the future of Command and Control (C2). This book begins at the beginning: focusing on the problem(s) Command and Control was designed (and has evolved) to solve. It is only by changing the focus from 'what' Command and Control is to 'why' Command and Control is that the U.S. military will place itself in a position to move on. Although transformation, which is inarguably about disruptive innovation, is a major policy objective of not only the DoD, but militaries throughout the world, these commitments to transformation have yet to shift the focus of Command and Control analysis and experimentation to the other side of the discontinuity. This series is meant to stimulate and contribute to the exploration of the other side. The purpose of the book is to provide the conceptual foundation for the C2 research and experimentation necessary to develop and explore the new C2 approaches needed for this transformation. In developing and presenting this foundation, the authors are unwaveringly focused on the future, not the past. While the foundation presented can be used to understand traditional approaches to C2, its value lies in its ability to help the military understand new network-centric approaches. The intended audience is very broad because, without a broad-based understanding of C2, progress is problematical. At the same time, the authors also are addressing issues crucial to the C2 community, from practitioners to theoreticians.
DTIC
Command and Control; Military Operations; Models; Warfare

20060056197 Assistant Secretary of Defense (C3I/Command Control Research Program), Washington, DC, USA
Campaigns of Experimentation: Pathways to Innovation and Transformation
Alberts, David S; Hayes, Richard E; Jan 2005; 257 pp.; In English
Report No.(s): AD-A457167; XD-ASD/C3I/CCRP; No Copyright; Avail.: CASI: A12, Hardcopy

This book, the seventh in the Office of the Assistant Secretary of Defense (OASD), Command and Control Research

Program's (CCRP) series on Information Age Transformation, addresses a critical core competency for a 21st century military, or for that matter any organization that needs to embrace disruptive innovation to survive. This core competency is the ability to successfully undertake campaigns of experimentation designed to result in disruptive innovation. This book is a logical follow-on to the 'Code of Best Practice for Experimentation,' which was focused on the design and conduct of individual experiments. That book introduced the idea of a campaign of experimentation and compared and contrasted the differences between an individual experiment and a campaign of experimentation. The ability to design and conduct individual experiments constitutes a necessary but not sufficient core capability to conceive, design, and conduct successful campaigns of experimentation. Thus, the purpose of this book is to build upon the discussions in the earlier 'COBP for Experimentation' and explain in greater detail the nature of a campaign of experiments, how these campaigns should be effectively conceived, designed, and executed, and how their results can be harvested in the context of the ongoing transformation of military organizations and operations. While discussions of campaigns of experimentation have broad applications, this book focuses on transformational campaigns that seek breakthroughs in knowledge or capability, rather than those designed to marginally improve or refine our knowledge or a given capability. In the vernacular of innovation, this book focuses on the role and conduct of campaigns of experimentation that involve disruptive innovation, rather than sustaining innovation. These campaigns are inherently more complex and involve greater risk than those focused on sustaining innovation, but they have correspondingly greater potential.
DTIC
Command and Control; Experiment Design; Warfare

20060056220 Assistant Secretary of Defense (C3I/Command Control Research Program), Washington, DC, USA
The Agile Organization: From Informal Networks to Complex Effects and Agility
Atkinson, Simon R; Moffat, James; Jan 2005; 245 pp.; In English
Report No.(s): AD-A457169; XD-ASD/C3I/CCRP; No Copyright; Avail.: CASI: A11, Hardcopy

Agility is the gold standard for Information Age militaries. Facing uncertain futures and new sets of threats in a complex, dynamic, and challenging security environment, militaries around the world are transforming themselves, becoming more information-enabled and network-centric. Command and control is at the heart of these transformations. Traditional approaches to command and control are being questioned, as new approaches are being explored. Perhaps the most significant aspect of this nascent revolution in how militaries organize, operate, and think about themselves and their adversaries is the change in the criteria for success. Traditional militaries and military analysis focus squarely on mission effectiveness for a set of selected missions (approved planning scenarios). Information Age militaries searching for a way to deal with the complexities, uncertainties, and risks associated with the 21st century security environment are discovering the virtues of agility, not only as a core competency in operations, but as a value metric for policy and investment decisions. This book, 'The Agile Organization,' explores the nature and behaviors of different kinds of networked enterprises and their implications for military organizations. The book is an indicator of the growing recognition that new organizational forms and approaches to command and control are needed to meet the security challenges of the 21st century.
DTIC
Command and Control; Management Planning; Networks; Organizations

20060056336 Godwin Gruber LLP, Dallas, TX, USA
Distributed Oscillator Architectures
Hjaimiri, S. A.; Wu, H.; 15 Nov 04; 10 pp.; In English
Contract(s)/Grant(s): NSF-ECS-0083220
Patent Info.: Filed Filed 15 Nov 04; US-Patent-Appl-SN-01-988-681
Report No.(s): PB2007-100821; No Copyright; Avail.: CASI: A02, Hardcopy

A voltage controlled oscillator is provided. The voltage controlled oscillator includes a traveling-wave amplifier having two inputs and two outputs, such as would be formed by a first transmission line having a first input and a first output and a second transmission line having a second input and a second output. The first output of the traveling-wave amplifier is connected to the first input. A delay is connected between the second output and the second input, so as to provide a voltage controlled oscillator that requires minimal power to operate.
NTIS
Patent Applications; Voltage Controlled Oscillators

20060056337 Fish and Neve IP Group, Boston, MA, USA
Motion-Based Visualization
Bobrow, R. J.; Roberts, R. B.; Ware, C.; Pickett, R.; 5 Nov 03; 18 pp.; In English
Contract(s)/Grant(s): NMA401-02-C-0019
Patent Info.: Filed Filed 5 Nov 03; US-Patent-Appl-SN-10-703-102
Report No.(s): PB2007-100822; No Copyright; Avail.: CASI: A03, Hardcopy

A data-display system employs a display in which the representations of data objects are caused to move on the display in order to convey information about the represented data objects. In one example, icons in a link-analysis display that represent data objects satisfying a selection criterion are made to execute distinctive motion. In another example, three-dimensional models of moving bodies in whose features components of respective data objects are encoded are projected onto a screen plane, and the resultant values are used to generate the display.
NTIS
Patent Applications; Motion; Scientific Visualization

33
ELECTRONICS AND ELECTRICAL ENGINEERING

Includes development, performance, and maintainability of electrical/electronic devices and components; related test equipment; and microelectronics and integrated circuitry. for related information see also *60 Computer Operations and Hardware*; and *76 Solid-State Physics*. For communications equipment and devices see *32 Communications and Radar*.

20060054198 Lucent Technologies, Murray Hill, NJ, USA
Thin Dielectric Layers on Substrates, and Methods of Making the Same
Bao, Z.; Katz, H. E.; 4 Nov 03; 14 pp.; In English
Contract(s)/Grant(s): NIST-70NANB2H3032
Patent Info.: Filed Filed 4 Nov 03; US-Patent-Appl-SN-10-701-185
Report No.(s): PB2007-100814; No Copyright; Avail.: CASI: A03, Hardcopy

Apparatus comprising: a first substrate; a dielectric layer comprising a first dielectric material on the first substrate, the dielectric layer having a dielectric layer thickness and being traversed by through holes passing from an interface with the first substrate, to an opposite side of the dielectric layer; and a second dielectric material at least partially blocking the through holes. Methods for making such apparatus.
NTIS
Dielectrics; Substrates

20060054199 Lucent Technologies, Murray Hill, NJ, USA
Devices Having Large Organic Semiconductor Crystals and Methods of Making the Same
Akkerman, H.; Katz, H. E.; 4 Nov 03; 16 pp.; In English
Contract(s)/Grant(s): NIST-70NANM2H3032
Patent Info.: Filed Filed 4 Nov 03; US-Patent-Appl-SN-10-701-7736
Report No.(s): PB2007-100813; No Copyright; Avail.: CASI: A03, Hardcopy

Semiconductor apparatus comprising: a dielectric layer comprising a surface, a portion of the surface having exposed aromatic groups; and a polycrystalline semiconductor layer comprising an organic semiconductor composition overlying and in contact with the portion of the surface, the organic semiconductor composition comprising a compound comprising a chain-like moiety, the chain-like moiety comprising a conjugated thiophene or phenyl group and comprising alkyl chains at ends of the chain-like moiety. Devices comprising semiconductor apparatus, methods for making semiconductor apparatus, and methods for making devices.
NTIS
Organic Semiconductors; Semiconductors (Materials)

20060055396 Air Force Research Lab., Wright-Patterson AFB, OH USA
Driving Point Impedance for a Linear Array of Half-Width Leaky-Wave Antenna (Preprint)
Corwin, Michael; Kempel, Leo; Schneider, Steve; Jul 2006; 6 pp.; In English
Contract(s)/Grant(s): Proj-7622

Report No.(s): AD-A456870; AFRL-SN-WP-TP-2006-126; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA456870; Avail.: CASI: A02, Hardcopy

Printed leaky-wave antennas offer the potential for a low-profile, wide-bandwidth antenna element that can be arrayed if desired. Microstrip leaky-wave antennas rely on the suppression of the familiar 0EH mode and the propagation of the radiating 1EH mode. It is well-known that above a critical frequency, this leaky-wave will propagate with little attenuation and that the phase difference between the two radiating edges of the microstrip leads to radiation. The driving point impedance for a given leaky-wave antenna.

DTIC

Antenna Arrays; Impedance; Linear Arrays; Waveguide Antennas

20060055411 Georgia Univ., Athens, GA USA

Iconic Representation and Dynamic Information Fidelity: Implications for Decision Support

Mahan, Robert P; Wang, Jun; Yanchus, Nancy; Elliott, Linda R; Redden, Elizabeth S; Shattuck, Ruby; Oct 2006; 45 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-01-C-0065; Proj-62716-AH70

Report No.(s): AD-A457035; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457035; Avail.: CASI: A03, Hardcopy

This report addresses the fitness of using icon-based systems to support decision making within a domain where the quality and reliability of the information are dynamically changing. Specifically, the study examined the use of iconic and non-iconic display forms to communicate information fidelity levels to decision makers for the purpose of supporting land navigation judgments. The results indicated that graphic and animated icons, as well as traditional digital display formats, produced accurate navigation judgments when information fidelity was high. In contrast, graphic and animated icon formats produced highest performance when information fidelity was moderate and/or low. These results are evaluated in the context of creating useful iconic display principles that may be applied to complex and uncertain decision environments where the fidelity of the information used to make decisions is in flux.

DTIC

Decision Making; Display Devices; Navigation

20060055414 MMCOMM, Inc., Torrance, CA USA

Envelope Switched Doherty Power Amplifier For RF Applications (Preprint)

Jeong, Jinseong; Wang, Yuanxun E; Dec 2005; 7 pp.; In English

Contract(s)/Grant(s): FA8650-05-C-1830; Proj-3005

Report No.(s): AD-A457038; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457038; Avail.: CASI: A02, Hardcopy

This report was developed under a SBIR contract. A new concept of envelope switched Doherty amplifier is introduced. The proposed amplifier maintains maximum efficiency over a wide range of output power fluctuation. The essential idea is to drive two amplifier devices connected in Doherty configuration with a pulsed envelope signal. A high-Q, low loss filter is placed at the output to recover for linearity and to generate a time-varying equivalent load impedance for optimal efficiency performance. Ideally, for a pair of equally sized and identically biased Class B amplifiers, a maximum efficiency, 78.5%, should be maintained all the way down to the 6dB output back-off level. This concept is demonstrated in the experiment with a pair of GaAs FETs at a frequency of 1.87GHz in the PCS band. A maximum output power of 32.7dBm with a PAE of 46% is measured and a PAE of 34.4% is measured at 6dB back-off level including the filter loss at the power amplifier (PA) output. The proposed architecture can be applied in designing high efficiency PAs with non-constant envelope modulations.

DTIC

Amplifiers; Field Effect Transistors; Power Amplifiers; Radio Frequencies; Switching

20060055563 Maryland Univ., College Park, MD USA

The Microchip Optera Project

Moss, Cynthia; Horiuchi, Timothy K; Jan 2006; 3 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-01-1-0415

Report No.(s): AD-A457159; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Bats use sonar to fly through their environment and catch insects in complete darkness. Studying their behavior and neurophysiology may help in building miniature autonomous air vehicles with sonar sensors. The long-term goal of this

project is to build a tiny, low-power, neuromorphic VLSI-based model of an FM bat echolocation system that can be demonstrated in an aerial target capture task using a flying vehicle. This system will work in real time and at low power.
DTIC
Chips (Electronics); Rangefinding; Very Large Scale Integration

20060055597 Naval Research Lab., Washington, DC USA
Improvements in Regenerative Frequency Dividers
Jensen, G K; Wyman, F E; Dec 9, 1949; 13 pp.; In English
Report No.(s): AD-A457222; NRL-3580; No Copyright; Avail.: CASI: A03, Hardcopy

This report describes novel regenerative frequency dividers where the use of multiple-tuned circuits In the mixer or multiple-tuned circuits In conjunction with crystal rectifier distorters provide a number of advantageous operating characteristics with a minimum number of tubes. The particular circuits have a high division ratio, require no voltage-regulated power supplies, and exhibit self-starting and locking qualities heretofore not available with regenerative frequency divider techniques.
DTIC
Crystal Rectifiers; Frequency Dividers

20060055602 Naval Research Lab., Washington, DC USA
A Regenerative Frequency Divider of Improved Stability
Jensen, G K; Jan 10, 1950; 20 pp.; In English
Report No.(s): AD-A457231; NRL-3653; No Copyright; Avail.: CASI: A03, Hardcopy

This report describes the final development of three ten-to-one regenerative frequency dividers, dividing from 100 to 10 kc, 10 to 1.0 kc, and 1.0 to 0.1 kc. These dividers possess very stable operating characteristics for wide variations in plate voltage and input signal voltage, and, in addition, exhibit desirable self-starting and non-critical tuning characteristics as well as circuit simplicity and small physical size. This is the final report on the development of the three regenerative frequency dividers which was one phase of the problem. Work on the main problem is continuing.
DTIC
Frequency Dividers; Stability

20060055611 Memtronics, Plano, TX USA
Top vs. Bottom Charging of the Dielectric in RF MEMS Capacitive Switches (Preprint)
Peng, Zhen; Yuan, Xiabin; Hwang, James C; Forehand, David; Goldsmith, Charles L; May 2006; 7 pp.; In English
Contract(s)/Grant(s): F33615-03-C-7003; Proj-ARPS
Report No.(s): AD-A457244; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Using a movable top electrode, for the first time, top vs. bottom charging of the dielectric in metal/insulator/metal capacitors is delineated. For the Al/SiO2/Cr structure used in RF MEMS capacitive switches, charge injection from Al into the top of SiO2 was found to have a higher threshold voltage, faster charging time, and slower discharging time than charge injection from Cr into the bottom of SiO2. The higher threshold is attributed to non-ideal contact geometry and chemistry. The faster charging time is attributed to the exponential voltage dependence. The slower discharging time is attributed to diffusion across SiO2. Since top charging is more critical to switch performance and reliability than bottom charging, understanding the trade off of top versus bottom charging can help minimize their undesirable effects.
DTIC
Capacitance; Dielectrics; Microelectromechanical Systems; Radio Frequencies; Switches

20060055621 Naval Research Lab., Washington, DC USA
U.S. Navy Radar Systems Survey
McLaughlin, D J; Johnson, L M; Sep 27, 1949; 121 pp.; In English
Report No.(s): AD-A457262; NRL-3544; No Copyright; Avail.: CASI: A06, Hardcopy

A series of studies reviewing naval electronic systems was initiated in order to facilitate the prosecution of problems related to the integration of systems for ‘Command’ purposes. This report enumerates all current and proposed Navy radar

systems, itemizing approximately 25 operational and technical characteristics. A bar graph showing frequency relationships of these radars is also included.
DTIC
Electronic Equipment; Military Technology; Navy; Radar Equipment; Surveys

20060055660 Intelligent Software Solutions, Colorado Springs, CO USA
WEBTAS Software Life Cycle Development
Sep 2006; 30 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-04-D-0008-0010; Proj-2183
Report No.(s): AD-A457345; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Under this effort, ISS enhanced the WebTAS Data Gateway to improve the system's ability to maximize generic data access and data mapping across disparate data sources. Additional capabilities included the enhancements to the WebTAS Project Manager function to include features that were previously embedded within the View manager. In addition, there were significant improvements in the functionality and flexibility of the WEbTAS Timetable capability to allow the user full control of data aggregation and display techniques, and as a replacement for the User Manager, a much improved WebTAS Security Manager was developed. The contractor completely retooled and updated WebTAS core documentation from WebTAS 2.5.1 to WebTAS 2.5.3 and 3.0 (including User s Guide, Installation and System Administration Manual). Finally, ISS investigated and resolved a number of system performance issues concerning WebTAS core implementation strategies.
DTIC
Computer Programming; Computer Programs; Data Bases; Display Devices; Life (Durability); Software Engineering; User Requirements

20060055663 Naval Postgraduate School, Monterey, CA USA
Characterization and Application of Four-Layer Semiconductor Structures in Pulse Mode Operation
Matos, Antonio P; Sep 2006; 89 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457352; No Copyright; Avail.: CASI: A05, Hardcopy

The characteristics and application of a thyristor (a four-layer semiconductor structure) in a pulse generating circuit are explored. A thyristor device was used to create a pulse generating circuit and the pulse interval duration of this circuit was experimentally measured. The pulse interval duration was determined to be characterized by a Poisson Point Process distribution that is dependent on both temperature and applied voltage bias. The adjustable aperiodicity of the pulse intervals was a key characteristic used to design a distributed processing system of micro-robots that are capable of swarming. A micro-robotic swarm platform was simulated using finite element analysis, a JAVA-based swarm model, and three fully operational macro-scale platforms.
DTIC
Computer Programming; Java (Programming Language); Pulse Generators; Semiconductor Devices; Semiconductors (Materials); Thyristors

20060055715 Yale Univ., New Haven, CT USA
Atomically Smooth Epitaxial Ferroelectric Thin Films for the Development of a Nonvolatile, Ultrahigh Density, Fast, Low Voltage, Radiation-Hard Memory
Ahn, C H; Jul 31, 2006; 7 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-04-1-0061; Proj-2305
Report No.(s): AD-A457446; No Copyright; Avail.: CASI: A02, Hardcopy

The goal of this research is to fabricate atomically smooth, single crystalline, complex oxide thin film nanostructures for use in a nonvolatile, ultrahigh density, fast, low voltage, radiation-hard memory. For this work, we use complex oxide materials, which possess rich electronic phase diagrams, encompassing metallic, insulating, antiferromagnetic, and ferromagnetic behavior. Complex oxides can also exhibit ferroelectricity, which is characterized by the presence of a non-volatile spontaneous polarization field that is reversible by application of an external electric field. This switchable, bi-stable polarization field is the basis for the nonvolatile memory studied in this work. Advanced physical vapor deposition techniques such as off-axis magnetron sputtering, are used to integrate the rich funtionalities of complex oxides with the ferroelectrics used in this work. For this project, we use the ferroelectric perovskite, pbZrl-xTixO3 (PZT), with the bi-stable

spontaneous polarization field of PZT being used to tune the electronic behavior of all-complex oxide field effect structures.
DTIC
Computer Storage Devices; Epitaxy; Ferroelectric Materials; Ferroelectricity; Low Voltage; Radiation Hardening; Thin Films

20060055766 Naval Postgraduate School, Monterey, CA USA
Signal-to-Noise Ratio Gains and Synchronization Requirements of a Distributed Radar Network
Hurley, Sean M; Jun 2006; 79 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457535; No Copyright; Avail.: CASI: A05, Hardcopy

This thesis explores the potential benefits of two, three, and four-node distributed radar networks with the potential to provide a received SNR proportional to n(exp 2) times that of a single-node system, where n is the number of nodes in the network. By plotting the Cassini curves for these distributed radar networks along with the Cassini curves of a monostatic radar system for the same level of received SNR, these benefits are graphically demonstrated. The SNR gains result in a much larger area of coverage for the distributed radar network compared to that of a power-equivalent monostatic radar. The impact of phase and pulse synchronization on a distributed radar network is also explored. By examining phase error and pulse error separately, and then examining their impact on the coverage areas of a two-node distributed radar network, the importance of synchronization to a distributed radar network is demonstrated.
DTIC
Networks; Radar Networks; Signal to Noise Ratios; Synchronism

20060055773 Naval Postgraduate School, Monterey, CA USA
Low Voltage Electrolytic Capacitor Pulse Forming Inductive Network for Electric Weapons
Mays, Thomas A; Jun 2006; 63 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457543; No Copyright; Avail.: CASI: A04, Hardcopy

Electric weapons, such as the railgun, require a pulse power supply capable of providing reliable high-current, high-energy pulses of many megawatts. Pulsed alternators potentially have the same maintenance issues as other motor-generator sets, so a solid-state system would be desirable, but high voltage capacitor systems are not robust enough for the field. We propose here a Low Voltage Electrolytic Capacitor Pulse Forming Inductive Network (LVEC PFIN) which stores power in a relatively low voltage capacitor bank and provides weapon power pulses by first draining the capacitors into a power inductor and then interrupting the flow of current via a switch counterpulsing technique in order to achieve railgun-appropriate voltages. For this thesis, a 13 kJ LVEC PFIN was constructed, using solid-state semiconductor switches to redirect 25 kA of current into a 1m ohms load, and the redirection of larger currents is clearly feasible. This technique may be a viable alternative once the energy densities and equivalent series resistance of low voltage capacitors and ultracapacitors reach the necessary levels.
DTIC
Capacitors; Low Voltage

20060055790 Air Force Research Lab., Hanscom AFB, MA USA
A Commemoration of Deschamps' and Sichak's 'Microstrip Microwave Antennas': 50 Years of Development, Divergence, and New Directions
Bernhard, J T; Mayes, P E; Schaubert, D; Mailloux, R J; Nov 1, 2006; 35 pp.; In English
Contract(s)/Grant(s): Proj-2304
Report No.(s): AD-A457574; No Copyright; Avail.: CASI: A03, Hardcopy

Fifty years ago, the Third Symposium on the USAF Research and Development Program was held at Robert Allerton Park. During this symposium Deschamps and Sichak, working for the Federal Telecommunications Laboratory, presented their work entitled Microstrip Microwave Antennas. Here we commemorate this now declassified work, often cited as the first microstrip antenna paper, by reflecting upon it in the light of significant advances in microstrip antenna theory and design that have sprung from the pages of the Symposia proceedings since. We conclude with a discussion of the future of microstrip antennas and related structures.
DTIC
Divergence; Microwave Antennas; Microwaves

20060055811 Gordon Research Conferences, Inc., Kingston, RI USA
Gordon Research Conference on Electrodeposition
Gray, Nancy R; Switzer, Jay A; Aug 4, 2006; 8 pp.; In English
Contract(s)/Grant(s): N00014-06-1-0803
Report No.(s): AD-A457603; No Copyright; Avail.: CASI: A02, Hardcopy

The Gordon Research Conference (GRC) on Gordon Research Conference on Electrodeposition was held at Colby-Sawyer College, New London, NH from July 30, 2006 through August 4, 2006. The Conference was well-attended with 98 participants (attendees list attached). The attendees represented the spectrum of endeavor in this field coming from academia, industry, and government laboratories, both U.S. and foreign scientists, senior researchers, young investigators, and students. In designing the formal speakers program, emphasis was placed on current unpublished research and discussion of the future target areas in this field. There was a conscious effort to stimulate lively discussion about the key issues in the field today. Time for formal presentations was limited in the interest of group discussions. In order that more scientists could communicate their most recent results, poster presentation time was scheduled. Attached is a copy of the formal schedule and speaker program and the poster program. In addition to these formal interactions, 'free time' was scheduled to allow informal discussions. Such discussions are fostering new collaborations and joint efforts in the field.
DTIC
Conferences; Electrodeposition

20060055821 Maryland Univ., College Park, MD USA
Design Considerations for Optically Connected Systems on Chip
Bambha, Neal K; Bhattacharyya, Shuvra S; Euliss, Gary; Jun 2003; 6 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): MDA972-00-1-0023
Report No.(s): AD-A457628; No Copyright; Avail.: CASI: A02, Hardcopy

This paper addresses some fundamental issues relating to the design of systems on chip that utilize optical interconnects. We present an information theoretical model for assessing trade-offs between global and local partitions in these systems, and evaluate interconnect topology synthesis and application mapping techniques for digital signal processing (DSP) applications in these systems.
DTIC
Architecture (Computers); Chips; Topology

20060055827 Naval Postgraduate School, Monterey, CA USA
Intelligent Maintenance Aid (IMA)
Shockley, Keith J; Jun 2006; 83 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457639; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Technological complexities of current ground combat systems require advanced maintenance methods to keep the fleet in a state of operational readiness. Currently, maintenance personnel use paper Technical Manuals (TM) that are cumbersome and not easily transportable or updated in the field. This thesis proposes using the latest technology to support maintainers in the field or depot by integrating the TMs with the onboard diagnostics Built-In-Test (BIT) and Fault Isolation Test (FIT) of the vehicle, to provide the maintainer with an improved diagnostics tool to expedite troubleshooting analysis. This will be accomplished by connecting the vehicle, using the vehicle's 1553 multiplex bus, with the Graphical User Interface (GUI) of an Intelligent Maintenance Aid (IMA). The IMA will use Troubleshooting Procedure (TP) codes generated during BIT and FIT testing. Using the information provided by these TP codes, through the IMA GUI, information from the technical manuals will be displayed to aid the maintainers in their diagnostic work. The results of this thesis will serve as a baseline for further research and will be presented to the program management office for combat systems (PM-CS) for further consideration and development.
DTIC
Artificial Intelligence; Electronic Equipment; Maintenance

20060056181 Lucent Technologies, Murray Hill, NJ, USA
Layer Incorporating Particles with a High Dielectric Constant
Katz, H. E.; Maliakal, A. J.; 4 Nov 03; 11 pp.; In English
Contract(s)/Grant(s): NIST-70NANB2H3032

Patent Info.: Filed Filed 4 Nov 03; US-Patent-Appl-SN-10-700-651
Report No.(s): PB2007-100841; No Copyright; Avail.: CASI: A03, Hardcopy

An apparatus includes a substrate having a surface and a dielectric layer located on the surface. The dielectric layer includes a distribution of particles. Each particle includes a particle core and a polymer shell chemically bonded to and located around the associated particle core. Each particle core includes a material having a dielectric constant of about fifteen or more. The dielectric layer has a dielectric constant of seven or more.

NTIS

Dielectrics; Patent Applications; Permittivity

20060056183 Saint Louis Univ., MO, USA

Immobilized Enzymes in Biocathodes

Minteer, S. D.; Topcagic, S.; Treu, B.; 31 Aug 04; 38 pp.; In English
Contract(s)/Grant(s): ONR-NOOO14-03-0222
Patent Info.: Filed Filed 31 Aug 04; US-Patent-Appl-SN-10-931-147
Report No.(s): PB2007-100842; No Copyright; Avail.: CASI: A03, Hardcopy

Disclosed is an improved biofuel cell having a cathode comprising a dual function membrane, which contains an oxygen oxidoreductase enzyme immobilized within a buffered compartment of the membrane and an electron transport mediator which transfers electrons from an electron conducting electrode to the redox reaction catalyzed by the oxygen osidoreductase enzyme. The improved biofuel cell also has an anode that contains an oxidoreductase enzyme that uses an organic fuel, such as alcohol, as a substrate. An electric current can flow between the anode and the cathode.

NTIS

Enzymes; Patent Applications

20060056225 Foster (Lynn G.), L.C., Salt Lake City, UT, USA

Microscopic Batteries for MEMS Systems

LaFolette, R. C.; Salmon, J. G.; Harb, J. N.; 5 Sep 04; 25 pp.; In English
Contract(s)/Grant(s): AF-F20601-96-C-0078
Patent Info.: Filed Filed 5 Sep 04; US-Patent-Appl-SN-10-982-270
Report No.(s): PB2007-100817; No Copyright; Avail.: CASI: A03, Hardcopy

Microscopic batteries, integratable or integrated with and integrated circuit, including a MEMS microcircuit, and methods of microfabrication of such microscopic batteries are disclosed.

NTIS

Electric Batteries; Microelectromechanical Systems; Patent Applications

20060056226 National Science Foundation, Washington, DC USA

Micro-Discharge Optical Source Apparatus and Method and System for Analyzing a Sample

Glanchandanl, Y. B.; Wilson, G. G.; Que, L.; Mitra, B.; Selvaganapathy, P.; 10 Sep 04; 17 pp.; In English
Contract(s)/Grant(s): DARPA-040074
Patent Info.: Filed Filed 10 Sep 04; US-Patent-Appl-SN-10-937-918
Report No.(s): PB2007-100818; No Copyright; Avail.: CASI: A03, Hardcopy

A micro-discharge optical source apparatus and a method and system which utilizes the apparatus to analyze a sample are provided. The apparatus includes a substrate and an anode electrode and a cathode electrode supported on the substrate. One of the electrodes, such as the cathode, is preferably a liquid electrode. The electrodes are spaced apart to define an inter-electrode gap there between. The apparatus further includes a voltage source for applying a voltage between the electrodes sufficient to generate a glow micro-discharge in the gap to cause a first emission having a first desired excitation spectrum. An optical element is integrated with the substrate to direct the first emission to travel along an optical path including an axis. In one embodiment, the system detects the direct fluorescence of a sample such as tryptophan and other amino acids. In another embodiment, the system detects fluorescence of dye-labeled biochemicals.

NTIS

Optical Paths; Glow Discharges

20060056298 Honeywell International, Inc., Morristown, NJ, USA

Dual Mode Display with a Backlight Filter for an Unactivated Light Emitting Diode

Campbell, W. T.; Maner, R. M.; 3 Nov 03; 20 pp.; In English
Contract(s)/Grant(s): N00019-93-C-006

Patent Info.: Filed Filed 3 Nov 03; US-Patent-Appl-SN-10-700-928
Report No.(s): PB2007-100826; No Copyright; Avail.: CASI: A03, Hardcopy

A dual mode or multimode backlight containing LEDs as a light source. The backlight has light cavity containing a reflective material. The cavity has an opening to allow light to be directed to a display source such as a liquid crystal display (LCD). Two sets of LEDs are provided, one set for day mode and one set for night mode. The night mode LEDs is fitted with an NVIS filter. The day mode LEDs is fitted with a filter that suppresses the phosphorescence from the day mode LEDs. The filter suppress the IR energy and allows maximum luminance from the day mode LEDs. During night mode operation, the backlight is flooded with light. Filtered light from the NVIS LED's would impinge on the day mode LED's causing them to phosphoresce. The filter over the day mode LEDs removes the infrared energy from the phosphorescent light emitted from the day mode LEDs.

NTIS

Light Emitting Diodes; Patent Applications; Liquid Crystals; Light Sources

20060056299 Ryan, Mason and Lewis, LLP, Locust Valley, NY, USA

Magnetic Random Access Memory Using Memory Cells with Rotated Magnetic Storage Elements

Lu, Y.; Roehr, W. R.; Scheuerlein, R. E.; 29 Oct 04; 7 pp.; In English
Contract(s)/Grant(s): MDA972-99-C-0009
Patent Info.: Filed Filed 29 Oct 04; US-Patent-Appl-SN-10-976-598
Report No.(s): PB2007-100827; No Copyright; Avail.: CASI: A02, Hardcopy

A magnetic random access memory circuit comprises a plurality of magnetic memory cells, each of the memory cells including a magnetic storage element having an easy axis and a hard axis associated therewith, and a plurality of column lines and row lines for selectively accessing one or more of the memory cells, each of the memory cells being proximate to an intersection of one of the column lines and one of the row lines. Each of the magnetic memory cells is arranged such that the easy axis is substantially parallel to a direction of flow of a sense current and the hard axis is substantially parallel to a direction of flow of a write current.

NTIS

Computer Storage Devices; Magnetic Storage; Memory (Computers); Patent Applications; Random Access

20060056300 Lawrence Livermore National Lab., Livermore, CA USA

List Mode Multichannel Analyzer

Archer, D. E.; Luke, S. J.; Mauger, J.; Riot, V. J.; Knapp, D. A.; 1 Nov 04; 15 pp.; In English
Contract(s)/Grant(s): DE-W-7405-ENG-48
Patent Info.: Filed Filed 1 Nov 04; US-Patent-Appl-SN-10-979-592
Report No.(s): PB2007-100828; No Copyright; Avail.: CASI: A03, Hardcopy

A digital list mode multichannel analyzer (MCA) built around a programmable FPGA device for onboard data analysis and on-the-fly modification of system detection/operating parameters, and capable of collecting and processing data in very small time bins (\h1 millisecond) when used in histogramming mode, or in list mode as a list mode MCA.

NTIS

Patent Applications; Field-Programmable Gate Arrays

20060056301 Ostrager Chong Flaherty and Broiman LLP, New York, NY, USA

Integrated Interface Electronics for Reconfigurable Sensor Array

Thomenius, K. E.; Fischer, R. A.; Wodnicki, R. B.; Edward, W.; 29 Oct 04; 15 pp.; In English
Contract(s)/Grant(s): DAMD17-02-1-0181
Patent Info.: Filed Filed 29 Oct 04; US-Patent-Appl-SN-10-997-0899
Report No.(s): PB2007-100829; No Copyright; Avail.: CASI: A03, Hardcopy

An integrated switch matrix for reconfiguring subelements of a mosaic sensor array to form elements. The configuration of the switch matrix is fully programmable. The switch matrix includes access switches that connect subelements to bus lines and matrix switches that connect subelements to subelements. Each subelement has a unit switch cell comprising at least one access switch, at least one matrix switch, a respective memory element for storing the future state of each switch, and a respective control circuit for each switch. The access and matrix switches are of a type having the ability to memorize control data representing the current switch state of the switch, which control data includes a data bit input to turn-on/off circuits incorporated in the control circuit. The sensor array and the switching matrix may be built in different strata of a co-integrated

structure or they may be built on separate wafers that are electrically connected. If the sensors are arranged on a hexagonal grid, the unit switch cells may be arranged on either a hexagonal or rectangular grid.
NTIS
Patent Applications; Sensors

20060056334 Duane Morris LLP, Princeton, NJ, USA
Surge Current Suppression in Power-Factor-Corrected AC-To-DC Converter with Capacitive Load
Wu, K. C.; 4 Nov 03; 13 pp.; In English
Contract(s)/Grant(s): N00014-992-0002
Patent Info.: Filed Filed 4 Nov 03; US-Patent-Appl-SN-10-700-848
Report No.(s): PB2007-100820; No Copyright; Avail.: CASI: A03, Hardcopy

A power supply for a capacitive-resistive load includes plural paralleled phase correcting modules together with current sharing controllers for tending to equalize their currents. Each module is provided with a diode, poled to prevent forward current from flowing in the return current path, for aiding in equalizing module currents. Surge currents are reduced by a single saturable reactor coupled to the combined outputs of current sharing controllers, thereby avoiding the need for soft-start in each controller. A precharging path extends from a source of pulsating direct voltage to the load, for precharging the load capacitance at turn-on.
NTIS
Alternating Current; Capacitance; Loads (Forces); Patent Applications; Surges

20060056338 Woodard, Emhardt, Moriarty, McNett and Henry, LLP, Indianapolis, IN, USA
Reduction of Residual Amplitude Modulation Frequency-Modulated Signals
Cannon, B. D.; 3 Nov 03; 14 pp.; In English
Contract(s)/Grant(s): DE-AC0676RL01831
Patent Info.: Filed Filed 3 Nov 03; US-Patent-Appl-SN-10-700-161
Report No.(s): PB2007-100823; No Copyright; Avail.: CASI: A03, Hardcopy

One system of the present invention includes a modulated light source subsystem to provide a first light signal with a first modulation index, and a second light signal with a second modulation index. The system also includes a region to receive an analyte for evaluation and direct the first light signal thereto, and a detector responsive to the second light signal and a third light signal from the region to provide an output representative of spectroscopic information. The third light signal further includes noise induced by residual amplitude modulation that is reduced at the detector by the second light signal in accordance with a difference between the first modulation index and the second modulation index.
NTIS
Amplitude Modulation; Frequency Modulation; Patent Applications

20060056356 National Inst. of Standards and Technology, Gaithersburg, MD USA, North Carolina Univ., Charlotte, NC, USA
Instrumentation and Metrology for Nanotechnology: Report of the National Nanotechnology Initiative Workshop. Held in Gaithersburg, Maryland on January 27-29, 2004
Postek, M. T.; Hocken, R. J.; Jan. 2004; 188 pp.; In English; Instrumentation and Metrology for Nanotechnology: Report of the National Nanotechnology Initiative Workshop., January 27 - 29, 2004, Gaithersburg, Maryland
Report No.(s): PB2007-102133; No Copyright; Avail.: National Technical Information Service (NTIS)

Instrumentation and metrology are both integral to the emerging nanotechnology enterprise, and have been identified by the National Nanotechnology Initiative (NNI) as critical nanotechnology areas. Instrumentation and metrology are vital to applications in everything from electronics to medicine and crosscut all the NNI areas of research and application. Advances in fundamental nanoscience, design of new nanomaterials, and ultimately manufacturing of new nanotechnology-based products will all depend to some degree on the capability to accurately and reproducibly measure properties and performance characteristics at the nanoscale.
NTIS
Measuring Instruments; Metrology; Nanotechnology

34
FLUID MECHANICS AND THERMODYNAMICS

Includes fluid dynamics and kinematics and all forms of heat transfer; boundary layer flow; hydrodynamics; hydraulics; fluidics; mass transfer and ablation cooling. For related information see also *02 Aerodynamics*.

20060054255 CH2M/Hill Hanford Group, Inc., Richland, WA, USA
Hanford Double-Shell Tank Thermal and Seismic Project Summary of Combined Thermal and Operating Loads
Mackey, T. C.; Mar. 17, 2006; 412 pp.; In English
Report No.(s): DE2006-878179; No Copyright; Avail.: National Technical Information Service (NTIS)

This report summarizes the results of the Double-Shell Tank Thermal and Operating Loads Analysis (TOLA) combined with the Seismic Analysis. This combined analysis provides a thorough, defensible, and documented analysis that will become a part of the overall analysis of record for the Hanford double-shell tanks (DSTs).
NTIS
Loads (Forces); Radioactive Wastes

20060054439 NASA Ames Research Center, Moffett Field, CA, USA
Arc Jet Flow Properties Determined from Laser- Induced Fluorescence of Atomic Species
Fletcher, Douglas G.; [1997]; 1 pp.; In English; 1997 Gordon Research conference on the Pysics and Chemistry of Laser Diagnostics in Combustion, 6-11 Jul. 2006, Plymouth, NH
Contract(s)/Grant(s): RTOP 242-33-01; No Copyright; Avail.: Other Sources; Abstract Only

Flow property measurements that were recently acquired in the Ames Research Center Aerodynamic Heating Facility (AHF) arc jet using two-photon Laser-Induced Fluorescence (LIF) of atomic nitrogen and oxygen are reported. The measured properties, which include velocity, translational temperature, and species concentration, cover a wide range of facility operation for the 30 cm nozzle. During the tests, the arc jet pressure and input stream composition were maintained at fixed values and the arc current was varied to vary the flow enthalpy. As part of this ongoing effort, a measurement of the two-photon absorption coefficient for the 3p4D(left arrow)2p4S transition of atomic nitrogen was performed, and the measured value is used to convert the relative concentration measurements to absolute values. A flow reactor is used to provide a known temperature line shape profile to deconvolve the laser line width contribution to the translational temperature measurements. Results from the current experiments are compared with previous results obtained using NO-beta line profiles at room temperature and the problem of multimode laser oscillation and its impact on the two-photon excitation line shape are discussed. One figure is attached, and this figure show relative N atom concentration measurements as a function of the arc power. Other measurements have already been acquired and analyzed. The arc jet flow facilities are heavily used in thermal protection material development and evaluation. All hypersonic flight and planetary atmospheric entry vehicles will use materials tested in these arc jet facilities. This poster represents an application of laser-spectroscopic measurements in an important test facility.
Author
Aerodynamic Heating; Atom Concentration; Jet Flow; Laser Induced Fluorescence; Test Facilities; Arc Heating

20060055392 NASA Langley Research Center, Hampton, VA, USA
Fabrication of 0.0075-Scale Orbiter Phosphor Thermography Test Models for Shuttle RTF Aeroheating Studies
Buck, Gregory M.; Powers, Michael A.; Griffith, Mark S.; Hopins, John W.; Veneris, Pete H.; Kuykendoll, Kathryn; November 2006; 47 pp.; In English
Contract(s)/Grant(s): WBS 759.07.05
Report No.(s): NASA/TM-2006-214507; L-19253; No Copyright; ONLINE: http://hdl.handle.net/2060/20060055392;
Avail.: CASI: A03, Hardcopy

This report details the techniques and fidelity associated with aeroheating models constructed in support of the return-to-flight boundary layer transition (BLT) activity for STS-114. This report provides technical descriptions of the methods, materials, and equipment used, as well as the surface quality results obtained with the cast ceramic phosphor thermography models.
Author
Aerodynamic Heating; Boundary Layer Transition; Thermography; Space Transportation System; Phosphors

20060055547 Cranfield Univ., Cranfield, UK
Implicit Large Eddy Simulation for Unsteady Turbulent Flows
Hahn, Marco; Drikakis, Dimitris; Apr 25, 2005; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457136; No Copyright; Avail.: CASI: A02, Hardcopy
No abstract available
Large Eddy Simulation; Simulation; Turbulent Flow; Unsteady Flow

20060055560 Purdue Univ., West Lafayette, IN USA
Hypersonic Laminar Instability on Round Cones Near Zero Angle of Attack
Schneider, Steven P; Jan 1, 2006; 25 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457153; No Copyright; Avail.: Defense Technical Information Center (DTIC)
No abstract available
Angle of Attack; Boundary Layer Stability; Hypersonic Flow; Hypersonics; Laminar Boundary Layer; Laminar Flow; Stability; Zero Angle of Attack

20060055561 Rutgers - The State Univ., Piscataway, NJ USA
RTO WG 10: Test Cases for CFD Validation of Hypersonic Flight
Knight, Doyle; Jan 1, 2006; 25 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F49620-99-1-0008
Report No.(s): AD-A457154; No Copyright; Avail.: CASI: A03, Hardcopy
No abstract available
Computational Fluid Dynamics; Hypersonic Flight

20060055701 Oregon State Univ., Corvallis, OR USA
Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results
Kokes, Joseph; Costello, Mark; Sahu, Jubaraj; Sep 2006; 34 pp.; In English
Contract(s)/Grant(s): W911QX-05-P-0558-P00002; Proj-H80
Report No.(s): AD-A457421; No Copyright; Avail.: CASI: A03, Hardcopy
A method to efficiently generate a complete aerodynamic description for projectile flight dynamic modeling is described. At the core of the method is an unsteady, time accurate computational fluid dynamics simulation that is tightly coupled to a rigid body dynamics simulation. A set of n short time snippets of simulated projectile motion at m different Mach numbers is computed and employed as baseline data. For each time snippet, aerodynamic forces and moments and the full rigid body state vector of the projectile are known. With time synchronized air loads and state vector information, aerodynamic coefficients can be estimated with a simple fitting procedure. By inspecting the condition number of the fitting matrix, it is straightforward to assess the suitability of the time history data to predict a selected set of aerodynamic coefficients. To highlight the merits of this technique, it is exercised on example data for a fin-stabilized projectile. The technique is further exercised for a fin- and spin-stabilized projectile using simulated data from a standard trajectory code.
DTIC
Aerodynamic Characteristics; Aerodynamic Coefficients; Computational Fluid Dynamics; Flight Simulation; Mathematical Models; Models; Projectiles; Trajectories; Unsteady Aerodynamics

20060055769 Naval Postgraduate School, Monterey, CA USA
Performance Comparison between Rough and Smooth-Cast Blades in a Low-Speed Multistage Compressor
Manry, Rebecca A; Jun 2006; 123 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457539; No Copyright; Avail.: Defense Technical Information Center (DTIC)
A performance comparison between smooth-cast and rough-cast blades was conducted in a lowspeed multistage compressor. The purpose was to show that rough-cast blades can be used for initial performance tests of low-speed compressors. A baseline performance was established with smooth-cast epoxy blades and then compared to rough-cast aluminum blades. The pressure-rise coefficient versus flow coefficient and velocity triangles were used as the measure for comparison between the different blade types. The velocity triangles were constructed and compared across the span (hub-to-tip) of the secondstage. This was done by using two probes that could traverse radially along the blade and sense the flow velocity and angle relative to the compressor axis. Measurements were taken at six different locations from the hub-to-tip

of the blade. The performance tests were conducted at four different throttle settings: near stall, open throttle, nominal operating point (NOP), and near the NOP. Results showed that although there were some differences between the smooth-cast and rough-cast blades, the overall performance was very similar. As a result, rough-cast blades could be used for initial performance tests or as the initial stages of a compressor in order to set up the flow for the evaluation of a new stage of smooth blades. The use of rough-cast blades in early stages would save the time and money needed to produce large numbers of high precision smooth-cast blades.
DTIC
Compressors; Flow Velocity; Low Speed; Surface Roughness; Turbocompressors

20060056068 NASA Langley Research Center, Hampton, VA, USA
Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating
Buck, Gregory M.; Powers, Michael A.; Nevins, Stephen C.; Griffith, Mark S.; Wainwright, Gary A.; November 2006; 19 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): WBS 759.07.05
Report No.(s): NASA/TM-2006-214508; L-19254; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056068;
Avail.: CASI: A03, Hardcopy

Methods, materials and equipment are documented for fabricating flat plate test models at NASA Langley Research Center for Shuttle return-to-flight aeroheating experiments simulating open and closed cavity interactions in Langley s hypersonic 20-Inch Mach 6 air wind tunnel. Approximately 96 silica ceramic flat plate cavity phosphor thermography test models have been fabricated using these methods. On one model, an additional slot is machined through the back of the plate and into the cavity and vented into an evacuated plenum chamber to simulate a further opening in the cavity. After sintering ceramic to 2150 F, and mounting support hardware, a ceramic-based two-color thermographic phosphor coating is applied for global temperature and heat transfer measurements, with fiducial markings for image registration.
Author
Thermography; Aerodynamic Heating; Heat Transfer; Phosphors; Fabrication; Flat Plates; Heating Equipment; Hypersonic Wind Tunnels

20060056344 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA, USA
In-Plant Testing of High-Efficiency Hydraulic Separators. (Annual Report, July 21, 2004-July 20, 2005)
Luttrell, G. H.; Honaker, R. Q.; Bratton, R. C.; Westersfield, T. C.; Kohmuench, J. N.; May 22, 2006; 48 pp.; In English
Report No.(s): DE2006-883712; No Copyright; Avail.: National Technical Information Service (NTIS)

Hydraulic separators are commonly used for particle size classification and gravity concentration of minerals and coal. Unfortunately, the efficiency of these processes can be quite low due to poor equipment design and variations in feed consistency. To help alleviate these problems, an industry-driven R&D program has been undertaken to develop a new generation of hydraulic separators that are more efficient and less costly to operate and maintain. These units, which are commercially called the CrossFlow separator and HydroFloat separator, have the potential to improve performance (separation efficiency and throughput) and reduce operating costs (power consumption, water and reagent usage). In Phase I of this project, laboratory and pilot-scale test units were evaluated at various industrial sites in both the coal and mineral industries. Based on promising results obtained from Phase I, full-scale prototypes were purchased and installed by a major U.S. phosphate producer and a large eastern U.S. coal company. The test data obtained from these sites demonstrate that significant performance improvements can be realized through the application of these high-efficiency separators.
NTIS
Cross Flow; Fluid Flow; Separators

20060056351 Geological Survey, Reston, VA USA
Inversion of Elastic Impedance for Unconsolidated Sediments
Lee, M. W.; January 2006; 19 pp.; In English
Report No.(s): PB2007-102688; USGS-SIR-2006-5081; No Copyright; Avail.: National Technical Information Service (NTIS)

The presence of gas hydrate in pore spaces of unconsolidated sediments increases both P-wave and S-wave velocities, whereas in sediments that are partially gas saturated, P-wave velocities decrease significantly and the S-wave velocities either increase slightly or do not change. Also, shallow sediments inside the gas-hydrate stability zone are commonly over-pressured,

in which case both P- and S-wave velocities decrease as pore pressure increases. Therefore, elastic properties of gas-hydrate-bearing sediments are important for quantifying amounts of gas hydrate as well as for discriminating its effect on velocity from the effect of free gas or pore pressure. Elastic properties of gas-hydrate-bearing sediments can be estimated from angle stacks by using elastic inversion methods. Commonly used elastic inversion methods assume that the VS/VP ratio is 0.5. However, the VS/VP ratios of gas-hydrate-bearing sediments are generally much less than 0.5, unless the gas-hydrate saturation is high (more than about 80 percent). The VS/VP ratio of 0.5 (or some other constant) is assumed, because the elastic inversion requires the VS/VP ratio to be known. In order to perform elastic inversion for sediments whose VS/VP ratio is much less than 0.5, predicted S-wave velocities are used to derive the VS/VP ratio necessary for the inversion. Model results indicate that this approach works well for both noise-free and noisy data.
NTIS
Impedance; Inversions; Sediments

20060056380 NASA Johnson Space Center, Houston, TX, USA
Higher Order Chemistry Models in the CFD Simulation of Laser-Ablated Carbon Plumes
Scott, C. D.; Greendyke, R. B.; Creel, J. R.; Payne, B. T.; 2005; 2 pp.; In English; 43rd Aerospace Sciences Meeting, 10-13 Jan. 2005, Reno, NV, USA; Copyright; Avail.: CASI: A01, Hardcopy

Production of single-walled carbon nanotubes (SWNT) has taken place for a number of years and by a variety of methods such-as laser ablation, chemical vapor deposition, and arc-jet ablation. Yet, little is actually understood about the exact chemical kinetics and processes that occur in SWNT formation. In recent time, NASA Johnson Space Center has devoted a considerable effort to the experimental evaluation of the laser ablation production process for SWNT originally developed at Rice University. To fully understand the nature of the laser ablation process it is necessary to understand the development of the carbon plume dynamics within the laser ablation oven. The present work is a continuation of previous studies into the efforts to model plume dynamics using computational fluid dynamics (CFD). The ultimate goal of the work is to improve understanding of the laser ablation process, and through that improved understanding, refine the laser ablation production of SWNT. Fig. 1 shows a basic schematic of the laser-ablation oven at NASA-JSC. Construction of the facility is simple in concept. Two concentric quartz tubes of 1.5 mm thickness form the inner and outer tubes with inside diameters of 2.2 and 5.08 cm respectively. At one end of the inner tube are located two 60 Hz pulsed lasers operating at 1064 nm and 532 nm wavelength with beam diameters of 5 mm aligned coaxially with the longitudinal axis of the inner quartz tube. For standard nanotube production runs, a 10 ns 532 nm pulse is followed 50 ns later by a 10 ns 1064 nm pulse. Each pulse is of 300 mJ energy. A target of carbon graphite with approximately 1% nickel and cobalt catalysts is located at the other end of the inner quartz tube. In the ordinary processing of SWNT, a base flow of 100 sccm of argon is maintained from the laser location and exits past the carbon target at a pressure of 66.7 kPa. These conditions yield a baseline mass flow through the chamber of 2.723x10(exp -6)kg/s of argon. The whole oven facility is heated to a temperature of 1473 K prior to nanotube production runs. Upon laser irradiation, part of the carbon target ablates immediately and forms a carbon vapor plume that penetrates into the argon base flow towards the laser initially at supersonic velocities. In the previous studies either a single carbon species, C3, was used to model the plume development, or a simplified 11 species carbon model reduced down from the Krestinin and Moravsky model for full fullerene chemistry was used. While both of these options yielded significant results, it was felt that the actual chemistry occ&g in the carbon plume might have a greater affect on the plume than assumed. Indeed, in the earlier attempts at modeling the carbon plume, several thermophysical characteristics could never be matched to experimental observations of plume development - mainly the propagation distance of the plume itself. In the present study, two additional chemistry models will be used to duplicate the previous studies simulations of the carbon plume. The first chemistry model used in this study is again a reduced form of the Krestinin and Moravsky rates. However the highest order carbon species allowed has been increased from C6 to C30 - therefore allowing the simulation of up to a half of the standard C60 fullerene. The second chemistry model investigated is a reduced form of a full carbon nanotube model developed at NASA-JSC. The C30 studies have already been accomplished at the present time, and the reduced SWNT model studies are currently underway. To pursue the current study, one sacrifice had to be made in that the simulation grid spacing had to be increased from 0.5 mm spacing to 1 mm spacing for the sake of computational efficiency since computational effort is proportional to the square of the number of grid points multiplied by the number of species considered. propagation that is far more in line with the experimental results observed by Puretzky et al as shown in Fig. 2. e C6 studies had yielded a far greater propagation in previous studies. In addition, chemical species development with the C30 model indicates that many higher order carbon species are produced outside of the plume proper (indicated by plotting contours of the background argon concentrations in Fig. 3) - this result was not observed in previous studies. In fact, some species primarily occurred outside of the plume itself - as shown for C27 in Fig. 4 when it is compared to Fig. 3. It could be asserted that this has occurred because all of the C27 in the plume had already been consumed in the formation of C30, but this does not seem to be indicated over time. Several other factors that arose in

the previous studies have also been made more clear by the use of the higher order chemical models - one being that the use of c6 as an indicator species was mistaken. C6 is the only carbon species in the previous studies that was not injected into the flowfield as a boundary condition; it was therefore hoped that this species would provide insight into the formation of higher order carbon species for comparison to full SWNT production. But, when the plot of total mass in the plume is examined on a species by species basis in Fig. 5, it is seen that Cg was a fairly insignificant contributor to the total carbon mass in the plume and would not provide information on higher order carbon formation. the thermophysical characteristics of the carbon plume as well as simulate the carbon plume using the reduced SWNT model to provide an even better simulation of full chemistry effects upon plume propagation.
Author
Carbon Nanotubes; Computational Fluid Dynamics; Laser Ablation; Plumes; Simulation; Models; Chemistry

20060056390 NASA Glenn Research Center, Cleveland, OH, USA
Conjugate Heat Transfer Analyses on the Manifold for Ramjet Fuel Injectors
Wang, Xiao-Yen J.; November 2006; 17 pp.; In English; Original contains color illustrations
Report No.(s): NASA/TM-2006-214455; E-15719; TFAWS06-1036; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056390; Avail.: CASI: A03, Hardcopy

Three-dimensional conjugate heat transfer analyses on the manifold located upstream of the ramjet fuel injector are performed using CFdesign, a finite-element computational fluid dynamics (CFD) software. The flow field of the hot fuel (JP-7) flowing through the manifold is simulated and the wall temperature of the manifold is computed. The three-dimensional numerical results of the fuel temperature are compared with those obtained using a one-dimensional analysis based on empirical equations, and they showed a good agreement. The numerical results revealed that it takes around 30 to 40 sec to reach the equilibrium where the fuel temperature has dropped about 3 F from the inlet to the exit of the manifold.
Author
Computational Fluid Dynamics; Finite Element Method; Fuel Injection; JP-7 Jet Fuel; Heat Transfer; Ramjet Engines; Flow Distribution

20060056433 NASA Glenn Research Center, Cleveland, OH, USA
Approaches to Cycle Analysis and Performance Metrics
Parson, Daniel E.; [2003]; 34 pp.; In English; Air Breathing Pulse Detonation Engine Technology, 4-5 Jan. 2003, Reno, NV, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 489.02.07.03; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056433; Avail.: CASI: A03, Hardcopy

The following notes were prepared as part of an American Institute of Aeronautics and Astronautics (AIAA) sponsored short course entitled Air Breathing Pulse Detonation Engine (PDE) Technology. The course was presented in January of 2003, and again in July of 2004 at two different AIAA meetings. It was taught by seven instructors, each of whom provided information on particular areas of PDE research. These notes cover two areas. The first is titled Approaches to Cycle Analysis and Performance Metrics. Here, the various methods of cycle analysis are introduced. These range from algebraic, thermodynamic equations, to single and multi-dimensional Computational Fluid Dynamic (CFD) solutions. Also discussed are the various means by which performance is measured, and how these are applied in a device which is fundamentally unsteady. The second topic covered is titled PDE Hybrid Applications. Here the concept of coupling a PDE to a conventional turbomachinery based engine is explored. Motivation for such a configuration is provided in the form of potential thermodynamic benefits. This is accompanied by a discussion of challenges to the technology.
Author
Air Breathing Engines; Computational Fluid Dynamics; Pulse Detonation Engines; Technology Utilization

35
INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography. For aerial photography see *43 Earth Resources and Remote Sensing*. For related information see also *06 Avionics and Aircraft Instrumentation*; and *19 Spacecraft Instrumentation and Astrionics*.

20060054200 Battelle Memorial Inst., Richland, WA, USA
High Performance Ion Mobility Spectrometry Using Hourglass Electrodynamic Funnel and Internal Ion Funnel
Smith, R. D.; Tang, K.; Shvartsburg, A. A.; 2 Sep 04; 20 pp.; In English
Contract(s)/Grant(s): DE-AC0676RLO1830

Patent Info.: Filed Filed 2 Sep 04; US-Patent-Appl-SN-10-933-661
Report No.(s): PB2007-100812; No Copyright; Avail.: CASI: A03, Hardcopy

A method and apparatus enabling increased sensitivity in ion mobility spectrometry/mass spectrometry instruments which substantially reduces or eliminates the loss of ions in ion mobility spectrometer drift tubes utilizing a device for transmitting ions from an ion source which allows the transmission of ions without significant delay to an hourglass electrodynamic ion funnel at the entrance to the drift tube and/or an internal ion funnel at the exit of the drift tube. An hourglass electrodynamic funnel is formed of at least an entry element, a center element, and an exit element, wherein the aperture of the center element is smaller than the aperture of the entry element and the aperture of the exit elements. Ions generated in a relatively high pressure region by an ion source at the exterior of the hourglass electrodynamic funnel are transmitted to a relatively low pressure region at the entrance of the hourglass funnel through a conductance limiting orifice. Alternating and direct electrical potentials are applied to the elements of the hourglass electrodynamic funnel thereby drawing ions into and through the hourglass electrodynamic funnel thereby introducing relatively large quantities of ions into the drift tube while maintaining the gas pressure and composition at the interior of the drift tube as distinct from those at the entrance of the electrodynamic funnel and allowing a positive gas pressure to be maintained within the drift tube, if desired. An internal ion funnel is provided within the drift tube and is positioned at the exit of said drift tube. The advantage of the internal ion funnel is that ions that are dispersed away from the exit aperture within the drift tube, such as those that are typically lost in conventional drift tubes to any subsequent analysis or measurement, are instead directed through the exit of the drift tube, vastly increasing the amount of ions exiting the drift tube.

NTIS

Funnels; Mobility; Spectrometers; Ions; Electrodynamics

20060055430 Army Research Lab., Aberdeen Proving Ground, MD USA

Localization of Tactile Signals as a Function of Tactor Operating Characteristics

Redden, Elizabeth S; Carstens, Christian B; Turner, Daniel D; Elliott, Linda R; Oct 2006; 71 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-62716AH70

Report No.(s): AD-A457062; ARL-TR-3971; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457062; Avail.: CASI: A04, Hardcopy

Throughout experiments investigating the utility of tactile displays, tactors with varying engineering specifications have been used. Some of these tactors may have been more effective than others in terms of the ability of the wearer to localize the position of the individual tactors and to feel the tactile stimulation during dynamic situations. This study compared Soldiers' abilities to localize three different configurations of tactors: an inertial shaker motor and a C-2 vibro-tactile transducer that was set at two different intensities. The correct signal detection and localization rates were fairly high for all three systems during static trials, ranging from 86.1% to 91.8% correct, and there were no significant differences among the three systems in terms of signal detection and localization in this event. The ability to correctly identify tactor location was degraded during the dynamic event, and differences among the three systems emerged. On the individual movement techniques course, tactor localization was best with the higher intensity C-2 vibrotactile transducer (78.7%) and worst with the inertial shaker motor (48.8%). Localization was best when the Soldier was moving upright or in a kneeling firing position, and localization was degraded when the Soldier's torso was in contact with the ground or when he was climbing an obstacle. Differences were also found in localization rates at different positions around the waist. Tactor location detections were highest at the front of the body and lowest at the sides.

DTIC

Position (Location); Tactile Discrimination; Touch

20060055558 Signature Research, Inc., Calumet, MI USA

Visual Through Infrared: Modeling Components and Methodologies for Estimating High Fidelity Ground Vehicle Signatures

Reynolds, William R; Dec 1, 2005; 11 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457151; No Copyright; Avail.: Defense Technical Information Center (DTIC)

No abstract available

Estimating; Infrared Signatures; Mathematical Models; Signatures; Visible Spectrum

20060055559 ThermoAnalytics, Inc., Calumet, MI USA
Applications of the MuSES Infrared Signature Code
Curran, Allen R; Gonda, Teresa G; Dec 1, 2005; 33 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457152; No Copyright; Avail.: CASI: A03, Hardcopy
No abstract available
Coding; Electro-Optics; Infrared Signatures; Signatures; Thermal Analysis

20060055587 Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung e.V., Munich, Germany
High-Speed Photographic Study of Wave Propagation and Impact Damage in Transparent Aluminum Oxynitride (AION)
Strassburger, Elmar; Sep 2006; 40 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N62558-04-P-6031
Report No.(s): AD-A457205; ARL-CR-579; No Copyright; Avail.: CASI: A03, Hardcopy
Fused silica and AlON specimens were tested by means of a modified edge-on impact technique. The specimens were placed between crossed polarizers, and the photo-elastic effect was utilized to visualize the stress waves. Pairs of impact tests at approximately equivalent velocities were carried out in transmitted plane (shadowgraphs, visualization of damage) and crossed polarized light (visualization of wave propagation). The experiments provided direct evidence of ceramic damage by nucleation and growth of fracture initiated by the stress waves, ahead of the coherent fracture front growing from the impacted edge. A comparison of the results in a reflected light set-up and the shadowgraphs indicated fracture nucleation in the interior of the ceramic. The experimental results provide a data basis for a deeper analysis of the damage mechanisms by means of numerical simulation. The work was supported by Dr. Douglas Templeton, U.S. Army Tank-Automotive Research, Development and Engineering Center, Warren, MI.
DTIC
Aluminum; High Speed; High Speed Photography; Impact Damage; Oxynitrides; Photographs; Transparence; Wave Propagation

20060055605 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA
Air Flow Patterns Around Several Biological Point Detection System Configurations
Wise, Daniel G; Weber, Daniel J; Carlile, Donna L; Nov 19, 2003; 42 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457236; No Copyright; Avail.: CASI: A03, Hardcopy
Current bio-defense point detection systems depend on acquiring a sample of the ambient aerosol. The aerosol inlet to the collection system is therefore a primary component & crucial to the performance of the entire point detection system. Flow field around and to an inlet intake is important issue when considering the performance of a point detection system. Inlet placement with respect to other objects in the flow field can have an impact on the performance of the system. For example: * The inlet could be sampling from recirculation zones where interferents accumulate * The inlet may be in a flow field where the ambient aerosol cannot be directly aspirated. * There could be local flow accelerations or vectoring to inlet at non-design orientations.
DTIC
Air Flow; Air Intakes; Biological Effects; Detection; Flow Distribution; Systems Engineering

20060055606 Texas A&M Univ., College Station, TX USA
Aerodynamic Aerosol Concentrators
Conerly, Shawn; Haglund, John S; McFarland, Andrew R; Nov 19, 2003; 21 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457237; No Copyright; Avail.: CASI: A03, Hardcopy
Overview: Detector Considerations Response threshold on the order of 104 particles. Air handling system is a major power consumer in the detector system. Goal: Develop High-Throughput, Low-Power Bioaerosol Concentrators. Slot-Nozzle Virtual Impactors Smaller nozzle dimensions reduce power consumed for fixed cutpoint and flow rate concentrator. Slot nozzles are easier to manufacture for high through-put and resist fouling to a greater degree than round nozzle virtual impactors. Prototype Devices LSVI and CSVI Units Wall loss mechanisms Misalignment of acceleration and receiver nozzle. Receiver nozzle profile. Acoustic resonance. Experimental Data. Research Plans.
DTIC
Aerosols; Concentrators

20060055635 Naval Postgraduate School, Monterey, CA USA

Optimal Stationing of RADAR Pickets and Anti-Ballistic Missile Defenders for Long Range Surveillance and Tracking (LRS&T) and Ballistic Missile Defense (BMD) Operations

Repass, Lawrence M; Sep 2006; 75 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457290; No Copyright; Avail.: CASI: A04, Hardcopy

We describe major enhancements to the missile defense planning aid JOINT DEFENDER (JDEF). JDEF is the first system that shows how to evaluate and exploit new and anticipated improvements in interceptors, longrange surveillance and tracking capabilities, networked communications, and the ability of detecting platforms to cue intercepting ones downrange. We want to improve system-wide effectiveness, gauged here by the reduction of expected damage inflicted. We defend an asset list (DAL) of targets, characterized by their locations and values to us. Our defenders include pure LOOKERs, radars and sensors of enemy missile launches, and SHOOTERs, platforms with means to both detect and intercept enemy launches. JDEF optimally positions platforms that can be moved, and prescribes what each platform should do. JDEF can estimate the value to either opponent of secrecy, deception, or intelligence. JDEF is the only missile defense planning system using formal optimization. Among many advantages this conveys, JDEF is able to unambiguously quantify the difference among disparate plans. Although the JDEF planner can manually control any detail, the planner is well advised to let optimization suggest where to start.

DTIC

Antimissile Defense; Ballistic Missiles; Missile Defense; Missile Ranges; Radar Tracking; Search Radar; Surveillance

20060055655 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA

Determination of MS2 Bacteriophage Stability at Low pH Using the Integrated Virus Detection System (IVDS)

Wick, Charles H; Elashvili, Ilya; McCubbin, Patrick E; Birenzvige, Amnon; Sep 2006; 13 pp.; In English

Report No.(s): AD-A457329; ECBC-TR-473; No Copyright; Avail.: CASI: A03, Hardcopy

This report describes testing of the survivability of MS2 virus under harsh conditions using the Integrated Virus Detection System (IVDS). In this study, the MS2 was subjected to a highly acidic and oxidative environment. Judging by the concentration of the virus particles, the virus survived 66 hr in 0.1 N HNO3 solution without any signs of diminution in the number of virus particles. This suggests that viruses might be able to survive such harsh environmental conditions.

DTIC

Bacteriophages; Detection; pH; Stability; Systems Integration; Viruses

20060055659 Naval Postgraduate School, Monterey, CA USA

Rip Channel Migration in the Nearshore

Minetree, Courtney M; Sep 2006; 55 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457344; No Copyright; Avail.: CASI: A04, Hardcopy

Video imaging data generated from the Naval Postgraduate School Imaging System (NAPSIS) during November 2004 to June 2006 was analyzed to determine the location of rip channels and track their morphology. During the study period, the rip fields constantly changed in shape, size, and location. Rip channels were found to have a mean migration southward at a rate of 0.16 meters per day with a standard deviation of 7.6 meters per day and maximum rates varying between approximately 30 meters per day north and 30 meters per day south. The migration exhibited a strong seasonal variation with southerly shifts in the fall and winter months, northerly shifts in the late winter and early spring months, and no significant shift in the late spring and summer months. Directional wave spectra measured every hour at the offshore NOAA buoy were refracted to the 10 meter depth contour at Marina and Sand City and compared with measured spectra at these locations. The significant wave heights at both locations exhibited a correlation of 0.94. Mean wave directions for Marina and Sand City were found to have correlations of 0.83 and 0.34, respectively. These refracted data were then used to calculate sediment transport rates at Stillwell Hall, Fort Ord. Rip channel migration and calculated sediment transport rates were correlated at 0.8, qualitatively confirming the hypothesis that the migration rate of rip channels is a function of modeled alongshore sediment transport. The sometimes rapid migration of these large scale morphological features is critical to the successful planning and execution of U.S. Navy and Marine Corps beach assaults and the operation of mine warfare. Because amphibious and special forces operate mainly in shallow areas, the modeling of rip current direction and magnitude contributes greatly to effective mission organization and accomplishment.

DTIC

Annual Variations; Depth; Imaging Techniques; Migration; Oceanography; Sediment Transport; Shallow Water; Video Signals; Warfare

20060055724 Naval Research Lab., Washington, DC USA
Progress Report on Fast Breeder Reactor Safety Studies
Beach, L A; Pieper, A G; Young, M P; Jun 1958; 27 pp.; In English
Report No.(s): AD-A457458; NRL-MR-803; No Copyright; Avail.: CASI: A03, Hardcopy

A proposal was made to ANL for NRL to construct a gamma ray pin-hole camera to follow the flow of molten fuel elements by observing the emitted gamma rays with a TV chain viewing an image of the fuel elements on a NaI screen. However, an alternative system has been proposed that will give the same space resolution, improved time resolution and dynamic range with greater flexibility and reduced cost. This system consists of a rotating cylinder with a large number of small collimating holes scanning across the test section. Signals from scintillation detectors placed behind the drum will intensity modulate the Z axis of multi-gun oscilloscopes, A continuously moving film camera will record these sweeps for study and analysis.
DTIC
Breeder Reactors; Cameras; Fast Nuclear Reactors; Reactor Safety; Thermal Reactors

20060055802 Ball Aerospace and Technologies Corp., Fairborn, OH USA
Chasing the Sun - The In-Flight Evaluation of an Optical Head Tracker
Sedillo, Michael R; Harris, David L; Franck, Douglas L; Mar 2006; 38 pp.; In English
Report No.(s): AD-A457590; No Copyright; Avail.: CASI: A03, Hardcopy

Head trackers have become an important tool in modern combat aircraft. They are used to: - Aim Weapons - Acquire Mission Critical Information - Receive Threat Warning Prompts - Measure Pilots Los For Precision Weapon Applications - Enable Intra-Cockpit Cueing - Maximize Overall Situation Awareness.
DTIC
Optical Tracking; Sun

20060056150 Defence Research and Development Canada, Ottawa, Ontario Canada
ISAR Motion Compensation using the Registration-Restoration-Fusion Method
Thayaparan, Thayananthan; Jun 2006; 32 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457104; DRDC-TM-206-131; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457104; Avail.: CASI: A03, Hardcopy

A new method is developed to perform target translational and rotational motion compensation for ISAR imaging. The method is based on a registration-restoration- fusion technique. This technique provides an efficient method to resolve the image smearing caused by the time-varying behavior of the target scattering centers and leads to a well-focused ISAR image. The basic idea is to use the nearest neighbor method to obtain control points and estimate motion parameters from two or more candidate images. The registration processes use these estimated motion parameters to remove both translational and rotational motion. The restoration process may be used to eliminate the blur that is induced by the registration process. Furthermore, the fusion of two registered images before or after restoration processing could be used to generate the focused ISAR image. This proposed method has been successfully applied to both experimental and simulated ISAR data.
DTIC
Image Processing; Radar Imagery; Restoration

20060056270 National Academy of Sciences - National Research Council, Washington, DC USA
Sensor Systems for Biological Agent Attacks: Protecting Buildings and Military Bases
Killian, James; Meyer, Emily Ann; Chang, Julius; Dressen, Sharon; Eyring, Greg; Jan 2004; 207 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DTRA01-00-C-0083
Report No.(s): AD-A457006; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457006; Avail.: CASI: A10, Hardcopy

The past decade has seen a growing concern about the potential for biological attacks on this nation's homeland and its military facilities. This concern was dramatically underscored by the events in the fall of 2001. The attack against the World Trade Center and the Pentagon made clear terrorists interest in mass casualties rather than smaller events to call attention to their cause. And the introduction of B. anthracis into the U.S. mail showed a willingness by some to use biological agents and also demonstrated their ability to develop or acquire relatively high-grade agent. Fortunately, during the past decade the nation had also invested significantly in developing technology to detect and respond to such a biological attack. As a result of this

investment, it is now possible to detect and identify biological agents in time (tens of minutes to hours) to pretreat potential victims before the onset of symptoms, thereby greatly reducing the consequences of most attacks. However, these time scales are still too long to enable the occupants of a facility to take some action to minimize their exposure for example, by altering airflow in a facility, sheltering in place, or evacuating the facility. Realizing the attractiveness of certain facilities as targets of biological attack and the desirability of minimizing the effects of any such attack not just by early treatment of exposed personnel but also by detection in time to minimize such exposures, the Defense Threat Reduction Agency (DTRA) chartered a study to examine the path to 'detect to warn' sensors for facility protection. Specifically, DTRA asked that the study examine representative scenarios for facility protection, elucidate the driving sensor requirements, identify detection technologies and systems that have the potential for meeting those requirements, and chart a roadmap for attaining those capabilities.
DTIC
Buildings; Sensors; Biological Weapons

36
LASERS AND MASERS

Includes lasing theory, laser pumping techniques, maser amplifiers, laser materials, and the assessment of laser and maser outputs. For cases where the application of the laser or maser is emphasized see also the specific category where the application is treated. For related information see also *76 Solid-State Physics*.

20060055422 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Blind Deconvolution of Anisoplanatic Images Collected by a Partially Coherent Imaging System
MacDonald, Adam; Mar 23, 2004; 171 pp.; In English
Report No.(s): AD-A457046; AFIT/DS/ENG/06-04; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457046;
Avail.: CASI: A08, Hardcopy

Coherent imaging systems offer unique benefits to system operators in terms of resolving power, range gating, selective illumination and utility for applications where passively illuminated targets have limited emissivity or reflectivity. This research proposes a novel blind deconvolution algorithm that is based on a maximum a posteriori Bayesian estimator constructed upon a physically based statistical model for the intensity of the partially coherent light at the imaging detector. The estimator is initially constructed using a shift-invariant system model, and is later extended to the case of a shift-variant optical system by the addition of a transfer function term that quantifies optical blur for wide fields-of-view and atmospheric conditions. The estimators are evaluated using both synthetically generated imagery, as well as experimentally collected image data from an outdoor optical range. The research is extended to consider the effects of weighted frame averaging for the individual short-exposure frames collected by the imaging system. It was found that binary weighting of ensemble frames significantly increases spatial resolution.
DTIC
Coherent Light; Images; Imaging Techniques

20060055581 Forschungsinstitut fuer Optronik und Mustererkennung, Ettlingen, Germany
Potential of Remote Laser Vibration Sensing for Military Applications
Lutzmann, Peter; Frank, R; Hebel, M; Ebert, R; Dec 1, 2005; 37 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457194; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Coherent Radar; Imagery; Lasers; Military Technology; Optical Radar; Remote Sensing; Remote Sensors; Vibration; Vibration Measurement

37
MECHANICAL ENGINEERING

Includes mechanical devices and equipment; machine elements and processes. For cases where the application of a device or the host vehicle is emphasized see also the specific category where the application or vehicle is treated. For robotics see *63 Cybernetics, Artificial Intelligence, and Robotics*; and *54 Man/System Technology and Life Support*.

20060054197 Andrews and Kurth, LLP, Houston, TX, USA
Rotary Shaft Sealing Assembly
Dietle, L. L.; Schroeder, J. E.; Kalsi, M. S.; Alvarez, P. D.; 5 Nov 2004; 30 pp.; In English
Contract(s)/Grant(s): DE-AC03-90ER80939

Patent Info.: Filed Filed 5 Nov 2004; US-Patent-Appl-SN-10-982-821
Report No.(s): PB2007-100815; No Copyright; Avail.: CASI: A03, Hardcopy

A rotary shaft sealing assembly in which a first fluid is partitioned from a second fluid in a housing assembly having a rotary shaft located at least partially within. In one embodiment a lip seal is lubricated and flushed with a pressure-generating seal ring preferably having an angled diverting feature. The pressure-generating seal ring and a hydrodynamic seal may be used to define a lubricant-filled region with each of the seals having hydrodynamic inlets facing the lubricant-filled region. Another aspect of the sealing assemble is having a seal to contain pressurized lubricant while withstanding high rotary speeds. Another rotary shaft sealing assembly embodiment includes a lubricant supply providing a lubricant at an elevated pressure to a region between a lip seal and a hydrodynamic seal with a flow control regulating the flow of lubricant past the lip seal. The hydrodynamic seal may include an energizer element having a modulus of elasticity greater than the modulus of elasticity of a sealing lip of the hydrodynamic seal.
NTIS
Sealing; Seals (Stoppers); Shafts (Machine Elements); Assembling

20060055554 Air Force Research Lab., Tyndall AFB, FL USA
Evaluation of Low-Pressure Drop Antimicrobial and Hybrid Air Filters
Sullivan, Patrick D; Sep 2006; 17 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F08637-03-C-6006; Proj-ARMT
Report No.(s): AD-A457145; No Copyright; Avail.: CASI: A03, Hardcopy

Low-pressure-drop aerosol filtration media for removing biological aerosols are investigated. Traditional non-woven media are enhanced with reactive chemistries forming Self Decontaminating Materials (SDMs). The AATCC methods 100 and 147 were found to be suitable for screening SDM filter media for antimicrobial activity. Method 147 is preferred since it is adequate for screening and much easier to perform than Method 100. Small sample disks (5 mm), as in the Kirby-Bauer method, can be substituted for the normal swatch used in Method 147. The screening method performance was predictive of the performance in bio-aerosol tests. The iodinated polymer resin based media, quaternary amine based media, and the N-halamine based media all proved effective in enhancing protection during bio-aerosol testing and merit further investigation.
DTIC
Air Filters; Antibiotics; Antiinfectives and Antibacterials; Low Pressure; Microorganisms

20060055650 Battelle Memorial Inst., Columbus, OH USA
Respirator Filter Efficiency Testing Against Particulate and Biological Aerosols Under Moderate to High Flow Rates
Richardson, Aaron W; Eshbaugh, Jonathan P; Hofacre, Kent C; Gardner, Paul D; Aug 2006; 183 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): SPO700-00-D-3180
Report No.(s): AD-A457318; No Copyright; Avail.: CASI: A09, Hardcopy

The growing terrorism threat associated with biological and chemical agents presents a challenge to emergency responders, healthcare workers, and the civilian population. Currently, National Institute for Occupational Safety and Health (NIOSH)-approved respirators are used in various workplace settings to provide protection against harmful aerosols. The primary objective of this project was to evaluate and compare the aerosol filtration performance of NIOSH-approved respirator filters with non-biological (inert) and biological test aerosols under breather flow rates associated with high work rates. The inert test challenges consisted of solid and oil aerosols having nominal diameters ranging from 0.02 to 3.02 micrometers, spanning the spectrum of potential biological threat agents. As expected, penetration of submicron aerosols was found to increase under increased cyclic and constant flow conditions. The magnitude and significance of this increase was dependent on the specific filter type and design. The most penetrating particle size was generally between 0.1 and 0.2 micrometers for the P100 filters and 0.05 and 0.10 micrometers for the N95 filters. Inert aerosols of similar aerodynamic diameter were shown to provide a reasonable estimate of performance against the biological aerosols tested.
DTIC
Aerosols; Bioassay; Evaluation; Flow Velocity; Particulates; Respirators; System Effectiveness

20060056224 NASA Johnson Space Center, Houston, TX, USA
Development of a Gravity-Insensitive Heat Pump for Lunar Applications
Cole, Gregory S.; Scaringe, Robert P.; Grzyll, Lawrence R.; Ewert, Michael K.; [January 2006]; 6 pp.; In English; Space Technology and Applications (STAIF), 11-15 Feb. 2007, Albuquerque, NM, USA; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056224; Avail.: CASI: A02, Hardcopy

Mainstream Engineering Corporation is developing a gravity-insensitive system that will allow a vapor-compression-cycle heat pump to be used in both microgravity (10(exp -6)g) and lunar (10(exp -6)g) environments. System capacity is 5 kW to 15 kW at design refrigerant operating conditions of 4.44 C and 60 C evaporating and condensing temperatures, respectively. The current program, performed for NASA Johnson Space Center (JSC) and presented in this paper, includes compressor performance analysis, detailed system design, and thermal analysis. Future efforts, including prototype fabrication, integration of a solar power source and controls, ground-testing, and flight-testing support, are also discussed.
Author
Heat Pumps; Microgravity; Thermal Analysis; Lunar Environment; Evaporation; Condensing; Design Analysis; Fabrication

20060056231 NASA Johnson Space Center, Houston, TX, USA
International Space Station Centrifuge Rotor Models A Comparison of the Euler-Lagrange and the Bond Graph Modeling Approach
Nguyen, Louis H.; Ramakrishnan, Jayant; Granda, Jose J.; [2006]; 8 pp.; In English; 2007 International Conference on Bond Graph, 15-17 Jan. 2007, San Diego, CA, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 769.06.04.01.02.04; Copyright; Avail.: CASI: A02, Hardcopy

The assembly and operation of the International Space Station (ISS) require extensive testing and engineering analysis to verify that the Space Station system of systems would work together without any adverse interactions. Since the dynamic behavior of an entire Space Station cannot be tested on earth, math models of the Space Station structures and mechanical systems have to be built and integrated in computer simulations and analysis tools to analyze and predict what will happen in space. The ISS Centrifuge Rotor (CR) is one of many mechanical systems that need to be modeled and analyzed to verify the ISS integrated system performance on-orbit. This study investigates using Bond Graph modeling techniques as quick and simplified ways to generate models of the ISS Centrifuge Rotor. This paper outlines the steps used to generate simple and more complex models of the CR using Bond Graph Computer Aided Modeling Program with Graphical Input (CAMP-G). Comparisons of the Bond Graph CR models with those derived from Euler-Lagrange equations in MATLAB and those developed using multibody dynamic simulation at the National Aeronautics and Space Administration (NASA) Johnson Space Center (JSC) are presented to demonstrate the usefulness of the Bond Graph modeling approach for aeronautics and space applications.
Author
International Space Station; Mathematical Models; Computerized Simulation; Euler-Lagrange Equation; Centrifuges; Systems Integration

20060056245 NASA Glenn Research Center, Cleveland, OH, USA
Transient Response of Rotor on Rolling-Element Bearings with Clearance
Fleming, David P.; Murphy, Brian T.; Sawicki, Jerzy T.; Poplawski, J. V.; October 2006; 16 pp.; In English; IFToMM 7th International Conference on Rotor Dynamics, 25-28 Sep. 2006, Vienna, Austria; Original contains color illustrations
Contract(s)/Grant(s): WBS 581.02.07.03.04.01
Report No.(s): NASA/TM-2006-214408; E-15687; Copyright; Avail.: CASI: A03, Hardcopy

Internal clearance in rolling element bearings is usually present to allow for radial and axial growth of the rotor-bearing system and to accommodate bearing fit-up. The presence of this clearance also introduces a ‘dead band’ into the load-deflection behavior of the bearing. Previous studies demonstrated that the presence of dead band clearance might have a significant effect on synchronous rotor response. In this work, the authors investigate transient response of a rotor supported on rolling element bearings with internal clearance. In addition, the stiffness of the bearings varies nonlinearly with bearing deflection and with speed. Bearing properties were accurately calculated with a state of the art rolling bearing analysis code. The subsequent rotordynamics analysis shows that for rapid acceleration rates the maximum response amplitude may be less than predicted by steady-state analysis. The presence of clearance may shift the critical speed location to lower speed values. The rotor vibration response exhibits subharmonic components which are more prominent with bearing clearance.
Author
Rotor Dynamics; Transient Response; Stiffness; Vibration; Loads (Forces); Deflection; Clearances

20060056249 NASA Glenn Research Center, Cleveland, OH, USA
Improved Seals for High Temperature Airframe Applications
DeMange, Jeffrey J.; Dunlap, Patrick H.; Steinetz, Bruce M.; October 2006; 26 pp.; In English; 42nd Joint Propulsion Conference and Exhibit, 9-12 Jul. 2006, Sacramento, CA, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 529.02.03
Report No.(s): NASA/TM-2006-214465; E-15728; AIAA Paper 2006-4935; Copyright; Avail.: CASI: A03, Hardcopy

Current thermal barrier seals, such as those used on the Space Shuttle, are insufficient to fully meet the demands of future hypersonic vehicles and reentry spacecraft. Previous investigations have demonstrated limited usage temperatures, as evidenced by a decreased ability to maintain sealing effectiveness at high temperatures (i.e., inadequate resiliency). In order to improve resiliency at elevated temperatures, Rene 41 (Allvac) was substituted for Inconel X-750 (Special Metals Corp.) as the spring tube material in the existing seal design. A seal construction incorporating the Rene 41 spring tube was fabricated and tested against the baseline Inconel X-750 spring tube seal. Although resiliency improvements were not as dramatic as in previous tests with the spring tubes alone, seals incorporating the Rene 41 spring tube exhibited an average 20 percent resiliency enhancement up to 1750 F when compared to seals containing the Inconel spring tube. In addition, the seals with the Rene 41 spring tubes showed less reduction in resiliency as temperatures increased above 1200 F. Results also indicated the Saffil (Saffil Ltd.) insulation in the core of the seal contributed more to resiliency than previously thought. Leakage data did not demonstrate an improvement with the seal containing the Rene 41 spring tube. However, based upon resiliency results, one could reasonably expect the Rene 41 version of the seal to track gap openings over a wider range. Therefore it would exhibit lower leakage than the Inconel X-750 version as the seal gap opens during a typical mission.
Author
Airframes; High Temperature; Sealing; Thermal Barriers (Plasma Control); Fabrication

20060056281 NASA Glenn Research Center, Cleveland, OH, USA
Further Investigations of High Temperature Knitted Spring Tubes for Advanced Control Surface Seal Applications
Taylor, Shawn C.; DeMange, Jeffrey J.; Dunlap, Patrick H., Jr.; Steinetz, Bruce M.; November 2006; 25 pp.; In English; 41st Joint Propulsion Conference and Exhibit, 10-13 Jul. 2005, Tucson, AZ, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 423.06.02.07.03
Report No.(s): NASA/TM-2006-214348; E-15623; AIAA Paper 2005-4154; Copyright; Avail.: CASI: A03, Hardcopy

Knitted metallic spring tubes are the structural backbones that provide resiliency in control surface seals for use on current and future reusable space launch vehicles. Control surface seals fill the space between movable control surfaces such as body flaps, rudders and elevons, and the static body structures to which they are attached. These seals must remain in continuous contact with opposing surfaces to prevent the ingestion of damaging hot gases encountered during atmospheric re-entry. The Inconel X-750 (Special Metals Corporation) spring tube utilized in the baseline control surface seal shows significant resiliency loss when compressed at temperatures as low as 1200 F. High temperature compression testing and microstructural analysis show that creep is the dominant deformation mechanism leading to permanent set and resiliency loss in tested spring tube samples. Additional evaluation using a structured design of experiments approach shows that spring tube performance, primarily high temperature resiliency, can be enhanced through material substitution of Rene 41 (Allvac) alloy (for the baseline Inconel X-750 material) when coupled with specialized thermal processing.
Author
Reusable Spacecraft; Inconel (Trademark); Control Surfaces; Spacecraft Launching; Reentry; Metals; High Temperature

20060056282 NASA Glenn Research Center, Cleveland, OH, USA
Apollo Seals: A Basis for the Crew Exploration Vehicle Seals
Finkbeiner, Joshua R.; Dunlap, Patrick H., Jr.; Steinetz, Bruce M.; Daniels, Christopher C.; November 2006; 30 pp.; In English; 42nd AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, 9-12 Jul. 2006, Sacramento, CA, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 423.06.02.07.03
Report No.(s): NASA/TM-2006-214372; E-15651; AIAA Paper 2006-5259; Copyright; Avail.: CASI: A03, Hardcopy

The National Aeronautics and Space Administration is currently designing the Crew Exploration Vehicle (CEV) as a replacement for the Space Shuttle for manned missions to the International Space Station, as a command module for returning astronauts to the moon, and as an earth reentry vehicle for the final leg of manned missions to the moon and Mars. The CEV resembles a scaled-up version of the heritage Apollo vehicle; however, the CEV seal requirements are different than those from Apollo because of its different mission requirements. A review is presented of some of the seals used on the Apollo spacecraft for the gap between the heat shield and backshell and for penetrations through the heat shield, docking hatches, windows, and the capsule pressure hull.
Author
Seals (Stoppers); Reentry Vehicles; Mission Planning; Hulls (Structures); Manned Space Flight; Space Shuttle Missions

20060056309 NASA Glenn Research Center, Cleveland, OH, USA

Operational Influence on Thermal Behavior of High-Speed Helical Gear Trains

Handschuh, Robert F.; Kilmain, Charles J.; October 18, 2006; 18 pp.; In English; Forum 62, 9-11 May 2006, Phoenix, AZ, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 561581.02.07.03.03.01

Report No.(s): NASA/TM-2006-214344; ARL-TR-3969; E-15571; Copyright; Avail.: CASI: A03, Hardcopy

An experimental effort has been conducted on an aerospace-quality helical gear train to investigate the thermal behavior of the gear system as many important operational conditions were varied. Drive system performance measurements were made at varying speeds and loads (to 5,000 hp and 15,000 rpm). Also, an analytical effort was undertaken for comparison to the measured results. The influence of the various loss mechanisms from the analysis for this high speed helical gear train gearbox will be presented and compared to the experimental results.

Author

Gears; Transmissions (Machine Elements); Temperature Effects; High Speed; Loads (Forces)

20060056456 NASA Glenn Research Center, Cleveland, OH, USA

High Temperature Evaluation of an Active Clearance Control System Concept

Taylor, Shawn C.; Steinetz, Bruce M.; Oswald, Jay J.; November 2006; 21 pp.; In English; 42nd Joint Propulsion Conference and Exhibit, 9-12 Jul. 2006, Sacramento, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 984754.02.07.03.07.02

Report No.(s): NASA/TM-2006-214464; E-15727; AIAA Paper-2006-4750; Copyright; Avail.: CASI: A03, Hardcopy

A mechanically actuated blade tip clearance control concept was evaluated in a nonrotating test rig to quantify secondary seal leakage at elevated temperatures. These tests were conducted to further investigate the feasibility of actively controlling the clearance between the rotor blade tips and the surrounding shroud seal in the high pressure turbine (HPT) section of a turbine engine. The test environment simulates the state of the back side of the HPT shroud seal with pressure differentials as high as 120 psig and temperatures up to 1000 F. As expected, static secondary seal leakage decreased with increasing temperature. At 1000 F, the test rig's calculated effective clearance (at 120 psig test pressure) was 0.0003 in., well within the industry specified effective clearance goal.

Author

High Temperature; Control Systems Design; Seals (Stoppers); Turbine Engines

39
STRUCTURAL MECHANICS

Includes structural element design, analysis and testing; dynamic responses of structures; weight analysis; fatigue and other structural properties; and mechanical and thermal stresses in structures. For applications see *05 Aircraft Design, Testing and Performance*; and *18 Spacecraft Design, Testing and Performance*.

20060054220 Mountain-Plains Consortium, Fargo, ND, USA

Support Motion Effects in a Timber Trestle Bridge: Physical and Analytical Modeling

Babcock, S. A.; Gutkowski, R. M.; Charlie, W. A.; Balogh, J.; Oct. 2006; 75 pp.; In English

Report No.(s): PB2007-102064; No Copyright; Avail.: National Technical Information Service (NTIS)

A representative one-tenth scale model of an open-deck three-span timber trestle bridge was constructed and subjected to load testing in the laboratory. The scaled timber trestle bridge incorporated a realistic wooden pile foundation in sandy soil. A computer-based analytical model was created with AxisVM software. The analytical model was used to predict the behavior of the physical model. The three-span complete timber trestle bridge model was constructed out of common dimension Douglas Fir. Each span was 1176 mm (48 in) long and utilized two semi-continuous bridge chords. Peeled pine poles were used in the pile foundation. This foundation type was used to create support motions similar to those observed in previous field testing. Wood crossties were also included in the physical specimen. Observed support motions of the physical specimen were similar to motions observed in field bridge tests. The AxisVM model was successful in predicting the behavior of the physical specimen. Typically, predicted deflections were within 5% to 10% of the measured values. The support motion created by the pile-soil interaction was also modeled successfully by using a linear spring approximation.

NTIS

Load Tests; Mathematical Models; Models

20060054254 CH2M/Hill Hanford Group, Inc., Richland, WA, USA

Hanford Double-Shell Tank Thermal and Seismic Project Establishment of Methodology for Time Domain-Structure Interaction Analysis of a Hanford Double-Shell Tank

Mackey, T. C.; Mar. 17, 2006; 410 pp.; In English

Report No.(s): DE2006-878180; No Copyright; Avail.: National Technical Information Service (NTIS)

The objective of this investigation is to establish the methodology necessary to perform the required soil-structure interaction (SSI) analysis of the double shell tanks (DSTs) in the time domain. Specifically, the analysis establishes the capabilities and limitations of the commercial time domain codes ANSYS and Dytran for performing seismic SSI analysis of the DSTs and it establishes much of the methodology required to perform the detailed seismic analysis of the DSTs. The justification for using a time domain code for SSI analysis proceeds in a step-by-step process in which the time domain solutions were benchmarked or calibrated against frequency domain solutions beginning with simpler site response problems and progressing to more complex (but still linear) SSI problems.

NTIS

Radioactive Wastes; Soils; Storage Tanks; Underground Storage

20060054256 CH2M/Hill Hanford Group, Inc., Richland, WA, USA

Hanford Double-Shell Tank Thermal and Seismic Project Buckling Evaluation Methods and Results for the Primary Tanks

Mackey, T. C.; Mar. 17, 2006; 248 pp.; In English

Report No.(s): DE2006-878178; No Copyright; Avail.: National Technical Information Service (NTIS)

This report documents a detailed buckling evaluation of the primary tanks in the Hanford double-shell waste tanks (DSTs), which is part of a comprehensive structural review for the Double Shell Tank Integrity Project. This work also provides information on tank integrity that specifically responds to concerns raised by the Office of Environment, Safety, and Health (ES&H) Oversight (EH-22) during a review of work performed on the double-shell tank farms and the operation of the aging waste facility (AWF) primary tank ventilation system.

NTIS

Radioactive Wastes; Thermal Buckling; Storage Tanks; Underground Storage; Shells (Structural Forms)

20060054257 CH2M/Hill Hanford Group, Inc., Richland, WA, USA

Hanford Double-Shell Tank Thermal and Seismic Project ANSYS Benchmark Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank

Mackey, T. C.; Mar. 17, 2006; 236 pp.; In English

Report No.(s): DE2006-878177; No Copyright; Avail.: National Technical Information Service (NTIS)

The overall seismic analysis of the Double Shell Tanks (DSTs) is being performed with the general-purpose finite element code ANSYS. The overall model used for the seismic analysis of the DSTs includes the DST structure, the contained waste, and the surrounding soil. The seismic analysis of the DSTs must address the fluid-structure interaction behavior and sloshing response of the primary tank and contained liquid. ANSYS has demonstrated capabilities for structural analysis, but the capabilities and limitations of ANSYS to perform fluid-structure interaction are less well understood. The purpose of this study is to demonstrate the capabilities and investigate the limitations of ANSYS for performing a fluid-structure interaction analysis of the primary tank and contained waste. To this end, the ANSYS solutions are benchmarked against theoretical solutions appearing in BNL 1995, when such theoretical solutions exist. When theoretical solutions were not available, comparisons were made to theoretical solutions of similar problems and to the results from Dytran simulations.

NTIS

Radioactive Wastes; Storage Tanks; Underground Storage; Seismology; Structural Analysis

20060054259 CH2M/Hill Hanford Group, Inc., Richland, WA, USA

Hanford Double-Shell Tank Thermal and Seismic Project Dytran Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank

Mackey, T. C.; Mar. 17, 2006; 212 pp.; In English

Report No.(s): DE2006-878175; No Copyright; Avail.: National Technical Information Service (NTIS)

The overall seismic analysis of the Double Shell Tanks (DSTs) is being performed with the general-purpose finite element code ANSYS. The global model used for the seismic analysis of the DSTs includes the DST structure, the contained waste, and the surrounding soil. The seismic analysis of the DSTs must address the fluid-structure interaction behavior and sloshing

response of the primary tank and contained liquid. ANSYS has demonstrated capabilities for structural analysis, but has more limited capabilities for fluid-structure interaction analysis. The purpose of this study is to demonstrate the capabilities and investigate the limitations of the finite element code MSC.Dytranz for performing a dynamic fluid-structure interaction analysis of the primary tank and contained waste. To this end, the Dytran solutions are benchmarked against theoretical solutions appearing in BNL 1995, when such theoretical solutions exist. When theoretical solutions were not available, comparisons were made to theoretical solutions to similar problems, and to the results from ANSYS simulations.
NTIS
Radioactive Wastes; Finite Element Method; Structural Analysis; Storage Tanks; Underground Storage

20060056160 Army Command and General Staff Coll., Fort Leavenworth, KS USA
The Effective Use of New Materials and Methodologies for Blast Mitigation in New and Renovated Facilities by the Armed Services
Warner, Scott A; Jan 2005; 113 pp.; In English
Report No.(s): AD-A457404; No Copyright; Avail.: CASI: A06, Hardcopy

Since 1993, there have been numerous terrorist bombing attacks toward US facilities located on US or US controlled soil. This fact has motivated government organizations to take a hard look at how their facilities are constructed and what would be the consequences if a device were detonated in the vicinity to damage the facilities and injure or kill the occupants. The armed services have a large role to play in this effort, based on the number and location of installations they own or operate and the threat probability of a future attack. In response, private industry and government research facilities have developed a significant number of innovations in materials and methodologies for building construction and renovation that are now available in order to help mitigate the damage to facilities and occupants as a result of explosive blast. These innovations have been directly and indirectly prompted by the fear of other attacks on US soil, plus the recognition by private industry of the potential lucrative market. The armed services have made efforts to test and incorporate these materials and methodologies into their building codes and standards; the extent of these incorporations is the focus of this research.
DTIC
Explosives; Buildings; Damage; Probability Theory; Construction

20060056319 NASA Glenn Research Center, Cleveland, OH, USA
Application of the Bootstrap Statistical Method in Deriving Vibroacoustic Specifications
Hughes, William O.; Paez, Thomas L.; November 2006; 18 pp.; In English; Ninth International Conference on Recent Advances in Structural Dynamics, 17-19 Jul. 2006, Southampton, UK; Original contains color illustrations
Contract(s)/Grant(s): DE-A-C04-94AL85000; WBS 931164.03.01.02.01
Report No.(s): NASA/TM-2006-214446; E-15709; Rept.- 94; No Copyright; ONLINE:
http://hdl.handle.net/2060/20060056319; Avail.: CASI: A03, Hardcopy

This paper discusses the Bootstrap Method for specification of vibroacoustic test specifications. Vibroacoustic test specifications are necessary to properly accept or qualify a spacecraft and its components for the expected acoustic, random vibration and shock environments seen on an expendable launch vehicle. Traditionally, NASA and the U.S. Air Force have employed methods of Normal Tolerance Limits to derive these test levels based upon the amount of data available, and the probability and confidence levels desired. The Normal Tolerance Limit method contains inherent assumptions about the distribution of the data. The Bootstrap is a distribution-free statistical subsampling method which uses the measured data themselves to establish estimates of statistical measures of random sources. This is achieved through the computation of large numbers of Bootstrap replicates of a data measure of interest and the use of these replicates to derive test levels consistent with the probability and confidence desired. The comparison of the results of these two methods is illustrated via an example utilizing actual spacecraft vibroacoustic data.
Author
Statistical Analysis; Resonant Vibration; Vibrational Stress; Structural Analysis; Acoustics; Random Vibration; Probability Theory

42
GEOSCIENCES (GENERAL)

Includes general research topics related to the Earth sciences, and the specific areas of petrology, mineralogy, and general geology. For other specific topics in geosciences see *categories 42 through 48*.

20060054261 Army Engineer District, Vicksburg, MS, USA
2006 Navigation Charts. J. Bennett Johnston Waterway, Red River Shreveport, Louisiana to Mouth of Red River Mile 235 to Mile O P.P.R.M. 4th Edition
January 2006; 162 pp.; In English
Report No.(s): PB2007-100109; No Copyright; Avail.: National Technical Information Service (NTIS)

The source of Red River is in eastern New Mexico. The river flows easterly across the Texas panhandle, along the boundary between Texas and Oklahoma into the southwest corner of Arkansas. The river then turns southeasterly across Louisiana for a total distance of about 1,208 miles, to a junction with the Atchafalaya River approximately 5 miles upstream of Simmesport, Louisiana. The mileage on the Red River is measured upstream beginning with mile 0.0 at the confluence of Lower Old River and Mississippi River, which is approximately 7 miles east of the Red, Atchafalaya, and Lower Old River junction.
NTIS
Charts; Navigation Aids; Rivers; Waterways

43
EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth features, phenomena and resources by aircraft, balloon, rocket, and spacecraft; analysis of remote sensing data and imagery; development of remote sensing products; photogrammetry; and aerial photography. For related instrumentation see *35 Instrumentation and Photography*.

20060055814 Carnegie-Mellon Univ., Pittsburgh, PA USA
Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised)
Thrun, Sebastian; Koller, Daphne; Ghahramani, Zoubin; Durrant-Whyte, Hugh; Ng, Andrew Y; Oct 20, 2002; 27 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N66001-01-C-6018; F30602-98-2-0137
Report No.(s): AD-A457608; CMU-CS-02-112; No Copyright; Avail.: CASI: A03, Hardcopy

This paper describes a scalable algorithm for the simultaneous localization and mapping (SLAM) problem. SLAM is the problem of determining the location of environmental features with a roving robot. Many of today's popular techniques are based on extended Kalman filters (EKFs), which require update time quadratic in the number of features in the map. This paper develops the notion of sparse extended information filters (SEIFs) as a new method for solving the SLAM problem. SEIFs exploit structure inherent in the SLAM problem, representing maps through local, Web-like networks of features. By doing so, updates can be performed in constant time, irrespective of the number of features in the map. This paper presents several original constant-time results of SEIFs, and provides simulation results that show the high accuracy of the resulting maps in comparison to the computationally more cumbersome EKF solution.
DTIC
Estimates; Inertial Navigation; Information Theory; Mapping; Position (Location); Robots; Supersonic Low Altitude Missile

20060055819 Carnegie-Mellon Univ., Pittsburgh, PA USA
A System for Three-Dimensional Robotic Mapping of Underground Mines
Montemerlo, Michael; Haehnel, Dirk; Ferguson, David; Triebel, Rudolph; Burgard, Wolfram; Thayer, Scott; Whittaker, William; Thrun, Sebastian; Oct 27, 2002; 18 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N66001-01-C-6018; NBCH1020014
Report No.(s): AD-A457621; CMU-CS-02-185; No Copyright; Avail.: CASI: A03, Hardcopy

The authors describe two robotic systems for acquiring high-resolution volumetric maps of underground mines. Their systems have been deployed in an operational coal mine in Bruceton, Pennsylvania, where they have been used to generate interactive 3-dimensional maps. Their approach includes a novel sensor head assembled from multiple SICK laser range finders, and a real-time algorithm for scan matching that generates accurate volumetric maps. The scan matching algorithm

performs horizontal and vertical simultaneous localization and mapping (SLAM). Data from the horizontal scans is used to remove artifacts in the vertical scans, and vice versa. The system can construct full 3-dimensional volumetric maps hundreds of meters in diameter, even when no odometry information is available.
DTIC
Coal; Dimensional Analysis; Mapping; Mines (Excavations); Position (Location); Robotics; Robots; Supersonic Low Altitude Missile

20060055820 Carnegie-Mellon Univ., Pittsburgh, PA USA
Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised)
Thrun, Sebastian; Koller, Daphne; Ghahramani, Zoubin; Durrant-Whyte, Hugh; Sep 28, 2002; 27 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N66001-01-C-6018; F30602-98-2-0137
Report No.(s): AD-A457622; CMU-CS-02-112; No Copyright; Avail.: CASI: A03, Hardcopy
This paper describes a scalable algorithm for the simultaneous localization and mapping (SLAM) problem. SLAM is the problem of determining the location of environmental features with a roving robot. Many of today's popular techniques are based on extended Kalman filters (EKFs), which require update time quadratic in the number of features in the map. This paper develops the notion of sparse extended information filters (SEIFs) as a new method for solving the SLAM problem. SEIFs exploit structure inherent in the SLAM problem, representing maps through local, Web-like networks of features. By doing so, updates can be performed in constant time, irrespective of the number of features in the map. This paper presents several original constant-time results of SEIFs, and provides simulation results that show the high accuracy of the resulting maps in comparison to the computationally more cumbersome EKF solution.
DTIC
Estimates; Inertial Navigation; Information Theory; Mapping; Position (Location); Robots; Supersonic Low Altitude Missile

20060056124 Baker (Michael, Jr.), Inc., Jackson, MS USA
Fort A.P. Hill, Virginia, Terrain Analysis
Jan 1979; 46 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DACA87-78-C-0131
Report No.(s): AD-A457650; No Copyright; Avail.: Defense Technical Information Center (DTIC)
No abstract available
Terrain; Terrain Analysis

20060056126 Army Engineer Topographic Labs., Fort Belvoir, VA USA
Fort Benning, Georgia, Terrain Analysis
Sep 1976; 39 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457651; No Copyright; Avail.: Defense Technical Information Center (DTIC)
No abstract available
Terrain; Terrain Analysis

20060056139 Engineer Detachment (283rd) (Terrain), Fort Bragg, NC USA
Fort Bragg, North Carolina, Terrain Analysis
Nov 1977; 48 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457653; No Copyright; Avail.: Defense Technical Information Center (DTIC)
No abstract available
Terrain; Terrain Analysis

20060056140 Soil Systems, Inc., Marietta, GA USA
Fort Campbell, Kentucky, Terrain Analysis
Dec 1977; 36 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAK70-77-C-0071
Report No.(s): AD-A457654; No Copyright; Avail.: Defense Technical Information Center (DTIC)
No abstract available
Terrain; Terrain Analysis

20060056141 Dames and Moore, Washington, DC USA
Fort Carson, Colorado, Terrain Analysis
Jan 1978; 42 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DACA87-77-C-0059
Report No.(s): AD-A457655; No Copyright; Avail.: Defense Technical Information Center (DTIC)
No abstract available
Terrain; Terrain Analysis

20060056257 Science Systems and Applications, Inc., Bay Saint Louis, MS, USA
Thermal Band Atmospheric Correction Using Atmospheric Profiles Derived from Global Positioning System Radio Occultation and the Atmospheric Infrared Sounder
Pagnutti, Mary; Holekamp, Kara; Stewart, Randy; Vaughan, Ronald D.; [2006]; 1 pp.; In English
Contract(s)/Grant(s): NNS04AB54T
Report No.(s): SSTI-2220-0092; Copyright; Avail.: Other Sources; Abstract Only
This Rapid Prototyping Capability study explores the potential to use atmospheric profiles derived from GPS (Global Positioning System) radio occultation measurements and by AIRS (Atmospheric Infrared Sounder) onboard the Aqua satellite to improve surface temperature retrieval from remotely sensed thermal imagery. This study demonstrates an example of a cross-cutting decision support technology whereby NASA data or models are shown to improve a wide number of observation systems or models. The ability to use one data source to improve others will be critical to the GEOSS (Global Earth Observation System of Systems) where a large number of potentially useful systems will require auxiliary datasets as input for decision support. Atmospheric correction of thermal imagery decouples TOA radiance and separates surface emission from atmospheric emission and absorption. Surface temperature can then be estimated from the surface emission with knowledge of its emissivity. Traditionally, radiosonde sounders or atmospheric models based on radiosonde sounders, such as the NOAA (National Oceanic & Atmospheric Administration) ARL (Air Resources Laboratory) READY (Real-time Environmental Application and Display sYstem), provide the atmospheric profiles required to perform atmospheric correction. Unfortunately, these types of data are too spatially sparse and too infrequently taken. The advent of high accuracy, global coverage, atmospheric data using GPS radio occultation and AIRS may provide a new avenue for filling data input gaps. In this study, AIRS and GPS radio occultation derived atmospheric profiles from the German Aerospace Center CHAMP (CHAllenging Minisatellite Payload), the Argentinean Commission on Space Activities SAC-C (Satellite de Aplicaciones Cientificas-C), and the pair of NASA GRACE (Gravity Recovery and Climate Experiment) satellites are used as input data in atmospheric radiative transport modeling based on the MODTRAN (MODerate resolution atmospheric TRANsmittance) radiative transport software to separate out the atmospheric component of measured top of atmosphere radiance. Simulated water bodies across a variety of MODTRAN model atmospheres including desert, mid-latitude, tropical and sub-artic conditions provide test bed conditions. Atmospherically corrected radiance and surface temperature results were compared to those obtained using traditional radiosonde balloon data and models. In general, differences between the different techniques were less than 2 percent indicating the potential value satellite derived atmospheric profiles have to atmospherically correct thermal imagery. Author
Atmospheric Correction; Satellite Imagery; Surface Temperature; Radiance

20060056370 NASA Stennis Space Center, Stennis Space Center, MS, USA
Remote Sensing Time Series Product Tool
Predos, Don; Ryan, Robert E.; Ross, Kenton W.; January 2006; 1 pp.; In English
Contract(s)/Grant(s): NNS04AB54T
Report No.(s): SSTI-2220-0091; Copyright; Avail.: Other Sources; Abstract Only
The TSPT (Time Series Product Tool) software was custom-designed for NASA to rapidly create and display single-band and band-combination time series, such as NDVI (Normalized Difference Vegetation Index) images, for wide-area crop surveillance and for other time-critical applications. The TSPT, developed in MATLAB, allows users to create and display various MODIS (Moderate Resolution Imaging Spectroradiometer) or simulated VIIRS (Visible/Infrared Imager Radiometer Suite) products as single images, as time series plots at a selected location, or as temporally processed image videos. Manually creating these types of products is extremely labor intensive; however, the TSPT development tool makes the process simplified and efficient. MODIS is ideal for monitoring large crop areas because of its wide swath (2330 km), its relatively small ground sample distance (250 m), and its high temporal revisit time (twice daily). Furthermore, because MODIS imagery is acquired daily, rapid changes in vegetative health can potentially be detected. The new TSPT technology provides users with the ability to temporally process high-revisit-rate satellite imagery, such as that acquired from MODIS and from its successor,

the VIIRS. The TSPT features the important capability of fusing data from both MODIS instruments onboard the Terra and Aqua satellites, which drastically improves cloud statistics. With the TSPT, MODIS metadata is used to find and optionally remove bad and suspect data. Noise removal and temporal processing techniques allow users to create low-noise time series plots and image videos and to select settings and thresholds that tailor particular output products. The TSPT GUI (graphical user interface) provides an interactive environment for crafting what-if scenarios by enabling a user to repeat product generation using different settings and thresholds. The TSPT Application Programming Interface provides more fine-tuned control of product generation, allowing experienced programmers to bypass the GUI and to create more user-specific output products, such as comparison time plots or images. This type of time series analysis tool for remotely sensed imagery could be the basis of a large-area vegetation surveillance system. The TSPT has been used to generate NDVI time series over growing seasons in California and Argentina and for hurricane events, such as Hurricane Katrina.
Author
Remote Sensing; Time Series Analysis; Computer Programs; Surveillance

44
ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells; and solar, geothermal, windpower, and waterwave conversion systems; energy storage; and traditional power generators. For technologies related to nuclear energy production see *73 Nuclear Physics*. For related information see also *07 Aircraft Propulsion and Power; 20 Spacecraft Propulsion and Power*; and *28 Propellants and Fuels*.

20060054262 National Renewable Energy Lab., Golden, CO USA
Plug-In Hybrid Electric Vehicle Energy Storage System Design. Preprint
Markel, T.; Simpson, A.; May 2006; 16 pp.; In English
Report No.(s): DE2006-883666; NREL/CP-540-39614; No Copyright; Avail.: Department of Energy Information Bridge

Plug-in hybrid electric vehicle technology holds much promise for reducing the demand for petroleum in the transportation sector. Its potential impact is highly dependent on the system design and in particular, the energy storage system. This paper discusses the design options including power, energy, and operating strategy as they relate to the energy storage system. Expansion of the usable state-of-charge window will dramatically reduce cost but will likely be limited by battery life requirements. Increasing the power capability of the battery provides the ability to run all-electrically more often but increases the incremental cost. Increasing the energy capacity from 20-40 miles of electric range capability provides an extra 15% reduction in fuel consumption but also nearly doubles the incremental cost.
NTIS
Energy Storage; Systems Engineering; Electric Automobiles

20060054275 National Renewable Energy Lab., Golden, CO USA
Solar Trough Organic Rankine Electricity System (STORES) Stage 1: Power Plant Optimization and Economics. November 2000-May 2005
Prabhu, E.; January 2006; 72 pp.; In English
Report No.(s): DE2006-881481; NREL/SR-550-39433; No Copyright; Avail.: National Technical Information Service (NTIS)

The National Renewable Energy Lab awarded SUBCONTRACT NO. NAA-1-30441-05 to Reflective Energies as a result of its competitive solicitation to find pathways to solar thermal power. The subcontract was to perform a study that would further develop the concept of the Solar Trough Organic Rankine Cycle Electricity System (STORES) through a Stage 1 Study. The objectives of the proposed work are as follows: (1) develop an optimized ORC power cycle for integration with a parabolic trough solar field, (2) develop a conceptual design and cost estimate for a 10 MWe STORES system, (3) conduct a performance and economic assessment of pilot and mature STORES plants, (4) conduct preliminary assessment of STORES market potential, and (5) identify next steps towards a demonstration or early commercial STORES project.
NTIS
Economics; Electricity; Parabolic Reflectors; Rankine Cycle; Solar Thermal Electric Power Plants; Troughs

20060055614 Naval Postgraduate School, Monterey, CA USA
Genetic Algorithm Based Optimization of Advanced Solar Cell Designs Modeled in SILVACO ATLAS(Trademark)
Utsler, James; Sep 2006; 109 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457248; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A genetic algorithm was used to optimize the power output of multi-junction solar cells. Solar cell operation was modeled using the Silvaco ATLASTM software. The output of the ATLASTM simulation runs served as the input to the genetic algorithm. The genetic algorithm was run as a diffusing computation on a network of eighteen dual processor nodes. Results showed that the genetic algorithm produced better power output optimizations when compared with the results obtained using the hill climbing/gradient approach.
DTIC
Algorithms; Genetic Algorithms; Solar Cells

20060055702 Army Construction Engineering Research Lab., Champaign, IL USA
Energy and Process Optimization and Benchmarking of Army Industrial Processes
Zhivov, Alexander M; Lin, Mike C; Woody, Alfred; Worek, William M; Chimack, Michael J; Miller, Robert A; Sep 2006; 158 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-AT45
Report No.(s): AD-A457423; ERDC/CERL-TR-06-25; No Copyright; Avail.: CASI: A08, Hardcopy

Energy and process optimization studies were conducted at selected Army Arsenals and Depots (Rock Island Arsenals; Corpus Christi, Tobyhanna, and Sierra Army Depots) to compare/benchmark energy use among these facilities and against private sector manufacturing facilities; and to identify energy conservation, process, and environmental opportunities that can improve the installations competitive positions. The results were evaluated to determine which processes were efficient, and those that could improve. Four processes were identified as suitable for benchmarking: metal casting, metal finishing, painting, and heat treat. The metal casting operation at Rock Island Arsenal was found to be one of the most efficient of the 59 foundries surveyed. The remaining three Arsenal and Depot operations were found comparable with and in some areas more advanced than their private industry counterparts. By analyzing strengths and weakness, these benchmarks help installations to achieve greater energy efficiency by continuous process improvement. The report covers basic energy consuming systems at most facilities and details energy saving measures that can reduce energy use and increase operational performance. This work can be used by energy and production managers at other DOD installations to optimize production processes performance and reduce their energy use.
DTIC
Energy Conservation; Industrial Plants; Optimization

20060055706 Army Construction Engineering Research Lab., Champaign, IL USA
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications
Adams, John W; Cassarino, Craig; Spangler, Lee; Johnson, Duane; Lindstrom, Joel; Binder, Michael J; Holcomb, Franklin H; Lux, Scott M; Jun 2006; 21 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457432; ERDC/CERL-SR-06-28-VOL-2; No Copyright; Avail.: CASI: A03, Hardcopy

Fuel cells are electrochemical devices that convert chemical energy to electrical energy with very high efficiency, and with very low levels of environmental emissions. The reformation of vegetable oil crops for fuel cell uses is not well known; yet vegetable oils such as canola oil represent a viable alternative and complement to traditional fuel cell feedstocks. This report summarizes a study conducted to identify various Montana oil crops available for reforming as a feedstock fuel in fuel cell applications. The use of vegetable oils, or bio-fuels, in Montana alone could potentially sustain more than 6000 fuel cell units, 5.0 kW in size. Many vegetable oils were found to be viable options for production and use in fuel cells in Montana. This project was undertaken to demonstrate a year-long operation of a fuel cell in Yellowstone National Park using canola oil feedstock. This study performed a literature search to: (1) determine the market availability of agricultural crops that produce vegetable oil, and (2) determine the amount of vegetable oil that could be extracted to serve as a feedstock in fuel cell applications.
DTIC
Agriculture; Farm Crops; Fuel Cells; Oils; Vegetables

20060055709 Army Construction Engineering Research Lab., Champaign, IL USA
Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass
Adams, John; Cassarino, Craig; Lindstrom, Joel; Eslin, Linda; Lux, Scott M; Holcomb, Franklin H; Aug 17, 2006; 88 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457436; ERDC/CERL-SR-06-41-VOL-3; No Copyright; Avail.: CASI: A05, Hardcopy

This study evaluated the use of Montana-based oilseed crops (canola oil) for power generation in defense and civilian fuel cell applications. Three major fuel production operations were considered: (1) recovery of oil from the harvested vegetable crop, (2) conversion of the vegetable oil into its biodiesel corollary, and (3) reforming the biodiesel into a synthesis gas. The study explored areas for potential improvements in the cost or technical performance in these major operations. Various commercialization pathways for agriculturally derived fuels were evaluated, with an emphasis on dual use opportunities. This work identified potential commercial and military applications for small, remote power generation systems, including fuel cells, which operate using those agriculturally derived fuels. This report documents barriers to commercialization that must be overcome, potential resolutions to those barriers, and stimuli for commercialization that can effectively advance the interests of key Department of Defense and Montana stakeholders in using Montana-based vegetable oil crops for remote power generation.
DTIC
Biomass; Commercialization; Electric Generators; Electric Power Plants; Fuel Cells; Oils; Vegetables

20060055712 Army Construction Engineering Research Lab., Champaign, IL USA
Detailed Fuel Cell Demonstration Site Summary Report: Naval Hospital at Marine Corps Air Ground Combat Center - Twentynine Palms
Torrey, J M; Westerman, John F; Taylor, William R; Holcomb, Franklin H; Bush, Joseph; Jun 2006; 149 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457440; ERDC/CERL-TR-06-17; No Copyright; Avail.: Defense Technical Information Center (DTIC)
Fuel cells are an environmentally clean, quiet, and a highly efficient method for generating electricity and heat from natural gas and other fuels. In fiscal year 1993 (FY93), the Engineer Research and Development Center, Construction Engineering Research Laboratory (ERDC-CERL) was assigned the mission of managing the DOD Fuel Cell Demonstration Program. Specific tasks included developing turnkey PAFC packages, devising site criteria, screening candidate DOD installation sites based on selection criteria, evaluating viable applications at each candidate site, coordinating fuel cell site designs, installation and acceptance of the PAFC power plants, and performance monitoring and reporting. CERL selected and evaluated 30 application sites, supervised the design and installation of fuel cells, actively monitored the operation and maintenance of fuel cells, and compiled lessons learned for feedback to fuel cell manufacturers. At the conclusion of the demonstration period, each of the demonstration fuel cell sites was given the choice to either have the fuel cell removed or to keep the fuel cell power plant. This report presents a detailed review of a 200 kW fuel cell installed at the Marine Corps Air Ground Combat Center (MCAGCC) Twentynine Palms and operated between June 1995 and May 2000.
DTIC
Combat; Energy Conservation; Fuel Cells; Hospitals

20060055801 Barcelona Univ., Spain
The Characteristics of Spanish Reservoirs
Armengol, J; Merce, R; Apr 11, 2003; 7 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N62558-02-M-6382
Report No.(s): AD-A457589; No Copyright; Avail.: CASI: A02, Hardcopy
Sau Reservoir was first filled in 1963 in a middle stretch of the Ter River, as part of a multi-use scheme, including hydroelectric power, agricultural irrigation, domestic and industrial water supply to metropolitan areas, and also recreational activities. Since it was built, the reservoir has experienced a process of increasing eutrophication (Vidal and Om 1993), from moderately eutrophic during the first years after filling, to severe eutrophication in the late 1980s. Several human activities in the basin fed the process: intensive use of fertilizers, pig and stock farming development, proliferation of industrial areas and changes in land use (Sabater et al. 1990; Sabater et al. 1991; Vidal and Om 1993; Sabater et al. 1995; Espadaler et al. 1997). To improve the quality of water supplied by the reservoir, wastewater treatment plants were built in main urban and industrial areas during the early 1990's (Vidal and Om 1993). Limnological characterization of Sau Reservoir started in 1963, conducted by the local water supply company (Aig es Ter-Llobregat , ATLL). Since 1995, this study is executed in collaboration with the Department of Ecology at the University of Barcelona, under supervision of Dr. Joan Armengol. Thus, a good database is available on both changes in the water body and on incoming materials through main inflows (the Ter River and the Major River, accounting for 85% and 8% of land drained by Sau Reservoir, respectively). The basic sampling frequency is monthly. Besides in-situ measured descriptors (i.e. temperature, conductivity, turbidity, dissolved oxygen concentration, pH, redox potential, and water transparency), chemical analyses are conducted on samples taken at several depths.
DTIC
Eutrophication; Hydroelectricity; Industrial Plants; Reservoirs; Supplying; Water; Water Quality

20060056273 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
A New Application of the Channel Packet Method for Low Energy 1-D Elastic Scattering
Zeringue, Clint M; Sep 2006; 77 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457059; AFIT/GAP/ENP/06-22; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457059; Avail.: Defense Technical Information Center (DTIC)

An algorithm is presented which uses the channel packet method (CPM) to simulate low-energy, wave-packet propagation and compute S-matrix elements. A four-by-four matrix containing the momentum, expansion coefficients of the reactants and products is introduced to account for initial and final states having both positive and negative momentum. The approach does not consider scattering from one side or the other, rather it considers both incoming and outgoing wave packets from the left and right simultaneously. Therefore, during one simulation all four S-matrix elements, and elements, S(sub +k,-K), S(sub-k, +k), S(sub +k, +k) and S(sub-k,-k)are computed. Numerical simulations of the algorithm are carried out on a conventional desktop computer and compared to the analytic solution of the transmission and reflection functions for a square well. The simulated results agree very well with the known solution up until very low energies, after which the results begin to oscillate about the theoretical values. The results indicate that if the correct Moller states are used the algorithm will produce the correct S-matrix elements across the entire energy range.
DTIC
Elastic Scattering; Wave Packets; Algorithms

45
ENVIRONMENT POLLUTION

Includes atmospheric, water, soil, noise, and thermal pollution.

20060054194 Yellowstone National Park, WY, USA
Winter Air Quality Study, 2004-2005. Results from Yellowstone National Park
Ray, J. D.; January 2005; 30 pp.; In English
Report No.(s): PB2007-101065; No Copyright; Avail.: National Technical Information Service (NTIS)

Ambient monitoring during the winter activity season was conducted at Old Faithful and at the West Entrance for the air pollutants, carbon monoxide (CO) and fine particulate matter (PM2.5). Summertime measurements at the West Entrance and vehicle entrance counts were used to compare to the winter season. Results from the ambient monitoring and a closely related emissions study are presented: CO was lower during the winter 2004-2005 season than in previous years at both monitoring stations and is well below the level of the national standard; PM2.5 was also lower this season than in previous years at the West Entrance. Both locations are below the level of the standard; the historical decreasing trend in the number of snowmobiles is mimicked by decreasing CO concentrations and is the primary reason for the lower ambient CO concentrations; sources of PM2.5 other than snowmobiles are contributing to the observed PM at Old Faithful; and summer traffic with wheeled-vehicles contribute a much smaller amount of CO and PM than winter activity by snowmobiles and snow coaches, despite much greater numbers of vehicles in summer.
NTIS
Air Quality; Winter; Yellowstone National Park (ID-MT-WY); Air Pollution; Pollution Monitoring

20060054202 Research Triangle Inst., Research Triangle Park, NC, USA
Toxicological Profile for Cyanide (2006 Update)
Jul. 2006; 342 pp.; In English
Report No.(s): PB2007-100674; No Copyright; Avail.: CASI: A15, Hardcopy

This public health statement tells you about cyanide and the effects of exposure to it. The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites are then placed on the National Priorities List (NPL) and are targeted for long-term federal clean-up activities. Cyanide has been found in at least 471 of the 1,662 current or former NPL sites. Although the total number of NPL sites evaluated for this substance is not known, the possibility exists that the number of sites at which cyanide is found may increase in the future as more sites are evaluated. This information is important because these sites may be sources of exposure and exposure to this substance may harm you. When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking the substance, or by skin contact. If you are exposed to cyanide, many factors will determine whether you will be harmed. These factors include the dose (how much), the

duration (how long), and how you come in contact with it. You must also consider any other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.
NTIS
Cyanides; Environmental Cleanup; Toxicity; Public Health; Toxic Hazards

20060054203 Research Triangle Inst., Research Triangle Park, NC USA
Toxicological Profile for Dichlorobenzenes (2006 Update)
Aug. 2006; 494 pp.; In English
Report No.(s): PB2007-100672; No Copyright; Avail.: CASI: A21, Hardcopy

This public health statement tells you about dichlorobenzenes (DCBs) and the effects of exposure to them. The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites are then placed on the National Priorities List (NPL) and are targeted for long-term federal clean-up activities. 1,2-, 1,3-, and 1,4-Dichlorobenzene have been identified in at least 281, 175, and 330, respectively, of the 1,662 current or former NPL sites. Although the total number of NPL sites evaluated for these substances is not known, the possibility exists that the number of sites at which dichlorobenzenes are found may increase in the future as more sites are evaluated. This information is important because these sites may be sources of exposure and exposure to these substances may harm you. When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking the substance, or by skin contact. If you are exposed to dichlorobenzenes, many factors will determine whether you will be harmed. These factors include the dose (how much), the duration (how long), and how you come in contact with them. You must also consider any other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.
NTIS
Environmental Cleanup; Toxicity; Contaminants; Dichlorides; Public Health; Toxic Hazards; Toxicology; Benzene Poisoning

20060054204 Research Triangle Inst., Research Triangle Park, NC USA
Toxicological Profile for 1,1,1-Trichloroethane (2006 Update)
Jul. 2006; 372 pp.; In English
Report No.(s): PB2007-100673; No Copyright; Avail.: CASI: A16, Hardcopy

This public health statement tells you about 1,1,1-trichloroethane (also called 1,1,1-TCE) and the effects of exposure to it. The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites are then placed on the National Priorities List (NPL) and are targeted for federal long-term cleanup activities. 1,1,1-Trichloroethane has been found in at least 823 of the 1,662 current or former NPL sites. Although the total number of NPL sites evaluated for this substance is not known, the possibility exists that the number of sites at which 1,1,1-trichloro-ethane is found may increase in the future as more sites are evaluated. This information is important because these sites may be sources of exposure, and exposure to this substance may harm you. When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking the substance or by skin contact. If you are exposed to 1,1,1-trichloroethane many factors will determine whether you will be harmed. These factors include the dose (how much), the duration (how long), and how you come in contact with it. You must also consider any other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.
NTIS
Environmental Cleanup; Toxicity; Public Health; Trichloroethylene

20060054205 Research Triangle Inst., Research Triangle Park, NC USA
Toxicological Profile for Hydrogen Sulfide (2006 Update)
Jul. 2006; 254 pp.; In English
Report No.(s): PB2007-100675; No Copyright; Avail.: CASI: A12, Hardcopy

This public health statement tells you about hydrogen sulfide and the effects of exposure to it. The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites are then placed on the National Priorities List (NPL) and are targeted for long-term federal clean-up activities. Hydrogen sulfide has been found in at least 35 of the 1,689 current or former NPL sites. Although the total number of NPL sites evaluated for this substance is

not known, the possibility exists that the number of sites at which hydrogen sulfide is found may increase in the future as more sites are evaluated. This information is important because these sites may be sources of exposure and exposure to this substance may harm you. When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking the substance, or by skin contact. If you are exposed to hydrogen sulfide, many factors will determine whether you will be harmed. These factors include the dose (how much), the duration (how long), and how you come in contact with it. You must also consider any other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.
NTIS
Environmental Cleanup; Health; Hydrogen Sulfide; Toxicity; Crude Oil; Public Health

20060054206 Research Triangle Inst., Research Triangle Park, NC USA
Toxicological Profile for Vinyl Chloride (2006 Update)
Jul. 2006; 330 pp.; In English
Report No.(s): PB2007-100671; No Copyright; Avail.: CASI: A15, Hardcopy

This public health statement tells you about vinyl chloride and the effects of exposure to it. The Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites are then placed on the National Priorities List (NPL) and are targeted for long-term federal clean-up activities. Vinyl chloride has been found in at least 616 of the 1,662 current or former NPL sites. Although the total number of NPL sites evaluated for this substance is not known, the possibility exists that the number of sites at which vinyl chloride is found could increase in the future as more sites are evaluated. This information is important because these sites may be sources of exposure, and exposure to this substance can harm you. When a substance is released either from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment. Such a release does not always lead to exposure. You can be exposed to a substance only when you come in contact with it. You may be exposed by breathing, eating, or drinking the substance, or by skin contact. If you are exposed to vinyl chloride, many factors will determine whether you will be harmed. These factors include the dose (how much), the duration (how long), and how you come in contact with it. You must also consider any other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.
NTIS
Chlorides; Environmental Cleanup; Toxicity; Polyvinyl Chloride; Public Health

20060054216 NASA, Washington, DC, USA
Final Environmental Impact Statement for the Outrigger Telescopes Project: Volume II
February 2005; 648 pp.; In English
Report No.(s): NASA\NP-2005-01-396-HQ; No Copyright; ONLINE: http://hdl.handle.net/2060/20060054216; Avail.: CASI: A99, Hardcopy

This volume contains appendices in support of the environmental impact statement for the Outrigger telescopes project.
CASI
Environmental Surveys; Telescopes; Construction; Hawaii

20060054217 Environmental Protection Agency, Research Triangle Park, NC USA
Air Quality Criteria for Lead. Volume I of II (October 2006)
Oct. 2006; 1251 pp.; In English
Report No.(s): PB2007-102080; EPA/600/R-05/144AF; No Copyright; Avail.: National Technical Information Service (NTIS)

This document critically assesses the latest scientific information concerning health and welfare effects associated with the presence of various concentrations of lead (Pb) in ambient air, as pertinent to providing updated scientific bases for EPA's periodic review of the National Ambient Air Quality Standards for Lead (Pb NAAQS). As such, this document builds upon previous assessments published by the U.S. Environmental Protection Agency (EPA), including: (a) the 1977 EPA document, Air Quality Criteria for Lead; (b) an updated revision of that Lead Air Quality Criteria Document and an accompanying Addendum published in 1986 (1986 Lead AQCD/Addendum); and (c) an associated 1990 Supplement to that 1986 AQCD/Addendum. This document focuses on evaluation and integration of information relevant to Pb NAAQS criteria

development that has become available mainly since that covered by the 1986 and 1990 criteria assessments.
NTIS
Air Quality; Ambience

20060054218 Energy Information Administration, Washington, DC, USA
Voluntary Reporting of Greenhouse Gases, 2004
Mar. 2006; 190 pp.; In English
Report No.(s): PB2007-102073; DOE/EIA-0608(2004); No Copyright; Avail.: National Technical Information Service (NTIS)

The Energy Policy Act of 1992 (EPACT) directed the U.S. Department of Energy (DOE), with the Energy Information Administration (EIA) as the implementing agency, to develop a program to document voluntary actions that reduce emissions of greenhouse gases or remove greenhouse gases from the atmosphere. DOE's Office of Policy and International Affairs developed the Guidelines to the Voluntary Reporting of Greenhouse Gases Program in consultation with the U.S. Environmental Protection Agency (EPA) and other Federal agencies, as well as through a public comment process. In addition to providing recognition for entities that voluntarily reduce greenhouse gas emissions or sequester carbon, the program serves to identify innovative and effective ways of reducing emissions. This report presents information on the eleventh reporting cycle of the Voluntary Reporting Program, including reported information on emissions, emission reductions, and carbon sequestration activities through 2004.
NTIS
Energy Policy; Greenhouse Effect

20060054221 National Inst. for Occupational Safety and Health, Cincinnati, OH, USA
Workers' Exposures to n-Propyl Bromide at a Helicopter Transmission Factory
Hanley, K. W.; Dunn, K.; Aug. 2006; 21 pp.; In English
Report No.(s): PB2007-101963; No Copyright; Avail.: CASI: A03, Hardcopy

The Industrywide Studies Branch of the National Institute for Occupational Safety and Health (NIOSH) conducted a field study at a helicopter tranmission manufacturing plant in Texas on February 9-10, 2004. At this facilty, n-propyl bromide (nPB) was used as a vapor degreasing solvent to remove oils and dirt from transmission pars prior to the plating operation necessary to affix a protective surface treatment. In ths research study, we measured workers' breathing zone concentrations to n-propyl bromide (nPB) and isopropyl bromide (iPB) with standard air sampling methods in conjunction with new methods for measuring exhaled breath and urinary metabolites.
NTIS
Air Pollution; Bromides; Exposure; Helicopter Propeller Drive; Industrial Plants; Personnel; Transmissions (Machine Elements)

20060054249 Pacific Northwest National Lab., Richland, WA, USA
Performance Assessment Monitoring Plan for the Hanford Site Low-Level Burial Grounds. Revision 1
January 2006; 94 pp.; In English
Report No.(s): DE2006-878238; No Copyright; Avail.: National Technical Information Service (NTIS)

U.S. Department of Energy (DOE) Order 435.1, Radioactive Waste Management, requires a disposal authorization statement authorizing operation (or continued operation) for low-level waste disposal facilities. The Order is designed to ensure that all DOE radioactive waste is managed in a manner that protects the environment, worker, and public health and safety. The disposal authorization specifies the limits and conditions on construction, design, operations, and closure of a low-level waste facility. DOE Order 450.1, Environmental Protection Program, and DOE Order 5400.5, Radiation Protection of the Public and the Environment, establish requirements and standards for environmental protection programs at all DOE sites. The environmental monitoring programs will be capable of detecting changing trends in performance to allow application of any necessary corrective action before exceeding the performance objectives stated in the order. DOE Order 450.1 requires implementation of sound stewardship practices that are protective of the air, water, land, cultural, and ecological resources impacted by DOE operations.
NTIS
Radioactive Wastes; Waste Management; Waste Disposal

20060054253 CH2M/Hill Hanford Group, Inc., Richland, WA, USA

Hanford Double-Shell Tank Thermal and Seismic Project Seismic Analysis of Hanford Double-Shell Tanks

Mackey, T. C.; Mar. 17, 2006; 730 pp.; In English

Report No.(s): DE2006-878182; No Copyright; Avail.: National Technical Information Service (NTIS)

The work statement provided to M&D Professional Services, Inc. (M&D) required that a nonlinear soil-structure interaction (SSI) analysis be performed on the double shell tanks (DSTs). The analysis is required to include the effects of sliding interfaces and fluid sloshing (fluid-structure interaction). SSI analysis has traditionally been treated by frequency domain computer codes such as SHAKE and SASS1. Such frequency domain programs are limited to the analysis of linear systems. Because of the contact surfaces, the response of the DSTs to a seismic event is inherently nonlinear and consequently outside the range of applicability of the linear frequency domain programs. That is, the nonlinear response of the DSTs to seismic excitation requires the use of a time domain code.

NTIS

Radioactive Wastes; Seismology

20060054277 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA

Voluntary Agreements for Energy Efficiency or GHG Emissions Reduction in Industry: An Assessment of Programs Around the World

Price, L.; January 2006; 38 pp.; In English

Report No.(s): DE2006-881402; LBNL-58138; No Copyright; Avail.: National Technical Information Service (NTIS)

Voluntary agreements for energy efficiency improvement and reduction of energy-related greenhouse gas (GHG) emissions have been a popular policy instrument for the industrial sector in industrialized countries since the 1990s. A number of these national-level voluntary agreement programs are now being modified and strengthened, while additional countries--including some recently industrialized and developing countries--are adopting these type of agreements in an effort to increase the energy efficiency of their industrial sectors. Voluntary agreement programs can be roughly divided into three broad categories: (1) programs that are completely voluntary, (2) programs that use the threat of future regulations or energy/GHG emissions taxes as a motivation for participation, and (3) programs that are implemented in conjunction with an existing energy/GHG emissions tax policy or with strict regulations. A variety of government-provided incentives as well as penalties are associated with these program.

NTIS

Energy Conservation; Greenhouse Effect

20060055713 Army Construction Engineering Research Lab., Champaign, IL USA

The Range Managers Toolkit (RMTK) Noise Tool

Swearingen, Michelle E; Jun 2006; 53 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-D048

Report No.(s): AD-A457441; ERDC/CERL-TR-06-15; No Copyright; Avail.: CASI: A04, Hardcopy

The Range Managers Toolkit (RMTK) Noise Tool is a noise prediction and impact assessment software tool designed to enable installation Range Control offices to quickly assess the noise impact of military training or testing at a specified site under a variety of weather conditions, and to plan preliminary range siting for noise. The noise model outputs a map display that designates acoustic regions in decibels and by color. This work documents and summarizes the scientific basis for noise complaint risk criteria, weather cases, and time-on-target assessment.

DTIC

Computer Programs; Damage Assessment; Impact; Impact Prediction; Noise Prediction

20060056189 Office of Air Quality Planning and Standards, Research Triangle Park, NC USA

Guidance for Quantifying and Using Long Duration Truck Idling Emission Reductions in State Implementation Plans and Transportation Conformity

Jan. 2004; 33 pp.; In English

Report No.(s): PB2007-102093; EPA/420/B-04/001; No Copyright; Avail.: CASI: A03, Hardcopy

The purpose of this document is to provide you with guidance on quantifying emission reductions from technologies which reduce long duration truck idling emissions from Class 8 trucks included in the state's on-road mobile sources inventory. This guidance is not intended to apply to emission reductions resulting entirely from state or local anti-idling laws, regulations, or ordinances that limit a vehicle's idling time. You may wish to use the emission reductions resulting from

implementing an idling reduction technology for meeting emission reduction requirements such as an RFP/ROP, attainment or maintenance SIP, or transportation conformity determination. Guidance on using these emission reductions for New Source Review offset purposes is addressed in a separate document.
NTIS
Transportation; Trucks; Exhaust Emission

20060056190 Office of Air Quality Planning and Standards, Research Triangle Park, NC USA
Guidance for Quantifying and Using Long Duration Switch Yard Locomotive Idling Emission Reductions in State Implementation Plans
Jan. 2004; 25 pp.; In English
Report No.(s): PB2007-102094; EPA/420/B-04/002; No Copyright; Avail.: CASI: A03, Hardcopy

The purpose of this document is to provide you with guidance on quantifying emission reductions from technologies which reduce long duration switch yard locomotive (SYL) idling emissions. You may wish to use the emission reductions resulting from implementing an idling reduction technology for meeting emission reduction requirements such as an RFP/ROP, attainment or maintenance SIP. Guidance on using these emission reductions for New Source Review offset purposes is addressed in a separate document.
NTIS
Locomotives; Rail Transportation; Switches; Exhaust Emission

20060056271 Air Force Center for Environmental Excellence, Brooks AFB, TX USA
Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 1 of 2
Barndt, Eric; DuWaldt, John; Chitwood, Connie; Zimmer, Robert; Rigley, Joe; Mar 2006; 324 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457052; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457052; Avail.: CASI: A14, Hardcopy

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended, Council on Environmental Quality NEPA implementing regulations (40 Code of Federal Regulations [CFR] Parts 1500-1508), and Air Force NEPA implementing regulations (32 CFR 989), the USAF 460 SW conducted an assessment of the potential consequences of proposed infrastructure Capital Improvement Projects (CIP) at Buckley Air Force Base (BAFB) that are described below in the Proposed Action. PROPOSED ACTION: The USAF proposes numerous infrastructure CIPs at Buckley AFB. Within the CIPs, eight (8) Area Development Plans (ADP) would encompass approximately 650 acres of land at various locations within the BAFB boundaries. The ADPs would include construction of various buildings and facilities, including new housing, dormitories, an entrance gate, roadway modifications and landscaping, a community center, installation support facilities, new headquarters and recreation areas.
DTIC
Military Air Facilities; Colorado; Environmental Monitoring

20060056272 Air Force Center for Environmental Excellence, Brooks AFB, TX USA
Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 2 of 2
Barndt, Eric; DuWaldt, John; Chitwood, Connie; Zimmer, Robert; Rigley, Joe; Mar 2006; 462 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457053; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457053; Avail.: Defense Technical Information Center (DTIC)

List of Appendices: APPENDIX A: Original General Plan Figures APPENDIX B: Construction Ground Disturbance Detail Table APPENDIX C: Demolition Ground Disturbance Detail Table APPENDIX D: Construction and Operation Air Emissions Calculations APPENDIX E: Construction and Demolition Dust Suppression Water Use Table APPENDIX F: Construction and Demolition Project Solid Waste Generation Table APPENDIX G: Proposed Action Traffic Impacts APPENDIX H: Cumulative Traffic Impacts APPENDIX I: Cumulative Impervious Surface/Increased Runoff Calculations APPENDIX J: Alternative Action 1 Traffic Impacts APPENDIX K: No Action Traffic Impacts APPENDIX L: Air Force Form 813's APPENDIX M: Public Comments APPENDIX N: Agency Coordination Letters APPENDIX O: Notice of Availability
DTIC
Military Air Facilities; Colorado; Environmental Surveys

20060056312 Environmental Protection Agency, Research Triangle Park, NC USA, Wisconsin Univ., Madison, WI, USA, Research Triangle Inst., Research Triangle Park, NC USA

Laboratory Study to Investigate Gaseous Emissions and Solids Decomposition During Composting of Municipal Solid Wastes

Ham, R. K.; Komilis, D.; Jan. 2003; 149 pp.; In English

Report No.(s): PB2007-102052; EPA/600/R-03/004; No Copyright; Avail.: CASI: A07, Hardcopy

A materials flow analysis was performed for composting municipal solid waste (MSW) and specific biodegradable organic components of MSW. This work is part of an overall U.S. Environmental Protection Agency (EPA) project providing cost, energy, and materials flow information on different methods to reduce, recycle, treat, or dispose of MSW. This information will be used by managers to optimize MSW management. Calculating energy and material flows, emissions, and costs associated with different methods and mixes of methods for handling MSW or for different components of MSW will provide basic information to guide decisionmakers. Composting is aerobic decomposition of a substrate, in this case MSW or its components. The purpose of this work is to quantify and model energy and material flows into a typical compost facility and material flows out of it. This work required laboratory experiments because material flows in particular were not known for general MSW or its components. The results indicate that MSW (at 25% inorganics) and its three largest decomposable components (i.e., food wastes, mixed paper, and yard wastes) will lose 47, 66, 35, and 48%, respectively, of their dry weight upon complete composting. This will produce 730, 1,340, 560, and 800 kg of carbon dioxide (CO2) per dry U.S. ton of MSW, food wastes, mixed paper, and yard wastes, respectively. Corresponding ammonia releases are 0.42, 49, 2.4, and 5.4 kg per dry ton. Volatile organic compound (VOC) releases were quantified for 12 targeted VOCs, and additional VOCs were found but not quantified. The results are modeled for facilities accepting various combinations of MSW components (or MSW of various compositions).

NTIS

Composting; Decomposition; Exhaust Emission; Exhaust Gases; Solid Wastes; Solids

20060056316 Swedish Environmental Protection Agency, Stockholm, Sweden

Feasibility Study: A Swedish Integrated Assessment Model

Sternhufvud, C.; Astroem, S.; Apr. 2006; 32 pp.; In English

Report No.(s): PB2007-102107; IVL-B1674; No Copyright; Avail.: CASI: A03, Hardcopy

The purpose of this feasibility study is to find out the interests in and requirements for the development of a Swedish Integrated Assessment Model (IAM) based on the Regional Air Pollution Information and Simulation model (RAINS) or the Greenhouse Gas and Air Pollution Interactions and Synergies model (GAINS). This study should also make clear the possibilities and constraints of a national model as well as discuss different applications of such a model.

NTIS

Air Pollution; Environment Models; Feasibility; Greenhouse Effect; Models; Pollution; Simulation; Sweden

20060056317

Test of a Filter Pack Combined with a PM10 Inlet. Final Report from NMR Project

Ferm, M.; Makkonen, U.; Hanssen, J. E.; Ellermann, T.; Jun. 2006; 25 pp.; In English

Report No.(s): PB2007-102108; IVL-B1686; No Copyright; Avail.: CASI: A03, Hardcopy

The EMEP filter pack for measuring gaseous and particulate reduced and oxidized nitrogen compounds in air has been modified with a PM(sub 10)1 inlet to meet the EU air quality directive for particle measurements. The filter pack also collects sulphur compounds as well as base cations and sodium chloride. The EMEP filter pack has been used for 20 years now and it is important that the PM10 inlet doesn't affect the results. The cut-off for the filter pack recommended by EMEP is unknown and may be affected by wind. Here it was found that the cut-off for the EMEP filter pack is larger than it is for PM(sub 10). This implies that higher calcium concentrations will be obtained with the original EMEP filter pack without a PM(sub 10) inlet. All comparisons of the two filter packs show excellent agreement for sulphur dioxide and man made sulphate particles. Some losses of total nitrate have been found with the PM(sub 10) inlet especially of particulate nitrate. Some losses of particulate ammonium also take place but do not affect the total concentration.

NTIS

Nuclear Magnetic Resonance; Sweden

20060056343 Akron Univ., Akron, OH, USA

CO2 Sequestration and Recycle by Photosynthesis. (Technical Report, September 24, 2004-September 23, 2005)

Feb. 12, 2006; 26 pp.; In English

Report No.(s): DE2006-883710; No Copyright; Avail.: Department of Energy Information Bridge

Hydrocarbon oxygenate synthesis from photocatalytic reactions of CO2 and H2O over various catalysts is a very attractive process. However, the formation rate of the hydrocarbons and oxygenates is significantly lower than conventional catalysis. One possible reason for the low rate of product formation is the presence of oxidation sites which reoxidize the products back to OO2 and H2O. For further improvement of catalytic activity for the reduction process, it is essential to understand the oxidation reaction process. We have studied photocatalytic oxidation of methylene blue and found the oxidation rate is significantly higher than the reduction rate.
NTIS
Carbon Dioxide; Photosynthesis

20060056349 Savannah River National Lab., Aiken, SC, USA
Interim Storage and Long Term Disposal of Research Reactor Spent Fuel
Stone, M. E.; Best, D. R.; Sep. 2006; 96 pp.; In English
Report No.(s): DE2006-891687; WSRC-STI-2006-00109; No Copyright; Avail.: Department of Energy Information Bridge
Aluminum clad research reactor spent nuclear fuel (SNF) is currently being consolidated in wet storage basins (pools). Approximately 20 metric tons (heavy metal) of aluminum-based spent nuclear fuel (Al-SNF) is being consolidated for treatment, packaging, interim storage, and preparation for ultimate disposal in a geologic repository. The storage and disposal of Al-SNF are subject to requirements that provide for safety and acceptable radionuclide release. The options studied for interim storage of SNF include wet storage and dry storage. Two options have also been studied to develop the technical basis for the qualification and repository disposal of aluminum spent fuel. The two options studied include Direct Disposal and Melt-Dilute treatment. The implementation of these options present relative benefits and challenges.
NTIS
Nuclear Fuels; Radioactive Wastes; Spent Fuels; Waste Disposal

20060056355 North Carolina Univ., Chapel Hill, NC, USA
Quantifying Uncertainty in Scenarios for Integrated Assessment of Climate Change
January 2006; 44 pp.; In English
Report No.(s): DE2006-883668; No Copyright; Avail.: National Technical Information Service (NTIS)
The determination of climate policy is a decision under uncertainty. The uncertainty in future climate change impacts is large, as is the uncertainty in the costs of potential policies. Rational and economically efficient policy choices will therefore seek to balance the expected marginal costs with the expected marginal benefits. This approach requires that the risks of future climate change be assessed. The decision process need not be formal or quantitative for descriptions of the risks to be useful. Whatever the decision procedure, a useful starting point is to have as accurate a description of climate risks as possible. Given the goal of describing uncertainty in future climate change, we need to characterize the uncertainty in the main causes of uncertainty in climate impacts. One of the major drivers of uncertainty in future climate change is the uncertainty in future emissions, both of greenhouse gases and other radiatively important species such as sulfur dioxide. In turn, the drivers of uncertainty in emissions are uncertainties in the determinants of the rate of economic growth and in the technologies of production and how those technologies will change over time. This project uses historical experience and observations from a large number of countries to construct statistical descriptions of variability and correlation in labor productivity growth and in AEEI. The observed variability then provides a basis for constructing probability distributions for these drivers. The variance of uncertainty in growth rates can be further modified by expert judgment if it is believed that future variability will differ from the past. But often, expert judgment is more readily applied to projected median or expected paths through time. Analysis of past variance and covariance provides initial assumptions about future uncertainty for quantities that are less intuitive and difficult for experts to estimate, and these variances can be normalized and then applied to mean trends from a model for uncertainty projections. The probability distributions of these critical model drivers, and the resulting uncertainty in projections from a range of models, can provide the basis of future emission scenario set designs.
NTIS
Climate Change; Environment Management; Emission

20060056474 Wisconsin Electric Power Co., WI, USA
Toxecon Retrofit for Mercury and Multi Pollutant Control on Three 90-MW Coal Fired Boilers
Johnson, R. E.; Jan. 25, 2006; 28 pp.; In English
Report No.(s): DE2006-884850; No Copyright; Avail.: Department of Energy Information Bridge
Wisconsin Electric Power Company (We Energies) signed a Cooperative Agreement with the U.S. Department of Energy

(DOE) in March 2004 to fully demonstrate TOXECON(sup TM) for mercury control at the We Energies Presque Isle Power Plant. The primary goal of this project is to reduce mercury emissions from three 90-MW units (Units 7, 8, and 9) that burn Powder River Basin (PRB) coal. This quarterly report summarizes progress made on the project from October 1, 2005, through December 31, 2005. The specific objectives of this project are to demonstrate the operation of the TOXECON(sup TM) multi-pollutant control system and accessories, and Achieve 90% mercury removal from flue gas through activated carbon injection; Evaluate the potential for 70% SO2 control and trim control of NOx from flue gas through sodium-based or other novel sorbent injection; Reduce PM emission through collection by the TOXECON(sup TM) baghouse; Recover 90% of the mercury captured in the sorbent; Utilize 100% of fly ash collected in the existing electrostatic precipitator; Demonstrate a reliable, accurate mercury CEM suitable for use in the power plant environment; Successfully integrate and optimize TOXECON(sup TM) system operation for mercury and multi-pollutant control.
NTIS
Air Pollution; Coal; Contaminants; Particulates; Pollution Control; Flue Gases; Mercury (Metal); Electric Generators; Exhaust Gases

46
GEOPHYSICS

Includes Earth structure and dynamics, aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism. For related information see *47 Meteorology and Climatology*; and *93 Space Radiation*.

20060055453 Wyoming Univ., Laramie, WY USA
Amplitude Analysis and Modeling of Regional Phases in PNE Profiles in Northern Eurasia and Seismic Regionalization
Morozov, Igor B; Li, Hongyan; Morozova, Elena; Duenow, Joel; Zheng, Haishan; Smithson, Scott B; Jun 30, 2006; 150 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DTRA01-01-C-0057; Proj-DTRA
Report No.(s): AD-A457102; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457102; Avail.: CASI: A07, Hardcopy

Seismological observations play an important role in detecting and locating all nuclear events, determining their yields and distinguishing them from earthquakes and other chemical explosions. Regional phases play a critical role for small-yield nuclear test monitoring. Regional phases travel in the crust and the upper mantle, which are very heterogeneous, therefore, calibration of phase propagation characteristics within different tectonic and geologic environments is necessary to use regional phases for nuclear test monitoring. Over the past decades, Russian scientists acquired a network of dense, linear, long range, three-component Deep Seismic Sounding (DSS) profiles using conventional and Peaceful Nuclear Explosions (PNEs) over a large area of Northern Eurasia. Seven PNE profiles and 19 PNE shots were used in this study. From west to east, the seven profiles mainly traverse the East-European Craton; the Timan Belt, the Timan-Pechora Basin, the Ural Mountains, the West-Siberian Basin, the West-Siberian Rift.
DTIC
Asia; Europe; Nuclear Explosions; Seismic Waves; Tectonics

20060055564 California Univ., Los Angeles, CA USA
Spacecraft Instrumentation to Measure and Stimulate Space Particles and Plasma Waves in the Medium-Earth Orbit (MEO) Regime
Moldwin, Mark; Jul 12, 2006; 26 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8718-05-C-0025; Proj-1010
Report No.(s): AD-A457161; No Copyright; Avail.: CASI: A03, Hardcopy

UCLA is building a three-axis fluxgate magnetometer for the AFRL-DSX mission. The instrument is designed to measure the medium-Earth orbit geomagnetic field with precision of 0.1 nT and provide the field direction to within 1 degree. The instrument will provide the DC magnetic field for phase space density calculations of energetic particles, the magnetic field vector information for the Loss Cone Imager (LCI) payload, and the ULF wave environment. The project is on schedule for engineering delivery in October 2006 and flight unit delivery in October 2007.
DTIC
Earth Orbits; Geomagnetism; Magnetometers; Plasma Waves; Spacecraft Instruments

20060055567 Naval Postgraduate School, Monterey, CA USA
Refractivity in the Arctic Regions
Stahlhut, Keir D; Sep 2006; 53 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457168; No Copyright; Avail.: CASI: A04, Hardcopy

The purpose of this study is to quantify patterns or trends of electromagnetic ducting conditions in the Arctic. On average, ducts occurred 5% of the time in the summer months, and 2-3% in the spring, fall, and winter months. This is considered a low approximation due to the vertical resolution of the sounding data. For some local regions, ducts occurred up to 20% of the time, especially in summer months. In general, local areas near coast lines or near the pole over ice/ocean had higher frequency of ducts than local areas over land mass. For summer and fall months, humidity gradients contributed most to the formation of a duct, while temperature gradients contributed to a lesser degree. For spring months, temperature gradients contributed most to the formation of the duct, while humidity gradients contributed to a lesser degree. For winter months, due to the extremely cold surface temperatures and low available humidity, temperature gradients were the dominant contribution to duct formation, and humidity gradients worked against duct formation.
DTIC
Arctic Regions; Ducts; Electromagnetism; Refractivity

47
METEOROLOGY AND CLIMATOLOGY

Includes weather observation forecasting and modification.

20060055617 Naval Postgraduate School, Monterey, CA USA
The Extratropical Transition of Tropical Storm Banyan
Vancas, Michael D; Sep 2006; 90 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457251; No Copyright; Avail.: Defense Technical Information Center (DTIC)

During July 2005, Typhoon Banyan recurved and underwent extratropical transition over the western North Pacific. Coincident with the extratropical transition of Banyan, a large mid-tropospheric anticyclone developed immediately east of the recurving typhoon. The anticyclone was associated with a high-amplitude, Rossby wave-like pattern that developed downstream of the anticyclone and extended across the North Pacific. Development of the anticyclone is examined with respect to the interaction between the outflow from Banyan and the midlatitude jet streak. During the poleward movement of TY Banyan, an anticyclonically-curved jet streak was forced by the merger of the upper-level outflow from Banyan and a jet streak associated with an upstream trough. The anticyclonic curvature was accentuated by the presence of a mid-tropospheric cyclone east of Banyan. The anticyclonic curvature increased as Banyan moved poleward and the mid-tropospheric cyclone moved equatorward. Thermodynamic forcing of the mid-tropospheric anticyclone is examined with respect to the poleward movement of warm moist air that ascends as it is advected around the eastern side of the decaying typhoon. The combination of dynamic and thermodynamic factors is examined in a potential vorticity framework to identify the development of the anticyclone east of Banyan and the transformation of Banyan into a midlatitude cyclone.
DTIC
Artificial Satellites; Cyclones; Pacific Ocean; Storms; Tropical Storms

20060055622 Naval Postgraduate School, Monterey, CA USA
Objective Identification of Environmental Patterns Related to Tropical Cyclone Track Forecast Errors
Sanabia, Elizabeth R; Sep 2006; 61 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457263; No Copyright; Avail.: CASI: A04, Hardcopy

The increase in skill of numerical model guidance and the use of consensus forecast techniques have led to significant improvements in the accuracy of tropical cyclone track forecasts at ranges beyond 72 hours. Identification of instances when the forecast track from an individual numerical model may be in error could lead to additional improvement in the accuracy of tropical cyclone track forecasts. An objective methodology is tested to characterize the spread among the three primary global numerical model forecast tracks used as guidance by the Joint Typhoon Warning Center. Statistically significant principal components derived from empirical orthogonal functions of mid-tropospheric height and vorticity forecast fields identify cases of large spread among model forecasts. Cases in which the three-model average forecast track resulted in a large error were characterized by a distribution of principal components such that one component was significantly different from the other two. Removal of the forecast track associated with the outlying principal component resulted in a reduced forecast error. Therefore, the objective methodology may be utilized to define a selective consensus by removing forecast tracks from

consideration based on the projection of forecast fields onto empirical orthogonal functions and inspecting the distribution of the resulting principal components.
DTIC
Cyclones; Errors; Forecasting; Mathematical Models; Tropical Storms

20060055725 Washington Univ., Seattle, WA USA
Technical and Scientific Evaluation of EM-APEX in Hurricane Frances
Sanford, Thomas B; Girton, James B; Sep 30, 2006; 12 pp.; In English
Contract(s)/Grant(s): N00014-04-1-0691
Report No.(s): AD-A457459; No Copyright; Avail.: CASI: A03, Hardcopy

The EM-APEX, a new autonomous sensor platform, capable of making long-duration measurements of ocean velocity profiles in inhospitable environments, was the focus of this project, aimed to increase our understanding of the capabilities of the EM-APEX, as well as to advance our scientific understanding of air-sea interaction under hurricanes using the first dataset from EM-APEX. Our objectives, approach, scientific tasks, results, both scientific and technical, are discussed in this Final Report.
DTIC
Autonomy; Hurricanes; Oceans

20060055800 Naval Postgraduate School, Monterey, CA USA
Evaluation of Causes of Large 96-H and 120-H Track Errors in the Western North Pacific
Payne, Kathryn A; Jun 2006; 109 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457588; No Copyright; Avail.: CASI: A06, Hardcopy

Whereas the Joint Typhoon Warning Center (JTWC) has ten track forecasts to 72 h, only four dynamical model forecasts are available at 96 h and 120 h. Forming a selective consensus (SCON) by proper removal of a likely erroneous track forecast is hypothesized to be more accurate than the non-selective consensus (NCON) of all four models. Conceptual models describing large track error mechanisms, which are related to known tropical cyclone motion processes being misrepresented in the dynamical fields, are applied to forecasts by the Navy Operational Global Atmospheric Prediction System (NOGAPS), U.S. Navy version of the Geophysical Fluid Dynamics Laboratory Model (GFDN), UK Meteorological Office (UKMO), and National Centers for Environmental Prediction (NCEP) Global Forecast System (GFS) during the 2005 western North Pacific typhoon season. A systematic error in the GFDN was identified in which the model built a false anticyclone downstream of the Tibetan Plateau, which explained over 50% of the large GFDN track errors. In the GFS model, 95% of the large errors occurred due to an incorrect depiction of the vertical structure of the tropical cyclone. The majority of NOGAPS and UKMO large errors were caused by an incorrect depiction of the midlatitude system evolutions. Characteristics of the erroneous forecast tracks and corresponding model fields are documented and illustrative case studies are presented. By applying rules of the Systematic Approach, the average SCON error was 222 n mi (382 n mi) less than NCON (JTWC) in 20% of all 120-h forecasts.
DTIC
Cyclones; Errors; Meteorological Parameters; Tropical Storms

20060056219 National Oceanic and Atmospheric Administration, Boulder, CO USA
Big Storm Named Katrina
Carson, R. T.; January 2006; 44 pp.; In English
Report No.(s): PB2007-100117; No Copyright; Avail.: National Technical Information Service (NTIS)

Many students are affect every year by hurricanes and the weather hazards that come with a storm. Through this book students will become aware of how important it is to understand hurricanes and their impacts. Students can tell their parents and friends what they need to do before, during, and after a hurricane. They can make the difference in someone's life. A Big Storm Named Katrinatells the story of Hurricane Katrina as she roared through the Gulf Coast. Hurricane Katrina was one of the most powerful storms the Gulf Coast has seen in many years. Seeing the images of destruction tells the story of just how powerful she was. All students should learn about the weather and be aware of how fast weather changes around them. Study hard and be storm wise.
NTIS
Education; Hurricanes; Storms

20060056320 NASA Langley Research Center, Hampton, VA, USA

On the Observed Changes in Upper Stratospheric and Mesospheric Temperatures from UARS HALOE

Remsberg, Ellis E.; [2006]; 38 pp.; In English; 4th IAGA/ICMA/CAWSES Workshop on Long-Term Changes and Trends in the Atmosphere, 4 - 8 Sept. 2006, Sodankyla, Finland; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056320; Avail.: CASI: A03, Hardcopy

Temperature versus pressure or T(p) time series from the Halogen Occultation Experiment (HALOE) on the Upper Atmosphere Research Satellite (UARS) have been extended and re-analyzed for the period of 1991-2005 and for the upper stratosphere and mesosphere in 10-degree wide latitude zones from 60S to 60N. Even though sampling from a solar occultation experiment is somewhat limited, it is shown to be quite adequate for developing both the seasonal and longer-term variations in T(p). Multiple linear regression (MLR) techniques were used in the re-analyses for the seasonal and the significant interannual, solar cycle (SC-like or decadal-scale), and linear trend terms. A simple SC-like term of 11-yr period was fitted to the time series residuals after accounting for the seasonal and interannual terms. Highly significant SC-like responses were found for both the upper mesosphere and the upper stratosphere. The phases of these SC-like terms were checked for their continuity with latitude and pressure-altitude, and in almost all cases they are directly in-phase with that of standard proxies for the solar flux variations. The analyzed, max minus min, responses at low latitudes are of order 1 K, while at middle latitudes they are as large as 3 K in the upper mesosphere. Highly significant, linear cooling trends were found at middle latitudes of the middle to upper mesosphere (about -2 K/decade), at tropical latitudes of the middle mesosphere (about -1 K/decade), and at 2 hPa (or order -1 K/decade).

Author

Halogen Occultation Experiment; Time Series Analysis; Solar Cycles; Upper Atmosphere Research Satellite (UARS); Atmospheric Temperature; Stratosphere; Mesosphere; Periodic Variations

20060056381 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Seasonal Prediction with the GEOS GCM

Suarez, Max; Schubert, S.; Chang, Y.; September 13, 1999; 1 pp.; In English; American Meteorological Society Eighth Conference on Climate Variations, 12-17 Sept. 1999, Denver, CO, USA; Copyright; Avail.: Other Sources; Abstract Only

A number of ensembles of seasonal forecasts have recently been completed as part of NASA's Seasonal to Interannual Prediction Project (NSIPP). The focus is on the extratropical response of the atmosphere to observed SST anomalies during boreal winter. Each prediction consists of nine forecasts starting from slightly different initial conditions. Forecasts are done for every winter from 1981 to 1995 using Version 2 of the GEOS GCM. Comparisons with six long-term integrations (1978-1995) using the same model are used to separate the contributions of initial and boundary conditions to forecast skill. The forecasts also allow us to isolate the SSt forced response (the signal) from the atmosphere's natural variability (the noise).

Author

Weather Forecasting; Winter; Boundary Conditions; Anomalies

20060056444 NASA Langley Research Center, Hampton, VA, USA

NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites

Palikonda, Rabindra; Minnis, Patrick; Spangenberg, Douglas A.; Khaiyer, Mandana M.; Nordeen, Michele L.; Ayers, Jeffrey K.; Nguyen, Louis; Yi, Yuhong; Chan, P. K.; Trepte, Qing Z.; Chang, Fu-Lung; Smith, William L, Jr.; [2006]; 8 pp.; In English; SPIE 5th International Symposium on Asia-Pacific Remote Sensing Conference 2006, 13-17 Nov. 2006, Goa, India; Original contains color illustrations

Contract(s)/Grant(s): WBS 018.02.13.01.60

Report No.(s): SPIE-6408-72; Copyright; Avail.: CASI: A02, Hardcopy

At NASA Langley Research Center (LaRC), radiances from multiple satellites are analyzed in near real-time to produce cloud products over many regions on the globe. These data are valuable for many applications such as diagnosing aircraft icing conditions and model validation and assimilation. This paper presents an overview of the multiple products available, summarizes the content of the online database, and details web-based satellite browsers and tools to access satellite imagery and products.

Author

Satellite Imagery; Information Retrieval; Satellite Observation; World Wide Web; Cloud Cover; GOES Satellites

51
LIFE SCIENCES (GENERAL)

Includes general research topics related to plant and animal biology (non-human); ecology; microbiology; and also the origin, development, structure, and maintenance of animals and plants in space and related environmental conditions. For specific topics in life sciences see *categories 52 through 55*.

20060054289 International Society for Gravitational Physiology, Washington, DC, USA
Journal of Gravitational Physiology, Volume 12, Number 1
Fuller, Charles A., Editor; Cogoli, Augusto, Editor; Hargens, Alan R., Editor; Smith, Arthur H., Editor; July 2005; ISSN 1077-9248; 341 pp.; In English; 26th Annual Gravitational Physiology Meeting, 26 Jun. - 1 Jul. 2005, Cologne, Germany; See also 20060054290 - 20060054435; Original contains black and white illustrations
Contract(s)/Grant(s): NNG05GM59G; Copyright; Avail.: Other Sources

The following topics were covered: System Specificity in Responsiveness to Intermittent -Gx Gravitation during Simulated Microgravity in Rats; A Brief Overview of Animal Hypergravity Studies; Neurovestibular Adaptation to Short Radius Centrifugation; Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis; Perception of Body Vertical in Microgravity during Parabolic Flight; Virtual Environment a Behavioral and Countermeasure Tool for Assisted Gesture in Weightlessness: Experiments during Parabolic Flight; Artificial Gravity: Physiological Perspectives for Long-Term Space Exploration; Comparison of the Effects of DL-threo-Beta-Benzyloxyaspartate on the Glutamate Release from Synaptosomes before and after Exposure of Rats to Artificial Gravity; Do Perception and Postrotatory Vestibulo-Ocular Reflex Share the Same Gravity Reference?; Vestibular Adaptation to Changing Gravity Levels and the Orientation of Listing's Plane; Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory; Environmental Challenge Impairs Prefrontal Brain Functions; Effect of 6-Days of Support Withdrawal on Characteristics of Balance Function; Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus; Audiological Findings in Antiorthostatic Position Modelling Microgravitation; Investigating Human Cognitive Performance during Spaceflight; The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by Asimulation Study; Characteristics of the Eyes Pursuit Function during Readaptation to Terrestrial Gravity after Prolonged Flights Aboard the International Space Station; Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects; Structural Reappraisal of Dendritic Tree of Cerebellar Purkinje Cell for Novel Functional Modeling of Elementary Sensorimotor Adaptive Processes; Orpheus 0 G or Ear in Microgravity to Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity; Understanding Visual Perception in the Perspective of Gravity; Cortical Regions Associated with Orthostatic Stress in Conscious Humans; Restoration of Central Blood Volume: Application of a Simple Concept and Simple Device to Counteract Cardiovascular Instability in Syncope and Hemorrhage; WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women; Intracranial Pressure Increases during Weightlessness. A Parabolic Flights Study; Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest; Calf Tissue Liquid Stowage and Muscular and Deep Vein Distension in Orthostatic Tests after a 90-Day Head Down Bed Rest; Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G; Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats; and Respiratory Sinus Arrhythmia: A Marker of Decreased Parasympathetic Modulation after Short Duration.

Derived from text

Gravitational Effects; Gravitational Physiology; Weightlessness; Physiological Responses; Physiology; Neurophysiology; Mental Performance; Microgravity; High Gravity Environments; Human Performance; Heart Function; Human Beings

20060054290 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Germany
Status of the SOS-LUX-Toxicity-Test on the International Space Station
Rabbow, E.; Rettberg, Petra; Baumstark-Khan, Christa; Reitz, Guenther; Schultz-Varnholt, Dirk; Franz, Markus; Reitz, Guenther; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P263-P264; In English; See also 20060054289
Contract(s)/Grant(s): BMBF-50WB9916; Copyright; Avail.: Other Sources

For the safety of astronauts and to ensure stability and integrity of the genome of microorganisms and plants used in bioregenerative life support systems it is important to improve our knowledge on the combined action of (space) radiation and microgravity. The SOS-LUX-Toxicity-Test as part of the TRIPLE-LUX project (accepted for flight in Biolab in Columbus on ISS) will provide an estimation of the health risk resulting from exposure of astronauts to the space radiation environment in microgravity by increasing the knowledge of cellular mechanisms of the interaction of microgravity and space radiation. In

the bacterial biosensor 'SOS-LUX-Toxicity- Test' developed at DLR (patent), bacteria are transformed with the plasmid pSwitch, carrying the promoterless lux operon of Photobacterium leiognathi under control of a DNA-damage dependent SOS promoter The space experiment and first results of tests with the bread board model of the automated space hardware under development are described.
Author
Radiation Dosage; Microgravity; Microorganisms; Aerospace Environments; Aerospace Safety; Bioinstrumentation; Closed Ecological Systems; Deoxyribonucleic Acid; Spaceborne Experiments; Stability; Toxicity

20060054291 Institute of Botany, Lithuania
Growth of Cress Seedlings and Morphogenesis of Root Gravisensors under Clino-Rotation and in Unidirectional Red or Blue Light
Rakleviciene, D.; Svegzdiene, D.; Zukauskas, A.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P209-P210; In English; See also 20060054289; Copyright; Avail.: Other Sources

The growth rate and orientation of cress seedlings in response to the direction of illumination under clinorotation were investigated at the initial stage of intensive hypocotyl elongation. Roots and hypocotyls growing in normal gravity conditions (1 g) and under clino-rotation at 3 rpm were illuminated with red (660 nm) or blue (450 nm) light from light-emitting diodes (LEDs). Unidirectional illumination in the direction opposite to the gravity vector promoted the growth rate of roots. Inhibition of gravitropism by clino-rotation reduced the growth of roots and stimulated the elongation of hypocotyls in both red and blue light. Illumination of roots invoked changes in the formation of gravisensing cells in the columella. Illumination under clino-rotation stimulated root statocyte growth and increased the number of amyloplasts in cells of the 3rd-6th columella rows. Also, an increase in the columella cell area, mainly caused by cell elongation in blue light and by enhanced radial growth in red light, was observed.
Author
Clinorotation; Gravitation; Seedlings (Botany); Sensors; Color; Illuminating

20060054292 Institute of Biomedical Problems, Moscow, Russian Federation
Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcromeric Cytoskeletal Proteins of Hindlimb Suspended Rats
Litvinova, K. S.; Vikhlyantsev, I. M.; Podlubnaya, Z. A.; Shenkman, B. S.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P159-P160; In English; See also 20060054289
Contract(s)/Grant(s): RFBR-04-04-49044; RFBR-04-04-48599; RFBR-03-04-48487; RFBR-05-04-08200; Copyright; Avail.: Other Sources

The study was purposed to analyze the effects of binding agent (10% EGTA) on soleus fiber contractile characteristics and cytoskeletal sarcomeric proteins in hindlimb suspended rats. Cage control and hindlimb-suspended rats were administered with saline or EGTA i.p. injections. Whereas the fiber diameter of unloaded rat soleus was 17% less than in control group and there were no significant differences between EGTA-treated rats and saline-treated animals. Values of fiber tension in saline-treated unloaded rats were less than in the control group by 45%, and in EGTA-treated rats - by 28%. The Cd/tension curve in hindlimb suspended saline-treated rats shifted to the right, which indicated to the less Ca(2+) sensitivity of myofibrils of unloaded soleus. At the same time Ca(2+) sensitivity in EGTA-treated suspended rats even exceeded the control levels. The hindlimb-suspended EGTA-treated rats tended to decrease their titin content to less degree (17%) than group of suspended rats injected with physiological saline (51%). The relative nebulin content decreased significantly (more than 50%) after hindlimb suspension but was not changed in EGTA-treated unloaded rats.
Author
Hindlimb Suspension; Rats; Calcium; Proteins; Fibers; Cytology; Skeletal Muscle; Contraction

20060054293 Institute for Endocrinological and Metabolic Diseases, Rome, Italy
Effects of Head Down Tilt upon Cortisol and Sex Hormones
Strollo, Felice; Pecorelli, Lia; Uva, Bianca Maria; More, Massimo; Strollo, Giovanna; Riondino, Giuseppe; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P161-P162; In English; See also 20060054289; Copyright; Avail.: Other Sources

Real and modelled microG conditions seem to induce reversible testicular failure. Suitable onground simulation methods are anyway needed in order to better aim kther studies in humans in space. A 5-hour head down tilt (5h-HDT) was therefore performed in 22 male and female healthy volunteers looking at adrenal and gonadal hormones as compared to 12 age- and

gendermatched controls. Cortisol and A decreased significantly in both genders, being cortisol decrease less pronounced in women, while leptin, LH, testosterone, estradiol and estrone failed to do so. The authors conclude that a 5h-HDT is only acceptable for adrenal adaptation studies whole longer duration HDT protocols are needed for gonadal investigations.
Author
Head Down Tilt; Hormones; Alcohols; Sex Glands

20060054294 Queensland Univ., Brisbane, Australia
Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health
D. L., Belavy; C. A,. Richardson; S., Wilson; R., Darnell; J., Hides; R., Toppenberg; B., Elmann-Larsen; J., Rittweger; D., Felsenberg; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P157-P158; In English; See also 20060054289; Copyright; Avail.: Other Sources

Changes in the human lumbo-pelvic (LP) muscles with unloading has received little attention in microgravity research, even though this body region has evolved with the development of upright posture in 1-g. This study used a specific movement task to examine the function of four LP muscles during 8-weeks of bed-rest and one-year follow-up. The main finding was the development of overactivity in the abdominal internal oblique muscle in the follow-up period. This finding implies that the L-P muscle changes occurring during bedrest do not recover on return to the 1-g environment. These results may have implications for musculo-skeletal health for those in sedentary lifestyles on Earth.
Author
Abdomen; Bed Rest; Health; Microgravity; Musculoskeletal System

20060054296 German Sports Univ., Cologne, Germany
Influence of Weightlessness and Apnea on Heart Rate and Blood Pressure Regulation during Exercise
Hoffmann, Uwe; Smerecnik, Mirco; Essfeld, Dieter; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P107-P108; In English; See also 20060054289
Contract(s)/Grant(s): FKZ-50-WB-9810; Copyright; Avail.: Other Sources

Breath-hold maneuvers induce hypoxia, hypercapnia, and various cardiovascular responses typically including increases in total peripheral resistance, mean arterial pressure (MAP) and decreases in heart rate m). The cardiovascular effects are commonly interpreted as an oxygen saving mechanism similar to the mammalian dive response. Exercise provokes opposite cardiovascular responses which support oxygen spending: An increase in HR and, under some circumstances, also stroke volume increase. Changes in total peripheral resistance (TPR) during exercise are the result of a vasoconstriction in the non-exercising tissues and a vasodilatation in the exercising muscles. In a recent study it was shown that the combination of apnea and intensive dynamic exercise leads to a marked increase in MAP and a HR depression after 15 s to 20 s after the onset of the stimulus. These effects were shown to be primarily due to breath-holding, not to the resulting hypoxia and/or hypercapnia [l]. The increase of MAP in these combinations is obviously mediated by a vasoconstriction. During space flight the combination of apnea and intensive exercise may occur for example during strenuous extravehicular activities.
Author
Physical Exercise; Heart Rate; Blood Pressure; Weightlessness; Physiological Responses; Hypercapnia; Cardiovascular System; Heart Function

20060054297 Vrije Univ., Brussels, Belgium
Investigating Human Cognitive Performance during Spaceflight
Pattyn, Nathalie; Migeotte, Pierre-Francois; Demaeseleer, Wim; Kolinsky, Regine; Morais, Jose; Zizi, Martin; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P39-P40; In English; Sponsored in part by Prodex #90030 (ESABE Federal Gov't, (BE DoD), and an Euro Space Foundation; See also 20060054289
Contract(s)/Grant(s): RSTD-HF10; Copyright; Avail.: Other Sources

Although astronauts' subjective self-evaluation of cognitive functioning often reports impairments, to date most studies of human higher cognitive functions in space never yielded univocal results. Since no golden standard exists to evaluate the higher cognitive functions, we proposed to assess astronaut's cognitive performance through a novel series of tests combined with the simultaneous recording of physiological parameters. We report here the validation of our methodology and the cognitive results of this testing on the cosmonauts from the 11 days odISSsea mission to the ISS (2002) and on a control group of pilots, carefully matched to the characteristics of the subjects. For the first time, we show a performance decrement in higher cognitive functions during space flight. Our results show a significant performance decrement for inflight measurement, as

well as measurable variations in executive control of cognitive functions. Taken together, our data establish the validity of our methodology and the presence of a different information processing in operational conditions.
Author
Manned Space Flight; Space Flight; Cognitive Psychology; Astronaut Performance

20060054298 Academy of Sciences (USSR), Moscow, Russian Federation
Influence of Rat Hindlimb Suspension on Sarcolemmal Dystrophin and its Sensitivity to Mechanical Damage
Gasnikova, N. M.; Shenkman, B. S.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P125-P126; In English; See also 20060054289
Contract(s)/Grant(s): RFBR-04-04-49044; RFBR-04-04-48757a; Copyright; Avail.: Other Sources

In two experiments performed on Wistar rats it was shown that hindlimb suspension leads to degradation of sarcolemmal dystrophin which became deeper during recovery; different parts of dystrophin molecule have the same sensitivity to the damage induced by downhill running in normal conditions and the different sensitivity to the damage induced by unloading, downhill running after hindlimb suspension and reloading; after hindlimb suspension the damage induced by downhill running is the same with the damage induced by reloading; calcium-binding agent EGTA decreases degradation of dystrophin during hindlimb suspension.
Author
Hindlimb Suspension; Rats; Damage; Sensitivity

20060054299 Potsdam Univ., Potsdam, Germany
An Innovative Approach for the Assessment of 3D Structures in Trabecular Bone
Marwan, Norbert; Saparin, Peter; Thomsen, Jesper S.; Kurths, Juergen; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P127-P128; In English; See also 20060054289
Contract(s)/Grant(s): ESA Proj. 14592; Copyright; Avail.: Other Sources

A series of new structural measures of complexity were introduced in order to quantify the micro-architecture of trabecular bone from 3D micro Computed Tomography micro-CT) data sets. The application of these measures on micro-CT data acquired from proximal tibia and lumbar vertebra illustrates their ability to quantify structures in trabecular bone.
Author
Bone Mineral Content; Lumbar Region; Vertebrae; Tibia

20060054300 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Koln, Germany
Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers
Lau, P.; Hellweg, C. E.; Kirchner, S.; Baumstark-Khan, C.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P245-P246; In English; See also 20060054289; Copyright; Avail.: Other Sources

During long-term space missions, astronauts suffer from the loss of minerals especially from weightbearing bones due to prolonged sojourn under microgravity. Bone loss during space flight is about 1-2% per month. Bone is continually being remodelled under the influence of three types of highly specialized cells. Osteoblasts, the bone forming cells, osteoclasts, the bone resorbing cells and finally osteocytes preserve the homeostasis of bone formation and resorption. In vitro 3-dimensional cell culture of osteoblastic cell lines on microcarrier beads might be a better model to evaluate changes in bone cell morphology, function and differentiation under influence of spaceflight related factors than the conventional 2-D monolayer culture technique. Furthermore, it allows production of a greater amount of cells compared to the monolayer culture. Aim of this study is to examine the effects of culturing the immortalized murine osteoblastic cell line OCT-1 in a 3-dimensional environment on cell morphology and proliferation rate.
Author
Culture Techniques; Osteoblasts; Microgravity; Regeneration (Physiology); Bone Demineralization; Spaceborne Experiments; Cells (Biology); Cytology; Homeostasis

20060054301 Academy of Sciences (Russia), Moscow, Russian Federation
Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions
Khusnutdinova, D. R.; Netreba, A. I.; Miller, T. F.; Kozlovskaya, I. B.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P143-P144; In English; See also 20060054289; Copyright; Avail.: Other Sources

Decline of contractile properties of antigravitational muscles is known to be a regular effect of microgravity. Results of studies (1,2,3,4) allowed to suggest the reflex nature of this decline during first stage of adaptation to weightlessness.

According this suggestion changes of contractile properties of muscles in this phase are caused by a decline of tonic motor unit activities and, consequently, decline of muscle stiffness, developing in supportlessness condition as a result of silencing lor diminishing1 support afferentation inflow. To test this hypothesis we have studied the dynamics of contractile properties changes that developed during the first days of exposure to supportlessness conditions.
Author
Drying; Muscles; Submerging; Contraction; Knee (Anatomy); Flexors; Thigh; Reflexes

20060054302 Vrije Univ., Amsterdam, Netherlands
Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest
Mulder, E. R.; Stegeman, D. F.; Gerrits, K.; deHaan, A.; Rittweger, J.; Felsenberg, D.; deHaan, A.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P155-P156; In English; See also 20060054289
Contract(s)/Grant(s): 14431/02/NL/SH2; Copyright; Avail.: Other Sources

Changes in the quadriceps femoris (QF) muscle with respect to anatomical cross sectional area (CSA), neural activation level and isometric maximal voluntary torque (MVT) were determined in 18 healthy men subjected to 8 weeks of horizontal bed rest (BR) with (n = 9) and without (Ctrl; n = 9) 6 days/week resistance exercise concurrent with whole body vibration (RVE). For Ctrl, mean QF CSA decreased linearly over time to a reduction of 14.3 +/-4.9% at the end of BR. For RVE, exercise during BR significantly mitigated this reduction (3.9 +/- 4.4%). Prior to and seven times during BR, MVT values were obtained together with neural activation levels, the latter by means of a superimposed stimulation technique. MVT was maintained for RVE during BR, whereas for Ctrl, MVT was significantly reduced by 14.2 +/- 8.1% after 8 weeks. In contrast to previous reports, the maximal voluntary activation remained unaltered for both groups throughout the study. For Ctrl, the absence of a change in neural activation might be related to the repeated testing during the bed rest, which had presumably resulted in a habituation to the task. When both groups were pooled, a significant positive correlation (R= 0.62; P \h 0.01) was observed between changes in CSA and changes in MVT.
Author
Physical Exercise; Habituation (Learning); Muscles; Human Beings; Bed Rest; Stimulation

20060054303 European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands
Biolab Experiment Development Status 2005
Brinckmann, Enno; Manieri, Pierfilippo; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P295-P296; In English; See also 20060054289; Copyright; Avail.: Other Sources

BIOLAB, ESA s major facility for biological Space research on the International Space Station (ISS), will accommodate the first two batches of experiments after its launch with the 'Columbus' Laboratory (spring 2007). Seven experiments have been selected for development: three of the first batch have concluded Phase A/B with the testing of the breadboards, in which the main functions of the scientific studies can be simulated and defined for further inputs to the final design of the experiment hardware. The biological specimens of the first batch are scorpions, plant seedlings, bacteria suspensions and cell cultures of mammalian and invertebrate origin. The experiment protocols request demanding resources ranging from life support for the entire mission (90 days) to skilled crew operations and transport/storage in deep freezers. Even more sophisticated experiments are in preparation for the second batch, dealing with various cell culture systems. This presentation gives an overview about the experiment development status, whilst the science background and breadboard test results will be presented by the respective experiment teams.
Author
Cells (Biology); Life Support Systems; Experiment Design; Culture Techniques; Invertebrates; Bacteria

20060054304 National Academy of Sciences, kiev, Ukraine
Actin Organization and Gene Expression in Beta Vulgaris Seedlings under Clinorotation
Kozeko, L. Ye; Shevchenko, G. V.; Artemenko, O. A.; Martyn, G. G.; Kordyum, E. L.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P187-P188; In English; See also 20060054289
Contract(s)/Grant(s): STCU-NN-01(R); Copyright; Avail.: Other Sources

Actin microfilaments (MFs) as highly dynamic structure respond by rapid reorganization to different external influences, including gravity. The object of our experiments was to examine both the actin organization and actin gene expression during growth and differentiation of root cells under clinorotation. It was shown that MFs acted as the indicator of changes caused by altered gravity in distal elongation zone (DEZ) cells, particularly actin cytoskeleton is enhanced in cortex cells. The data

testify stable actin expression under altered gravity. The F-actin MFs enhancement in cortex cells of the DEZ occurred under clinorotation at the same level of the total actin content as in the stationary conditions is suggested to be caused by transformation of G-actin into F-actin.
Author
Gene Expression; Clinorotation; Seedlings (Botany); Gravitation; Microfibers

20060054305 Fourth Military Medical Univ., Xi'an, China
Depressed Tetanic Contractile Function Cannot be Compensated by Increasing Stimulating Frequency in Unloaded Soleus Muscle
Gao, Fang; Yu, Zhi-Bin; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P129-P130; In English; See also 20060054289; Copyright; Avail.: Other Sources

The weightlessness-induced muscle atrophy is associated with a reduced force and power and with an increased fatigability [11. In prolonged manned space missions, these alterations in skeletal muscles could limit the crew's ability to work in space and to rapidly egress in an emergency on return to Earth. In order to elucidate the underlying mechanisms of the increased fatigability in the atrophic skeletal muscle, we isolated the typically fast and slow muscle, extensor digitorum longus (EDL) and soleus (SOL), to observe the changes in maximal contraction tension, optimal stimulating frequency, and recovery features after fatigue in the intermittent tetanic Contraction.
Derived from text
Musculoskeletal System; Weightlessness; Skeletal Muscle; Muscular Function; Frequencies; Atrophy; Contraction

20060054306 Moscow State Univ., Russian Federation
The Effect of Simulated Microgravity on Nitrergic Innervation of the Middle Cerebral Artery
Fadyukova, O. E.; Tarasova O. S.; Tsvirkoun, D. V.; Buravkov, S. V.; Vinogradova, O. L.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P99-P100; In English; See also 20060054289
Contract(s)/Grant(s): RFBR-N03-04-48740; Copyright; Avail.: Other Sources

The present study was designed to examine the density of nitrergic perivascular nerves in rat cerebral vessels after 2-week tail suspension. Preparations of middle cerebral artery (MCA) were histochemically stained for NADPHdiaphorase. A significant decrease of density of nerves exhibiting NADPH-diaphorase activity was revealed in proximal part of MCA in post-suspension rats: 28+/-4 vs 49+/-5 points per 100(exp 2) microns(exp 2) in control. Therefore, vascular alterations under conditions of microgravity may include the decreased influence of dilatory nitrergic nerves.
Author
Gravitational Effects; Microgravity; Cerebrum; Arteries; Cardiovascular System; Nerves

20060054307 National Academy of Sciences, Kiev, Ukraine
Differentiation of Plant Graviperceiving and Graviresponding Cells in Altered Gravity
Kordyum, E. L.; Martyn, G. G.; Shevchenko, G. V.; Kozeko, L. Ye.; Artemenko, O. A.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P189-P190; In English; See also 20060054289
Contract(s)/Grant(s): NN-01(R); Copyright; Avail.: Other Sources

A main goal of our work was to compare the anatomy and ultrastructure of a root cap, including statocytes (graviperceiving cells), and a root proper meristem and elongation zone (graviresponding cells) of Beta vulgaris seedlings grown in the control and under clinorotation as a root apex is a very convenient model for the study of plant cell gravisensitivity. The comparison of the ultrastructure and topography of cell organelles clearly showed the differences in growth by elongation and differentiation in time and space between statocytes and cortex cells of the distal elongation zone (DEZ), in dependence on their main functions. A root graviperceptive apparatus develops under clinorotation but it does not function. DEZ cells reveal the highest metabolism activity in both variants that can underlie their specific physiological properties and provide cell rapid growth in the central elongation zone.
Author
Seedlings (Botany); Clinorotation; Cell Division; Anatomy; Organelles

20060054308 Alenia Spazio S.p.A., Turin, Italy
Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study
Guarnieri, Vincenzo; Lobascio, Cesare; Nieminen, Petteri; Parisi, Gianni; Tamburini, Vittorio; Tracino, Emanuele; Journal of

Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P299-P300; In English; See also 20060054289; Copyright; Avail.: Other Sources

Cosmic radiation is a fundamental problem for space exploration. In REMSIM study (funded by ESA in the Aurora framework) strategies have been investigated to protect astronauts from radiation in interplanetary missions. This paper focuses on radiation damage to humans and definition of dose thresholds.

Author

Radiation Effects; Radiation Damage; Dosage; Astronauts; Cosmic Rays; Auroras

20060054309 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Cologne, Germany

Core Data Model Proposal for Physiology Research in Space

Duwe, Helmut; Wilke, Doris; Schwartmann, Dirk; Wirtz, Michael; Petrat, Guido; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P301-P302; In English; See also 20060054289; Copyright; Avail.: Other Sources

The Consultative Committee for Space Data Systems (CCSDS) has released a 'Reference Model for an Open Archival Information System' (OAIS). This technical recommendation is aiming to develop a broader consensus for long-term archives of space-related digital data. A key issue of the OAIS framework is the necessity of elaborating a data model with structural and semantic aspects to enable interoperability . A group at the DLR Institute of Aerospace Medicine (DLR-ME) has started to work on a structural and semantic data model for life science research in space. The core terms of the data model, which have been explicated in the sense of semantics ('meaning of words') are: scientific study, study plans (study protocol as well as detailed implementation plan), methods, tasks, study subject, parameter, and measurement data. Extensions and refinements are underway for terms like study segment, schedule, study structural path, complex science data object, etc.

Author

Aerospace Medicine; Physiology; Research; Data Systems; Life Sciences

20060054310 ICN Business School, Nancy, France

Virtual Environment a Behavioral and Countermeasure Tool for Assisted Gesture in Weightlessness: Experiments during Parabolic Flight

Didier, Fass; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P19-P20; In English; See also 20060054289; Copyright; Avail.: Other Sources

We present results of experiments performed by three subjects on earth and in hypergravity and weightlessness during parabolic flights (Flight campaign ndeg8 CNES-SPACEHAB), using a virtual and augmented reality system for assisted action. Using analysis of three-dimensional hand movements (drawing of ellipses), we compare the dynamical sensory-motor integration and motor performance (orientation, shape, figural and kinematics features) with or without the assistance of virtual environments. Using this gesture-based method we evaluate physiological effects and integration of both change of gravity and artefactual environment on performance. We demonstrate how artificial visual information dynamically generated by a wearable virtual environment may help gesture in the three-dimensional space parabolic flight, according to the theoretical integrative neuroscience principles

Author

High Gravity Environments; Virtual Reality; Weightlessness; Parabolic Flight; Physiological Effects; Neurology; Kinematics

20060054311 Centre Hospitalier Univ., Tours, France

Calf Tissue Liquid Stowage and Muscular and Deep Vein Distension in Orthostatic Tests after a 90-Day Head Down Bed Rest

Arbeille, P.; Kerbeci, P.; Audebert, P.; Capri, A.; Pascaud, L.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P67-P68; In English; See also 20060054289; Copyright; Avail.: Other Sources

The objectives were to assess the contribution of (1) the calf veins distension and (2) the tissue liquid stowage during stand test, to orthostatic intolerance 'OI' after a head down bed rest (HDBR) of 9Odays. Method: The population consisted of a control group (Co-gr, n=9) and an exercise Fly wheel counter-measure group (CM-gr, n=9). Calf vein cross sectional area (CSA) and surrounding tissue liquid content (tissue image darkness) were assessed by echography during pre and post HDBR stand-tests. Results: From supine to standing (post HDBR), the Tibial and muscular vein CSA increased significantly in non tolerant subjects whereas in tolerant subjects the vein CSA did not change. Post HDBR the tissue image darkness (proportional to tissue liquid content) increased more from supine to standing in non tolerant than in tolerant subjects. No significant difference were found between Co and exercise CM groups. Conclusion: High calf vein CSA and tissue liquid content increase

at post-HDBR stand-test were significantly correlated with occurrence of OI but not with CM.
Author
Tissues (Biology); Tibia; Bed Rest; Veins; Physical Exercise

20060054312 Russian Academy of Medical Sciences, Moscow, Russian Federation
Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G
Gulevskaja, T. S.; Morgunov, V. A.; Krasnov, I. B.; Loginov, V. I.; Chelnaya, N. A.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P69-P70; In English; See also 20060054289
Contract(s)/Grant(s): INTAS-ESA-N99-1191; Copyright; Avail.: Other Sources

The histological study of brain vessels was undertaken in the rats exposed to 24-day tail-suspension (TS) and underwent during TS to rotation on centrifuge at 2 G (with vector of gravity 'backchest') 1 hour daily from the 5-th to the 23-d day of TS. After 24- day TS extracerebral arteries were characterized by adaptive structural changes hindering from excessive blood inflow to brain where as in veines, venules, capillaries and choroid plexus the destructive changes were found, which together with revealed edema of brain pointed out the difficulty of blood and cerebrospinal fluid outflow. In brain of the rats subjected only to intermittent 2 G the changes of vessels were moderately pronounced. In contrast to the animals exposed only to TS or 2 G the TS rats subjected to intermittent 2 G were characterized by considerably more pronounced adaptive and destructive changes in brain vessels and pronounced edema of brain tissue. These results point out the aggravation of TS and intermittent 2 G (with vector of gravity 'back-chest') effects on brain blood circulation at their joint influences.
Author
Brain Circulation; Blood Circulation; Centrifuges; Arteries; Rotation; Morphology; Gravitation

20060054313 Karolinska Inst., Stockholm, Sweden
Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device
Pozzo, Marco; A;lmer. Bkperm; Mprrbramd. :ema; Tesch, Per A.; Faroma. Darop; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P113-P114; In English; See also 20060054289
Contract(s)/Grant(s): ESA-14737/02/NL/SH; Copyright; Avail.: Other Sources

Exposure to microgravity has adverse effects on skeletal muscle size and function. Such effects can be counteracted by training using a Flywheel Exercise Device (FWED). Multichannel EMG signals were detected in nine males from vastus medialis and laterialis muscles during 30 coupled concentric (CON) and eccentric (ECC) actions on the FWED. Muscle fiber conduction velocity (CV) was assessed for each action. CV initial values depended on muscle action type (CONECC) and were higher in CON than ECC actions. CV decreased (P\h0.05) over time during the task. Its slope was greater for VL than VM but was not different between CON and ECC. It was concluded that direct measure of CV is feasible during dynamic exercise, and that this technique may be used for objective assessment of the effect of resistance training in counteracting microgravity-induced muscle atrophy.
Author
Musculoskeletal System; Skeletal Muscle; Muscular Function; Microgravity; Electromyography; Exposure; Atrophy

20060054314 Hirosaki Univ., Japan
Effects of Heat Stress on the Regeneration of Injured Skeletal Muscle in Rats
Yoshioka, Toshitada; Goto, Katsumasa; Kojima, Atsushi; Akema, Tatsuo; Sugiura, Takao; Ohira, Yoshinobu; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P115-P116; In English; See also 20060054289; Copyright; Avail.: Other Sources

The purpose of this study was to investigate the effects of heat stress on the regeneration of injured mammalian skeletal muscles. To activate a necrosis-regeneration cycle, cardiotoxin (CTX) was injected into the left tibialis anterior (TA) muscle, except for the normal control group. Rats in the heat-stressed group were exposed to heat in a heat chamber 24 hours before or immediately after CTX injection. The muscle protein contents in the heat-stressed group were significantly higher than the non-heated group 28 days after CTX injection (p\h0.05). The CTX-injection-related increment of Pax7-positive nuclei in the heated group was greater than that in the non-heated group. Evidences suggest that heat-stress could activate satellite cells, promote the proliferation and the differentiation of satellite cells, and facilitate the regeneration of muscle.
Author
Musculoskeletal System; Temperature Effects; Skeletal Muscle; Proteins; Injection

20060054315 Academy of Sciences (Russia), Moscow, Russian Federation

Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent

Shenkman, B. S.; Moukhina, A. M.; Litvinova, K. S.; Nemirovskaya, T. L.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P119-P120; In English; See also 20060054289

Contract(s)/Grant(s): RFBR-04-04-490044; RFBR-05-04-08200; Copyright; Avail.: Other Sources

Recently found Ca(2+) accumulation inside soleus fibers of hindlimb suspended rodents is believed to trigger on the chain of cellular events usually observed during gravitational unloading [1,2]. We suggested that myoplasmic Ca(2+) excess might contribute to the altered myosin heavy chain (MHC) and sarco-endoplasmic reticulum Ca-ATPase (SERCA) isoform distribution in an unloaded muscle. It was found that the administration of the Ca-binding agent EGTA in the course of the 14 day hindlimb unloading attenuated the slow-to-fast myosin heavy chain transformation and completely prevented the increase of the SERCA I expression during unloading. It is concluded that intra-fiber calcium excess contributes to unloading-induced alterations in MHC and SERCA isoform patterns but distribution of these proteins is regulated independently.

Author

Endoplasmic Reticulum; Nonuniformity; Adenosine Triphosphate; Enzyme Activity; Rats; Proteins; Muscles; Myosins

20060054316 Telemetronics Biometry BV, Wageningen, Netherlands

Monitor Activity, Temperature and Heart Rate with a Mouse Telemeter to be used for Animal Research on Board the International Space Station

vanEssen, G.; Masseling, B. H. C. J.; Jansen, M. B.; vanLoon, J.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P281-P282; In English; See also 20060054289

Contract(s)/Grant(s): MG-057; Copyright; Avail.: Other Sources

In-flight animal research is necessary when we want to learn more about the role of gravity or the lack thereof during orbital flights on the (human) body. In the preparation for such experiments we developed STAR, Space Telemetry for Animal Research, a wireless and battery-less mouse biometric telemeter capable of monitoring the heart rate, body temperature and animal activity in grouped housed animals. The system is capable to monitor up to 20 animals simultaneously. To verify the application of the telemeter accelerometers, by which activity is measured, we flew a subset of the telemeter system on board the International Space Station in the framework of the Dutch Soyuz Mission, DELTA that flew in April 2004. Goals to be achieved during this mission were: - To test the accelerometers of STAR under microgravity conditions with the same electrical circuit functions - Get the electronic circuit space qualified. We showed that the accelerometers act similar on Earth as in flight under microgravity conditions. Therefore, from this part of the study, we may conclude that the accelerometers are suitable for use in the implant currently under development. Recently, the first in vivo experiments showed reliable body temperature and heart rate data. In general we might conclude that the STAR-system is suitable to be implemented in animal research, both in space and on ground.

Author

In Vivo Methods and Tests; Microgravity; Heart Rate; Accelerometers; Body Temperature

20060054317 Sassari Univ., Italy

Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism

Coinu, Rita; Chiaviello, Angela; Covelli, Bianca; Meloni, Dionigia; Galleri, Grazia; Pippia, Proto; Meloni, Maria A.; Franconi, Flavia; Palumbo, Giuseppe; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P255-P256; In English; See also 20060054289; Copyright; Avail.: Other Sources

We have previously shown that thymidine incorporation, amino acid uptake, protein synthesis and glucose transport were modified in VSMC and MCF-7 cells exposed to modeled gravity. Now we report the effects that modeled gravity may exert on the relative cycling behavior and protein expression. We concluded that the major effects of modeled gravity on cell metabolism were limited to the activation of some check points that limit (probably transiently) the rate of the metabolism more than the metabolism itself.

Author

Gravitational Effects; Protein Synthesis; Amino Acids; Metabolism; Proteins; Glucose

20060054318 Technische Hochschule, Aachen, Germany

European Network using Fish as Osteoporosis Research Models (ENFORM)

Goerlich, R.; Renn, J.; Alestrom, P.; Nourizadeh-Lillabadi, R.; Schartl, M.; Winkler, C.; Muller, M.; Midtlyng, P. J.; Eberius, M.; Slenzka, K.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P279-P280; In English; See also 20060054289; Copyright; Avail.: Other Sources

Osteoporosis, characterized by loss of bone density, is one of the most important bone diseases of humans worldwide. It causes problems in post-menopausal women, in astronauts during long-term spaceflights and in industrial animal production. Bone alterations leading to osteoporosis are well-documented at the cellular level, but the underlying molecular events are still poorly understood and most of our knowledge is derived from in vitro studies using cell culture systems. Recent findings indicate a remarkable conservation of the key regulators of bone development and homeostasis between mammals and fish. Medaka (Oryzias latipes) and zebrafish (Danio rerio) offer experimental advantages that can be exploited for bone research. Author

Osteoporosis; Fishes; Mammals; In Vitro Methods and Tests; Bone Mineral Content; Homeostasis; Culture Techniques; Cells (Biology)

20060054319 Academy of Sciences (USSR), Moscow, Russian Federation

Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro

Buravkova, L. B.; Merzlikina, N. V.; Romanov, Yu. A.; Buravkov, S. V.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P241-P242; In English; See also 20060054289; Copyright; Avail.: Other Sources

In vivo and in vitro studies have identified the bone marrow as the primary source of a multipotential mesenchymal stem cells (MSC) that give rise to progenitors for several mesenchymal tissues, including bone, cartilage, tendon, adipose, muscle and hematopoietic-supporting stroma. It is known that MSC are sensitive to chemical signals and mechanical stimuli. It was also suggested that microgravity may influence on progenitor cells and induce abnormalities in cellular differentiation in muscle and skeletal components leading to the changes in physiological regeneration of these tissues. To prove gravitational sensitivity of MSC, we studied the effects of prolonged clinorotation on cultured human MSC (hMSC) morphology, actin cytoskeleton organization and phenotype. It was found that the proliferation rate was significantly decreased during clinorotation but augmented during recovery. The cell cytoskeleton displayed actin filament thinning and altered morphology at clinorotation. The production of interleukin-6 was increased and expression of surface molecules was modified by simulated microgravity. Observed changes of cultured hMSC behavior suggest the gravitational sensitivity of human stromal progenitor cells.

Author

In Vitro Methods and Tests; In Vivo Methods and Tests; Gravitational Effects; Stem Cells; Musculoskeletal System; Microgravity; Interleukins; Physiology; Molecules

20060054320 NASA Johnson Space Center, Houston, TX, USA

Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins

Kumel, Yasuhiro; Shimokawa, Hitoyata; Morita, Sadao; Katano, Hisako; Akiyama, Hideo; Hirano, Masahiko; Ohya, Keiichi; Sams, Clarence F.; Whitson, Peggy A.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P151-P152; In English; See also 20060054289; Copyright; Avail.: Other Sources

Rat osteoblasts were cultured for 4 and 5 days aboard Space Shuttle and solubilized on board. The mRNA levels of the post-receptor signaling molecules were analyzed by quantitative RT-PCR. The G-protein alpha subunit G(alpha)q mRNA levels were elevated 3-fold by microgravity. G(alpha)q stimulates PLC(beta), and then PKC. PKC(delta) and PKC(theta) mRNA levels were increased 2- to 5-fold by microgravity The mRNA levels of SOS and Ras GRF were increased 4 to 5-fold by microgravity, while Ras GAP was not altered. Spaceflight-induced bone loss might be attributed to microgravity modulation of the signaling pathway in osteoblasts.

Author

Osteoblasts; Rats; Proteins; Tyrosine; Microgravity; Bone Demineralization; Modulation

20060054321 Academy of Sciences (Russia), Moscow, Russian Federation

Effect of 6-Days of Support Withdrawal on Characteristics of Balance Function

Sayenko, D. G.; Artamonov, A. A.; Ivanov, O. G.; Kozlovskaya, I. B.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P33-P34; In English; See also 20060054289; Copyright; Avail.: Other Sources

The role of different sensorimotor and sensory factors on postural disorders at different stages of the exposure to microgravity still remains unknown. The results obtained after the Dry Immersion \@I) exposure, showed that after 6 days of DI the subjects' ability to resist to posture perturbations was highly reduced, the EMG response of corrective muscles was increased, and the structure of corrective responses was modified, so that the equilibrium was maintained by the elimination of excessive degrees of freedom. Thus, the results of the study have revealed profound changes in postural synergies

suggesting a significant contribution of the support afferentation to posture control.
Author
Microgravity; Exposure; Electromyography; Posture; Muscles; Perturbation

20060054322 Fourth Military Medical Univ., Xi'an, China
Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats
Ma, Jin; Ren, Xinling; Meng, Qinjun; Zhang, Lifan; Purdy, Ralph E.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P71-P72; In English; See also 20060054289
Contract(s)/Grant(s): NAG9-1149; 30170355; Copyright; Avail.: Other Sources

Responses of endothelium removed femoral arterial rings to vasoactive compounds were examined in vitro, and the expression of Myosin and Actin of femoral artery were observed by Western Blotting and Immunohistochemistry in hndlimb unweighting rats and control rats. The results showed that contractile responses of femoral arterial rings evoked by Phenylephrine, Endothelin-1, Vasopressin, KCl, Ca(2+) and Ca(2+) ionophore A23187 were decreased in hindlimb unweighting rats as compared with that of controls. But vasoddatory responses induced by SNPand cGMP were not different between groups. No significant differences have been found in expressions of Calponin, Myosin, Actin, and the ratio of MHC SM1/SM2 between the two groups, but expression of alpha-SM-Actin decreased in hindlimb unweighting rats. The data indicated that the diminished contractile responsiveness probably result from altered contractile apparatus, especially the contractile proteins.
Author
In Vitro Methods and Tests; Vasopressins; Arteries; Endothelium; Potassium Chlorides; Proteins

20060054323 NASA Johnson Space Center, Houston, TX, USA
Effect of Sampling Schedule on Pharmacokinetic Parameter Estimates of Promethazine in Astronauts
Boyd, Jason L.; Wang, Zuwei; Putcha, Lakshmi; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P283-P284; In English; See also 20060054289
Contract(s)/Grant(s): PWC 111-30-10-05; Copyright; Avail.: Other Sources

Six astronauts on the Shuttle Transport System (STS) participated in an investigation on the pharmacokinetics of promethazine (PMZ), a medication used for the treatment of space motion sickness (SMS) during flight. Each crewmember completed the protocol once during flight and repeated thirty days after returned to Earth. Saliva samples were collected at scheduled times for 72 h after PMZ administration; more frequent samples were collected on the ground than during flight owing to schedule constraints in flight. PMZ concentrations in saliva were determined by a liquid chromatographic/mass spectrometric (LC-MS) assay and pharmacokinetic parameters (PKPs) were calculated using actual flight and ground-based data sets and using time-matched sampling schedule on ground to that during flight. Volume of distribution (V(sub c)) and clearance (Cl(sub s),) decreased during flight compared to that from time-matched ground data set; however, Cl(sub s) and V(sub c) estimates were higher for all subjects when partial ground data sets were used for analysis. Area under the curve (AUC) normalized with administered dose was similar in flight and partial ground data; however AUC was significantly lower using time-matched sampling compared with the full data set on ground. Half life (t(sub 1/2)) was longest during flight, shorter with matched-sampling schedule on ground and shortest when complete data set from ground was used. Maximum concentration (C(sub max)), time for C(sub max), (t(sub max)), parameters of drug absorption, depicted a similar trend with lowest and longest respectively, during flight, lower with time-matched ground data and highest and shortest with full ground data.
Author
Pharmacology; Aerospace Medicine; Chromatography; Promethazine; Schedules; Data Acquisition; Parameter Identification

20060054324 European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands
The ERASMUS Experiment Archive
Isakeit, Dieter; Sabbatini, Massimo; Carey, William; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P287-P288; In English; See also 20060054289; Copyright; Avail.: Other Sources

The Erasmus Experiment Archive is an electronic database, accessible through the Internet, that collects in a single reference repository scientific, technical and operational information regarding the experiments performed in the experiment facilities which fall under the responsibility of the ESA Directorate of Human Spaceflight, Microgravity and Exploration. The archive is operated, filled with content 2nd kept up-to-date by the Erasmus User Centre. which forms part of the Directorate.

The archive shares its records and is interoperable with similar experiment archives of the partner agencies NASA USA) and JAXA (Japan) through a mutually agreed standard for experiment records called the International Distributed Experiment Archive (IDEA).
Author
Data Bases; Microgravity; Space Flight; Documents; European Space Agency

20060054325 Fourth Military Medical Univ., Xi'an, China
System Specificity in Responsiveness to Intermittent -Gx Gravitation during Simulated Microgravity in Rats
Zhang, Li-Fan; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P1-P4; In English; See also 20060054289
Contract(s)/Grant(s): NNSF-30171032; NNSF-30470649; DMF-98Z083; Copyright; Avail.: Other Sources

The responsiveness of different physiological systems to intermittent exposure to -Gx by standing or centrifugation during simulated microgravity varies greatly. Cardiac muscle and vessels are most responsive and bone and test is are highly resistant, whereas that of skeletal muscle is moderate. Increasing G-level to 2.6 G showed less or no additional benefit in alleviating adverse changes in muscle and bone. Whether centrifugation combined with exercise and biomechanical methods can maintain bone integrity during prolonged simulated/real microgravity is a critical issue.
Author
Biodynamics; Musculoskeletal System; Skeletal Muscle; Microgravity; Gravitation; Centrifuging

20060054326 Amsterdam Univ., Netherlands
A Brief Overview of Animal Hypergravity Studies
vanLoon, Jack J. W. A.; Tanck, Esther; vanNieuwenhoven, Frans A.; Snoecks, Luc H. E. H.; deJong, Herman A. A.; Wubbels, Rene J.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P5-P10; In English; See also 20060054289
Contract(s)/Grant(s): MG-053; MG-057; Copyright; Avail.: Other Sources

In this paper on animal physiology in a modulated inertial environment we try to provide only a brief overview of the wealth of research that has been conducted over the last decades. The initial work using centrifuges started mainly some 40 years ago. Obviously, for most of the gravitational physiology studies centrifuges were used but with the onset of more regular spaceflight also the other side of the inertial spectrum, with respect to the Earth s lxg, could be explored. The initial species investigated were mice, rats, dogs and chicken but later also toads, rabbits, snakes or crickets were subject of study. Nearly all body systems are investigated and are influenced by an increase in weight. The obvious vestibular and musculo-skeletal system but also the immune system and cardiovascular system are adapting to the hypergravity environment. Especially the last decade has seen increasing interest in the application of chronic acceleration in the study of neuroplasticity, general animal behavior and cognitive functions. In this overview we also reports on some results of a hypergravity tissue sharing experiment regarding bone and stress proteins. Long-Evans rats were exposed to 2.5xg for 7-10 months using the animal centrifuge in Amsterdam
Author
High Gravity Environments; Gravitational Physiology; Animals; Cardiovascular System; Musculoskeletal System

20060054327 Tokyo Medical and Dental Univ., Japan
Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus
Kumei, Yasuhiro; Zeredo, Jorge; Shimokawa, Reiko; Shimokawa, Hitoyata; Kimoto, Mari; Nasution, Fajar Hamonangan; Ohya, Keiichi; Toda, Kazuo; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P35-P36; In English; See also 20060054289; Copyright; Avail.: Other Sources

We measured the unit activities of hippocampal neurons telemetrically via chronically implanted recording electrodes in rats during a 5-min exposure to 2G. The firing frequency was increased three-times as high as the basal level throughout the period of exposure to 2G. Upon termination of 2G exposure, hippocampal slices were prepared to measure the field potential in the CA1 region as responding to electrical stimulation of Schaffer's collaterals. The relative ratio of amplitude of the negative deflection, as compared between 100 vs. 1Hz stimulation, was 40% increased in the 2G-slices. Hypergravity enhanced unit activities and synaptic transmission in the CA1 region, which may underlie the gravity-response mechanism of rat.
Author
High Gravity Environments; Hippocampus; Neurons; Rats; Neurophysiology

20060054328 International Society for Gravitational Physiology, Washington, DC, USA

Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity

Tomatis, Alfred; Talbi, Louisa; Vervoort, Jozef; Fromenteau, Joel; deVoigt, Martin; VanDeun, Jozef; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P49-P50; In English; See also 20060054289; Copyright; Avail.: Other Sources

The goal of the proposed work is to collect data on the responses of the vestibular system to long-term conditions of weightlessness and to evaluate the benefits of a program of Electronic Ear) designed to act preventively to lessen symptoms due to weightlessness and to readapt the vestibular system after return to normal gravity. Data in the form of listening tests and brain maps tests and observations) will be collected during pre- and post-flight simulation. We have to identify if the preservation process of astronauts against weightlessness effects is located in the ear. The longterm objective of the study is to create a blueprint of an Electronic Ear to be used on board should the outcome be positive.

Author

Ear; Microgravity; Middle Ear; Osteoporosis; Signs and Symptoms; Aerospace Medicine; Weightlessness; Gravitation

20060054329 Sassari Univ., Italy

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates

Coinu, Rita; Chiaviello, Angela; Covelli, Bianca; Meloni, Dionigia; Galleri, Grazia; Pippia, Proto; Meloni, Maria A.; Franconi, FLavia; Palumbo, Giuseppe; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P105-P106; In English; See also 20060054289; Copyright; Avail.: Other Sources

This study was aimed at establishing whether modeled microgravity conditions, created in a three-dimensional clinostat (Random Positioning Machine, RPM), influence the membrane-associated Na(+), K(+) and Mg(2+) ATPase activities in heart homogenates from rats (exposed to RPM for 48 hours). The experimental data indicate that modeled low g significantly decreased the total ATPase (P\h0.01) and Na(+), K(+) -ATPase activities (p\h0.05) with no change of the Mg(2+) -ATPase activity, compared to the respective rat control groups (ground). This Na(+), K(+) - pump inhibition could cause a digital-like effect in response to several modifications of many physiological processes even if this inhibition might also be causally related to the physiological environment induced by RPM. The exact mechanism by which total ATPase and Na(+), K(+) -ATPase activities decrease in response to RPM conditions remains to be established. We cannot rule out that a reduced intracellular ATP production, previously demonstrated in other cellular systems submitted to modeled microgravity conditions, could be responsible for the effects reported here.

Author

Microgravity; Physiology; Adenosine Triphosphate; Clinostats; Enzyme Activity; Heart

20060054330 Eidgenoessische Technische Hochschule, Zurich, Switzerland

A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions

Cogoli-Greuter, M.; Galleri, G.; Meloni, M. A.; Liuzzo, M. I.; Cogoli, A.; Pippia, P.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P243-P244; In English; See also 20060054289; Copyright; Avail.: Other Sources

Cell-cell interaction between T cells and monocytes as well as aggregate formation are important means of signal transduction in mitogenic activation of lymphocytes. Nearly total loss of T cell activation was discovered in microgravity and confirmed by later experiments. Aggregate formation of lymphocytes in suspension was observed in microgravity but there is still no direct evidence that interactions between monocytes and T lymphocytes are occurring normally in microgravity. In this study we have found that locomotion of adherent monocytes is modified in modelled low gravity conditions, using the Random Positioning Machine as earth based model of low gravity conditions. The experiments were performed in the MIA unit, hardware suitable for Type I containers, the interface to the Kubik incubator flying in the upcoming Soyuz Missions.

Author

Monocytes; Cells (Biology); Lymphocytes; Microgravity; Quantitative Analysis; Genetics; Clinostats

20060054331 Academy of Sciences of the Ukraine, Kiev, Ukraine

Ultrastructural Peculiarities and Galactolipid Contents in Chlorella Cells in Altered Gravity

Popova, A. F.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P205-P206; In English; See also 20060054289; Copyright; Avail.: Other Sources

The comparative research of the ultrastructural organization of the cells of unicellular alga Chlorella grown during different periods in microgravity and under clinorotation is carried out. The spectrum and depth of the ultrastructural changes

of cellular organelles correlate with the experiment duration. The similarity of the ultrastructural organization of the control and flight variants is shown. Under long-term experiments, the essential changes were observed, first of all, in the chloroplast ultrastructure. Both the changes in a ratio of a relative volume of starch, photosynthetic membranes and stroma, the disturbances in topography of the thylakoids were noted. The obtained results on the chloroplast changes are confirmed basically in model experiments with slow horizontal clinorotation. The contents of total galactolipids as basic lipid components of photosynthetic membranes were analyzed in Chlorella cells under clinorotation. Statistically authentic increase in a total amount of galactolipids, in particular, monogalactosyl diacylglycerol (MGD) and digalactosyl diacylglycerol (DGD) was registered in clinorotated cells compared to the control. An increased amount of these lipids in Chlorella cells under clinorotation, and also physical properties of a cone-like shape of MGD molecules can be one of the reasons of the reorganization in a thylakoid topography and formation of the significant thylakoid bends.
Author
Microgravity; Chlorella; Organelles; Molecules; Chloroplasts; Clinorotation; Lipids

20060054332 Academy of Sciences of the Ukraine, Kiev, Ukraine
Expression of Small Heat Shock Proteins in Pea Seedlings under Gravity-Altered Conditions
Talalaev, Alexandr S.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P203-P204; In English; See also 20060054289; Copyright; Avail.: Other Sources

A goal of our study was to evaluate the stress gene expression in Pisum sativum seedlings exposed to altered gravity and temperature elevation. We investigate message for the two inducible forms of the cytosolic small heat shock proteins (sHsp), sHsp 17.7 and sHsp 18.1. Both proteins are able to enhance the refolding of chemically denatured proteins in an ATP-independent manner, in other words they can function as molecular chaperones. We studied sHsps expression in pea seedlings cells by Western blotting. Temperature elevation, as the positive control, significantly increased PsHsp 17.7 and PsHsp 18.1 expression. Expression of the housekeeping protein, actin was constant and comparable to unstressed controls for all treatments. We concluded that gravitational perturbations incurred by clinorotation did not change sHsp genes expression.
Author
Thermal Shock; Gene Expression; Genes; Gravitation; Clinorotation; Proteins

20060054333 Free Univ., Brussels, Belgium
3-D Ballistocardiography, A Tool Revisited for Following Astronaut Cardiovascular Function?
Migeotte, P.-F.; Colin, F.; Sa, R. C.; Prisk, G. Kim; Paiva, M.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P89-P90; In English; See also 20060054289; Copyright; Avail.: Other Sources

A recording on a crew member of the D2-Spacelab mission constitutes, to our knowledge, the only 3-D acceleration data that includes respiratory movements. In a previous paper [l], the description of the Balistocardiogram (BCG) on three axes revealed that the information along the antero-posterior axis (which is inaccessible on earth) was of the same magnitude as the 2 other projections, and thus of crucial importance for the physiological interpretation. The present study analyses in details the 3-D displacement vector (DV).
Author
Ballistocardiography; Cardiovascular System; Flight Crews; Astronauts

20060054334 Academy of Sciences (USSR), Moscow, Russian Federation
Heart Rate Variability in Evaluation of Functional State and Types of Autonomic Regulation under Conditions of Space Flight
Chernikova, A. G.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P85-P86; In English; See also 20060054289; Copyright; Avail.: Other Sources

A mathematical model on the base of heart rate variability (HRV) analysis was created after generalization of the results of many HRV studies during space flights on orbital station 'Mir' , in model terrestrial experiments and investigations in humans with different degree of functional deconditioning [l]. The results of HRV studies at orbital station Mir and International Space Station (ISS) showed that condition of nearly all cosmonauts in the course of flight was not beyond the scope of physiological norm. It was revealed a presence of different types (classes) of autonomic regulation under conditions of space flight. Clearly denominated individual types of adaptation reactions, which are little changed for several years, are formed in each cosmonaut.
Author
Autonomic Nervous System; Mir Space Station; Mathematical Models; Adaptation; Heart Rate

20060054335 Academy of Medical Sciences, Kiev, Ukraine

Relations Between Prooxidant and Antioxidant Variables in Hypergravity and Aging

Timchenko, albert; Utko, Natalie; Bezrukov, Vladislav; Muradian, Khachik; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P171-P172; In English; See also 20060054289; Copyright; Avail.: Other Sources

A battery of physiological and biochemical variables has been studied prior, during and after mild (2 g, 4 h) hypergravity (HG,) in young and old male Wistar rats. HG induced simicant decline of the body temperature and increased thermoconductivity on the background of relatively less pronounced changes of V02 and VC02 in young and old rats. Physiological variables returned practically to the control level within 3 h of recovery. All studied enzyme activities were elevated in the liver of HGtreated animals, although only the increase of glutathione peroxidase in young and SOD and glutathione reductase in old animals were statistically signcficant. Highly significant correlation between SOD and catalase expression and activities were preserved at aging and HG, underlining importance of coordinated action of this first line of antioxidant defense in stress conditions. Results of multivariable analyses, however, evidence in favor of significant alterations in relations between studied prooxidant and antioxidant variables at HG.

Author

Antioxidants; Biochemistry; High Gravity Environments; Males; Physiology; Aging (Biology)

20060054336 Semmelweis Univ. Medical School, Budapest, Hungary

Detailed Structural Analysis on Retinal Vascular Bed by Automated Computer Processing of Fluorescein Angiography

Noszek, Annamaria; Garab, Sandor; Nemes, Janos; Simon, Laszlo; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P93-P94; In English; See also 20060054289; Copyright; Avail.: Other Sources

Fluorescein angiography (FLAG) became a standard and essential diagnostic tool, especially in diabetic retinopathy (DR). Our computer program, developed for semi-automatic analysis (Dendron Pro Ret) on vascular ramification, enabled us to define a set of structural parameters resulting in a powerful tool both for clinical and scientific studies.

Author

Structural Analysis; Retina; Angiography; Structural Design

20060054337 State Research Center of Russia, Moscow, Russian Federation

Hemodynamic Changes in Post-Suspension Rats during Gradual Hemorrhage

Vinogradova, O. L.; Borovik, A. S.; Tsvirkoun, D. V.; Tarasova, O. S.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P101-P102; In English; See also 20060054289; Copyright; Avail.: Other Sources

In urethane-anesthetized rats the effects of 2-week tail suspension upon the hemodynamic changes during simulated orthostatism and during loss of blood were studied. Baseline values of mean arterial pressure (MAP) and pulse interval (PI) did not differ in cage control (C) and post-suspension rats (TS). In both groups 45deg head-up tilt resulted in prominent decline of MAP. In C group this effect was followed by the compensatory phase, which was virtually lost in TS group. No significant postural changes of PI were observed. Gradual hemorrhage (30% blood loss during 30 min) resulted in similar MAP drop in C and TS (up to 40% of baseline level). Along with that, PI increase was less prominent in TS (25%) compared to C (60%) indicating higher resistance of the heart to hypovolemia after suspension.

Author

Hemorrhages; Hemodynamic Responses; Heart Rate; Heart; Arteries; Blood

20060054338 Academy of Sciences of the Ukraine, Kiev, Ukraine

Changes in the Topography of Cellular Components in Pea Root Statocytes Exposed to High Gradient Magnetic Field

Belyavskaya, Ninel A.; Polishchuk, Olexandr V.; Kondrachuk, Alexander V.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P207-P208; In English; See also 20060054289

Contract(s)/Grant(s): STCU(NN-13R); Copyright; Avail.: Other Sources

High-gradient magnetic field (HGMF) is one of methods, by which gravitropism in plants is studied. The aim of our study was elucidation of HGMF effects on topography of cellular components in root statocytes of 4- day Pisum sativum L. seedlings in comparison to gravistimulation. Under gravistimulation during 5, 30 and 60 min seedlings were rotated 45"; magnetostimulation was carried out along gap between two NdFeB magnets (0.7 T). Morphometric measurements were made from images of whole statocytes, for upper, middle and lower thirds of cells, and proximal and distal halves of cells. Morphometric analysis revealed that HGMF resulted in the redistribution of all cellular components in statocytes. The

correlation in the amyloplast distribution between gravistimulation and magnetostimulation was established.
Author
Gravitropism; Magnetic Fields; Magnets; Topography

20060054339 Academy of Sciences (Russia), Moscow, Russian Federation
Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats
Moukhina, Alexandra; Ardabievskaya, Ana; Vikhlyantsev, Ivan; Podlubnaya, Zoya; Nemirovskaya Tatiana; Shenkman, Boris; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P145-P146; In English; See also 20060054289
Contract(s)/Grant(s): RFBR-02-04-50025; RFBR-03-04-48487; RFBR-05-04-49355a; Copyright; Avail.: Other Sources

It is known that activity of postural extensors (m. soleus) decreases and activity of flexors (m. tibialis anterior) increases under unloading conditions. We have tested the hypothesis supposing that increased flexor activities during unloading exert suppressive influence on postural extensor activities and thus lead to dramatic changes in fiber size, MHC expression sarcomeric proteins content in m.soleus. We have inactivated hindlimb flexor muscles (m.soleus antagonists) by bilateral tenotomy. 20 male Wistar rats were divided on 3 groups: cage control (C), hindlimb suspension for 14 days WS), tenotomy of hindlimb flexor muscles with 14 days hindlimb suspension afterwards (HST). Several soleus muscle fiber characteristics decreased significantly in HS group (p\h0.05) as compared with C group: cross sectional area (CSA) of type I muscle fibers, titin/MyHC ratio and nebulin/MyHC ratio. MyHC isoform pattern shifted slow-to-fast significantly. NFATcl1 content increased in nuclear protein extract of m. soleus in HS group. None of these parameters was significantly different in HST group from those of C group. It has been concluded that the tenotomy of flexors under hindlimb suspension prevents atrophy of type I muscle fibers. decrease the degradation of titin and nebulin and prevent slow-to-fast shift of fiber MyHC isoform pattern, possibly through prevention of increase NFATcl content in muscle fiber nuclear protein extract. Therefore, suppressive influence of increased flexor activity could be one of mechanisms that lead to the changes in m. soleus under unloading conditions. The work was supported by WBR grants: 02-04-50025, 03-04-48487 and the special program of RAS Integration mechanisms of functional control in the living system .
Author
Suppressors; Proteins; Hindlimb Suspension; Unloading; Rats; Muscle Fibers

20060054340 Lambda-X SA, Nivelles, Belgium
High Performance Laser Scanning Confocal Microscope for Microgravity Research
Beghuin, D.; vandeVen, M.; Ameloot, M.; Claessens, D.; VanOostveldt, P.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P307-P308; In English; See also 20060054289; Copyright; Avail.: Other Sources

A multifunctional laser scanning confocal microscope (LSCM) is built in the framework of ESA General Support Technology Program (GSTP). The instrument is made compatible in size with European Drawer Rack for its opto-mechanical parts. Dedicated to living cell or tissue study, the microscope mounted in inverted mode includes two excitation lasers, and correspondingly two spectral detection channels. It further includes a differential interference contrast microscope (DIC in transmission). Hardware and software support FRAP (fluoerescence recovery after photobleaching), FLIP (fluorescence loss in photobleaching), FLIM (fluorescence lifetime imaging).
Author
Microscopes; Microgravity; Scanning; Laser Applications; Imaging Techniques; Support Systems; Lasers

20060054341 Liege Univ., Belgium
Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity
Nusgens, B. V.; Chometon, G.; Gulgnandon, A.; Ho, G.; Lambert, Ch.; Mineur, P.; Servotte, S.; Zhang, Z.; Deroanne, C.; Eckes, B., et al.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P269-P270; In English; See also 20060054289
Contract(s)/Grant(s): PEA-90095; DLR-50WB0321; CNES-4800000185; Copyright; Avail.: Other Sources

The small G proteins of the Rho family (RhoGTPases) are key operators in the signaling arising from extracellular matrix through integrin receptors and from membrane receptors for soluble ligands. Flight data show that microgravity affects cell architecture and gene expression leading us to assume that the signaling pathway(s) involving the RhoGTPases might be disturbed in a weightlessness environment. To test this hypothesis in microgravity, we created genetically engineered human fibroblasts that will be used in Biolab on the ISS.
Author
Gene Expression; Microgravity; Weightlessness; Proteins; Ligands; Fibroblasts; Membranes

20060054342 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Cologne, Germany

Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP

Ivanova, Krassimira; Lambers, Britta; Block, Ingrid; Bromelis, Birgit; Das, Pranab K.; Gerzer, Rupert; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P237-P238; In English; See also 20060054289; Copyright; Avail.: Other Sources

Gravity alteration (micro- and hypergravity) is known to influence cell functions. As guanosine 3 ,5 -cyclic monophosphate (cGMP) is an important messenger in melanocyte signaling we have compared the regulation of cGMP levels in human melanocytes and melanoma cells with different metastatic potential under hypergravity conditions. We were able to demonstrate that long-term exposure to hypergravity stimulates cGMP efflux in cultured human melanocytes and nonmetastatic melanoma cells, whereas highly metastatic melanoma cells appear to be insensitive to hypergravity, most probably, due to an up-regulated cGMP efflux at 1g. Here we report that these effects are associated with the expression of the multidrug resistance proteins 4 and 5 known to act as selective export pumps for amphiphilic anions like cGMP. Thus, an altered gravity vector may induce cGMP-dependent signaling events in melanocytic cells that could be important for malignant transformation.

Author

High Gravity Environments; Cytology; Gravitational Effects; Metastasis; Proteins; Efflux

20060054343 Saint-Etienne Univ., France

Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts

Guignandon, Alain; Lambert, Charles A.; Rega, Georgette; Laroche, Norbert; Heyeres, Antoine; Lapiere, Charles M.; Vico, Laurence; Nusgens, Betty V.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P239-P240; In English; See also 20060054289; Copyright; Avail.: Other Sources

We investigated the effects of microgravity (pg) during a 2-day mission on STS-095. Human dermal fibroblasts were seeded on a fibrillar collagen type I coat and exposed to ground conditions, micro-g and in-flight 1g centrifugation. To determine overall cell tension, we examined focal adhesion components such as vinculin WIN) and fibrous actin (ACT) by confocal microscopy. By way of Confocal Interferential Reflection Microscopy (CIRM) we were able to illustrate interaction between cells and collagen fibrils. Analyses were performed in cellular/acellular zones. We observed that after 2 days of pg, VIN contacts were dissipated and polymerization of ACT was restricted to cell periphery. This observation indicated that tethering structures were disorganized leading to reduced intracellular tension; moreover, in acellular zones, we observed a normal collagen network whatever the conditions. On the opposite, cellularized zones in pg presented a significant reduction in fibrils density as compared to centrifuge and ground controls. Overall these observations indicated that maintenance of fibrillar organization was rapidly impaired in micro-g and could be related to the relaxation of fibroblast cytoskeleton. This relaxation resulted in degradation of collagen support.

Author

Fibroblasts; Centrifuging; Degradation; Microgravity; Polymerization; Tethering; Skin (Anatomy); Collagens

20060054344 Dresden Univ. of Technology, Dresden, Germany

Association of Hormonal Responses and Performance of Student Pilots during Acceleration Training on the Human Centrifuge

Wirth, D.; Rohleder, N.; Welsch, H.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P165-P166; In English; See also 20060054289; Copyright; Avail.: Other Sources

Prediction of student pilots +G(sub z) tolerance by stress hormone levels would be a useful tool in aviation medicine. The aim of the present study was to analyze the relationship between neuroendocrine parameters with performance during acceleration training on the human centrifuge (HC). We investigated 21 student pilots during self-controlled acceleration training on the HC. Adrenocorticotropic hormone (ACTH), cortisol, epinephrine, and norepinephrine were measured after individual training sessions and at rest. Performance was defined by several characteristics including maximum tolerated acceleration. ACTH and cortisol, were significantly higher 20 minutes after acceleration training compared to the resting condition. Subjects tolerated a maximal acceleration of +6.69 G(sub z). HPA hormone levels and responses were associated with maximum tolerated acceleration +G(sub z). These findings support the expectation that acceleration-induced increases in stress hormones may enable the organism to tolerate a higher acceleration and could therefore be used as predictors for acceleration tolerance.

Author

Acceleration Tolerance; Physiological Responses; Adrenocorticotropin (ACTH); Endocrine Systems; Hormone Metabolisms; Neurophysiology; Human Centrifuges

20060054345 Slovak Academy of Sciences, Bratislava, Slovakia

Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation

Kvetnansky, R.; Petrak, J.; Mravec, B.; Tillinger, A.; Jurani, M.; Baranovska, M.; Hapala, I.; Frollo, I.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P-167-P-168; In English; See also 20060054289

Contract(s)/Grant(s): VEGA-2/5125; VEGA-2/5043; SP-51/026-08-00/028; Copyright; Avail.: Other Sources

Hypergravity is known to activate the sympathoadrenal system (SAS). Rats subjected to various accelerations (+G) exhibited increased levels of plasma epinephrine (EPI) and partly also norepinephrine (NE). However, the collection of blood was performed after centrifugation finished and therefore plasma NE and EPI levels could have been affected by the process of deceleration. The aim of this study was to evaluate plasma EPI and NE levels in blood collected directly during the centrifugation after reaching different +G, using newly developed remote controlled equipment. Such telemetrically regulated equipment for multiple blood sampling allows us to investigate selective effects of hypergravity during centrifugation. All animals had a polyethylene tubing in the tail artery which was connected to a pre-programmed device for three blood withdrawals (0.6 ml each) into individual syringes, performed at any chosen time intervals. Plasma EPI and NE levels were measured at hypergravity between +1G - +5G. Plasma EPI levels showed a huge, hypergravity dependent increase at the interval of 10-20 min. After the blood collection was completed, the centrifuge was turned off and another blood sampling was performed immediately after the centrifuge stopped (10 min). In these samples plasma EPI levels showed a significant reduction compared to the 20 min interval of centrifugation but the EPI levels at 4G-6G were still significantly elevated compared to precentrifugation levels. Plasma NE levels showed less pronounced changes (increased after 6G only) with a slower return to control levels. Thus, our data has shown completely different responses of the adrenomedullary (epinephrine) and sympathoneural (norepinephrine) systems to hypergravitation. This data shows that the increased gravitation and not the stressful situations connected with centrifugation is the factor responsible for massive activation of the adrenomedullary system. The mechanism of small activation of the sympathoneural noradrenergic system during hypergravity has to be elucidated.

Author

High Gravity Environments; Centrifuging; Rats; Blood; Catecholamine; Sympathetic Nervous System; Adrenal Gland

20060054346 Institute of Aviation Medicine, Prague, Czechoslovakia

Pilots' Examination in a Rapid LBNP Exposure

Dosel, P.; Hanousek, J.; Petricek, J.; Cettl, L.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P87-P88; In English; See also 20060054289; Copyright; Avail.: Other Sources

An LBNP (Lower body negative pressure) examination technique is applied in our case as one of the possibilities for preliminary indirect individual estimation of the pilot s positive gravitational acceleration (+Gz) tolerance. It partly replaces demanding and expensive examinations in a human centrifuge. LBNP exposition is also used as a method of drill in anti-g maneuvers LBNP examinations allow evaluating entirely the orthostatic part of the actual cardiovascular response as the basic part of the complex resistance to overloading. Although the LBNP load represents a principally different load than +Gz overloading, possibilities of the prediction of the low level of +Gz tolerance using an LBNP method were proved. The LBNP examination method was developed for the applicants pre-selection with low level of +Gz tolerance.

Author

Lower Body Negative Pressure; Antigravity; Cardiovascular System; Heart Function; Human Centrifuges; Physical Examinations

20060054347 Institute of Botany, Lithuania

Investigation of Cress Root Gravisensing under Low Magnitute Acceleration

Svegzdiene, D.; Rakleviciene, D.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P211-P212; In English; See also 20060054289; Copyright; Avail.: Other Sources

The sensitivity of gravisensors and amyloplast location within statocytes in cress roots grown at 1 g were investigated under low magnitude transverse accelerations on a centrifuge-clinostat with two orthogonal axes. After stimulation by acceleration of 0.0042 and 0.019 g and rotation on a clinostat, a relationship between gravitropic response of roots and the stimulus dose was analyzed. The threshold dose was evaluated to be about 2 to 4 gxs, depending on the magnitude of acceleration. Statolith positioning was studied in roots on applying accelerations in the range 0.0011-0.1564 g. Structural analysis of statocytes revealed only a slight transverse displacement of amyloplasts in response to the 60 gxs dose (0.0045g x 4h). It exceeded considerably the threshold dose evaluated for roots under similar acceleration. Our data allow suggesting

that a slight, however, transient, translocation of amyloplasts under the action of low magnitude acceleration may trigger and transmit the gravitropic stimulus.
Author
Plant Roots; Sensitivity; Gravitropism; Stimulation; Structural Analysis; Magnitude

20060054348 Academic Center for Dentistry, Amsterdam, Netherlands
Seeds-In-Space Education Experiment during the Dutch Soyuz Mission, DELTA
Van Loon, J. J. W. A.; Wamsteker, J. A.; Weterings, K. A. P.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P213-P214; In English; See also 20060054289
Contract(s)/Grant(s): MG-057; Copyright; Avail.: Other Sources

We have used the broad appeal of the universe and space flight to boost interest in science education in The Netherlands, via a classroom experiment, named Seeds In Space, SIS. By germinating Rucola seeds in the dark and in the light in the classrooms and by comparing these results with those obtained in the same experiment performed in International Space Station (ISS) during the Dutch Soyuz mission DELTA, students could learn about the cues that determine direction of plant growth. Within The Netherlands, some 80.000 students participated, representing 15% of the population in the age group of 10-14. In addition another 80.000 German pupils, a few local schools in the Moscow -Koroljov- area and some in the Dutch Antilles also participated in the SIS experiment. Considering these numbers, it can be concluded that SIS was a very successful educational project and might be considered for hture Shuttle, Soyuz, or other ISS missions.
Author
Education; Seeds; Soyuz Spacecraft; Spaceborne Experiments; Space Missions

20060054349 University of Western Ontario, London, Ontario, Canada
Cortical Regions Associated with Orthostatic Stress in Conscious Humans
Kimmerly, Derek S.; OLeary, Debbie D.; Cechetto, Angela; Shoemaker, J. Kevin; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P53-P54; In English; See also 20060054289; Copyright; Avail.: Other Sources

The purpose of this study was to determine the cortical structures associated with lower body negative pressure (LBNP)-induced baroreflex control using functional magnetic resonance imaging (fMRI). Heart rate (HR) and LBNP were simultaneously monitored during scanning. Central venous pressure (CVP), muscle sympathetic nerve activity (MSNA) and arterial blood pressure (ABP) were measured on a separate day. Random effects analyses (SPM2) were used to evaluate fMRI signal changes that correlated separately with both LBNP and HR (15 and 35-mmHg versus 5-mmHg LBNP). LBNP at 15- and 35-mmHg decreased CVP and increased MSNA, both P less than 0.05 versus baseline) but only LBNP at 35- mmHg elevated HR. ABP was similar at all levels of LBNP. Cortical regions demonstrating increased activity at higher HR and greater LBNP included the right superior posterior insula and the cerebellum. Conversely, bilateral anterior insular cortices, the right anterior cingulate, amygdala, and mediodorsal nucleus of the thalamus showed decreased neural activation.
Author
Orthostatic Tolerance; Stress (Biology); Human Beings; Consciousness

20060054350 Universite de Versailles Saint-Quentin-en-Yvelines, Versailles, France
Understanding Visual Perception in the Perspective of Gravity
Villard, Eric; Garcia-Moreno, Francesc Tinto; Peter, Nicolas; Clement, Gilles; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P51-P52; In English; See also 20060054289; Copyright; Avail.: Other Sources

This investigation explores whether the absence of gravitational information in a microgravity environment affects the perception of several classical visual illusions and ambiguous figures. Because the perception of horizontal and vertical orientation changes in microgravity, our prediction was that the strength of these illusions based on the arrangement of horizontal and vertical lines would be altered when subjects are free-floating during parabolic flight. The frequency of appearance of illusions that rely on perspective cues for depth, such as the Reversed-T, Muller-Lyer, and Ponzo illusions, and the time delay for perceiving the reversal of three-dimensional ambiguous figures, substantially decreased when observers were free-floating. These results indicate the visual system also relies on otolith and somatosensory information for 3D perception when presented with planar representations of geometric figures.
Author
Microgravity; Gravity Perception; Visual Perception; Vertical Orientation; Sensory Perception; Horizontal Orientation; Otolith Organs

20060054351 Humboldt Univ., Berlin, Germany

Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue

Boschmann, Michael; Adams, Frauke; Tank, Jens; Schaller, Karin; Boese, Andrea; Heer, Martina; Klaus, Susanne; Luft, Friederich C.; Jordan, Jens; Luft, Friedrich C.; Jordan, Jens; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P175-P176; In English; See also 20060054289; Copyright; Avail.: Other Sources

Long term immobilization and reduced food intake is often associated with development of orthostatic intolerance. Blocking the norepinephrine transporter (NET) can also mimic symptoms of orthostatic intolerance. Therefore, we hypothesized that simulated microgravity (14 days bed rest at head down tilt, BR) can cause changes in postganglionic NET function and adrenoreceptor (AR) sensitivity and these changes can be aggravated by hypocaloric food intake. For testing, two microdialysis probes were inserted into subcutaneous adipose tissue of eight young healthy men at day 1 and 14 of BR and perfused with Ringer's solution and increasing doses of tyramine and isoproterenol in order to simulate NET blockade and stimulate AR, respectively. At day 14 of eucaloric diet and BR, isoproterenol induced lipolysis was greater, whereas at day 14 of hypocaloric diet and BR, tyramine induced lipolysis was greater when compared to day 1. Therefore, the nutritional state affects NET function and AR sensitivity differently during BR.

Author

Adipose Tissues; Autonomic Nervous System; Microgravity; Simulation; Caloric Requirements

20060054352 Naples Univ., Italy

SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space

DeMicco, Veronica; Aronne, Giovanna; Scala, Michele; Eduardo, Pasquale; Haladich, Marco; Castagnolo, Dario; Fortezza, Raimondo; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P217-P218; In English; See also 20060054289; Copyright; Avail.: Other Sources

The aim of this study was to design and develop an automatic growth support system for sprouts production in Space addressing a main biological requirement: seedling development had to occur completely under microgravity conditions from seed imbibition until chemical fixation of seedlings. This research is placed within the scenario of producing sprouts of soy, and other species, on board of Space platforms to integrate astronauts' diet with fresh food. The project SAYSOY was submitted within the Education programmes of ESA and was selected for the flight onboard of FOTON M2 satellite. The experiment is based on previous tests conducted on ground in simulated low-gravity conditions where emphasis was addressed to the effect of altered gravity on biological processes that affect nutritional value (metabolism of phenolics) and taste satisfaction (hydration of tissues, vascular differentiation and lignification affecting turgidity and softness of sprouts). The hardware was developed according to the specifications of the FOTON capsule and biological requirements in the sight of the planned analyses of biometrical anatomy on the recovered seedlings. The experiment SAYSOY was successfully conducted flying from May 3lst to June 16th, 2005.

Author

Seedlings (Botany); Soybeans; Space Platforms; Spaceborne Experiments; Pilotless Aircraft; Plant Growth Regulators

20060054353 NASA Ames Research Center, Moffett Field, CA, USA

Prenatal Centrifugation: A Mode1 for Fetal Programming of Body Weight?

Baer, Lisa A.; Rushing, Linda; Wade, Charles E.; Ronca, April E.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P181-P182; In English; See also 20060054289

Contract(s)/Grant(s): NNA04CK03; NIMH-MH46485; Copyright; Avail.: Other Sources

'Fetal programming' is a newly emerging field that is revealing astounding insights into the prenatal origins of adult disease, including metabolic, endocrine, and cardiovascular pathophysiology. In the present study, we tested the hypothesis that rat pups conceived, gestated and born at 2-g have significantly reduced birth weights and increased adult body weights as compared to 1-g controls. Offspring were produced by mating young adult male and female rats that were adapted to 2-g centrifugation. Female rats underwent conception, pregnancy and birth at 2-g. Newborn pups in the 2-g condition were removed from the centrifuge and fostered to non-manipulated, newly parturient dams maintained at 1 -g. Comparisons were made with 1-g stationary controls, also crossfostered at birth. As compared to 1-g controls, birth weights of pups gestated and born at 2-g were significantly reduced. Pup body weights were significantly reduced until Postnatal day (P) 12. Beginning on P63, body weights of 2-g-gestated offspring exceeded those of 1-g controls by 7-10%. Thus, prenatal rearing at 2-g restricts neonatal growth and increases adult body weight. Collectively, these data support the hypothesis that 2-g centrifugation alters

the intrauterine milieu, thereby inducing persistent changes in adult phenotype.
Author
Pregnancy; Centrifuging; Body Weight; Phenotype; Hypotheses; Cardiovascular System; Endocrinology

20060054354 Osaka Univ., Toyonaka, Japan
How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation
Matsuoka, Yoshikazu; Kawano, Fuminori; Oke, Yoshihiko; Higo, Yoko; Kawabe, Naoko; Wang, XiaoDong; Terada, Masahiro; Shinoda, Yo; Lan, Yong Bo, et al.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P147-P148; In English; See also 20060054289; Copyright; Avail.: Other Sources

To investigate the relationship between the myonuclear capability and the number of nucleolus during muscle remodeling, oral supplementation of beta-guanidinopropionic acid (beta-GPA) on the characteristics of plantaris muscle fibers mas performed for 2 weeks in adult male Wistar rats. Effects of beta-GPA supply in culture medium on mouse myoblast cell line C2C12 was also studied. The mean fiber cross-sectional area was less in beta-GPA-fed than control rats (35%, p\h0.05). And the myonuclear number per mm of fiber length was significantly greater (35%, p\h0.05). Thus, the cytoplasmic volume per myonucleus was less (52%) in beta-GPA-fed rats (p\h0.05). The number of nucleolar organizer regions (NORs) per myonucleus was also less (17%) in f3-GPA-fed group (p\h0.05). The number of NORs was greater (14%) in the myoblasts cultured with creatine phosphate compared with non-supplemented control, but it was less (10%) in the myoblasts cultured with beta-GPA (p\h0.05). Further the number of NORs was also greater (26%) in the differentiated myotubes cultured with creatine phosphate (p\h0.05). The results suggested that the nucleoli may play some role(s) in the regulation of muscle fiber size and its number may be influenced by creatine content.
Author
Atrophy; Muscle Fibers; Cells (Biology); Creatine; Cytoplasm; Muscles

20060054355 Technische Univ., Munich, Germany
Phagocytosis as a Biomarker for Stress Responses
Huber, K.; Kroetz-Fahning, M.; Hock, B.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P265-P266; In English; See also 20060054289
Contract(s)/Grant(s): 50WB0430; Copyright; Avail.: Other Sources

An in vitro test has been developed for the detection of immunotoxic events. It will be used within the project 'TRIPLE LUX' on the International Space Station to investigate the effects of single and combined space flight conditions on mammalian phagocytes. The intensity of the respiratory burst during phagocytosis can be followed by the luminol-based chemiluminescence response after stimulation with zymosan. We adapted this test system for polymorphonuclear leukocytes, purified from sheep blood and stored by cryoconservation. In this report we show the immunostimulating effect of hydrocortisone and the immunosuppressive impact of cadmium as an example for alterations that can be detected by this test.
Author
Biomarkers; Chemiluminescence; In Vitro Methods and Tests; Leukocytes; Hydroxycorticosteroid; Cadmium; Stress (Biology)

20060054356 Academy of Sciences of the Ukraine, Kiev, Ukraine
Altered Gravity Causes the Changes in the Protein NopA100 in Plant Cell Nucleoli
Sobol, Margarita A.; Gonzalex-Camacho, Fernando; Kordyum, Elizabeth L.; Medina, Francisco Javier; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P195-P196; In English; See also 20060054289
Contract(s)/Grant(s): ESP2001/2-144; ESP2001-4522-PE; ESP2003-09475-C02-02; Copyright; Avail.: Other Sources

A nucleolar protein homologous to the mammalian nucleolin and to the onion nucleolin-like protein NopA 100 was detected in nuclear soluble protein fraction from Lepidium sativum root meristematic cells, using the specific silver staining method and the cross-reaction with the anti-NopA100 antibody. In 2D Western blots of soluble nuclear fraction, NopAlOO was revealed as a smear extending through a certain range of PI. In extracts obtained from seedlings grown under clinorotation, the extension of the PI range was shorter than in the stationary control indicating a lower phosphorylation of the protein. This suggests that altered gravity causes a decrease in the rate of nucleolar activity.
Author
Proteins; Nuclei (Cytology); Cells (Biology); Clinorotation; Antibodies; Seedlings (Botany)

20060054357 Tottori Univ., Japan

Effects of Water Temperature on Cardiac Autonomic Nervous System Modulation during Foot Immersion (Foot Bath)

Nishimura, M.; Ono, K.; Onodera, S.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P91-P92; In English; See also 20060054289; Copyright; Avail.: Other Sources

The purpose of this study was to make clear the effects of water temperature during foot immersion (foot bath) on heart rate, blood pressure, rectal temperature and autonomic nervous system modulation. The subjects performed foot immersion at 25, 35,41 and 45 degrees Celsius at random, during different days, but always at the same time. Cardiac autonomic nervous system modulation was estimated with the power spectrum analysis of heart rate variability by using the Fast Fourier Transformation. The two frequency components of HRV was measured by integrate low frequency (LF;0.04-0.15 Hz) and high frequency (HF; 0.15-0.40 Hz). HF was used as an indicator of cardiac vagal modulation and was showed logarithmically (LogHF). hgHF during foot immersion at 35 and 41 degrees Celsius was significantly increased. These data indicate that cardiac vagal activity was affected by water temperature during foot immersion (foot bath).

Author

Autonomic Nervous System; Blood Pressure; High Frequencies; Low Frequencies; Temperature Effects; Water Temperature; Spectrum Analysis

20060054358 Loyola Coll., Chennai, India

Effect of Simulated Microgravity on Aspergillus Niger

Pratap, Jeffrey J.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P219-P220; In English; See also 20060054289; Copyright; Avail.: Other Sources

A rotating bioreactor was developed to simulate micrograv y and its influence was studied on fungal growth. The reactor was designed to simulate microgravity using free fall principle, which creates an apparent weightlessness for a brief period of time. In this experiment, a sealed vertically rotating tube is the reactor in which the cells are grown. For the first time vertically rotating tubes were used to obtain free fall thereby simulating microgravity. Simulated microgravity served significant in the alteration of growth and productivity of Aspergillus niger, a common soil fungi. Two other sets of similar cultures were maintained as still and shake control cultures to compare with the growth and productivity of cells in rotating culture. It was found increased growth and productivity occurred in simulated microgravity. Since this experiment involves growth of cells in a liquid medium, the fluidic effects must also be studied which is a limitation.

Author

Microgravity; Simulation; Soils; Aspergillus

20060054359 Tuebingen Univ., Germany

Short-Term Exposure of Arabidopsis Cell Cultures to Hyper-G: Short-Term Changes in Transcription Regulator Expression

Babbick, Maren; Hampp, Ruediger; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P221-P224; In English; See also 20060054289; Copyright; Avail.: Other Sources

Callus cultures of Arabidopsis thaliana (cv. Columbia) were used to screen for early changes in gene expression in response to altered gravitational fields. In a recent microarray study we found hyperg dependent changes in gene expression which indicated the involvement of WRKY genes [Martzivanou M. and Hampp R., Physiol. Plant., 118, 221-231, 2003]. WRKY genes code for a family of plant-specific regulators of gene expression. In this study we report on the exposure of Arabidopsis callus cultures to 8g for up to 30 min. Quantitative analysis by real time RT-PCR of the amount of transcripts of WRKYs 3, 6, 22, 46, 65 and 70 showed individual changes in expression. As far as their function is known, these WRKY proteins are mainly involved in stress responses. As most alterations in transcript amount occurred within 10 min of treatment, such genes can be used for the investigation of microgravity-related effects on gene expression under sounding rocket conditions (TEXUS, MAXUS).

Author

Quantitative Analysis; Microgravity; Gene Expression; Gravitational Fields; Proteins; Genes

20060054360 Consiglio Nazionale delle Ricerche, Milan, Italy

Effects of Space-Flight Simulation on Human Cells

Villa, Alessandro; Versari, Silvia; Barenghi, Livia; Maier, Jeanette; Bradamante, Silvia; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P277-P278; In English; See also 20060054289

Contract(s)/Grant(s): ESA-14631/SH/NL/00; Copyright; Avail.: Other Sources

Some pathological conditions of astronauts, such as cardiovascular deconditioning, represent the adaptive response to a change in gravity conditions. In this context endothelial cells are crucial in the maintenance of the functional integrity of the vascular wall. We focused our attention on the effects exerted by microgravity (pg) and hypergravity at the cellular level. We studied pg on Human Umbilical Vein Endothelial Cells (HUVEC) using the Random Positioning Machine (RPM) as simulator. This facility allows to culture cells in standard plates and thus to evaluate many endothelial functions important in angiogenesis. The RF M best operative parameters were assessed using human leukocytes U937 as model cell culture and the results were compared with those obtained in simulated (RWV) and real (spaceflight) pg conditions. We concluded that RPM represents a good tool to characterize cell behaviour in simulated pg. The effects exerted by hypergravity on HUVEC and U937 viability were analyzed using the Medium Sized Centrifuge for Acceleration Research (MidiCAR) for different g values and different times. To finally investigate the effects of spaceflight on different human cells we developed a spaceflight-like protocol consisting of an initial hypergravity phase (launch) followed by a pg simulation (orbital flight).
Author
Cells (Biology); Flight Simulation; Space Flight; High Gravity Environments; Cardiovascular System; Astronauts; Microgravity

20060054361 Nottingham Univ., Loughborough, UK
Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems
Anthony, P.; Davey, M. R.; Dijkstra, C.; Catherall, A.; Hill, R. J. A.; Hampp, R.; Martzivanon, M.; Power, J. B.; Lowe, K. C.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P311-P312; In English; See also 20060054289
Contract(s)/Grant(s): EPSRC-GR/S83005/01; Copyright; Avail.: Other Sources

Earth-based experimentation is fundamental to study the effects of altered gravity on biological systems. Strong and inhomogeneous magnetic fields can provide variable effective gravity on living organisms, since many are diamagnetic. At Nottingham, a specially constructed superconducting magnet with a closed-cycle liquid helium cooling system is being exploited to investigate the separate effects of high magnetic fields and altered gravity on gene expression, physiology and development of prokaryotic and eukaryotic cells. Physical parameters of the magnet have been optimised for application to biological systems.
Derived from text
Closed Cycles; Gravitational Effects; Magnetic Effects; Nonuniform Magnetic Fields; Superconducting Magnets; Levitation

20060054362 Technische Hogeschool, Delft, Netherlands
Diminished Performance of Bacterial Fuel Cells in Microgravity
deVet, S. J.; Rutgers, R.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P309-P310; In English; See also 20060054289; Copyright; Avail.: Other Sources

The student-experiment 'BugNRG' was flown to the International Space Station to study the effects of microgravity on the output of Bacterial Fuel Cells (BFCs) using the Rhodoferax Ferrireducens strain. Due to the possibilities of the impact of microgravity on the bacteria, a higher output and better performance was hypothesized. Voltage and current were recorded and the container temperature was logged. Measurements of the ISS and reference experiments indicate a significantly lower performance in microgravity. The exact mechanism for this performance remains as yet unknown. The BFCs worked in orbit and this is a 'space-first'.
Author
Fuel Cells; Bacteria; Microgravity; Gravitational Effects; Electric Potential

20060054363 Suez Canal Univ., Ismailia, Egypt
Hardware Development for Electrophysiological Long-Term Studies in Space
Sallam, A. El-Din; Schmaeh, M.; Horn, E. R.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P271-P272; In English; See also 20060054289
Contract(s)/Grant(s): DLR-50WB0323; Copyright; Avail.: Other Sources

Basic mechanisms of adaptation to microgravity conditions are in the focus of the experiment SCORPI and its precursor experiment SCORPI-T. The development of proper 'stress-free' immobilization techniques is a prerequisite for reliable long-term recordings in microgravity and thus for the success of SCORPI, an experiment selected for flight on the International Space Station by which effects of space flights on the circadian rhythms and the biological clock will be studied besides basics of physiological adaptation to microgravity. SCORPI-T was successfully performed in June 2005. Technical

tests met SCORPI requirements; the animal's physiological stability was not affected by the flight.
Author
Adaptation; Microgravity; Physiological Responses; Electrophysiology; Hardware; Aerospace Engineering

20060054364 Fourth Military Medical Univ., Xi'an, China
Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory
Sun, Xi-Qing; Li, Jin-Sheng; Cao, Xin-Sheng; Wu, Xing-Yu; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P29-P30; In English; See also 20060054289
Contract(s)/Grant(s): NNSF-39800158; Copyright; Avail.: Other Sources

We systematically studied the effect of high-sustained +Gz on the brain and its mechanism in past ten years by animal centrifuge experiments. On the basis of the facts we observed and the more recent advances in acceleration physiology, we put forward a compound mechanism hypothesis to offer a possible explanation for +Gz-induced brain injury and dysfunction of learning and memory. It states that, ischemia during high G exposure might be the main factor accounting for +Gzinduced brain injury and dysfunction of learning and memory, including transient depression of brain energy metabolism, disturbance of ion homeostasis, increased blood-brain barrier permeability, increased brain nitric oxide synthase expression, and the protective effect of heat shock protein 70. In addition, the large rapid change of intracranial pressure and increased stress during +Gz exposure might be one of the important factors accounting for +Gz-induced brain injury and dysfunction of learning and memory.
Author
Brain Damage; Intracranial Pressure; Centrifuges; Blood-Brain Barrier; Metabolism; Temperature Effects; Homeostasis; Acceleration Tolerance

20060054365 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Cologne, Germany
Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight?
Ovampva. Lrasso,ora; Lambers, Britta; Block, Ingrid; Bromeis, Birgit; Gerzer, Rupert; Das, Pranab K.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P233-P236; In English; See also 20060054289; Copyright; Avail.: Other Sources

Hormone secretion in mammals often displays circadian rhythms. These rhythms usually relay on internal biological clocks, which adjusts to geophysical parameters like the lighddark cycle, temperature cycle, or gravity force, all functioning as time cues. In humans, synchronized external and internal rhythms are important for good performance. This study focuses on the effect of altered gravity on the rhythmic secretory pattern of prolactin (PRL), a hormone of the hypothalamic-pituitary system. Several studies have shown that space flight disturbs PRL secretion. Further, we will investigate the response of clock gene expression in the suprachiasmatic nucleus (SCN), the central circadian pacemaker implicated in the neural network for timed PRL secretion, under various gravitational fields. The results of this study will demonstrate the vulnerability of mammalian endocrine systems to changes in gravity and may help in the design of counter actions for stabilizing circadian rhythms during long-term manned space flight.
Author
Circadian Rhythms; Genes; Manned Space Flight; Pituitary Hormones; Secretions; Microgravity

20060054366 Consejo Superior de Investigaciones Cientificas, Madrid, Spain
Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS
Herranz, Raul; Benguria, Alberto; Medina, Javier; Gasset, Gilbert; vanLoon, Jack J.; Zaballos, Angel; Marco, Roberto; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P253-P254; In English; See also 20060054289; Copyright; Avail.: Other Sources

The ISS expedition 8, a Soyuz Mission, flew to the International Space Station (ISS) to replace the two member ISS crew during October 2003. During this crew exchanging flight, the Spanish Cervantes Scientific Mission took place. In it some biological experiments were performed among them three proposed by our Team. The third member of the expedition, the Spanish born ESA astronaut Pedro Duque, returned within the Soyuz 7 capsule carrying the experiment containing transport box after almost 11 days in microgravity. In one of the three experiments, the GENE experiment, we intended to determine how microgravity affects the gene expression pattern of Drosophila with one of the current more powerful technologies, a complete Drosophila melanogaster genome microarray (Affymetrix(TradeMark)version 1.0). Due to the constrains in the current ISS experiments, we decided to limit our experiment to the organism rebuilding processes that occurs during

Drosophila metamorphosis. In addition to the ISS samples, several control experiments have been performed including a lg Ground control parallel to the ISS flight samples, a Random Position Machine microgravity simulated control and a parallel Hypergravity (10g) experiment. Extracted RNA from the samples was used to test the differences in gene expression during Drosophila development. A preliminary analysis of the results indicates that around five hundred genes change their expression profiles, many of them belonging to particular ontology classification groups.
Author
Gene Expression; International Space Station; Ribonucleic Acids; Soyuz Spacecraft; Microgravity; Drosophila; Organisms; High Gravity Environments

20060054367 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Cologne, Germany
Hypergravity Modulates Cyclic GMP Efflux in Nitric Oxide-Stimulated Human Melanocytic Cells
Stieber, Christiane; Ivanova, Krassimira; Block, Ingrid; Gerzer, Rupert; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P251-P252; In English; See also 20060054289; Copyright; Avail.: Other Sources

Gravity alteration is known to influence cell functions. We recently found that hypergravity may stimulate cGMP efflux in human melanocytic cells when cGMP hydrolysis is inhibited. Here we examined whether hypergravity modulates cGMP efflux in nitric oxide (NO)-stimulated melanocytes and melanoma cells (MCs) using NONOates as direct NO donors. In the presence of 0.1 mM DETA-NO and long-term application of hypergravity (up to 5g for 24 h) an elevated cGMP efflux in cultured melanocytes and non-metastatic MCs compared to lg was observed, whereas short-term exposure was not effective. The hypergravity-stimulated cGMP efflux was inhibited by 1 pM trequinsin, a selective inhibitor of the multidrug resistance proteins 4 and 5 (MRP4/5). The results of the present study indicate that hypergravity may stimulate cGMP efflux in NOstimulated human melanocytes and non-metastatic MCs most probably by an enhanced expression of MRP4/5. Thus, an altered acceleration vector may induce signaling events in human melanocytic cells
Author
High Gravity Environments; Nitric Oxide; Metastasis; Efflux; Proteins; Exposure; Cytology

20060054368 Riga Technical Univ., Latvia
A Perspective for Ultrasonic Assessment of Osteoporotic Changes of Bone Structure in Proximal Tibia
Tatarinov, Alexey; Gowin, Wolfgang; Beller, Gisela; Saparin, Peter; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P139-P140; In English; See also 20060054289; Copyright; Avail.: Other Sources

The proximal tibia is proposed as a new site for ultrasonic assessment of structural changes in trabecular bone. Ultrasonic axial propagation signals and continuous frequency sweeps in 0.1-0.5 MHz band were analyzed. It was found that energy redistribution between 0.1 and 0.3 MHz spectral components was in a good agreement with the trabecular bone mineral density. Dispersion of the propagating wave packets was another feature discerning bones with the high and low density. Several ultrasonic parameters correlating with the bone structure and suitable for an in vivo approach are proposed.
Author
Tibia; Ultrasonics; Loads (Forces); Spaceborne Experiments

20060054369 National Academy of Sciences, Nauki, Ukraine
The Influence of Clinorotation on Root Cell Differentiation in Brassica Rapa Seedlings
Yana, Kalinina; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P199-P200; In English; See also 20060054289; Copyright; Avail.: Other Sources

In this work we present the results of anatomical and ultrastructural investigations of root apices of Brassica rapa 6-day old seedlings grown in the stationary conditions and under slow horizontal clinorotation. The main attention was paid to the structural and functional organization of cells non-specialized for gravity perception during their growth and differentiation in a root. It was shown a decrease in length of the root growth zone due to reduction of the cell number in cell files under clinorotation. We conclude that the meristem proliferation activity was depressed under clinorotation. Some ultrastructural rearrangements of mitochondria in the distal elongation zone (DEZ) and increasing of their partial volume per cell were also observed. It is assumed that these changes reflect the intensification of mitochondrium functional activity in a DEZ cortex cells during clinorotation. An analysis of the experimental results supposes plants sense disorientation in the gravitational field as a stress.
Author
Clinorotation; Seedlings (Botany); Plant Roots; Cells (Biology)

20060054370 Bulgarian Academy of Sciences, Sofia, Bulgaria

A New Space Greenhouse Concept Development for Optimal Plant Growth

Ivanova, Tania; Kostov, Plamen; Sapunova, Svetlana; Ilieva, Iliana; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P193-P194; In English; See also 20060054289

Contract(s)/Grant(s): KI-1-01/03; Copyright; Avail.: Other Sources

Significant results in the field of Gravitational Plant Physiology were achieved in experiments carried out on the MIR Space Station in the decade 1990-2000 by international scientific teams using the Bulgarian developed two modifications SVET-1 and -2 Space Greenhouses (SG). A new concept for adaptive control of the environmental parameters for optimizing plant growth conditions in the next generation SVET-3 SG is developed. Appropriate methods and sensors for wider monitoring of plant leaf environment and some plant physiological parameters are searched. Special attention is paid to optimization of the substrate parameters and adequate water, nutrients and oxygen delivery to the plant roots. Results obtained in earth biotechnical experiments imitating some processes that could occur in microgravity are discussed.

Author

Gravitational Physiology; Greenhouses; Microgravity; Plant Physiology; Vegetation Growth; Optimization; Spaceborne Experiments

20060054371 Erlangen-Nuernberg Univ., Erlangen, Germany

Behavior of Gravisensitive Cells on 2D and 3D Clinostats

Straunch, Sebastian M.; Hemmersbach, Ruth; Seibt, Dieter; Schuber, Marianne; Haeder, Donat-P.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P259-P260; In English; See also 20060054289; Copyright; Avail.: Other Sources

2D and 3D clinostats are widely applied to study the influence of simulated microgravity on different kinds of organisms and cell cultures [11. To critically evaluate the results achieved (functional weightlessness, omnilateral gravistimulation or other side effects such as strong mechanical disturbances) a comparison between the applied simulation methods and real microgravity is necessary. In a first approach, the swimming behavior of Euglena gracilis, a 'professional gravi-sensing' unicellular freshwater flagellate, was observed under 2D and 3D clinostat conditions as well as under real microgravity during a TEXUS sounding rocket flight. According to current theory Euglena perceives the gravity vector by stimulation of mechanosensitive channels: the cell mass, which is denser than the surrounding medium, exerts pressure onto the lower membrane and the resulting gated calcium influx modulates the beating pattern of the flagella [4]. A changed influence of gravity of the cells can be directly visualized by changes in their orientation with respect to gravity (gravitaxis).

Author

Gravitational Effects; Clinostats; Membranes; Microgravity; Organisms; Weightlessness

20060054372 Technische Univ., Berlin, Germany

TRIPLE LUX-B: Phagocytosis in Mussel Hemocytes

Hansen, P. D.; Unruh, E.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P267-P268; In English; See also 20060054289; Copyright; Avail.: Other Sources

The TRIPLELUX-B Experiment contributes to risk assessment concerning immunotoxicity under space flight conditions. The assay system of the TRIPLELUX-B Experiment will be performed with a well defined quantification and evaluation of the immune function phagocytosis. The indicator cells are the hemocytes of blue mussels (Mytilus edulis) and oysters (Crassostrea gigas). The signals of the immuno cellular responses are translated into luminescence as a rapid optical reporter system. The results expected will allow to conclude whether the observed responses are caused by microgravity and/or radiation. The immune system of invertebrates has not been studied so far in space. The choice of the phagocytes from invertebrates is justified by the claim to study the universal validity of innate immune responses. The components of the phagocytosis test system for the BIOLAB are now established under terrestrial conditions. The next step for adaptation to the BIOLAB conditions and hardware is in progress.

Author

Hemocytes; Physiological Responses; Immunity; Microgravity; Luminescence; Assaying

20060054373 Montana State Univ., Bozeman, MT, USA

Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity

Guadarrama, Seratna; deL. Pulcini, Elinor; Broadaway, Susan C.; Pyle, Barry H.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P249-P250; In English; See also 20060054289

Contract(s)/Grant(s): NAS2-14263; NCC2-1143; NIH-P20-RR-16455-04; Copyright; Avail.: Other Sources

Stress, radiation and microgravity cause astronauts to experience secondary immunosuppression. Spaceflight conditions enhance bacterial growth and alter antimicrobial susceptibility. Clinostats are used to model microgravity effects at lxg. In controls rotated on the vertical axis, the g-vector acts on cells as in static cultures. Salmonella enterica serovar Typhimurium virulence genes are up-regulated in modelled microgravity (MMG); a MMG regulon has been postulated. We hypothesize that the virulence of P. aeruginosa (PA) may be affected similarly by microgravity, which could be observed in MMG. This study focused on regulation of the ETA protein by PA during growth in MMG. PA103 was grown in an ETA production medium at 37 C. One series of media was inoculated with frozen cultures and grown using horizontal (MMG) or static incubation. Another series inoculated with refrigerated cultures included vertical rotating controls. Analyses included optical density (OD), agar plate counts (PC) on R2A, ETA ELISA, and protein expression by 2-D gel analyses. Growth and ETA results differed depending on inoculum, with minor effects of MMG. Proteomic analysis of 2-D gels indicate differences in protein expression with MMG. Growth and ETA results show that consistent methodology is critical when studying environmental effects. This study provides information on the relationships between environmental changes and virulence regulation, especially for flight experiments, when ground experiments are used to predict potential spaceflight effects.
Author
Pseudomonas; Microorganisms; Salmonella; Environment Effects; Antiinfectives and Antibacterials; Bacteria; Clinostats; Genes

20060054376 Centro de Investigaciones Biologicas, Madrid, Spain
Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems
Matia, Isabel; Gonzalez-Camacho, Fernando; Kiss, John Z.; Gasset, Gilbert; Van Loon, Jack; Medina, Francisco Javier; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P191-P192; In English; See also 20060054289
Contract(s)/Grant(s): ESP2001-4522-PE; ESP2003-09475-C02-02; SRON MG-057; Copyright; Avail.: Other Sources

Seedlings of Arabidopsis thaliana grown for 4 days in weightlessness showed a longer size than the ground 1 g control. In the primary root, cortical meristematic cells showed an enhanced proliferating rate, but ribosome biogenesis was reduced, as inferred from the nucleolar size and from the levels of the nucleolar protein nucleolin. An additional ground control in simulated microgravity, using a random positioning machine, produced results comparable to those of the flight experiment. These data demonstrate that gravity conditions influence basic cellular processes mutually interconnected in the root meristem, such as cell proliferation, cell cycle progression and ribosome biogenesis, which are decisive for developmental patterning and morphogenesis.
Author
Cells (Biology); Ribosomes; Weightlessness; Seedlings (Botany); Plant Roots; Biological Evolution

20060054377 Vrije Univ., Amsterdam, Netherlands
Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration
Stegeman, D. F.; Mulder, E. R.; Gerrits, K.; Rittweger, J.; Felsenberg, D.; deHaan, A.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P111-P112; In English; See also 20060054289
Contract(s)/Grant(s): ESA-14431/02/NL/SH2; Copyright; Avail.: Other Sources

We report on electromyographic (EMG) changes induced in the quadriceps femoris muscle in 19 healthy men (aged 24 - 43 years). The volunteers were subjected to 8 weeks of horizontal bed rest with (n = 9) and without (n = 10) countermeasure consisting of resistive-type of exercise with concurrent whole body vibration (RVE), all in supine position. The EMG responses were measured using a high-density surface EMG system. Muscle fiber conduction velocities (MFCV) and EMG amplitudes were obtained at maximal voluntary torque (MVT). No EMG amplitude change from pre- to post-bed rest was observed in Ctrl, whereas an unexpected substantial (33%) increase of EMG amplitude was observed in RVE. MFCV declined with 8.2% for Ctrl (P \h 0.05) and declined with only 2% for RVE. This result can be explained reasonably by a reduced mean muscle fiber diameter on the basis of a reduced muscle cross sectional area. The EMG amplitude outcome may imply that part of the preservation of force in the RVE group is related to a traininginduced increase in central nervous drive to the muscle.
Author
Electromyography; Physical Exercise; Bed Rest; Supine Position; Muscles; Human Beings; Central Nervous System

20060054378 Norwegian Defence Research Establishment, Kjeller, Norway
Perception of Body Vertical in Microgravity during Parabolic Flight
Arnesen, Tonje Nanette; Olsen, Morten Hannevik; Sylvestre, Bruno; Clement, Gilles; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P17-P18; In English; See also 20060054289; Copyright; Avail.: Other Sources

This experiment investigated the ability of human subjects to accurately locate their body long axis (axis running from head to toes) while free-floating in microgravity. The effects of tactile pressure applied on the chest and back upon the accuracy of this perception have also been tested. The goal was to identify those tactile inputs that provide the subject with the greatest clues for the location of the body vertical. The subjects wore a mask and were in total darkness. They had to align two luminous lines inside the mask in two different vertical planes: roll (right/left) and pitch (forward/backward). Results showed that the subjects' ability to locate their body long axis was considerably impaired in microgravity, compared to normal gravity, especially in the pitch plane, but that pressure on the chest or on the back restored this ability.
Author
Parabolic Flight; Gravitation; Human Beings; Pressure Effects

20060054379 Nottingham Univ., Loughborough, UK
Magnetic Levitation and Gravity: Influences on Microbial Systems
Dijkstra, C.; Anthony P.; Davey, M. R.; Catherall, A.; Cox, S.; Hill, R. J. A.; Power, J. B.; Lowe, K. C.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P297-P298; In English; See also 20060054289
Contract(s)/Grant(s): GR/S83006/01; Copyright; Avail.: Other Sources

Living organisms are influenced by gravity, an inescapable force on Earth. The expense and difficulties associated with testing biological responses to low gravity conditions using free-fall conditions and space orbiting stations [l] have initiated demand for novel Earth-based models [2]. However, laboratory-based clinostats also have specific constraints, since the gravitational force remains. Interestingly, strong and inhomogeneous magnetic fields may be used to provide variable effective gravity on many biological systems through their diamagnetism. Diamagnetic levitation exploits the properties of weakly magnetic substances (e.g. water) to produce an acceleration equal in magnitude and opposite in direction to acceleration due to gravity [3]. This approach produces acceleration at the atomic level, ensuring homogeneity of motion throughout the sample. A superconducting, closed-cycle, helium-cooled magnet (Fig. 1) has been optimized and is being used to assess the effects of altered effective gravity on bacteria. This investigation was undertaken because previous studies during space flight have demonstrated that suspension cultures of bacteria exhibit increased growth in response to microgravity [4, 5]. Several workers have also reported that magnet fields alone decreased the viability of both Gram-negative and Gram-positive bacteria, an effect which correlated with increasing field strength and time of exposure [6].
Author
Biological Effects; Gravitational Effects; Physiological Responses; Levitation; Magnetic Suspension; Superconductivity

20060054380 Dr. Nagy and Co., Ltd., Budapest, Hungary
Audiological Findings in Antiorthostatic Position Modelling Microgravitation
Nagy, E.; Bencze, G.; Csengery, A.; Almasi, A.; Grosz, A.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P37-P38; In English; See also 20060054289; Copyright; Avail.: Other Sources

In our previous examinations we examined the behaviour of diagonal optokinetic nystagmus (DOKN), as well as the cardio-pulmonary changes in antiorthostatic posture (AP). The aim of our present study is the following: how modelled microgravitation influences the pure tone threshold and the speech threshold. The body fluids (blood, liquor, lymph) shift to the cranial direction because of the effect of microgravitation. Both the antigravitational muscular activity and the blood-vessel reflexes, which are habituated to the earthy relations, have got part in this. We examined the effect of cranial shifting of fluids in simulated microgravitational position caused by -30 degrees antiorthostatic position lasting for 3 hours.
Author
Microgravity; Audiology; Speech Recognition; Models; Pitch

20060054381 Eidgenoessische Technische Hochschule, Zurich, Switzerland
Effects of Vector-Averaged Gravity on the Response to Different Stimulatory Signals in T-Cells
Vadrucci, Sonia; Lovis, Pascal; Henggeler, Daniele; Lambers, Britta; Cogoli, Augusto; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P177-P178; In English; See also 20060054289; Copyright; Avail.: Other Sources

In this study, we investigated the influence of several combinations of activators on the stimulation of purified T-Lymphocytes under vector-averaged gravity generated by the random positioning machine (RPM). Our results show that anti-CD3 antibody in combination with either anti-CD28 or Interleukin-2 (IL-2) acted favourably on the proliferation independently of gravity conditions. It was observed that proliferation in the RPM samples only decreased if the combination of activators included the lectins Concanavalin A (Con A) or Phytohemagglutinin (PHA) in combination with anti-CD28. In these samples, we further found a clear deficit in the upregulation of c-fos, IL-2 and the alpha-subunit of the IL-2 receptor

(IL-2R(alpha)). Our results suggest that attenuation in T-cell activation is most likely due to a reduced expression and induction of early stimulatory factors, and is activator-dependent.
Author
Clinostats; Lymphocytes; Interleukins; Stimulation; Immune Systems; Gravitation

20060054383 Semmelweis Univ. Medical School, Budapest, Hungary
Structural Reappraisal of Dendritic Tree of Cerebellar Purkinje Cell for Novel Functional Modeling of Elementary Sensorimotor Adaptive Processes
Simon, Laszlo; Garab, Sandor; Noszek, Annamaria; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P47-P48; In English; See also 20060054289; Copyright; Avail.: Other Sources

Both compound spike generating process revealed in the (cat's) cerebellar Purkinje cell and the separating dendritic areas, identified by structural analysis of ramification pattern indicate a phase-sensitive, nonlinear integration of input information. This sophisticated paradigm could be the basic tool of novel cerebellar functional theories and models.
Author
Structural Analysis; Cerebral Cortex; Cerebellum; Neurons

20060054384 NASA Johnson Space Center, Houston, TX, USA
Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects
Vaksman, Z.; Boyd, J. L.; Wang, Z.; Putcha, L.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P45-P46; In English; See also 20060054289
Contract(s)/Grant(s): NIH-RO1-64797-01; Copyright; Avail.: Other Sources

The objective of this study is to compare cognitive function tests, Automated Neurological Assessment Metrics (ANAM) based Readiness Evaluation System (ARES(Registered TradeMark)) on a Palm Pilot and Windows based Spaceflight Cognitive Assessment Tool (WinSCAT(Registered TradeMark)) on a personal computer (PC) to assess performance effects of promethazine (PMZ) after administration to human subjects. In a randomized placebo-controlled cross-over design, subjects received 12.5, 25, and 50 mg intramuscular (IM) PMZ or a placebo and completed 14 sessions with WinSCAT(Registered TradeMark) (v. 1.26) and ARES(Registered TradeMark) (v. 1.27) consecutively for 72 h post dose. Maximum plasma concentrations (4.25, 6.25 and 13.33 ng/ml) were linear with dose and were achieved by 0.75, 8, and 24 h after dosing for the three doses, respectively. No significant differences in cognitive function after PMZ dosing were detected using WinSCAT(Registered TradeMark), however, tests from ARES(Registered TradeMark) demonstrated concentration dependent decrements in reaction time associated with PMZ dose.
Author
Neurology; Performance Tests; Mental Performance; Human Beings; Reaction Time; Computer Systems Performance; Dosage

20060054385 N.G.Kholodny Institute of Botany, Kyiv, Ukraine
Changes in Ultrastructure of Mitochondria in Root Apex Cells of Soybean Seedlings in Microgravity
Klymchuk, Dmytro; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P215-P216; In English; See also 20060054289; Copyright; Avail.: Other Sources

The morphology and ultrastructure of mitochondria in root statocytes of soybean seedlings grown 6 days on board the space shuttle Columbia during STS-87 mission are analyzed. The majority of the mitochondria from spaceflight seedlings grown in the presence of KMnO4 for ethylene removal and in the absent of KMnO4 were round or ellipsoid in the shape, while the shape of the ground control organelles could vary considerably. Spaceflight seedlings showed also an insignificant decrease in the volume of the mitochondria as well as the lower electron-dense matrix and less developed cristae when compared with the ground control organelles. The possible mechanisms by which the mitochondria can change their morphology and ultrastructural organization are discussed.
Author
Mitochondria; Seedlings (Botany); Organelles; Soybeans; Shape Control; Morphology; Ellipsoids

20060054386 Academy of Sciences (USSR), Moscow, Russian Federation
Cytotoxic Activity of Natural Killer Cells in Vitro under Microgravity
Grigorieva, O. V.; Buravkova, L. B.; Rykova, M. P.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P173-P174; In English; See also 20060054289; Copyright; Avail.: Other Sources

Changes in the immune response during space flight are close relation to functions of NK lymphocytes and their ability to interact with target cells. The aim of this research was to study NK cells cytotoxic activity and their ability to produce cytokines under microgravity in vitro. The modification of the method to study NK cells cytotoxic activity with the use of human peripheral blood mononuclear cells and myeloblasts K-562 (as target cells) proved highly effective (Buravkova et al., 2004). The flight experiment Cell-to-cell interaction with the use of the special device Fibroblast-1 was carried out by Russian cosmonauts within the first two days after the docking when a new crew was taking over on International Space Station (ISS 8 - 10). The data collected on board ISS revealed that NK lymphocytes cytotoxic activity in vitro can increase under microgravity. The ground-based simulation experiments showed that long-term changes in gravity vector direction clinorotation resulted in a smaller increase of NK cells cytotoxic activity than it did in microgravity. As lymphocytes produce cytokines while interacting with target cells, the levels of TNF-alpha, IL-1alpha, IL- 2, IL-6 in cell-conditioned medium were assessed. The data showed that microgravity has varied effects on cytokines production level.
Author
Toxins and Antitoxins; Cytology; In Vitro Methods and Tests; Microgravity

20060054387 Centre Hospitalier Univ., Tours, France
Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest
Arbeille, Ph; Kerbeci, P.; Porcher, M.; Audebert, P.; Mohty, D.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P65-P66; In English; See also 20060054289; Copyright; Avail.: Other Sources

The objective was to investigate the main leg, Portal, Jugular veins, and cardiac chambers during a long term head down bedrest (90 days). The population consisted of a control group (Co-gr, n=9) and an exercise Fly wheel countermeasure group (CM-gr, n=9). Method: Internal Saphenous, Common/Superficial Femoral, Popliteal, Posterior Tibial, Gastrocnemian, Portal Jugular veins and Cardiac chambers were investigated by echography. Results: The echographies were performed at HDBR day 28, 60 and 85. All veins and cardiac chambers, on all subjects showed a lumen dark (no structure inside) and were perfectly compressible under the probe pressure except cardiac chambers and Portal vein anatomically not compressible. Conclusion: (a) There was no sign of venous flow stagnation nor venous thrombosis on any subjects at any time during the 90 days in bedrest. (b) There was no difference between the control and the exercise subjects (c) The Cardiac chambers were found normal but the Jugular veins were enlarged at the end of the HDBR.
Author
Thrombosis; Leg (Anatomy); Physical Exercise; Veins; Tibia; Lumens; Bed Rest

20060054388 Academy of Sciences of the Ukraine, Kiev, Ukraine
Comparison of the Effects of DL-threo-Beta-Benzyloxyaspartate on the Glutamate Release from Synaptosomes before and after Exposure of Rats to Artificial Gravity
Tatiana, Borisova; Natalia, Krisanova; Nina, Himmelreich; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P23-P24; In English; See also 20060054289; Copyright; Avail.: Other Sources

The present study assesses the efficiency of a newly developed competitive non-transported inhibitor DL-threo-Beta-benzyloxyaspartate as modulator of L-[C-14]glutamate release from synaptosomes. The experiments were carried out with Wistar rats subjected to normal or altered gravity conditions. We have demonstrated that exposure to artificial gravity led to a change in membrane transporter affinity to DL-TBOA, the magnitude of IC(sub 50) decreases from 18+/-2 micron to 11+/-2 micron. The investigations of depolarization-evoked L-[C-14]glutamate release mediated by membrane glutamate transporters have found that application of 10 micron DL-TBOA exerted a slighter effect on control rats in comparison with gravity-loaded ones (decrease of L-[C-14]glutamate efflux for control and centrifuge-induced loaded rats was equal to 15+/-2.2 % and 26.2+/-3.9 %, respectively). These data lead to believe that centrifuge-induced hypergravity had complex effect on glutamatergic transmission differently affected the processes of glutamate release and reuptake.
Author
High Gravity Environments; Artificial Gravity; Centrifuges; Modulators; Membranes; Inhibitors; Glutamates

20060054389 Vrije Univ., Amsterdam, Netherlands, Vrije Univ., Amsterdam, Netherlands, Vrije Univ., Amsterdam, Netherlands
Rapid Nitric Oxide Production by Bone Cells in Response to Mechanical Vibration
Bacabac, R. G.; Smit, Th. H.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P153-P154; In English; See also 20060054289
Contract(s)/Grant(s): MG-055; MG-057; Copyright; Avail.: Other Sources

The adaptation of bone to mechanical stress is believed to be mediated by the strain-induced fluid flow through the lacuno-canalicular system. Osteocytes are believed to sense fluid shear stresses and respond by producing signaling molecules that regulate the activity of osteoblasts and osteoclasts for bone formation and resorption. We have shown earlier a rate-dependent response by bone cells to mechanical loading by fluid shear stress. Other studies showed that low magnitude (\h 10 micro(e)) high-frequency (10-100 Hz) mechanical loading stimulated bone growth in vivo. High frequencies seem to be stimulatory to bone cells. Thus, we studied the nitric oxide (NO) production of MC3T3-E1 osteoblast-like cells in response to vibration stress at a wide frequency range (5-100 Hz), at different amplitudes. We found that the rapid NO response to vibration stress increased with the applied peak acceleration rate. This suggests that the bone cell response to vibration stress treatment is highly dependent on the applied frequency of loading regardless of the applied amplitude.
Author
Osteoblasts; Shear Stress; Bone Demineralization; Adaptation; Fluid Flow; Frequency Ranges; High Frequencies; In Vivo Methods and Tests; Nitric Oxide

20060054390 Dresden Univ. of Technology, Dresden, Germany
Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men
Rohleder, N.; Wirth, D.; Frabl, W.; Kowoll, R.; Schlemmer, M.; Vogler, S.; Kirsch, K. A.; Kirschbaum, C.; Gunga, H.-C.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P169-P170; In English; See also 20060054289; Copyright; Avail.: Other Sources

Limited data are available on the response of stress systems to microgravity. Increased activity of stress systems is reported during space flight, but unchanged or decreased activity during simulated microgravity. We here investigated the impact of head-out water immersion on the activity of the hypothalamus-pituitary-adrenal (HPA) axis and the sympathetic-adrenal-medullary (SAM) system. Eight healthy young men were exposed to a six-hour water immersion in a thermo neutral bath and a control condition. Saliva samples were taken before, during, and after interventions to assess cortisol as an index for HPA axis activity, and salivary alpha-amylase as an index for SAM system activity. Cortisol levels uniformly decreased during both conditions. Amylase levels increased during both conditions, but were significantly lower during the first half of water immersion compared to the control condition. In conclusion, the HPA axis is not influenced by simulated microgravity, while SAM system activity shows initial decreases during water immersion.
Author
Water Immersion; Males; Microgravity; Hypothalamus; Adrenal Gland; Sympathetic Nervous System; Saliva

20060054391 National Center for Epidemiology, Budapest, Hungary
Production of Cytokines by Human PBMCs in Simulated Microgravity
Bakos, Agnes; Varkonyi, Andrea; Minarovits, Janos; Batkai, Laszlo; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P-163-P164; In English; See also 20060054289
Contract(s)/Grant(s): TP090; Copyright; Avail.: Other Sources

Alteration of immune functions have been observed in lymphocytes from astronauts after long-term and short term space flight. To study the influence of microgravity on the cytokine network, human peripheral blood mononuclear cells (PBMCs) were investigated for their ability to secrete different cytokines (TNF-alpha, IL-12, and IFN-gamma) in simulated microgravity established by Rotary Cell Culture System (RCCS). We detected a significantly enhanced level of all investigated cytokines in simulated microgravity. They appeared consecutively: TNF-alpha showed its maximum at 24 hours, IL-12 at 48 hours and IFN-gamma at day 6. We suggest that simulated microgravity itself affects the production of different intercellular signal molecules and modulates thereby immune cell function.
Author
Cytology; Microgravity; Cells (Biology); Culture Techniques

20060054392 Institute for Human Factors TNO, Soesterberg, Netherlands
Vestibular Adaptation to Changing Gravity Levels and the Orientation of Listing's Plane
Nooij, Suzanne A. E.; LeMair, Anita F.; Bos, Jelte E.; Groen, Eric L.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P27-P28; In English; See also 20060054289; Copyright; Avail.: Other Sources

With the application of artificial gravity in long term space missions, insight into the vestibular adaptation mechanisms regarding changing G-levels is relevant. We have previously shown that we can simulate the symptoms of space motion sickness on Earth by means of long duration centrifugation. We used this centrifuge paradigm to investigate the effect of long duration centrifugation on 3D eye movements. In particular we looked at the orientation of Listing's plane in relation to body

tilt in pitch. The results showed a significant effect of body tilt on the orientation of Listing's plane and this relationship was altered after centrifugation. We thus assume that adaptation to a prolonged altered gravity environment involves a change of the internal representation of gravity.
Author
Vestibules; Artificial Gravity; Attitude (Inclination); Motion Sickness; Eye Movements

20060054393 Massachusetts Inst. of Tech., Cambridge, MA, USA
Neurovestibular Adaptation to Short Radius Centrifugation
Jarchow, Thomas; Young, Laurence R.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P11-P14; In English; See also 20060054289; Copyright; Avail.: Other Sources

Artificial gravity produced by a short-rdus centrrfuge spinning between 20 and 30 rpm (120-180 deg/sec) is a promising countermeasure against the multiple debilitating effects of long duration exposure to microgravity When subjects move their head on a rapidly spinning platform the unexpected forces generate VOR responses perpendicular to the head motion, and unexpected tumbling and biting sensations. Exposing subjects to the head turns whle spimng on two days leads to adaptation, and decreases the mitial responses. We tested for the effect of head turn direction (leftlright quadrant) and or the effect of malung adaptive head turns away from the rotation axis (otolith loading). Imtial responses mcreased for the first few head turns in a novel drt-ection followed by an overall adaptation
Author
Centrifuging; Adaptation; Microgravity; Tumbling Motion; Artificial Gravity

20060054394 Institute of Botany, Ukraine
Gene Expression of delta-1- and delta-3-Cyclins in Root Meristem Cells of Pisurn Sativurn L. under Clinorotation
A., Artemenko Olga; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P201-P202; In English; See also 20060054289; Copyright; Avail.: Other Sources

The data on the influence of altered gravity on plant cell proliferation are ambiguity [1, 3] although a delay of the cell cycle duration in comparison with the control was observed in the most cases. Evidently, the principal regulatory processes in a cell cycle occur in the G1-phase. Cyclins are important regulators in different phases of a cell cycle and have a high homology in plant and mammalian cells. delta-cyclins are specific for plants and control the presynthetic phase events and beginning of S-phase. Therefore, we firstly performed the study the influence of slow horizontal clinorotation on delta3- and delta1-cyclins genes expression in early events of pea root development.
Author
Cells (Biology); Clinorotation; Gene Expression; Plant Roots

20060054395 Academic Center for Dentistry, Amsterdam, Netherlands
Modulation of Gene Expression in Bone Cells during Strain-Adapted Bone Remodeling
Klein-Nulend, J.; Bacabac, R. G.; Vatsa, A.; Tan, S. D.; Smit, Th. H.; Van Loon, J. J. W. A.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P225-P228; In English; See also 20060054289
Contract(s)/Grant(s): MG-055; MG-057; Copyright; Avail.: Other Sources

Bone tissue can adapt to changing mechanical demands. The osteocytes are believed to play a role as the professional mechanosensory cells of bone, and the lacuno-canalicular network as the structure that mediates mechanosensing. Loading on bone produces flow of interstitial fluid in the lacunar-canalicular network along the surface of osteocytes, which is likely the physiological signal for bone cell adaptive responses in vivo. The alignment of secondary osteons along the dominant loading direction suggests that bone remodeling is guided by mechanical strain. We propose that alignment during remodeling occurs as a result of different canalicular flow patterns around cutting cone and reversal zone during loading. The response of osteocytes to fluid flow includes prostaglandin synthesis and expression of inducible cyclooxygenase-2, an enzyme that mediates mechanical loading-induced bone formation in vivo. The response of osteocytes to fluid flow also includes nitric oxide production, and expression of endothelial nitric oxide synthase. Nitric oxide has been shown to mediate the mechanical effects in bone, leading to enhanced prostaglandin E2 release. These studies have increased our understanding of the cell biology underlying Wolff's Law. This may lead to new strategies for combating disuse-related osteoporosis, such as occurs during long-mission spaceflights.
Author
Bones; Cells (Biology); Gene Expression; Modulation; Strain Distribution

20060054396 Institute of Botany, Ukraine

A Role of Peroxidases in Acceleration of the Aging of Potato Minitubers under Influence of Microgravity

Olena, Nedukha; Elizabeth, Kordyum; Gennadly, Martyn; Galina, Martyn; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P197-P198; In English; See also 20060054289; Copyright; Avail.: Other Sources

The structure of periderm and storage parenchyma cells, and the peroxidase location and activity in potato minitubers (Solanum tuberosum L., cv Adreta) formed on the horizontal clinostat (2 rev/min) and in the stationary sonditions have been investigated by the methods of transmission electron microscopy, immuno-cytochemistry and biochemistry. Long-term horizontal clinorotation that particle simulated microgravity led to the acceleration of minituber aging, an increase in FITC-peroxidase complex fluorescence intensity, partial destruction of investigated cells as well as an increase in the guaiacol- and ascorbateperoxidase activity. The intensification of peroxidase activity it is supposed to connect with the strengthened antioxidant processes in potato minitubers under clinorotation.

Author

Cells (Biology); Clinostats; Enzymes; Microgravity; Potatoes; Biochemistry; Aging (Biology)

20060054397 NASA Ames Research Center, Moffett Field, CA, USA

The Role of Possible Feedback Mechanisms in the Effects of Altered Gravity on Formation and Function of Gravireceptors of Mollusks and Fish

Kondrachuk, Alexander V.; Boyle, Richard D.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P179-P180; In English; See also 20060054289; Copyright; Avail.: Other Sources

The variety of the effects of altered gravity (AG) on development and function of gravireceptors cannot be explained by simple feedback mechanism that correlates gravity level and weight of test mass. The reaction of organisms to the change of gravity depends on the phase of their development. To predict this reaction we need to know the details of the mechanisms of gravireceptor formation

Author

Gravireceptors; Gravitational Effects; Weight (Mass); Organisms; Feedback

20060054398 Free Univ., Brussels, Belgium

Respiratory Sinus Arrhythmia: A Marker of Decreased Parasympathetic Modulation after Short Duration Spaceflight

Migeotte, P. -F.; Sa, R. C.; Prisk, G. Kim; Paiva, M.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P73-P74; In English; See also 20060054289; Copyright; Avail.: Other Sources

We investigated the hypothesis that the effects of a short duration spaceflight on the autonomic nervous system can be reflected in the respiratory component of heart rate variability (HRV), the respiratory sinus arrhythmia (RSA).

Author

Respiratory Rate; Arrhythmia; Sinuses; Modulation; Heart Rate

20060054399 Upper Columbia Basin Network, Caen, France

Intracranial Pressure Increases during Weightlessness. A Parabolic Flights Study

Denise, P.; Normand, H.; Duretete, A.; Buzer, L.; Avan, P.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P63-P64; In English; See also 20060054289

Contract(s)/Grant(s): CNES 2004; CNES 2005; Copyright; Avail.: Other Sources

The fluid shift induced by weightlessness likely induces an elevated intracranial pressure (ICP). This factor may contribute to space adaptation syndrome (SAS). Recently, it has been shown that ICP can be monitored every few seconds non invasively by otoacoustic emissions (OAE). The OAE of 6 subjects were measured along the course of parabolic flights aboard the zero-gravity A300 Airbus. Built-in noise rejection and signal processing techniques enabled valid OAE signals to be collected and analyzed online in 4 of 6 subjects. On average, the phase of 1 H z - OAE rotated by -41deg from 1 to 1.8 g, and by +78.7deg at 0 g relative to 1 g. From reference invasive ICP measurements in a control group of neurosurgery patients, it is possible to infer that ICP increased by about 34 mmHg in transient weightlessness.

Author

Weightlessness; Intracranial Pressure; Fluid Shifts (Biology); Space Adaptation Syndrome

20060054400 Army Inst. of Surgical Research, Fort Sam Houston, TX, USA

Restoration of Central Blood Volume: Application of a Simple Concept and Simple Device to Counteract Cardiovascular Instability in Syncope and Hemorrhage

Convertino, Victor A.; Cooke, William H.; Lurie, Keith G.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P55-P60; In English; See also 20060054289; Copyright; Avail.: Other Sources

The inability to tolerate upright standing posture due to development of severe orthostatic hypotension and syncope is a clinical problem that has plagued astronauts and military personnel in their austere operational environments as well as millions of people worldwide. More critically, hemorrhagic shock remains a leading cause of death in both civilian and battlefield trauma. Central hypovolemia and cardiovascular collapse (insufficiency) are the common features shared by syncope and hemorrhagic shock. It is therefore clear that the development of an effective countermeasure against the onset of syncope or hemorrhagic shock should focus on the simple concept of functionally restoring central blood volume. Although replacing blood or fluids may be beneficial in a clinical setting, it can prove impossible in operational settings such as a spacecraft and battlefields.
Derived from text
Blood Volume; Cardiovascular System; Shock (Physiology); Restoration; Hypotension

20060054401 Waterloo Univ., Ontario, Canada
WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women
Hughson, R. L.; Kerbeci, P.; Arbeille, Ph.; Mattar, L.; Shoemaker, J. K.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P61-P62; In English; See also 20060054289; Copyright; Avail.: Other Sources

During 2005, 24 women will take part in the Women International Space-simulation for Exploration (WISE). In this paper we report on the first phase that studied 4 Exercise (EX+LBNP), 4 nutrition (NUT), and 4 no countermeasure control (CON) subjects. The EX+LBNP group completed regular exercise on a treadmill inside LBNP, flywheel resistive exercise and static periods of LBNP, and had recovery days. The NUT group received daily protein supplements. Integrative cardiovascular responses were obtained and here we report data for heart rate during LBNP, blood volume and angiotensin 11. LBNP was applied at 0, -10, -20 and -30 mmHg for 2-minutes for each stage. Blood was sampled prebed rest and on HDT-60. After 60-days head down bed rest, HR in the CON group increased by 6.1+/-2.8 bpm at rest and by 20.7+/-5.0 bpm at -30 mmHg LBNP. The EX+LBNP group had increases of 3.6+/-5.6 and 11.6+/-5.4 bpm, while the NUT group HR increased 2.6+/-3.1 and 9.4+/-3.6 bpm. The EX+LBNP group had almost no change in blood volume or plasma angiotensin II from pre-bed rest to HDT60, while both the CON and NUT groups had larger increases in plasma volume and almost double concentrations of angiotensin II. These data show a positive effect in the EX+LBNP group on the heart rate response as well as an unexpected possible benefit in the NUT group. Further studies are required to confirm possible cardiovascular benefits of the protein supplement.
Author
Cardiovascular System; Physiological Responses; Bed Rest; Blood Volume; Heart Function; Heart Rate; Lower Body Negative Pressure; Proteins

20060054402 Milan Univ., Italy
Adaptation of the Baroreflex Sensitivity to Microgravity: Data from the STS-107 Columbia Mission
DiRienzo, Marco; Parati, Gianfranco; Castiglioni, Paolo; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P75-P76; In English; See also 20060054289; Copyright; Avail.: Other Sources

It has been speculated that a deconditioning of arterial baroreflex may occur during exposure to microgravity and that this phenomenon may facilitate orthostatic intolerance. To verify this hypothesis, we studied the possible occurrence of changes in the sensitivity of the baroreflex control of the heart (BRS) during the 16-day STS 107 mission. We recorded arterial blood pressure and heart rate in four crew members at rest and during exercise before flight (baseline) and during flight: within 14 hours from launch (acute exposure) and between the 6th and 14th day of mission (prolonged exposure). BRS was estimated by the sequence technique. Compared to pre-flight values, BRS increased significantly during acute exposure to microgravity and returned to baseline values after prolonged exposure, thus excluding a baroreflex impairment at least during the first 14-days of a space flight.
Author
Baroreflexes; Blood Pressure; Flight Crews; Space Shuttle Missions; Physical Exercise; Adaptation; Heart Rate; Microgravity

20060054403 Institute of Medicine and Spatiale Physiology, Toulouse, France
Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability
Pavy-Le-Traon, Anne; Jacques, Bernard; Stephane, Beroud; Costes-Salon, Marie-Claude; Bareille, Marie-Pierre; Pathak, Atul; Gallnier, Michel; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P79-P80; In English; See also 20060054289; Copyright; Avail.: Other Sources

The aim of this study was to investigate the effects of prolonged Head down bed rest (HDBR) (90 days) on heart rate variability (HRV) in 25 healthy male volunteers (mean age: 33 y). Nine subjects performed flywheel resistance muscular training. 24h-ECG recordings were performed in pre-HDBR (D-12, D-3), HDBR (D 15, D 32, D 62, D 85) and recovery (D+4). The mean HR, SDNN and coefficient of variation (SDNN normalized by HR) reflecting overall HRV were calculated as well as the power in Low (LF) and High (HF) frequencies (24hperiod). HDBR induced a significant decrease in HRV favoured by inactivity. LF and LF/HF mainly under sympathetic influence decreased significantly on D15 and then tended to stabilize around baseline values. HF reflecting parasympathetic modulation decreased with HDBR but some changes occurred in pre-HDBR, in relation with the experiment conditions, and raised the issue of reference values. No exercise effect was observed.

Author

Bed Rest; Physical Exercise; Electrocardiography; Heart Rate; High Frequencies; Modulation

20060054404 Academy of Sciences (Russia), Moscow, Russian Federation

Astronauts Autonomic Regulation Reserves Evaluation during Pre- and Postflight Examinations

Pashenko, A. V.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P81-P82; In English; See also 20060054289; Copyright; Avail.: Other Sources

A system 'Reserve' is a new type of equipments for physiology and medicine. The system 'Reserve' is based on space medicine methods and traditional medicine technology. The system 'Reserve' was assembled from commercial medicine diagnostic equipments, but algorithms for analysis and software are being developed with an assisting of space medicine experience and new methods of information processing. A destination of the system 'Reserve' is to investigate states between norm and pathology ('prenosological diagnostic'). Main attention is directed not only for examination methods, but for analysis and data estimation. During all space flight stages the functional reserve evaluation of astronaut is one of crucial problems for both a medical control and a physiological research. The reserve evaluation is important not only in the space flight, but in pre- and post flight periods. Today, most of medical examinations register a current state of systems, organs and load tolerance: physical, orthostatical, psychological, hypoxical, etc. These examinations show functional reserves, but a cost of achieving such reserves. Investigations of adaptation had formed idea about 'the reserve s cost' depending from the regulation system stress and the 'reserve s cost' is a key for estimation of functional reserves.

Author

Astronauts; Autonomic Nervous System; Physiology; Reserves; Aerospace Medicine; Pathology

20060054405 Zurich Univ., Switzerland

Do Perception and Postrotatory Vestibulo-Ocular Reflex Share the Same Gravity Reference?

Lorincz, E. N.; Hes, B. J. M.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P25-P26; In English; See also 20060054289; Copyright; Avail.: Other Sources

To characterize the brain's computation in estimating the head orientation in space inferred from vestibular signals alone, we measured the 3D post-rotatory eye velocity induced by off vertical roll rotations in normal humans as well as the setting of the subjective visual vertical (SVV). Subjects were rotated in total darkness at +60"/s left or right ear down for 5 cycles before being stopped in one of 7 orientations between 0 and 290'. The desaccaded postrotatory angular eye velocity was fitted following a 3D generalisation of Robinson's velocity storage model, in which we introduced a gravity dependent projection operator to obtain an estimation of the head orientation. The SW was measured immediately after the final orientation was reached. The data show that 3D residual eye velocity reflects fairly accurately the actual spatial head orientation.

Author

Angular Velocity; Gravitation; Estimating; Brain; Reflexes; Rotation

20060054406 Fourth Military Medical Univ., Xi'an, China

Angiotensinogen Expression in Vascular Tissues of Simulated Weightless Rats

Bao, Jun-Xiang; Zhang, Zi-Tai; Zhang, Li-Fan; Ma, Jin; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P83-P84; In English; See also 20060054289; Copyright; Avail.: Other Sources

The aim was to elucidate whether changes of angiotensinogen (AGT) are involved in the adaptation of arteries to simulated weightlessness. Conventional and real-time RT-PCR and Western blot were performed to examine mFWA and protein expressions of AGT in arterial tissues of tail-suspended (SUS) rats. The results showed that compared with CON rats, mRNA and protein expressions of AGT in basilar arterial tissue were significantly increased in SUS rats, but had no obvious

change in carotid tissues. In mesenteric and femoral tissues, mFWA expressions of AGT were significantly decreased in SUS rats, but protein expression of AGT just showed a tendency of decrease. The results suggest that local renin-angiotensin system (L-RAS) may play a pivotal role in adaptation of arteries to weightlessness.
Author
Angiotensins; Cardiovascular System; Weightlessness Simulation; Neck (Anatomy); Proteins; Arteries; Adaptation

20060054407 European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands
Last Call for Biorack: Results of 82 Experiments in Orbit
Brinckmann, Enno; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P275-P276; In English; See also 20060054289; Copyright; Avail.: Other Sources

Biorack, ESA's first facility for biological Space research, has spent m total 58 days in orbit, performing 82 experiments in six missions on the Space Shuttle in the period 1985 till 1997. After Biorack s retirement in 1997, a fist list of the published experiment results had been presented 1999 in Maastricht (Netherlands) at the 7th European Symposium on Life Sciences Research in Space. Meanwhile, further papers of the 42 investigator teams have been collected and were compiled in a list of 370 publications, covering a wide range in Space Biology. This concludes the success story of Biorack, which is now on permanent display at the airport in Bremen and at DLR in Cologne.
Author
Exobiology; Life Sciences; Space Shuttles; Spacelab Payloads

20060054408 European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands
ESA Ground Based Facilities
Jost, P. D.; Binot, R. A.; Schmitt, D. A.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P285-P286; In English; See also 20060054289; Copyright; Avail.: Other Sources

The opportunities for implementing life- and physical sciences experiments in space are scarce and precious. It is desirable that new concepts are tested on the ground first, using simulations of the space environment. Since 200 1, a European network of facilities for space-related research in life, physical and interdisciplinary sciences is available. Experiments should be aimed at investigating the influence of gravity or other space-related conditions on natural phenomena. This is a programmatic paper summarizing the features of ESA's research announcement supporting the use of such facilities.
Author
European Space Agency; Physical Sciences; Aerospace Environments; Life Sciences

20060054409 Academy of Sciences (Russia), Moscow, Russian Federation
Mechanical Stimulation of the Foot Support Zones as a Way to Maintain Activity of the Tonic Muscular System during Functional Support Deprivation
Tatiana, Miller; Oleg, Ivanov; Irina, Sayenko; Denis, Galanov; Alla, Guekht; Irina, Sayenko; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P149-P150; In English; See also 20060054289
Contract(s)/Grant(s): RFBR-05-04-49747; Copyright; Avail.: Other Sources

Purpose of this work was to study the effect of the mechanical stimulation of foot support zones on the tonic muscular system at the patients with ischemic stroke. In this study transverse stiffness of the m. soleus (Sol.) and m. tibialis anterior (TA) have been measured at the patients with ischemic stroke during a recovery phase in the resting state and in the course of the mechanical stimulation of foot support zones. Resting patients with ischemic stroke were found to have distinct asymmetric shifts in muscle tone with a prevalence of transverse flexor stiffness over extensor. Foot stimulation on the pattern of natural locomotion cancelled out the muscle tone asymmetry totally.
Author
Muscular Tonus; Flexors; Stimulation; Locomotion; Ischemia

20060054410 Genoa Univ., Genoa, Italy
Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research
Liu, Y.; Biticchi, R.; Alberici, G.; Tenconi, C.; Cilli, M.; Fontana, V.; Cancedda, R.; Falcetti, G.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P291-292; In English; See also 20060054289; Copyright; Avail.: Other Sources

For the scientific community the ability of flying mice under weightless conditions in space, compared to other rodents, offers many valuable advantages. These include the option of testing a wide range of wild-type and mutant animals, an

increased animal number for flight and a reduced demand on shuttle resources and crew time. In this study, we describe a spaceflight hardware for mice, the Mouse Drawer System (MDS). MDS can interface with Space Shuttle middeck and International Space Station Express Rack. It consists of Mice Chamber, Liquid Handling Subsystem, Food Delivery Subsystem, Air Conditioning Subsystem, Illumination Subsystem, Observation Subsystem and Payload Control Unit. It offers single or paired containment for 6-8 mice with a mean weight of 40 grams/mouse for a period of up to 3 months. Animal tests were conducted in a MDS breadboard to validate the biocompatibility of various subsystems. Mice survived in all tests of short and long duration Results of blood parameters, histology and aidwaste composition analysis showed that MDS subsystems meet the NIH guidelines for temperature, humidity, food and water access, air quality, odour and waste management.
Author
Autonomy; Mice; Space Flight; Hardware; Microgravity; Research

20060054411 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Koeln, Germany
Biolab Crew Training
Illmer, Norbert; Muellerschkowski, Uwe; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P303; In English; See also 20060054289; Copyright; Avail.: Other Sources

In order to return optimum scientific data for the evaluation on ground astronauts have to be efficiently trained on facility operations and the science background of the experiments. The European Astronaut Centre (EAC) provides training to all astronauts assigned to experiments on the BIOLAB research facility of Columbus. This training primarily uses the full scale BIOLAB training model at EAC.
Author
Astronauts; Research Facilities; Education

20060054412 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Koeln, Germany
The Biolab Facility Responsible Center at the German Aerospace Center DLR
Schuber, Marianne; Seibt, Dieter; Esser, Paul; Cogoli, Marianne; Vadrucci, Sonia; Henggeler, Daniele; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P305-P306; In English; See also 20060054289; Copyright; Avail.: Other Sources

European User Support and Operations Centers (USOCs) are supporting ESA payloads developed for Columbus. For biological experiments on the International Space Station, DLR MUSC will act as Facility Responsible Center (FRC) supported by the Facility Support Center (FSC) Biotesc/ETH Zurich.
Derived from text
European Space Agency; Payloads; Project Management; Spaceborne Experiments

20060054413 Grand Valley State Univ., Allendale, MI, USA
Interactions of Light and Gravity in Chara Internodal Cells
Staves, Mark P.; Whitsit, Kimberly; Yeung, Edward; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P247-P248; In English; See also 20060054289; Copyright; Avail.: Other Sources

The shoots of Chara corallina are composed of large (ca. 2-5 cm length and 0.5 mm diameter) internodal cells alternating with smaller, node-forming cells. We find that these shoots are both negatively gravitropic as well as positively phototropic. Differential growth in response to both gravity and light typically takes place in the two most apical (youngest) internodal cells, however the plants can be manipulated so that all curvature takes place in a single cell. We grew Chara in aquaria filled with artificial pond water with their rhizoids in 35 mm film canisters containing soil. Thus, it was easy to reorient the axis of the plant with respect to gravity. Experimental plants were allowed to develop to a stage where they had one or two visible internodal cells. In the absence of light, internodal cells are negatively gravitropic. If gravistimulated (horizontal) internodal cells are illuminated with white light from above, gravity and light act together and more rapid curvature ensues. If however, gravistimulated internodal cells are illuminated from below, gravity and light act antagonistically and light can overcome the gravity signal. We find that gravistimulated cells illuminated from below will bend up (i.e. negatively gravitropic and negatively phototropic) at light intensities below ca. 1 mico-mol/sq m/s whereas they curve downward (positively gravitropic and positively phototropic) at higher light intensities. Preliminary studies indicate that both blue and green light stimulate phototropism whereas red light is not effective. Chara thus provides a system in which a single, statolith-free cell responds to both light and gravity and in which the interactions of the light- and gravity-induced signal transduction pathways can be investigated.
Author
Gravitropism; Phototropism; Illuminating; Genetics; Soils

20060054414 Kayser Italia, Livorno, Italy

SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space

Serafini, L.; Ramacciotti, T.; Vigano, W.; Donati, A.; Porciani, M.; Zolesi, V.; Schulze-Varnholt, D.; Manieri, P.; Sallam, A. El-Din; Scj,aj. \h; Horn, E. R.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P273-P274; In English; See also 20060054289; Copyright; Avail.: Other Sources

The study of physiological adaptation to long-term space flights with special consideration of the internal clock systems of scorpions is the goal of the SCORPI and SCORPI-T experiments. SCORPI was selected for flight on the International Space Station (ISS) and will be mounted in the European facility BIOLAB, the ESA laboratory designed to support biological experiments on micro-organisms, cells, tissue, cultures, small plants and small invertebrates. SCORPI-T experiment, performed on the Russian FOTON-M2 satellite in May-June 2005, represents an important precursor for the success of the experiment SCORPI on BIOLAB. This paper outlines the main features of the hardware designed and developed in order to allow the analysis of critical aspects of experiment execution and the verification of experiment objectives. The capabilities of the hardware developed for SCORPI and SCORPI-T show its potential use for any future similar type of experiments in space.

Author

Cells (Biology); Physiological Responses; Neurophysiology; Microorganisms; Adaptation

20060054415 NASA Ames Research Center, Moffett Field, CA, USA

Centrifugation Effects on Estrous Cycling, Mating Success and Pregnancy Outcome in Rats

Ronca, April E.; Rushing, Linda S.; Tou, Janet; Wade, Charles E.; Baer, Lisa A.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P183-P184; In English; See also 20060054289

Contract(s)/Grant(s): NNA04CK83A; NIH-MH-46485; Copyright; Avail.: Other Sources

We analyzed the effects of 2-g centrifugation on estrous cycling, mating success and pregnancy outcome in rats. Sexually mature female and male rats were assigned to either 2-g centrifuge or non-centrifuge conditions, and to non-breeding or breeding conditions. In non-breeding females, estrous cycles were analyzed by examining vaginal cytology before and for 35 days during centrifugation. Breeding females were time-mated following 7 days of adaptation to centrifugation. Following adaptation to centrifugation, estrous cycle duration over a five-cycle period was similar in centrifuged and non-centrifuged females. Identical numbers of centrifuged and non-centrifuged females conceived, however centrifuged females took four-times longer than controls to achieve conception. Births occurred at the normal gestational length. Pup birth weight and postnatal survival were p\h0.05 reduced in centrifuged as compared to non-centrifuged groups. In conclusion, 2-g centrifugation had no effect on estrous cycle length or the probably of becoming pregnant but delayed conception and diminished pregnancy outcome.

Author

Centrifuging; Pregnancy; Rats; Adaptation; Cycles; Birth

20060054416 Academy of Sciences (Russia), Moscow, Russian Federation

Effect of 7-Days Dry Immersion in Combination with Mechanical Stimulation of Foot Support Zones upon Resistance to Fatigue of Knee Extensors and Flexors

Netreba, A. I.; Khusnutdinova, D. R\g; Vinogradova, O. L.; Kozlovskaya, I. B.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P137-P138; In English; See also 20060054289

Contract(s)/Grant(s): MOE-43.802.12.0001; MOE-27.02.2003; MOE-43.802.12.0002; MOE-19.03.2003; Copyright; Avail.: Other Sources

The aim of investigation was to reveal the effect of supportlessness in combination with artificial stimulation of foot support zones on fatigue resistance of knee extensors and flexors in static and rhythmic tests. 10 volunteers were exposed to 7 days dry immersion (DI). 4 of them were subjected to mechanical stimulation of foot support zones. 7-day DI did not evoke any changes in fatigue resistance during rhythmic contractions of knee extensors and flexors in both groups. Static test revealed significant decrease of fatigue resistance of both knee flexors and extensors. In the group with stimulation of support zones unfavorable effects of immersion were minimized for knee extensors but not for flexors. Thus support withdrawal is associated with a decrease of fatigue resistance for both knee flexors and extensors only under conditions of static tension. Artificial stimulation of support zones of the foot selectively affects the posture muscles.

Author

Drying; Flexors; Fracture Strength; Stimulation; Submerging; Feet (Anatomy); Supports

20060054417 NASA Johnson Space Center, Houston, TX, USA

Human Adaptation Genetic Response Suites: Toward New Interventions and Countermeasures for Spaceflight

Sundaresan, A.; Pellis, N. R.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P229-P231; In English; See also 20060054289; Copyright; Avail.: Other Sources

Genetic response suites in human lymphocytes in response to microgravity are important to identify and further study in order to augment human physiological adaptation to novel environments. Emerging technologies, such as DNA micro array profiling, have the potential to identify novel genes that are involved in mediating adaptation to these environments. These genes may prove to be therapeutically valuable as new targets for countermeasures, or as predictive biomarkers of response to these new environments. Human lymphocytes cultured in lg and microgravity analog culture were analyzed for their differential gene expression response. Different groups of genes related to the immune response, cardiovascular system and stress response were then analyzed. Analysis of cells from multiple donors reveals a small shared set that are likely to be essential to adaptation. These three groups focus on human adaptation to new environments. The shared set contains genes related to T cell activation, immune response and stress response to analog microgravity.

Author

Genetics; Manned Space Flight; Physiology; Lymphocytes; Human Tolerances; Physiological Responses

20060054418 Massachusetts Univ., Amherst, MA, USA

Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS

Musgrave, M. E.; Kuang, A.; Blasiak, J.; Tuominen, L. K.; Levine, L. H.; Morrow, R. C.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P185-P186; In English; See also 20060054289

Contract(s)/Grant(s): NAG10-329; NAG2-1375; Copyright; Avail.: Other Sources

Brassica rapa L. cv. 'Astroplants' were grown on the International Space Station during April - June 2002 in the Biomass Production System. Plants were manually pollinated and were maturing seeds when they were harvested for preservation in flight by fixation or freezing. Overall growth and development were comparable between flight and ground control plants. Chlorophyll and carbohydrate content of the leaves were the same in the two treatments. Although comparable numbers of seeds were produced inside the seed pods, the developing seeds from the spaceflight treatment had only half of the dry weight of the ground controls and had altered storage components. Glucosinolate content of the stem tissue was also determined. The concentration of 3-butenyl-glucosinolate was on average 75% greater in the spaceflight samples than in the ground control. The results demonstrate how the spaceflight environment influences nutritional and flavor characteristics of a potential crop for use in a Biological Life Support System.

Author

International Space Station; Spacecraft Environments; Farm Crops; Chlorophylls; Seeds; Life Support Systems; Life Sciences

20060054419 Fourth Military Medical Univ., Xi'an, China

Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity

Xie, Man-Jiang; Fu, Zhao-Jun; Zhang, Li-Fan; Ma, Jin; Cheng, Hong-Wei; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P97-P98; In English; See also 20060054289; Copyright; Avail.: Other Sources

The purpose of this study was to investigate whether L-type Ca(2+) channels (Ca(sub L)) are differentially activated in cerebral and mesenteric arteries during simulated microgravity. The function of CaL in vascular smooth muscle cells (VSMCs) was studied by whole-cell patch clamp. For cerebral arteries, the VSMCs of suspended rats had a more depolarized membrane potential (Em) and a larger calcium current density as compared with those of control rats. For small mesenteric arteries, VSMCs of suspended rats had a more negative Em and smaller calcium current densities. These results suggested that different profiles of channel remodeling in VSMCs might occur and play an important role in vascular adaptation to microgravity.

Author

Arteries; Cardiovascular System; Current Density; Smooth Muscle; Microgravity; Calcium; Cerebrum

20060054420 Academy of Sciences (USSR), Kiev, Russian Federation

Superoxide Dismutase, Catalase, Glutathione Peroxidase, and Glutothione Reductase in the Heart of Hypergravity-Treated and Aging Rats

Utko, Natalie; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P103-P104; In English; See also 20060054289; Copyright; Avail.: Other Sources

Activities of superoxide dismutase (SOD), catalase, glutathione peroxidase (GP), and glutathione reductase (GR) were

determined in the heart of young and old control and hypergravity (HG) treated male Wistar rats. Relatively small and insignificant changes were observed when comparing enzyme activities in the heart of young and old control rats, whereas HG induced significant decline of SOD and GP in the group of old rats and GR in young animals. Statistically highly significant positive correlation found for SOD and downstream acting catalase in young (r=0.72; P\h0.00001) and old rats (r=0.86; P\h0.00001) was preserved in HG-treated young animals as well (r=0.66;P\h0.02), assuming that SOD-catalase pair could remain functionally related in both aging and HG. However, three-dimensional (3D) nonlinear plotting and cluster analysis revealed significant alterations in enzyme relations in the heart of both aging and HG-treated animals.
Author
High Gravity Environments; Glutathione; Inorganic Peroxides; Catalase; Enzyme Activity

20060054421 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Koln, Germany
The German ISS Experiment Cellular Responses to Radiation in Space (CERASP): The Effects of Single and Combined Space Flight Conditions on Mammalian Cells
Baumstark-Khan, C.; Hellweg, C. E.; Arenz, A.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P261-P262; In English; See also 20060054289; Copyright; Avail.: Other Sources

The German experiment 'Cellular Responses to Radiation in Space (CERASP)', to be performed on the International Space Station (ISS) will supply basic information on the cellular response to radiation applied in microgravity. One of the biological endpoints under investigation will be gene activation by space flight conditions in mammalian cells, based on fluorescent promoter reporter systems using green fluorescent protein. The promoter element to be investigated reflects the activity of the nuclear factor kappa B (NF-KB) pathway. Results obtained with X-rays and accelerated argon ions (95 MeV/u, LET approx.230 kev/micron) produced at the French heavy ion accelerator GANIL imply that densely ionizing radiation has a stronger potential to activate NF-KB dependent gene expression than sparsely ionizing radiation.
Author
Ionizing Radiation; Mammals; Cells (Biology); Flight Conditions; Microgravity; International Space Station; Gene Expression

20060054423 Bari Univ., Italy
The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by a Simulation Study
Tagliabue, Michele; Pedrocchi, Alessandra; Pedotti, Antonio; Danelon, Furio; Ferrigno, Giancario; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P41-P42; In English; See also 20060054289; Copyright; Avail.: Other Sources

Whether in microgravity our Central Nervous System (CNS) preserves terrestrial motor strategy or it learns a new weightlessness-specific motor plan, is still an open question. In order to find an answer, in this work a simulation study is carried out. A human movement simulator allowing one to predict the lateral leg raising execution features, corresponding to different motor strategies is designed. It is used to verify whether the same motor strategy, focused on the centre of mass stabilisation, able to predict the on ground motor behaviour, can predict the movement features of astronauts performing the same task during a long-term space mission. The results show a great mismatching between the actual and the so predicted movements. On the contrary, much better results can be obtained using the microgravity-specific motor strategy, aimed to minimise the dynamic interaction with the environment.
Author
Torque; Weightlessness; Simulation; Microgravity; Central Nervous System; Stabilization

20060054424 Hungarian Academy of Sciences, Budapest, Hungary
Environmental Challenge Impairs Prefrontal Brain Functions
Balazs L.; Czigler, I.; Grosz, A.; Emri, M.; Mikecz, P.; Szakall, Sz.; Tron, L., Jr.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P31-P32; In English; See also 20060054289; Copyright; Avail.: Other Sources

Hypoxic challenge might provide insights to the mechanisms of how environmental stressors alter human abilities. Similarities between the possible neural consequences of hypoxia and those of weightlessness and cosmic irradiation endorse this possibility. We studied brain electrical activity and behavioural measures in various cognitive reaction time (RT) tasks in hypoxic conditions. In one experiment changes in regional cerebral blood flow were measured. The findings were indicative of the particular vulnerability of the prefrontal brain areas to hypoxia. It is suggested that hypoxia may be used as an analogue

to investigate the effect of environmental stressors arising in space flight on central nervous system (CNS)
Author
Brain Circulation; Weightlessness; Mental Performance; Central Nervous System; Blood Flow

20060054425 Nihon Univ., Tokyo, Japan
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis
Shiozawa, Youke; Iwase, Satoshi; Kamiya, Atsunori; Takada, Hiroki; Michikami, Daisaku; Hirayanagi, Kaname; Takada, Hiroki; Watanabe, Yoriko; Sugenoya, Jun-ichi; Mano, Tada-aki; Yajima, Kazuyoshi; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P15-P16; In English; See also 20060054289; Copyright; Avail.: Other Sources

To evaluate the effectiveness of centrifuge-induced artificial gravity with ergometric exercise to disused osteoporosis, 9 young healthy men were exposed to -6' head-down bed-rest for 14 days. Four out of nine subjects were loaded by intermittent artificial gravity with ergometric workload. The rest of subjects were the control group. The concentrations of urine deoxy-pyridinoline were examined in each subject before and after the bed-rests. The rate of increase of urine deoxy-pyridinoline of the Countermeasure group was significantly more suppressed than the control group. This countermeasure can definitely suppress the bone absorption which is caused by 14 days head-down bed-rest; however the effectiveness is still insufficient. More gravitational load or exercise load is still required.
Author
Gravitational Effects; Artificial Gravity; Ergometers; Human Beings; Osteoporosis

20060054426 M.A.T.I. Centre of Excellence, Udine, Italy
Artificial Gravity: Physiological Perspectives for Long-Term Space Exploration
diPrampero, Pietro E.; Antonutto, Guglielmo; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P21-P22; In English; See also 20060054289; Copyright; Avail.: Other Sources

We suggested previously the Twin Bike System (TBS) as a possible countermeasure to prevent cardiovascular deconditioning during long term space flight. The TBS consists of two bicycles, operated by the astronauts, moving at the very same speed, but in the opposite sense, along the inner wall of a cylindrical space module, thus generating a centrifugal acceleration vector, mimicking gravity. To gain some insight on the effectiveness of the TBS we hereby propose a similar approach (the Mono Bike System, MBS) to be tested during bed rest on Earth.
Author
Physiology; Centrifugal Force; Cardiovascular System; Artificial Gravity; Astronauts; Bed Rest

20060054427 Osaka Univ., Toyonaka, Japan
Mechanical and/or Neural Activity-Dependent Regulation of Soleus Muscle Fibers of MDX Mice
Terada, Masahiro; Kawano, Fuminori; Lan, Yong Bo; Matsuoka, Yoshikazu; Wang, Xiao Dong; Ohira, Yoshinobu; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P135-P136; In English; See also 20060054289; Copyright; Avail.: Other Sources

Roles of mechanical andor neural activity in the necrosis-regeneration cycle in the soleus muscle fibers of mdx mice were studied. Five-weeks-old male mdx and wild type (WT) mice were separated into tenotomy (T), denervation (D), and T+D groups. The distal tendons of the left plantarflexors (soleus, plantaris, and gastrocnemius) mere ablated in the T group. The left sciatic nerve was transected at the gluteal region in the D group. The right limb was kept intact as the normal control. Ambulation was allowed after the surgery. Soleus muscle was sampled 14 days after the surgery and analyses were performed in cross-section of whole muscle and in single fibers removed longitudinally. The total fiber number of the untreated muscle was 913 plus or minus 19 (Mean plus or minus SEM) and 872 plus or minus 45 in WT and mdx mice, respectively. The fiber number in mdx mice was decreased approx. 48% by T and approx. 31-35% by D and T+D, which induced fiber atrophy, may be due to either inhibited regeneration or stimulated necrosis. Although fibers with central nuclei or necrosis were not observed in WT muscle, approx. 25-40% of fibers (vs. approx. 40% in the contralateral control side) in treated muscles of mdx mice, analyzed cross-sectionally, were central-nucleated. However, fibers with only central nuclei were not detected in the longitudinally isolated fibers of treated groups, may be due to the phenomenon that the fibers with necrosis were lost in the relaxing solution. But % fibers with both central and peripheral nuclei were decreased and those with peripheral nuclei alone were increased by T. In both cross-sectional and longitudinal analyses, the % distribution of the central-nucleated relative to total fiber number was not affected by D, but decreased by T in mdx mice (p greater than 0.05). Myonuclear number per mm of fiber length was identical generally, although the number was increased by T. Furthermore, DNA fragmentation was noted

in the mdx fibers with necrosis. These data suggested that the localization of myonuclei, as well as either necrosis or regeneration, of muscle fibers, is influenced by neural and/or mechanical activities.
Author
Mice; Muscle Fibers; Nerves; Musculoskeletal System

20060054428 Osaka Univ., Toyonaka, Japan
Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading
Wang, Xiao Dong; Kawano, Fuminori; Terada, Masahiro; Matsuoka, Yoshikazu; Shinoda, Yo; Ishihara, Akihiko; Ohira, Yoshinobu; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P131-P132; In English; See also 20060054289; Copyright; Avail.: Other Sources

Effects of 16 days of hindlimb suspension on the characteristics of single soleus muscle fibers were compared between male Wistar and Wistar Hannover rats (5 weeks old). The greater effects of unloading were noted in Wistar Hannover rats. The unloading-related reductions of muscle weight and fiber cross-sectional area vs. the pre-suspension levels were greater than Wistar rats. The percent of fibers expressing pure type I myosin heavy chain (MHC) was decreased and that of type I+II MHC fibers was increased, the magnitudes of these changes were greater than Wistar rats. Total number of myonuclei in control situation was greater in Wistar Hannover rats, but the more numberj of myonuclei were decreased following unloading. Responses of myonuclear domain levels were similar. The numbers of both quiescent and mitotic active satellite cells in control situation were greater in Wistar rats. But the magnitude of the unloadingrelated decrease was identical for Wistar Hannover and Wistar rats. Although the level of heat shock protein 27 (HSP27) expression in Wistar rats was decreased by unloading, de novo appearance of HSP27 was noted in Wistar Hannover rats. It is suggested that greater responses of soleus muscle fibers of Wistar Hannover than Wistar rats may be related to the different expression of protein, although the precise mechanism is still unclear.
Author
Hindlimb Suspension; Muscle Fibers; Rats; Thermal Shock; Spaceborne Experiments

20060054429 Osaka Univ., Toyonaka, Japan
Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle
Kawano, Fuminori; Matsuoka, Yoshikazu; Oke, Yoshihiko; Higo, Yoko; Terada, Masahiro; Umemoto, Shiori; Kawabe, Naoko; Wang, Xiao Dong; Shinoda, Yo; Lan, Yong Bo, et al.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P133-P134; In English; See also 20060054289; Copyright; Avail.: Other Sources

The structure of periderm and storage parenchyma cells, and the peroxidase location and activity in potato minitubers (Solanum tuberosum L., cv Adreta) formed on the horizontal clinostat (2 rev/min) and in the stationary conditions have been investigated by the methods of transmission electron microscopy, immuno-cytochemistry and biochemistry. Long-term horizontal clinorotation that particle simulated microgravity led to the acceleration of minituber aging, an increase in FITC-peroxidase complex fluorescence intensity, partial destruction of investigated cells as well as an increase in the guaiacol- and ascorbate-peroxidase activity. The intensification of peroxidase activity it is supposed to connect with the strengthened antioxidant processes in potato minitubers under clinorotation.
Author
Biochemistry; Clinostats; Loads (Forces); Muscles; Rats; Cells (Biology)

20060054430 Consiglio Nazionale delle Ricerche, Milan, Italy
Advantages of Simulated Microgravity in the Production of Compounds of Industrial Relevance
Versari, Silvia; Villa, Alessandro; Barenghi, Livia; Bradamante, Silvia; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P257-P258; In English; See also 20060054289
Contract(s)/Grant(s): ESA 14651/00/NL/SH-CCN001; Copyright; Avail.: Other Sources

Glutathione (alpha-glutamyl-L-cysteinylglycine, GSH) is the most abundant non-protein thiol compound and it is widely distributed in living organisms, mainly, in eukaryotic cells. Inside the cells, GSH assumes pivotal roles in bioreduction processes and protection against oxidative stress. Due to its antioxidant properties, GSH is widely used not only in food and cosmetic area but also as a pharmaceutical compound. The best total GSH production obtained culturing yeast cells in standard conditions is about 3.5% DCW, as the sum of intracellular (mainly) and extracellular GSH. Its production is limited by a feedback inhibition process. Using our patented microgravity (pg) simulator, the NRG bioreactor, we obtained a three-fold increase in total GSH production. In particular we observed an increased GSH extracellular excretion (9%), thus avoiding the feedback inhibition and easing the downstream processing. To confirm the role of pg, we extended our findings on GSH

extracellular production using another pg simulator, the Rotating Wall Vessel (RWV).
Author
Microgravity; Simulators; Antioxidants; Bioreactors; Glutathione; Proteins; Rotation

20060054431 Nuevas Tecnologias Espaciales S.A., Llissa d'Amunt, Spain
Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device
Nunez, F.; Romero, A.; Chua, J.; Mas, J.; Tomas, A.; Catalan, A.; Castellsaguer, J.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P141-P142; In English; See also 20060054289; Copyright; Avail.: Other Sources

MARES (Muscle Atrophy Research and Exercise System) is a computerized ergometer for neuromuscular research to be flown and installed onboard the International Space Station in 2007. Validity of data acquired depends on controlling and reducing all significant error sources. One of them is the misalignment of the joint rotation axis with respect to the motor axis. The error induced on the measurements is proportional to the misalignment between both axis. Therefore, the restraint system's performance is critical [l]. MARES HRS (Human Restraint System) assures alignment within an acceptable range while performing the exercise (results: elbow movement: 13.94mm plus or minus 5.45, Knee movement: 22.36mm plus or minus 6.06) and reproducibility of human positioning (results: elbow movement: 2.82mm plus or minus 1.56, Knee movement 7.45mm plus or minus 4.8). These results allow limiting measurement errors induced by misalignment.
Author
Atrophy; Muscular Strength; Physical Exercise; Alignment; Stability; Joints (Anatomy); Position (Location); Human Body

20060054432 Institute of Biomedical Problems, Moscow, Russian Federation
Results of Cardiorespiratory System Autonomic Regulation Investigations during Long Term International Space Station Missions: Experiment 'Pulse'
Baevsky, R. M.; Baranov, V. M.; Chernikova, A. G.; Funtova, L. L.; Pashenko, A. V.; Tank, J.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P77-P78; In English; See also 20060054289; Copyright; Avail.: Other Sources

Investigations on OS 'Mir' showed transient changes in neurohumoral regulation indicating a powerful activity of regulatory systems. The experiment 'Pulse' is performed from 5th expedition on ISS. The aim of the experiment is to investigate adaptation process in microgravity by analysis of autonomous regulation of the cardiorespiratory system. The data equipped in the experiment shows a growth of activity of regulatory and sympathetic systems of autonomous system in adaptation for the long term microgravity. Characteristics of adaptation reactions depend on individual regulatory type. The evaluation of the regulatory systems tension and its functional reserves give important information for estimation of pathological risk.
Author
Autonomic Nervous System; Heart Function; Microgravity; Neurotransmitters

20060054433 Kawasaki Medical School, Kurashiki, Japan
Effect of Swimming Suits' Difference at Supine Position in Water on Heart Rate, Rectal Temperature and Sense of Subjective Temperature
Ono, Kumiko; Onodera, Sho; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P95-P96; In English; See also 20060054289; Copyright; Avail.: Other Sources

The present study investigated the influence of such suits on heart rate (HR), rectal temperature (RT) and sense of subjective temperature (SST) during rest by supine position in water at about 30 C for 60 minutes. Six adult men participated in this experiment voluntarily. Three types of swimming suits were used: a regular swimming suit (group C) and two suits for warmth (group I and group II). RT continued falling until the end of the experiment. Group C s RT showed a significantly low value when compared with group I and II. Group C s SST showed a significantly low value when compared with group I and 11 s similar RT. This suggests swimming suits designed for warmth can be effective for preventing cold in water.
Author
Supine Position; Swimming; Heart Rate; Human Beings; Body Temperature

20060054434 Escuela Tecnica Superior de Ingenieros de Telecomunicacion, Valladolid, Spain
New Technique for Simulation of Microgravity and Variable Gravity Conditions
delaRosa, R.; Alonso, A.; Hornero, R.; Abasolo, D. E.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P289-P290; In English; See also 20060054289; Copyright; Avail.: Other Sources

This paper suggests a microgravity or variable gravity conditions simulator based on a Neuromuscular Control System (NCS), working as a man-machine interface. The subject under training lies on an active platform that counteracts his weight. And a Virtual Reality (VR) system displays a simulated environment, where the subject can interact a number of settings: extravehicular activity (EVA), walking on the Moon or training the limb response faced with variable acceleration scenes. Results related to real-time voluntary control have been achieved with neuromuscular interfaces at the Bioengineering Group in the University of Valladolid. It has been employed a custom real-time system to train arm movements. This paper outlines a more complex design that can complement other training facilities, like the buoyancy pool, in the task of microgravity simulation.
Author
Bioengineering; Microgravity; Simulation; Neuromuscular Transmission

20060054435 Alenia Spazio S.p.A., Italy
MISS: Mice on International Space Station
Falcetti, G.; Schiller, P.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P292-P294; In English; See also 20060054289; Copyright; Avail.: Other Sources

The use of rodents for scientific research to bridge the gap between cellular biology and human physiology is a new challenge within the history of successful developments of biological facilities. The ESA funded MISS Phase A/B study is aimed at developing a design concept for an animal holding facility able to support experimentation with mice on board the International Space Station (ISS). The MISS facility is composed of two main parts: 1. The MISS Rack to perform scientific experiments on board the ISS. 2. The MISS Animals Transport Container (ATC) to transport animals from ground to orbit and vice-versa. The MISS facility design takes into account guidelines and recommendations used for mice well-being in ground laboratories. A summary of the MISS Rack and MISS ATC design concept is hereafter provided.
Author
Mice; Animals; International Space Station; Cells (Biology); Physiology

20060055231 Wyle Labs., Inc., Houston, TX, USA
Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo
Iarlsson, Ingrid; Grivel, Jean-Charles; Chen. Silvia; Karlsson, Anders; Albert, Jan; Fenyol, Eva Maria; Margolis, Leonid B.; January 10, 2005; 1 pp.; In English
Contract(s)/Grant(s): NAS9-02078
Report No.(s): W05-002; No Copyright; Avail.: Other Sources; Abstract Only

CCR5-utilizing HIV-1 variants (R5) typically transmit infection and dominate its early stages, whereas emergence of CXCR4-using (X4 or R5X4) HIV-1 is often associated with disease progression. However, such a switch in co-receptor usage can only be detected in approximately onehalf of HIV-infected patients (switch virus patients), and progression to immunodeficiency may also occur in patients without detectable switch in co-receptor usage (non-switch virus patients). Here, we used a system of ex vivo-infected tonsillar tissue to compare the pathogenesis of sequential primary R5 HIV-1 isolates from the switch and non-switch patients. Inoculation of ex vivo tissue with these R5 isolates resulted in viral replication and CCR5(+)CD4(+) T cell depletion. The levels of such depletion by HIV-1 isolated from non-switch virus patients were significantly higher than those by R5 HIV-1 isolates from switch virus patients. T cell depletion seemed to be controlled by viral factors and did not significantly vary between tissues from different donors. In contrast, viral replication did not correlate with the switch status of the patients; in tissues fiom different donors it varied 30-fold and seemed to be controlled by a combination of viral and tissue factors. Nevertheless, replication-level hierarchy among sequential isolates remained constant in tissues from various donors. Viral load in vivo was higher in switch virus patients compared to non-switch virus patients. The high cytopathogenicity of CCR5(+)CD4(+) T cells by R5 HIV-1 isolates from non-switch virus patients may explain the steady decline of CD4(+) T cells in the absence of CXCR4 using virus; elimination of target cells by these isolates may limit their own replication in vivo.
Author
Pathogenesis; Human Immunodeficiency Virus; Patients; Viruses; Tissues (Biology); Lymphatic System

20060055400 Army Medical Research Inst. of Infectious Diseases, Fort Detrick, MD USA
An Activity-Dependent Assay for Ricin and Related RNA N-Glycosidases Based on Electrochemiluminescence
Keener, William K; Rivera, Victor R; Young, Charles C; Poli, Mark A; Jan 2006; 9 pp.; In English
Report No.(s): AD-A456993; TR-06-067; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA456993; Avail.: Defense Technical Information Center (DTIC)

Synthetic biotinylated RNA substrates were cleaved by the combined actions of ricin holotoxin and a chemical agent, N,N'-dimethylethylenediamine. The annealing of the product with a ruthenylated oligodeoxynucleotide resulted in the capture of ruthenium chelate onto magnetic beads, enabling the electrochemiluminescence (ECL)-based detection of RNA N-glycosidase activities of toxins. ECL immunoassays and the activity assay exhibited similar limits of detection just below signals with 0.1ng/ml of ricin; the ECL response was linear as the ricin concentration increased by two orders of magnitude. Activities were detected with other adenine-specific RNA N-glycosidases, including Ricinus communis agglutinin (RCA), saporin, and abrin II. The substrate that provided the greatest sensitivity was composed of a four-residue loop, GdAGA, in a hairpin structure. When the 2'-deoxyadenosine (dA) was substituted with adenosine (A), 2'-deoxyinosine, or 2'-deoxyuridine, toxin-dependent signals were abolished. Placing the GdAGA motif in a six-residue loop or replacing it with GdAdGA or GdAAA resulted in measurable activities and signal patterns that were reproducible for a given toxin. Data indicated that saporin and abrin II shared one pattern, while ricin and RCA shared a distinct pattern. A monoclonal antibody that enhanced the activities of ricin, RCA, and abrin II to different extents, thus improving the diagnostic potential of the assay, was identified.

DTIC

Antibodies; Assaying; Chemiluminescence; Electroluminescence; Ribonucleic Acids; Toxins and Antitoxins

20060055405 Brooke Army Medical Center, Fort Sam Houston, TX USA

A Quantitative Electrochemiluminescence Assay for Clostridium perfringens alpha toxin

Merrill, Gerald A; Rivera, Victor R; Neal, Dwayne D; Young, Charles; Poli, Mark A; Aug 10, 2006; 8 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457028; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457028; Avail.: CASI: A02, Hardcopy

Described is a rapid direct sandwich format electrochemiluminescence assay for identifying and assaying Clostridium perfringens alpha toxin. Biotinylated antibodies to C. perfringens alpha toxin bound to streptavidin paramagnetic beads specifically immunoadsorbed soluble sample alpha toxin which subsequently selectively immunoadsorbed ruthenium (Ru)-labeled detection antibodies. The ruthenium chelate of detection antibodies chemically reacted in the presence of tripropylamine and upon electronic stimulation emitted photons (electrochemiluminescence) that were detected by the photodiode of the detector. Elevated toxin concentrations increased toxin immunoadsorption and the specific immunoadsorption of Ru-labeled antibodies to alpha toxin, which resulted in increased dose-dependent electrochemiluminescent signals. The standardized assay was rapid (single 2.5-h coincubation of all reagents), required no wash steps, and had a sensitivity of about 1ng/ml of toxin. The assay had excellent accuracy and precision and was validated in buffer, serum, and urine with no apparent matrix effects.

DTIC

Assaying; Bacteria; Chemiluminescence; Electroluminescence; Toxins and Antitoxins

20060055406 Rochester Univ., NY USA

Angiogenic Signaling in Living Breast Tumor Models

Brown, Edward; Jun 2006; 23 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0396

Report No.(s): AD-A457030; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457030; Avail.: CASI: A03, Hardcopy

In this grant we propose to elucidate the signaling pathway that translates VEGFR activation into elevated vessel permeability, in endothelial cells within living breast tumor models. The working hypothesis is that the signaling pathway involved is a constitutively active form of the pathway shown for healthy mesenteric microvessels. Progress to date includes the recruitment of personnel to the new laboratory, the development and testing of a novel method for the measurement of convective flow in tumors in vivo, the investigation of second harmonic generation as a reproducible measure of photodamage in tissue during diffusion and permeability measurements, and preliminary experiments to evaluate methodology for tasks to commence in upcoming years.

DTIC

Angiogenesis; Breast; Endothelium; Microscopy; Tumors

20060055407 Massachusetts General Hospital, Boston, MA USA
Systemic Oncolytic Cytokine HSV Therapy of Prostate Cancer
Varghese, Susan; May 2006; 11 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-05-1-0367
Report No.(s): AD-A457031; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457031; Avail.: CASI: A03, Hardcopy

We have made substantial progress toward the goals outlined in our grant application. In particular, we demonstrate the efficacy of systemically administered oncolytic viruses for the treatment prostate cancer in the transgenic TRAMP mouse model. We show that while intravenous administration of the NV1023 parental virus at 12 weeks of age (presence of prostate adenocarinoma) resulted in reduced tumor burden, the effects by the IL-12 expressing NV1042 virus were substantially more robust in reducing the frequency of primary tumor growth. Moreover, injection of this cytokine producing virus at 18 weeks of age (presence of metastatic disease)was more effective than NV1023 in reducing the occurrence of lung metastasis. Finally, persistence of tumor infectivity by NV1042 was established by detecting the LacZ-expressing NV1042 virus in the prostate at least 1 week after the final virus infection and also by identifying viral DNA by real-time PCR in both primary and metastatic tumors, but not in liver or blood at 2 weeks after final virus injection.
DTIC
Cancer; Infectious Diseases; Prostate Gland; Therapy; Viral Diseases

20060055421 University of North Texas Health Science Center, Forth Worth, TX USA
Breast Cancer Therapy With Annexin 11 Nanoparticles
Vishwanatha, Jamboor; May 1, 2006; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-04-1-0756
Report No.(s): AD-A457045; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457045; Avail.: CASI: A03, Hardcopy

The long-term goal of our research program is to identify the key molecular events that lead to development and progression of breast cancer, in order that improved therapies to treat this disease can be developed. The objective of studies outlined in this proposal is to determine if sustained inhibition of annexin II prevents breast cancer cell growth and angiogenesis. During the performance period of this grant, we have developed a novel nanotechnology mediated vector (nanoparticles) for delivering a novel protein annexin II. We show that nanoparticle mediated delivery of human annexin II inhibitory RNA results in reduced cell proliferation and cell migration. Future studies should be aimed at testing the ability of these sustained release nanoparticles on reducing breast cancer tumors in an animal model system.
DTIC
Breast; Cancer; Mammary Glands; Nanoparticles; Therapy

20060055423 Mayo Clinic, Rochester, MN USA
Benign Breast Disease: Toward Molecular Prediction of Breast Cancer Risk
Hartmann, Lynn C; Jun 2006; 45 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-02-1-0473
Report No.(s): AD-A457047; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457047; Avail.: CASI: A03, Hardcopy

Optimal early detection and prevention strategies for breast cancer are predicated on the health professional's ability to identify individuals at significantly increased risk for this disease. The purpose of this research is to bring molecular risk prediction for breast cancer into the clinical arena. This will require progress on three fronts of scientific endeavor: (1) establishment of a tissue repository of benign breast disease; (2) assessment of potential biomarkers of risk in this tissue set; and (3) discovery of new, potentially relevant biomarkers of risk. The authors have made significant progress on these aims. Their current cohort comprises 9,376 women, 758 (8%) of whom have been diagnosed with breast cancer since the time of their benign biopsy. They have established a tissue repository of benign breast tissue and have collected the subsequent breast cancers for 646 out of 758 (85%) of the cases. They have assessed the significance of benign histology in predicting the risk of future breast cancer, examining in detail the role of proliferative disease, atypia, papillomas, radial scars, and involution. They also have explored the link between centrosome amplification and COX-2 and breast cancer outcomes. This coming year, they will be focusing on additional molecular markers and genetic profiling.
DTIC
Biomarkers; Breast; Cancer; Health; Mammary Glands; Markers; Molecular Biology; Risk

20060055425 Burnham Inst., La Jolla, CA USA
The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor
Matsuzawa, Shu-ichi; Nov 2005; 10 pp.; In English
Contract(s)/Grant(s): W81XWH-05-1-0007
Report No.(s): AD-A457050; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457050; Avail.: CASI: A02, Hardcopy

The androgen receptor (AR) signaling-pathway plays crucial roles in the growth and progression of prostate cancer cells. Recent studies indicate that Beta-Catenin physically binds to AR and enhances its transcriptional activity in a ligand-dependent manner. P53 also has been implicated in AR signaling because of its ability to induce expression of Siah1, which binds and activates E3 ligase complexes that degrade Beta-Catenin. In this study, the authors demonstrated the biological significance and molecular mechanisms by which AR is regulated by the p53-induced Siah1 protein. Moreover, they identified the relevant proteins that are targeted for degradation by Siah1 besides Beta-Catenin. Thus, enhanced Siah function may suppress the ability of androgen to promote tumor cell growth. Understanding more about the functions of Siah-family proteins may therefore suggest novel strategies for chemoprevention and for improved treatment of prostate cancer.
DTIC
Cancer; Chemoreceptors; Degradation; Genes; Hormones; Males; Prostate Gland; Regulators; Suppressors; Tumors

20060055437 Naval Submarine Medical Research Lab., Groton, CT USA
Naval Submarine Medical Research Laboratory Command History, OPNAV 5750-1 Fiscal Year 2005
Lamb, Jerry C; Huebner, Heather M; Fitzgerald, Maria P; Sep 26, 2006; 39 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457076; NSMRL-SR-06-02; OPNAV-5740-1; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457076; Avail.: CASI: A03, Hardcopy

This is the Command History OPNAV 5750-1 for the Naval Submarine Medical Research Laboratory for Fiscal Year 2005.
DTIC
Medical Science

20060055529 Johns Hopkins Univ., Baltimore, MD USA
Inhibition of Fatty Acid Synthase (FAS): A New Drug for Breast Cancer Chemoprevention
Kuhajda, Francis P; Apr 2005; 15 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-02-1-0430
Report No.(s): AD-A457109; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Fatty acid synthase (FAS) has shown promise as a new target for breast cancer therapy. FAS is the primary enzyme responsible for the de novo synthesis of fatty acid and is highly expressed in most common human cancers, including breast, colorectal, prostate, ovary, and lung. Moreover, high levels of FAS have been found in cancer precursor lesions of the breast, prostate, and colon. In contrast, dietary fat down-regulates FAS and fatty acid synthesis in most normal tissues. To test the effect of FAS inhibition in cancer, we have developed a novel, chemically stable, small molecule FAS inhibitor, C75, that induces apoptosis in human breast cancer cells in vitro and in vivo. C75 has shown significant anti-tumor effect against MCF-7 human breast cancer xenografts in athymic mice. In light of these data, we have demonstrated that inhibition of FAS delays or eliminates mammary cancer in the neu-N transgenic mouse mammary cancer model. Moreover, treatment reduced the expression of genes known to be involved in neu signal transduction.
DTIC
Breast; Cancer; Drugs; Fatty Acids; Inhibitors; Mammary Glands

20060055532 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Rijswijk, Netherlands
Fast Detection of Ciprofloxacin Resistance, Part I
Broekhuijsen, M P; Dijk, W C van; Oct 2005; 34 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457114; TNO-DV2-2005-A165; No Copyright; Avail.: CASI: A03, Hardcopy

Fast DNA-based methods for detecting antibiotic resistance in bacteria were evaluated. The best method was adapted for use with several species, including Bacillus anthracis. The method was shown to be widely applicable, reliable, and performed

within 90 minutes. DNA mutations associated with ciprofloxacin resistance were examined, and can be used to extend the method to other bacterial species.
DTIC
Antibiotics; Bacteria

20060055542 Scripps Research Inst., La Jolla, CA USA
Proteomics in Malaria
Johnson, Jeffrey R; Florens, Laurence; Carucci, Daniel J; Yates, III, John R; Jan 2004; 12 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457131; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The recent completion of human, Anopheles gambiae, and Plasmodium falciparum genomes relevant to the study of human malaria allows the application of modern proteomic technologies to complement previously implemented conventional approaches. Proteomic analysis has been employed to elucidate global protein expression profiles, subcellular localization of gene products, and host-pathogen interactions that are central to disease pathogenesis and treatment. The high throughput nature of these techniques is in accord with the pace of drug and vaccine development that have the potential to directly reduce the morbidity and mortality of disease.
DTIC
Genome; Parasitic Diseases; Proteome

20060055569 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Rijswijk, Netherlands
Fast Detection of Ciprofloxacin Resistance - Part II
Broekhuijsen, M P; Dijk, W C van; Feb 2006; 29 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457173; TN0-DV2-2005-A222; No Copyright; Avail.: CASI: A03, Hardcopy

The fast method for detection of ciprofloxacin resistance in bacteria, as described in a previous report, is extended to additional pathogens, including Brucella melitensis (causative agent of Brucellosis), Yersinia pestis (causative agent of Plague) and Staphylococcus aureus (including MRSA strains). The method is validated with several strains of these pathogens.
DTIC
Antibiotics; Bacteria; Staphylococcus

20060055578 Army Center for Health Promotion and Preventive Medicine (Provisional), Aberdeen Proving Ground, MD USA
Diagnosis and Treatment of Diseases of Tactical Importance to U.S. Central Command
Oct 2005; 330 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457189; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This TG is compiled and edited for military physicians and physician assistants operating outside the continental USA (OCONUS) under the U.S. Central Command (USCENTCOM). The geographic area of consideration includes parts of Central and Southwest Asia, and northeastern Africa. A reasonable degree of geographic specificity is provided for conditions that show significant variability in this regard. Certain tropical diseases (such as filariasis) will most likely not be encountered in Central Asia. However, this TG is not to be considered a definitive source of medical intelligence, and the reader is referred to the Armed Forces Medical Intelligence Center (AFMIC) for the most current medical intelligence. Diseases outlined herein are primarily within the scope of primary care internal medicine. The following caveats bear mentioning: Focus is on initial, not definitive, management outside of the hospital. Assumed level of care is I or II, with a worst-case evacuation policy of 7 days. The format and distribution of this TG is aimed at providers who would generally lack laboratory support, and whose local supply of drugs, sterile supplies, and medical equipment would be extraordinarily limited. However, for most conditions, components of definitive care are briefly mentioned to help guide the reader through triage and clinical decisions that depend on feasibility of evacuation and predictability of an acceptable prognosis. Determination of physical profiles and specific duty limitations are left primarily to the provider, though some of the information in this guide may be helpful in decision support. This is not a complete guide for preventive countermeasures. Therefore, this is not the source for patient or command education. Use alternative, easily available, military sources for prevention guidance at the individual, small-unit, and command level. (see USACHPPM Web site).
DTIC
Diagnosis; Diseases; Health; Medical Services; Military Operations; Physicians

20060055604 Army Medical Research Inst. of Infectious Diseases, Fort Detrick, MD USA
Efficacy of rSEB Vaccine and CpG ODN Administered by Inhalation in Monkeys
Roy, Chad J; Nov 19, 2003; 27 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-02-4-NN-049
Report No.(s): AD-A457234; No Copyright; Avail.: CASI: A03, Hardcopy

Introduction/concept: Staphylococcal enterotoxins (SEs) family of exotoxins (23-29 kDa) produced Staphylococcus aureus categorized as a superantigen stimulate T cells release of cytokines (e.g., interferon- , IL-6 and TNF-) ' Primates/humans very sensitive to SEB due to MHC class II binding affinities ' MHC polymorphisms within human populations contributes to individual differences in susceptibility to the effects of SEB Inbred mice differ in MHC alleles results in varying sensitivities to SEB rodents are not very susceptible ' A recombinant SEB vaccine (rSEBv) developed at USAMRIID protected both rodents and nonhuman primates from lethal aerosols of SEB enteric effects observed in vaccinees May stem from lack of mucosal immunity against SEB Both systemic and mucosal immunity is thought to be important when protecting against SEB A proteosome-toxoid SEB vaccine admin. mucosally to monkeys resulted in 100% protection against SEB aerosol challenge and an overall reduction of enteric effects, ' this observation was not quantifiable (Lowell et al., 1996). DTIC

Immunology; Monkeys; Respiration; Vaccines

20060055615 Texas Univ., Houston, TX USA
The Clinical Development of Thalidomide as an Angiogenesis Inhibitor Therapy for Prostate Cancer
Logothetis, Christopher J; Oct 2004; 11 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-01-1-0069
Report No.(s): AD-A457249; No Copyright; Avail.: CASI: A03, Hardcopy

The purpose of this award is to evaluate the: 1) Safety and toxicity and neo-adjuvant thalidomide therapy prior to radical prostatectomy in patients with locally advanced prostate carcinoma (PCa); 2) Efficacy of neoadjuvant thalidomide treatment, as measured by the rate of tumor reduction/PSA decline; 3) Qualitative measurements of the in vivo effect of thalidomide therapy on the Endothelial and Epithelial compartment. Significance: The ability to assess in vivo the effects of thalidomide as well as identify surrogate markers of anti-angiogenic activity is invaluable to the design of new effective therapies. Prior to the DODs final decision (April 2002) to sponsor the correlative studies proposed in the grant 18 patients had been entered in this study. Their clinical information I attached. Pending some additional HSRRB required amendments, the patients' research tissue was stored but the funds awarded were not used to perform any of the studies until we obtained the final DOD approval. After April 2002 (when DOD was cited as a partial sponsor) and until we solved all the remaining issues and obtained DOD clearance to proceed (912003) we held accrual in this trial. We have re-activated the study and are confident that we will complete patient accrual within I year. We are requesting a no-cost extension of I year to allow completion of the planned studies.
DTIC

Angiogenesis; Cancer; Inhibitors; Prostate Gland; Therapy

20060055623 Woods Hole Oceanographic Inst., MA USA
Experimental Measures of Blast and Acoustic Trauma in Marine Mammals
Ketten, Darlene R; Feb 29, 2004; 12 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N000149711030
Report No.(s): AD-A457264; No Copyright; Avail.: CASI: A03, Hardcopy

Blast traumas are essentially mechanical responses, therefore blast effects are inducible and measurable in post-mortem specimens. To determine onset of damage zones for blast trauma in marine mammals, fresh post-mortem specimens were implanted with pressure gages, CT scanned, and exposed to underwater blast pressures of 10-300 psi. Following exposures, specimens were rescanned and necropsied by a team of blast pathology specialists blinded to test pressures. All procedures were documented by UW video and still photography. The results show severity and type of impacts are mass-dependent and correlated with received psi. Classic blast damage was found in all tissues. Some organs unique to cetaceans have distinct damage patterns that may be diagnostic in UW blast cases. For the smallest species, safe margins are in the 10-12 psi received pressure range; for larger species the ranges can be 20-25 psi. Important issues remaining to be tested include near field vs. far field loading effects, exponential vs sinusoidal bursts, and synergistic effects of rate of pressure increase, peak pressure, waveform and duration.
DTIC

Acoustics; Animals; Explosions; Injuries; Marine Biology; Marine Mammals

20060055634 Naval Postgraduate School, Monterey, CA USA
Radio Frequency Identification (RFID) for Naval Medical Treatment Facilities (MTF)
Macalanda, Eduardo C; Sep 2006; 145 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457286; No Copyright; Avail.: CASI: A07, Hardcopy

The application of Radio Frequency Identification (RFID) technology in hospitals is modest primarily due to cost and policy issues. Similar to the evolution of other electronic technologies, unit costs for components have been dramatically reduced in the past few years. Despite the reduction in costs, RFID technology has not yet achieved the tipping point of economic rationality for adoption at most healthcare organizations. Although the technology has been primarily applied to asset management and supply chain applications, Navy Medicine stands to gain tremendous benefit if this technology could be successfully implemented for staff and patient tracking in addition to inventory management. The purpose of this thesis was to conduct a review of RFID technology and components that could fit into the Navy Medicine's structure. The study explored the implementation requirements associated with the deployment in other industries that could be used as benchmarks for Navy Medicine implementation. Different technological architectures were described to illustrate the various techniques that could be used for creating the opportunity to automate administration, reduce errors and improve security for both patients and staff.

DTIC

Health; Medical Services; Military Operations; Modulation Transfer Function; Radio Frequencies

20060055643 Naval Postgraduate School, Monterey, CA USA
Hurricane Katrina: Utilization of Private, Non-Governmental Health Professionals Time for New Strategies
Scott, Linda J; Sep 2006; 91 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457308; No Copyright; Avail.: CASI: A05, Hardcopy

This thesis focuses on the medical as part of the public health response to Hurricane Katrina, specific to the issues of the private, non-governmental health professional. A brief survey was completed by 39 state level Bioterrorism Hospital Coordinators. Information obtained highlights the issues of the inability to deploy these private health professionals. Traditional governmental mutual aid mechanisms do not cover private non-governmental health professionals for workers compensation and death benefits. A review of the potential deployment mechanisms provides insight to the challenges and complexity specific to private health professionals. The motivation for volunteerism highlights the importance of targeting volunteer activities to the motivation of the individual volunteer. Investigating the impact thwarting the private, nongovernmental health professionals may have on future planning and response activities reinforce the need to modify the structures currently in place. The National Response Plan stresses the importance of including private industry into emergency preparedness and response strategies. This thesis outlines a strategy to pilot a project working with an established state volunteer registry by providing mechanisms to federalize those pre-identified, pre-credentialed volunteer health professionals. Once completed, this pilot could be expanded to other states ensuring a solid mechanism to quickly and safely mobilize this critical response discipline.

DTIC

Health; Hurricanes; Medical Services; Public Health; United States

20060055656 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA
Catalytic Enzyme-Based Methods for Water Treatment and Water Distribution System Decontamination. 1. Literature Survey
DeFrank, Joseph J; Jun 2006; 73 pp.; In English
Report No.(s): AD-A457330; ECBC-TR-489; XJ-EPA-600/1; No Copyright; Avail.: CASI: A04, Hardcopy

Many special considerations are needed in the application of enzymes to contaminated drinking water systems. Because of the large volumes of water contained in water distribution and treatment systems, a decontaminant will need to be active for a much longer time than in military operations. As drinking water flows very quickly in pipes, methods need to be developed to ensure that the enzymes maintain sufficient contact with the contaminated water or materials. The goal of this project is to identify, develop, and evaluate at least one enzyme-based method for treating flowing contaminated water and one enzyme-based method for decontaminating drinking water pipes. A thorough literature search was undertaken to fully identify the potential of enzymes to treat contaminated drinking water and/or to decontaminate distribution systems equipment. The literature search considered the potential application of enzymes to a large range of possible water contamination scenarios, from groundwater to drinking water and from toxic industrial chemicals to chemical and biological warfare agents.

DTIC

Decontamination; Enzymes; Potable Water; Surveys; Water; Water Treatment

20060055683 California Univ., Los Angeles, CA USA

DNA MIcroarray-Assisted Modeling of Metabolic and Regulatory Networks With Applications to Bio-Defense

Liao, James C; Roychawdhury, Vwani; Sep 2006; 63 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8750-01-2-0557; Proj-BIOC

Report No.(s): AD-A457394; No Copyright; Avail.: CASI: A04, Hardcopy

During the course of the project four software tools for BioSPICE were developed. These include Network Component Analysis (NCA), GeneScreen, 1cDNA, and MIcroArray Experimental Spice (MIAMESpice). NCA uses available connectivity information between genes and transcriptional factors and gene expression level time course data (obtainable through DNA microarray experiments) to estimate parameters and infer a gene transcriptional network through a Matlab analysis routine. GeneScreen processes gene expression data with a collection of computational statistic routines to extract significant gene association patterns. 1cDNA estimates confidence intervals for messenger RNA, mRNA expression levels in microarray experiments, including elimination of extreme outliers, quality filtering, normalization of the log10 signal intensity ratios, and assessment of expression levels. MIAMESpice packages raw and normalized data files from a set of related microarray experiments, saving all associated data from an experiment (or set of experiments) into one archive file. Users can also enter experimental annotations, array design information, and array design files.

DTIC

Deoxyribonucleic Acid; Gene Expression; Mathematical Models; Metabolism; Network Analysis; Software Development Tools

20060055687 Sloan-Kettering Inst. for Cancer Research, New York, NY USA

Novel Protein Microarray Technology to Examine Men with Prostate Cancer

Lilja, Hans; Dec 2005; 69 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-05-1-0124

Report No.(s): AD-A457402; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The authors developed a novel macro and nanoporous silicon surface for protein microarrays to facilitate high-throughput biomarker discovery, and high-density protein-chip array analyses of complex biological samples. This surface offers 3D-surface enlarging properties and spot confinement, enabling both highly sensitive assays and high-density arrays with high precision. Relative standard deviation (RSD) of signal intensity both within and between chips was less than 20%. The detection limit and dynamic range of the novel protein chip surface was assessed with monoclonal anti-PSA IgG. Lower limit of detection was approximately equal to 0.7 ng/mL (26 pM) with linear detection (dynamic range) up to 104-fold higher levels. The authors also developed microfluid-nanovial arrays to enable rapid proteolytic digestion linked to matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF) mass spectrometry. It uses minute amounts of sample and enhances both speed and accuracy in clinical applications of proteomics techniques, Automated picoliter microdispensing allows for precise fluid handling in the microarray format. To assess this platform in a putative clinical application, two prostate cancer biomarkers, PSA and human kallikrein 2 (hK2) were digested at levels of 100 fmol (PSA), 20 fmol (PSA), and 8 fmol (hK2). All biomarker digestions were completed in less than 30 seconds, with successful MS-identification in the porous nanovial setting.

DTIC

Antibodies; Biomarkers; Blood; Cancer; Chemical Analysis; Human Beings; Males; Markers; Porous Silicon; Prostate Gland; Proteins

20060055711 Chicago Univ., Chicago, IL USA

Post-Transcriptional Regulation of MKK4-A Stress Signaling Kinase Implicated in the Regulation of Metastatic Growth

Rinker-Schaeffer, Carrie W; Apr 2006; 23 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W81XWH-04-1-0852

Report No.(s): AD-A457439; No Copyright; Avail.: CASI: A03, Hardcopy

Mitogen-activated protein kinase kinase 4 (MKK4) is a dual-specificity kinase with a critical role in regulating the activity of the c-Jun-N-terminal kinase (JNK) and p38 kinases. We identified a novel biological function for MKK4 in the regulation of growth of ovarian and prostate cancer metastases. Previous clinical correlative studies showed that MKK4 protein levels were reduced in high-grade prostate cancer and prostate and ovarian cancer metastases as compared to normal tissue controls. These findings prompted the investigation of mechanism(s) responsible for down-regulation of MKK4 in a panel of cancer cell lines. Initial studies found that low levels of MKK4 protein did not correlate with either exon deletion or decreased levels of MKK4 mRNA, suggesting that MKK4 protein levels were regulated by either reduced translation or reduced protein

stability. The endogenous MKK4 protein was very stable and did not appear to be subject to altered proteolysis. Instead, MKK4 biosynthesis appeared may be regulated by altered translation. In support of this assertion, we found that the cytosolic MKK4 mRNA was shifted towards active polysomes in cells with higher levels of MKK4 protein, suggesting that MKK4 mRNA was translated more efficiently in these cells. This study supports a novel mechanism for the regulation of MKK4 protein levels. Further, these findings have potential therapeutic implications for modulating the expression of an important signaling kinase involved in the regulation of metastatic growth.
DTIC
Cancer; Metastasis; Ovaries; Prostate Gland; Proteins; Ribonucleic Acids

20060055714 Library of Congress, Washington, DC USA
AIDS in Africa
Cook, Nicolas; Mar 9, 2006; 20 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457443; CRS-IB10050; No Copyright; Avail.: CASI: A03, Hardcopy

Sub-Saharan Africa ('Africa' hereafter) has been more severely affected by AIDS than any other part of the world. In 2005, the United Nations reports, there were about 25.8 million HIV-positive adults and children in the region, which has about 11.3% of the world's population but over 64% of the worldwide total of infected persons. The overall adult rate of infection in Africa is 7.2%, compared with 1.1% worldwide. Nine southern Africa countries have infection rates above 10%. Ten African countries with the largest infected populations account for over 50% of infected adults worldwide. By the end of 2005, an estimated 27.5 million Africans had died of AIDS since 1982, including 2.4 million in 2005. AIDS has surpassed malaria as the leading cause of death in Africa, and it kills many times more Africans than war. In Africa, 57% of those infected are women. U.S. concern over AIDS in Africa grew in the 1980s, as the epidemic's severity became apparent. Legislation enacted in the 106th and the 107th Congresses increased funding for worldwide AIDS programs. P.L. 108-25, signed into law on May 27, 2003, authorized $15 billion over five years for international AIDS programs. President Bush announced his Emergency Plan for AIDS Relief (PEPFAR) in his 2003 State of the Union message. Twelve of 15 PEPFAR 'focus countries' are in Africa. Under the FY2007 budget request, the 12 countries would receive a 61% boost in AIDS-related aid, to $1.99 billion, under the State Department's Global HIV/AIDS Initiative account. Nonetheless, activists and others urge that more be done, given the scale of the African pandemic.
DTIC
Africa; Signs and Symptoms; Viruses

20060055717 House Ear Inst., Los Angeles, CA USA
Neurofibromatosis Type 2 (NF2) Natural History Consortium
Slattery, William H; Jan 2006; 12 pp.; In English
Contract(s)/Grant(s): DAMD17-01-1-0710
Report No.(s): AD-A457448; No Copyright; Avail.: CASI: A03, Hardcopy

Neurofibromatosis 2 (NF2) is an autosomal disorder characterized by the development of multiple tumors within the brain and spinal canal. The purpose of the study is to define the growth rates and clinical course of tumors associated with NF2-affected individuals. An international consortium of clinical centers and expertise in NF2 will be developed, further expanding the infrastructure developed in the Natural History of Vestibular Schwannomas in NF2 US Army grant. We will standardize the volumetric analysis of intracranial and spinal tumors, assess the patients audiological, neurological, and ophthalmological functioning, and analyze molecular and clinical features of the disease over the course of 4 years. Ninety-six subjects are enrolled in the study. Of the 96 subjects enrolled 26 have withdrawn. Of the subjects who have completed and have had the scans sent to WorldCare for analyzing for Year 1 84 (98%) cranial exams and 78 (91%) spinal exams have been received. Of the subjects who have completed the Year 2 exams, 74 (95%) cranial exams and 62 (79%) spinal exams have been sent. Of the subjects who have completed the Year 3 exams, 48 (91%) cranial exams and 40 (75%) spinal exams have been sent. Of the subjects who have completed the Year 4 exams, 23 (92%) cranial exams and 19 (76%) spinal exams have been sent. WorldCare has analyzed, and sent HEI 83 (99%) Year 1 Cranial MRI CRFs, 63 (85%) of the Year 2 Cranial MRI CRFs, 45 (94%) of the Year 3 Cranial MRI CRFs, 21 (91%) of the Year 4 Cranial MRI CRFs. WorldCare has analyzed, and sent HEI 76 (97%) of the Year 1 Spinal MRI CRFs, 46 (74%) of the Year 2 Spinal MRI CRFs and 33 (83%) of the Year 3 Spinal MRI CRFs, 14 (75%) of the Year 4 Spinal MRI CRFs.
DTIC
Clinical Medicine; Nervous System; Ophthalmology; Organizations; Vestibules

20060055730 Meharry Medical Coll., Nashville, TN USA

Is Peripheral Benzodiazepine Receptor (PBR) Gene Expression Involved in Breast Cancer Suppression by Dietary Soybean Protein?

Das, Salil; Jun 2006; 25 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0352

Report No.(s): AD-A457465; No Copyright; Avail.: CASI: A03, Hardcopy

Among many environmental factors, dietary factors play an important role in the development and progression of breast cancer. It has been established that women in Asian countries consume more soy protein than women in the USA and that the incidence of breast cancer in women in Asian countries is generally lower. While this association is correlative and no causative effect has been demonstrated, an increasing body of evidence suggests that soy protein consumption may be protective, thus reducing the risk of breast cancer development. The purpose of this study was to elucidate the molecular mechanism(s) by which dietary soy protein may offer its tumor suppressing effect. We developed a breast cancer model in female rats in which soy protein replaced case in as the dietary source of protein to investigate whether tumor development can be counteracted. The results showed a delay in the tumor formation and also a protection against the aggressiveness of the tumors in the soy protein group than in the casein group. The aggressive phenotype expression of breast cancer was correlated with the increased expression of a particular gene, peripheral benzodiazepine receptors (PBRs), implicating PBRs to be considered as a cancer promoting gene. Furthermore, the aggressive phenotype expression of breast cancer, such as increased ligand binding, increased gene expression and possible mutation(s), PBRs-mediated cholesterol transport into the nucleus, and NTPase activity of breast epithelial cells was controlled by dietary consumption of soy protein. Our studies also revealed that PBRs may play an important role in angiogenesis, and expression of some key angiogenic factors, such as b-FGF and VEGF in breast tumors was lower in soy protein group than in case in group. Therefore, it can be suggested that the breast cancer suppressing effect of dietary soy protein is mediated by inhibition of PBRs-mediated angiogenic signaling.

DTIC

Breast; Cancer; Diets; Gene Expression; Mammary Glands; Proteins; Soybeans

20060055731 Fox Chase Cancer Center, Philadelphia, PA USA

The Nuclear Death Domain Protein p84N5; a Candidate Breast Cancer Susceptibility Gene

Godwin, Andrew; May 2006; 21 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0312

Report No.(s): AD-A457466; No Copyright; Avail.: CASI: A03, Hardcopy

Besides family history of cancer and an individual's age, no single etiologic factor can identify women at an increased risk for the disease. Approximately 10% of all cases of breast cancer exhibit a familial pattern of incidence. Efforts to identify the genetic basis of familial breast cancer reached fruition some years ago, when the breast-cancer susceptibility genes BRCA1 and BRCA2 were identified. However, recent studies have suggested that mutations in these genes are associated with a smaller number (20 to 60%) of hereditary breast cancer families than originally estimated, especially in studies that have been based on population-based family materials. Several groups, including ours, are searching for additional breast cancer susceptibility genes using whole genome scanning approaches, but the success of many of these approaches depends on the underlying heterogeneity of the remaining cancer susceptibility loci. The failure, to date, to identify additional breast cancer susceptibility genes associated with a high risk of disease suggests that more than one may exist. We have taken the approach that the next BRCA genes will be those that encode for proteins whose functions are linked to important cell regulatory pathways. We have recently found one such candidate BRCA3 protein, referred to as TREX84 (p84N5).

DTIC

Breast; Cancer; Death; Genetics; Mammary Glands; Oncogenes; Proteins

20060055732 California Univ., San Francisco, CA USA

Exploring Early Detection Methods: Using the Intraductal Approach to Predict Breast Cancer

Baltzell, Kimberly; Dodd, Marylin; Jun 2006; 49 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0354

Report No.(s): AD-A457467; No Copyright; Avail.: CASI: A03, Hardcopy

Breast cancer is a leading cause of death among women in the U.S. Early diagnosis is believed to be key to minimizing mortality thus techniques to identify high-risk women are essential. This study is using an interdisciplinary approach to conduct a follow-up study on a group of 3413 women from the Santa Barbara Ca area who had breast fluids drawn between 1970-1990 using one of the following three methods: nipple aspiration ductography or ductal lavage. The follow-up study will determine if abnormal cytologic findings from the past are associated with a higher incidence of breast cancer development

during the later years. Follow-up methods include direct contact using questionnaires linkage with the California Cancer Registry (CCR) linkage with the California Department of Vital Statistics and the National Death Index. Data has been completed on 539 subjects all mailings have been completed. Follow-up phone calls have begun and all follow up and data entry is to be completed by June 15 2006. 380 cases of breast cancer have been identified via California Cancer Registry and a final merge will be done in June 2006. Analysis of data will begin in July 2006.
DTIC
Breast; Cancer; Cytology; Detection; Mammary Glands

20060055733 State Univ. of New York, Albany, NY USA
Integrating Geographic Information Systems (GIS) Into Breast Cancer Epidemiologic Research
Han, Daikwon; Feb 2006; 71 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-03-1-0475
Report No.(s): AD-A457468; No Copyright; Avail.: CASI: A04, Hardcopy

The objective of this postdoctoral training research is an integration of GIS and a spatio-temporal perspective into breast cancer research of the relationship between environmental exposures and breast cancer risk. We have completed collection of historic traffic information, and updating of the lifetime residential histories for our dataset for the breast cancer cases and controls. I have also been involved in analysis and writing of a classic epidemiologic research paper and have participated in several workshops as a part of epidemiology training. The development of a theoretical framework measuring similarity and difference of individual's lifetime residential history was completed, and a GIS-based traffic model was established. These data and epidemiologic evidence were used for further analyses, based on the models of geospatial lifeline for the estimation of lifetime residential exposures to PAHs and breast cancer risk. Findings from these studies indicate that environmental exposures in early life may be associated with breast cancer risk. Since we found evidence of association between PAHs exposures in relation to breast cancer risk, especially PAH exposures during sensitive time periods in early life, we strongly believe that models of geospatial lifeline can be effectively used for the estimation of lifetime residential exposures to PAHs and breast cancer risk.
DTIC
Breast; Cancer; Epidemiology; Geographic Information Systems; Mammary Glands; Medical Science

20060055734 North Shore Univ. Hospital, Manhasset, NY USA
Role of Rac GTPases in Chemokine-Stimulated Breast Carcinoma
Symons, Marc H; Jul 2006; 15 pp.; In English
Contract(s)/Grant(s): W81XWH-05-1-0323
Report No.(s): AD-A457469; No Copyright; Avail.: CASI: A03, Hardcopy

CXCR4 is highly expressed in breast carcinoma cells and is essential for breast cancer metastasis to the lung. CXCR4 is the receptor for CXCL12, a chemokine that is enriched in organs that are targeted by metastatic breast cancer, such as lung and liver. The molecular mechanisms of CXCR4-mediated breast cancer metastasis however are poorly understood. In this project we test the hypothesis that Rac proteins are essential for CXCR4-mediated breast carcinoma cell proliferation and survival, thereby contributing to breast cancer metastasis. The Rac proteins examined comprise Rac1, Rac1b and Rac3. In Task 1, we investigate the role of Rac proteins in CXCL12-regulated breast carcinoma cell proliferation and survival in vitro. In Task 2, we will determine the contribution of these Rac proteins to breast cancer metastasis in vivo. These approaches should allow us to validate Rac-controlled signaling proteins as novel therapeutic targets for metastatic breast cancer. The research performed in this first year of funding largely pertains to Task 1. We showed that CXCL12 stimulates Rac1 activity in breast carcinoma cells, suggesting that Rac1 is likely to play a role in CXCL12- mediated functions in these cells. We also discuss efforts to specifically downregulate the Rac1b splice form.
DTIC
Breast; Cancer; Liver; Lungs; Mammary Glands; Metastasis

20060055736 Sloan-Kettering Inst. for Cancer Research, New York, NY USA
Modifiers of the Efficacy of Risk-Reducing Salpingo-Oophorectomy for the Prevention of Breast and Ovarian Cancer in Carriers of BRCA1 and BRCA2
Kauff, Noah D; May 2006; 25 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-03-1-0375
Report No.(s): AD-A457472; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The principle investigator was funded via a Physician-Scientist Training Award to participate in a comprehensive training plan to foster the transition to independent clinical breast cancer researcher. This plan included 1) conduct of a prospective study examining modifiers of the efficacy of risk-reducing salpingo-oophorectomy for the prevention of breast and ovarian cancer in carriers of BRCA mutations; and 2) participation in didactic coursework and structured training in research methodology, biostatistics, molecular biology, and ethics. Progress from 5/1/2005 - 4/30/2006 includes: 1) Presentation of the first prospective data able to examine the efficacy of risk-reducing salpingo-oophorectomy for the prevention of BRCA-associated breast and gynecologic cancer when BRCA1 and BRCA2 mutation carriers are examined separately; 2) Publication of the first prospective data examining the risk of breast and ovarian cancer in BRCA-negative hereditary breast cancer families; and 3) Publication of a robust method for testing for BRCA1 and BRCA2 founder mutations in formalin-fixed paraffin-embedded tissue; 4) Continuation of formal training in genetic epidemiology laboratory methods, outcomes analysis, and conduct of clinical research; and 5) Receipt of an R03 award (1 R03 CA119265-01 to N.D.K.) to conduct a genetic epidemiologic, computational and structural analysis of BRCA2 variants of uncertain significance.
DTIC
Breast; Cancer; Genes; Mammary Glands; Ovaries; Prevention; Risk

20060055738 Columbia Univ., New York, NY USA
Design and Testing of Bi-Functional, P-Loop-Targeted MDM2 Inhibitors
Prives, Carol L; Mar 2006; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-05-1-0297
Report No.(s): AD-A457474; No Copyright; Avail.: CASI: A03, Hardcopy

This proposal is to design and evaluate a novel class of bifunctional MDM2 inhibitors, based on the discovery that nucleotides can bind to the P-loop of MDM2 and cause its relocalization to the nucleolus. Such bifunctional compounds will be designed to target MDM2, but not other P-loop-containing proteins. This approach represents a new strategy for the inhibition of MDM2 function and the treatment of breast cancer. During the first year of this grant we have (1) cloned and expressed GST-fused Mdm2 wild-type RING domain and its point mutations; (2) procured and tested all commercially available fluorescently labeled ATP analogs and identified 2 specific high affinity binders to the Mdm2 RING domain; (3) created a structure-activity relationship model (SAR) of the Mdm2 RING domain based on filter binding data of known ATP analogs for use in structure-based virtual screening; (4) developed high-throughput filters to exclude toxic and reactive compounds from commercial compound libraries, and (5) performed virtual screen on pre-filtered compound libraries and retrieved 800 candidate compounds for testing. Going forward we will build on these accomplishments to identify and optimize novel compounds that interact with and inhibit the E3 ligase activity of Mdm2.
DTIC
Breast; Cancer; Inhibitors; Mammary Glands; Proteins

20060055739 Lankenau Inst. of Medical Research, Wynnewood, PA USA
Breast Cancer Suppression by IDO Inhibitors
Prendergast, George C; May 2006; 64 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-03-1-0332
Report No.(s): AD-A457476; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Immune escape is a crucial feature of cancer progression about which little is known. Elevation of the immunomodulatory enzyme indoleamine 2,3-dioxygenase (IDO) in tumor cells can facilitate immune escape. Not known is how IDO becomes elevated or whether IDO inhibitors will be useful for cancer treatment. Based on evidence that Bin1 loss elevates IDO and enhances immune evasion by tumor cells, we hypothesized that reversing IDO activity with chemical inhibitors would enhance immune recognition and rejection of tumor cells. We aimed to (1) generate an IDO antibody to assess its expression in normal and malignant breast tissue, (2) identify pharmacologically attractive 'lead' inhibitors of IDO, and (3) evaluate the ability of compounds with IDO inhibitory activity to block tumor growth in the MMTV-neu mouse model of breast cancer. In Year 3 of this project we report progress beyond the Aims as originally proposed, which were completed last year. Briefly, we report progress on new inhibitors and findings related to compound formulation, mechanism, and efficacy. This highly successful project has helped drive the efforts of a multidisplinary team of government, biotech, and academic groups who are collaborating to move a lead IDO inhibitor into Phase I clinical trials later this year.
DTIC
Breast; Cancer; Chemical Reactions; Drugs; Immunity; Inhibitors

20060055744 Integrated Wave Technologies, Inc., Fremont, CA USA
Effects of Techa River Radiation Contamination on the Reproductive Function of Residents
Kosenko, M M; Nov 2006; 80 pp.; In English
Contract(s)/Grant(s): DTRA01-03-D-0022
Report No.(s): AD-A457491; No Copyright; Avail.: CASI: A05, Hardcopy

Studies of the effects of radiation on reproductive function in large populations have revealed uncertain and sometimes contradictory results. Radiation from nuclear weapons has been implicated in transient amenorrhea, earlier menopause, and altered sex ratios in offspring but no difference from control populations with regard to fertility, spontaneous abortions, and stillbirth rates was noted. Russian studies of radiochemical plant employees exposed to external gamma radiation and incorporation of Pu239 have shown unstable hypomenorrhea, oligomenorrhea, and, in chronic radiation syndrome (CRS) patients, increased spontaneous abortions but no effects on pregnancy or labor. This study reviews the effects of chronic external and internal radiation exposure on the populations living along the Techa River, including persons with CRS. Although delayed menarche was noted, earlier menopause was not, unlike in Japan. Sex ratios of offspring were altered, the direction depending upon whether the father or mother was irradiated. The statistical means for certain neonatal physical parameters (length, weight, head circumference) were not changed if the parents were irradiated, but deviations in both directions from the mean were associated with increased exposure. Congenital developmental defects of offspring of CRS patients were increased but not overall neonatal death rates.
DTIC
Contamination; Fertility; Radiation Effects; Radiation Sickness; Rivers

20060055745 Integrated Wave Technologies, Inc., Fremont, CA USA
The Pathogenesis and Therapy of Combined Radiation Injury
Boudagov, R S; Oulianova, L P; Tsyb, A F; Oct 2006; 40 pp.; In English
Contract(s)/Grant(s): DTRA01-03-D-0022-0015; Proj-BD
Report No.(s): AD-A457493; No Copyright; Avail.: CASI: A03, Hardcopy

Cytokine production by different kinds of macrophages, and serum IL-1Beta, TNF-alpha, IL-6, IL-3, and GM-CSF levels, were evaluated in a murine model of combined injury (whole body irradiation + thermal burn). The results were compared with systemic cytokine responses to radiation or burn alone. The obtained data suggest that increased IL-6 levels may play an important role in the pathogenesis of combined injury. Single injection of extract from Serratia marcescens (Imuvert) or synthetic trehalose dicorynomy-colate improved hematological status, enhanced the serum IL-6 levels, but did not promote survival in mice. On the other hand, heat-killed Lactobacillus acidophilus demonstrated a weak effect on cytokine response, did not improve severe hematological disorders, but none the less increased 30 days survival in mice up to 100%, versus 50% in the untreated group.
DTIC
Biological Effects; Injuries; Pathogenesis; Physiological Responses; Radiation Injuries; Therapy

20060055746 Pennsylvania Univ., Philadelphia, PA USA
Using the Internet to Collaborate with Consumers in Redefining a Psychosocial Agenda for Families with Hereditary Breast Cancer
Coyne, James C; Jun 2006; 9 pp.; In English
Contract(s)/Grant(s): W81XWH-04-1-0562
Report No.(s): AD-A457495; No Copyright; Avail.: CASI: A02, Hardcopy

Women at increased risk of Hereditary Breast and Ovarian Cancers (HBOC) and their families face dilemmas about testing, risk management and family dissemination of results on their own. They face problems regarding the accuracy of the information they have received, difficulties accessing new information and specialized services, and resistance and misinformation from inadequately informed health care professionals in the community. Thus, they are forced to develop their own informal means of individual and communal coping and to identify and access appropriate formal services without guidance. The FORCE website (www.facingourrisk.org) serves important functions in the sharing of information, provision of support and active problem-solving, and in normalizing and validating the women's response to their predicament. This project is intended to yield the basis for clinically useful tools to reach out to these women and better address their unmet needs. It will identify the specific tasks with which they need assistance and the forms that competent coping takes. Results will give impetus to new clinical, public policy, and research agendas for women and their families living with inherited risk of cancer. To date, we have combined quantitative and qualitative analyses to identify and examine one of the most frequently discussed topics on the message boards; decision-making regarding the use of hormone replacement therapy (HRT) following

prophylactic oophorectomy (PO). Other papers in progress include the decision to undergo prophylactic mastectomy and subsequent decisions surrounding reconstruction, the lived experience of prophylactic mastectomy, and sense of self and renegotiation of identity following prophylactic mastectomy.
DTIC
Breast; Cancer; Consumers; Genetics; Hormones; Internets; Mammary Glands; Medical Services; Social Factors

20060055747 Boston Univ., Boston, MA USA
Towards the Early Detection of Breast Cancer in Young Women
Oberai, Assad A; Oct 2005; 59 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-04-1-0763
Report No.(s): AD-A457496; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Although mammography is a valuable screening tool for breast cancer, it is less effective in younger women. Further, cancers in this age group are aggressive, and survival rates are lower. There is need for an effective screening technique to complement clinical and self breast exams. Elasticity Imaging (EI) could assume this role, as it relies on extracting information from ultrasound images which are unaffected by the denseness of the breast. The application of EI to breast cancer detection utilizes the fact that tumors are stiffer than the surrounding tissue, and may be easily discerned in an image of the spatial variation of stiffness. We believe that in order to realize the true diagnostic potential of EI, the linear-elastic model which is typically used, must be replaced by a more realistic non-linear one. Experimental data suggests that this may lead to clearer differentiation of several important tissue types. Our long term goal is to develop and test an ultrasound-based methodology for generating multiple-parameter elasticity images of breast tissue for improved diagnosis and detection of breast cancer in young women. Our aim for this grant is to obtain proof of concept results.
DTIC
Breast; Cancer; Detection; Females; Mammary Glands

20060055748 Texas Univ., Dallas, TX USA
The Role of Semaphorin 3B (SEMA3B) in the Pathogenesis of Breast Cancer
Castro-Rivera, Emely; Apr 2006; 15 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-03-1-0188
Report No.(s): AD-A457498; No Copyright; Avail.: CASI: A03, Hardcopy

Semaphorin 33 is a secreted member of the semaphorin family important in axonal guidance which we and others have recently shown can act as a tumor suppressor by inducing apoptosis either by re-expression in tumor cells or applied as a soluble ligand. The common method of inactivation of SEMA3B is by allele loss and HDAC. We study the mechanism of SEMA3B effect on breast cancer cells. We found that vitamin D3 and TGF beta 1 can induce SEMA3B protein and promoter activation. We found that VEGF165 which is reported to bind to neuropilin (NP) significantly decreased the anti-mitotic effect of transfected or secreted SEMA3B on breast cancer cells. By contrast VEGFi2i a VEGF variant that lacks binding to NPs receptors had no effect on SEMA3B growth suppressing activities. In addition SEMA3B competed for binding of 1251-VEGF165 to lung and breast cancer cells. We also found that SEMA3B apoptotic and anti-proliferative effect on cancer lines it is in part by the inhibition of Akt pathway. In conclusion we hypothesize that VEGF165 produced by tumor cells acts as an autocrine survival factor and SEMA3B mediates its tumor suppressing effects at least in part by blocking this VEGF autocrine activity and by inhibiting the Akt pathway.
DTIC
Apoptosis; Breast; Cancer; Mammary Glands; Pathogenesis

20060055750 Burnham Inst., La Jolla, CA USA
Hypoxia as a Driving Force for Genetic Instability During Breast Tumorigenesis
Abraham, Robert T; Oct 2005; 37 pp.; In English
Contract(s)/Grant(s): DAMD17-02-1-0730
Report No.(s): AD-A457513; No Copyright; Avail.: CASI: A03, Hardcopy

The overall hypothesis that drives this project is that persistent replication stress generates mutational events in breast epithelial cells that fuel breast cancer (BCa) progression. Our model predicts that a major source of replicative stress in BCa is hypoxia, which stalls active replication forks, and selects for cells that have bypassed this S-phase checkpoint due to mutations in the ATR-hchkl pathway. The specific aims of this project are: (1) to define the role of the ATR checkpoint pathway

in hypoxia-induced cytostasis, and (2) to determine whether sensitivity to killing by certain anticancer agents. Hypoxia, Genetic Instability, Cell-Cycle Checkpoints, Cancer Chemotherapy
DTIC
Breast; Cancer; Chemotherapy; Genetics; Hypotheses; Hypoxia; Mammary Glands

20060055764 State Univ. of New York, Stony Brook, NY USA
Clinically Practical Magnetic Resonance Protocol for Improved Specifically in Breast Cancer Diagnosis
Tudorica, Luminita A; Jun 2006; 31 pp.; In English
Contract(s)/Grant(s): W81XWH-04-1-0513
Report No.(s): AD-A457533; No Copyright; Avail.: CASI: A03, Hardcopy

The purpose of this postdoctoral training award is for the PI to be trained in every aspect of conducting a research breast cancer study in a clinical setting. This study aims to improve specificity of breast cancer detection by using a combined MRI/MRS protocol. In the past year, the second year of this award, the PI has learned the details in MRI/MRS data acquisition, data analysis, recruiting and consenting patients, and is confident in performing the above tasks independently. Through close interactions with the local IRB committee and the Army Surgeon General's Human Subjects Research Review Board, the PI obtained IRB approval for this project from both parties in December 2005. Eight subjects have been recruited by the closing date of this report. The results from these eight subjects show 100% sensitivity and 100% specificity of the combined MRI/MRS protocol, which were presented as part of a poster in the 14th annual meeting of the International Society for Magnetic Resonance in Medicine.
DTIC
Breast; Cancer; Clinical Medicine; Diagnosis; Imaging Techniques; Magnetic Resonance; Mammary Glands; Protocol (Computers)

20060055765 Brigham and Women's Hospital, Boston, MA USA
Reproductive and Hormonal Risk Factors for Breast Cancer in Blind Women
Lockley, Steven; May 2006; 15 pp.; In English
Contract(s)/Grant(s): W71XWH-04-1-0553
Report No.(s): AD-A457534; No Copyright; Avail.: CASI: A03, Hardcopy

Epidemiological observations indicate that breast cancer risk is lower in visually impaired women compared to sighted women and that risk is inversely correlated with degree of visual impairment. A hypothesis to explain these findings is that blind people are less susceptible to suppression of melatonin by light exposure at night and therefore have higher levels of melatonin. Melatonin has oncostatic properties in vitro. In a survey of 12,000 blind women, we will test the hypothesis that 1) the distribution of known reproductive risk factors for breast cancer among blind women will be consistent with lower risk when compared to the general population. In a subset of 240 women, we will test the hypotheses that 2) urinary melatonin levels are lower and estrogen levels are higher among blind women with light perception compared to women without light perception; 3) melatonin levels will be higher and estrogen levels lower among totally blind women who have non-24-hour melatonin rhythms and therefore a confirmed absence of light-induced suppression of melatonin, compared to totally blind women who have 24- hour melatonin rhythms and may be affected by light. Data collection is ongoing and there are no results to report at this time.
DTIC
Blindness; Breast; Cancer; Circadian Rhythms; Females; Hormones; Mammary Glands; Melatonin; Risk

20060055771 Naval Postgraduate School, Monterey, CA USA
HIV/AIDS Prevention in Zambia: A Preliminary Study of Obstacles to Behavior Change in the Copperbelt
Nyerges, Jana R; Jun 2006; 88 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457541; No Copyright; Avail.: CASI: A05, Hardcopy

Since the 1980s, HIV prevention programs around the world have continuously expanded in attempts to meet challenges in the fight against HIV/AIDS. These programs are generally based on primary prevention, which uses Information Education and Communication (IEC) to modify individual behavior. In Africa, as in many underdeveloped countries, various country-specific studies report that a majority of the population is knowledgeable about HIV/AIDS and how to prevent transmission. Yet while research shows a relatively strong link between education and behavior modification in developed countries, that link appears to be much weaker in less developed regions, including Africa. The literature identifies social and economic factors, especially gender inequalities and poverty, as significant obstacles to behavior change. This thesis assesses

the impact of these factors in the Copperbelt region in Zambia, and finds significant evidence that both social and economic factors operate as fundamental obstacles to behavior change. These findings suggest that HIV interventions need to go beyond IEC to deal with broader community development challenges. Gender imbalances play a particularly large role, and the findings suggest a desperate need for gender-specific interventions targeting men.
DTIC
Prevention; Viruses; Zambia

20060055781 Winston-Salem State Univ., Winston-Salem, NC USA
Quality of Life and Functional Status Across the Life Course
Naughton, Michelle J; May 2006; 66 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-01-1-0447
Report No.(s): AD-A457557; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This Behavioral Center of Excellence in Breast Cancer contains three separate, but related research projects focused on breast cancer patients' quality of life and functional status. There is also a Biostatistic's Core Facility supporting all three studies. The three projects are: Project 1) Menstrual Cycle Maintenance and Quality of Life Following Treatment for Breast Cancer: A Prospective Study. This is a study of women aged 45 years and younger diagnosed with a first breast cancer. Project 2) Investigating Mechanisms to Explain Age Associated Differences in Quality of Life Among Breast Cancer Patients. This study examines psychosocial and clinical factors associated with patient's (aged 18-80+ years) coping and quality of life during the first 18 months post-diagnosis. Project 3) Research on Optimal Recovery Practices in Breast Cancer (RESTORE). This is a randomized exercise intervention trial with a lymphedema prevention program. Project 1 is a continuation of a study that was initiated in January of 1998. Projects 2 and 3 are new protocols, which will begin patient recruitment in the fall of 2002. All three studies have the potential to greatly improve the functional status and life quality of breast cancer patients during treatment and beyond.
DTIC
Breast; Cancer; Mammary Glands

20060055783 Johns Hopkins Univ., Baltimore, MD USA
Restoration of Transforming Growth Factor Beta Signaling by Histone Deacetylase Inhibitors in Human Prostate Carcinoma
Qian, Zheng D; Oct 2005; 9 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W81XWH-04-1-0839
Report No.(s): AD-A457563; No Copyright; Avail.: CASI: A02, Hardcopy

The goal of the current grant is to investigate the potential antitumor activity of histone deacetylase inhibitor MS-275 a with the activation of TGFb signaling pathway with the restoration of TGFbeta receptor II. As presented in our initial proposal, prostate cancer cell line LNCaP has reduced expression in TGFbRII, which is due to the promoter histone deacetylation Subsequent treatment with chromatin remodeling agent MS-275 was able to restore the expression of TGFbRII. We hypothesized that the restoration of TGFb signaling may contribute to the antitumor activity of MS-275. In the past a year half, we have focused our effort to identify the re-expression of TGFbRII in vivo, and investigate the antitumor activity 275 in several relevant prostate cancer model. We observed dose and time dependent upregulation of TGFbeta1 and TC LNCaP cells. A cDNA microarray of LNCaP cells (untreated vs. MS-275 treated) has been done, and the data is being analyzed. We observed the antitumor activity of MS-275 in two different models of prostate cancer xenografts. Immunohistochemistry analysis of reactivation of TGFb1 in vivo is on going.
DTIC
Cancer; Inhibitors; Prostate Gland; Restoration

20060055792 Hospital Ramon Y. Cajal, Madrid, Spain
Bioelectromagnetics 2005
Aug 14, 2006; 569 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8655-05-1-5046
Report No.(s): AD-A457577; No Copyright; Avail.: CASI: A24, Hardcopy

The Final Proceedings for Bioelectromagnetics 2005, 20 June - 24 June 2005. The Bioelectromagnetics Society (BEMS) and the European BioElectromagnetics Association (EBEA) will meet jointly in Dublin, Ireland for Bioelectromagnetics 2005. Topics include: 1) the role of electric fields in wound healing and nerve regeneration; 2) ultrashort high voltage pulses for

tumor treatment; 3) therapeutic uses of magnetic fields; 4) health effects from radiofrequency exposure; 5) RF standards and epidemiology; and 6) EMF in our environment. There are 3 special sessions in the program: Therapeutic uses of magnetic fields extremely high voltage nanosecond pulses and their biological effects and electric fields in development and medicine. DTIC

Electromagnetic Fields; Healing; Therapy

20060055808 Air Force Research Lab., Wright-Patterson AFB, OH USA

Cell-Like Entities: On the Boundary Between Non-Living and Living

Frazier, John M; Kelley-Loughnane, Nancy; Rodriguez, Mauricio; Viveros, Leamon; Trott, Sandra; Paliy, Oleg; Tomczak, Melanie; Apr 2006; 29 pp.; In English

Contract(s)/Grant(s): Proj-2312

Report No.(s): AD-A457599; AFRL-HE-WP-TP-2006-0069; No Copyright; Avail.: CASI: A03, Hardcopy

In the last few decades, scientists have learned how to manipulate the basic components of life, how to design biomolecular networks, how to evolve biomolecules with unique characteristics and how to direct and control cellular processes at the molecular level. Using this knowledge as a foundation, it is theoretically possible to conceive of designing biological constructs, which we refer to as cell-like entities (CLEs), that use custom engineered biological machinery to accomplish specified tasks. The practical challenge is: Can we fabricate biological constructs for specific purposes using the same principles and components found in natural biological systems? For example, can CLEs be designed to detect very low levels of specific chemicals and fluoresce to indicate their presence; can they be designed to synthesize functional chemicals on demand, or can they use engineered metabolic pathways to detoxify environmental pollutants? The building of CLEs that could accomplish these goals would result in fundamental breakthroughs in exploiting our understanding of cellular control systems and biochemical information processing. The concept of the CLE is based on understanding how the biochemical reactions network that we call a living cell functions, how is it controlled and what are the key processes and components that will provide unique functions when integrated. The goal is not to create a living organism, but to create a biological construct that utilizes the essence of living systems to provide a wide array of solutions to current technological and medical challenges. DTIC

Biochemistry; Boundaries

20060055829 Duke Univ., Durham, NC USA

A Computer-Aided Diagnosis System for Breast Cancer Combining Digital Mammography and Genomics

Jesneck, Jonathan; Lo, Joseph; May 2006; 88 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W82XWH-05-1-0292

Report No.(s): AD-A457641; No Copyright; Avail.: CASI: A05, Hardcopy

This study investigated a computer-aided diagnosis system for breast cancer by combining the following three data sources: mammogram films, radiologist-interpreted BI-RADS descriptors, and proteomic profiles of blood sera. In this first year of the fellowship, we have collected calcification and mass data sets. To these data sets we have applied the following classification algorithms: Bayesian probit regression, linear discriminant analysis, artificial neural networks, as well as a novel method of decision fusion. For the calcification data set, the classifiers' performances under 100-fold cross validation were AUC = 0.73 for Bayesian probit regression, 0.68 +/- 0.01 for LDA, 0.76 +/- 0.01 for ANN, 0.85 +/- 0.01 for decision fusion . For the mass data set, the classifiers' performances under 100-fold cross validation were AUC = 0.94 for Bayesian probit regression, 0.93 +/- 0.01 for LDA, 0.93 +/- 0.01 for ANN, 0.94 +/- 0.01 for decision fusion. Decision fusion had a slight performance gain over the ANN and LDA (p = 0.02), but was comparable to Bayesian probit regression. Decision fusion significantly outperformed the other classifiers (p \h 0.001).

DTIC

Bayes Theorem; Breast; Cancer; Computer Techniques; Diagnosis; Discriminant Analysis (Statistics); Mammary Glands

20060056134 Defence Research and Development Suffield, Suffield, Alberta Canada

ChromaBlast - a Data Visualization Tool

Ford, Barry N; Shei, Yimin; Bjarnason, Stephen; Richardson, Catharine; Jun 2006; 34 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457115; DRDC-SUFFIELD-TM-2006-049; No Copyright; Avail.: CASI: A03, Hardcopy

Experimental systems in biology now have the capability to produce massive amounts of numerical data. Large scale analysis of such data is facilitated by costly integrated software packages. Often however, such packages have limited or no

data reduction or manipulation tools, such as basic spreadsheet functionality. Thus the researcher is compelled to utilize a competent spreadsheet package, such as Microsoft Excel, then export the data set to analysis software. Reformatting data or reducing it for analysis must then be redone in the spreadsheet after each analysis run, until the final dataset is appropriately formatted for the analysis package. In order to facilitate the use of the capabilities of the spreadsheet software and perform data reduction or basic analysis without having to switch back and forth between software units, we are building a set of analysis tools in Excel. One of the most useful of the tool set is ChromaBlast, which normalizes columnar data, sorts the data into user-selectable range-driven bins, develops a colour heat map from the data, and outputs the heat map and bin assortment for review. Using intrinsic tools in the spreadsheet software, output data can be filtered and sorted to emphasize data patterns, and facilitate rapid data review.
DTIC
Color Coding; Computer Techniques; Data Reduction; Gene Expression; Genome; Scientific Visualization; Spreadsheets

20060056163 New York Univ., New York, NY USA
Regulation of MDM2 Activity by Nucleolin
Borowiec, James A; Jun 2006; 65 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-03-1-0299
Report No.(s): AD-A457556; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A key antagonist of the p53 tumor suppressor is human MDM2 (Hdm2). We examined the significance of a recently identified complex between Hdm2 and nucleolin a c-Myc-induced gene product with defined roles in ribosomal RNA processing and the inhibition of chromosomal DNA replication following stress. Changes in the level of nucleolin protein in unstressed cells cause parallel changes in the amount of pS3 protein. Alterations in pS3 levels arise from nucleolin binding to the p53-antagonist Hdm2 resulting in the inhibition of both pS3 ubiquitination and Hdm2 auto-ubiquitination. Unexpectedly we find that nucleolin also reduces Hdm2 protein levels demonstrating that nucleolin inhibits Hdm2 using multiple mechanisms. Increases in nucleolin levels in unstressed cells led to higher expression of p2lcipl/wafl a reduced rate of cellular proliferation and an increase in apoptosis. Thus nucleolin has a number of properties in common with the tumor suppressor ARF. We propose that nucleolin like ARF responds to hyper-proliferative signals by up-regulation of pS3 through Hdm2 inhibition. These findings have important implications on the progression of breast cells to cancer and have the potential to provide new therapeutic routes to treat breast cancers.
DTIC
Estrogens; Regeneration (Physiology); Apoptosis

20060056174 Naval Postgraduate School, Monterey, CA USA
Improving Clinical Efficiency of Military Treatment Facilities
Piner, Thomas J; Sep 2006; 89 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457196; No Copyright; Avail.: CASI: A05, Hardcopy

The Department of Defense is facing medical expenses that are growing at an unprecedented rate. The top leadership is looking for ways to reduce costs and improve efficiency while still providing world class medical care for its beneficiaries. One option is to implement a relatively new tool called Data Envelopment Analysis (DEA). This tool uses linear programming to identify efficient entities, called decision making units (DMU), relative to the other entities in the set. In the past, DEA studies used military hospitals as DMUs. This study is different in that it uses clinics within hospitals as DMUs. The rational behind this is that administrators have difficulty using data that tells them in general terms that they have too many people or are spending too much money. What they need is a tool that tells them where there are too many people or where they are spending too much money. A hospital is made up of clinics so it is intuitive to begin by improving the efficiency of the clinics which in turn will improve the efficiency of the whole hospital.
DTIC
Medical Services; Clinical Medicine; Hospitals

20060056385 NASA Johnson Space Center, Houston, TX, USA, NASA Johnson Space Center, Houston, TX, USA
Food and Nutrition for the Moon Base: What we have Learned in 45 Years of Space Flight
Lane, Helen; Kloeris, Vickie; Perchonok, Michele; Zwart, Sara; Smith, Scott M.; [2006]; 7 pp.; In English; Original contains color illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056385; Avail.: CASI: A02, Hardcopy

The USA has a new human space flight mission to return to the Moon, this time to establish an outpost to continue research there and develop our ability to send humans to Mars and bring them back in good health. The Apollo missions were

the first human expeditions to the Moon. Only 2 crew members landed on the lunar surface on each Apollo mission, and they spent a maximum of 72 hours there. Future trips will have at least 4 crew members, and the initial trips will include several days of surface activity. Eventually, these short (sortie) missions will extend to longer lunar surface times, on the order of weeks. Thus, the challenges of meeting the food and nutritional needs of crew members at a lunar outpost will be significantly different from those during the early Apollo missions. The U.S. has had humans in space beginning in 1961 with increasing lengths of time in space flight. Throughout these flights, the areas of particular concern for nutrition are body mass, bone health, and radiation protection. The development and refinement of the food systems over the last 30 years are discussed, as well as the plans for both the sortie and lunar. The articles briefly review what we know today about food and nutrition for space travelers and relate this knowledge to our planned human flights back to the Moon.
Author
Lunar Bases; Moon; Nutrition; Manned Space Flight; NASA Space Programs; Food Intake

20060056493 NASA Johnson Space Center, Houston, TX, USA
High-frequency ECG
Tragardh, Elin; Schlegel, Todd T.; [2006]; 21 pp.; In English; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

The standard ECG is by convention limited to 0.05-150 Hz, but higher frequencies are also present in the ECG signal. With high-resolution technology, it is possible to record and analyze these higher frequencies. The highest amplitudes of the high-frequency components are found within the QRS complex. In past years, the term 'high frequency', 'high fidelity', and 'wideband electrocardiography' have been used by several investigators to refer to the process of recording ECGs with an extended bandwidth of up to 1000 Hz. Several investigators have tried to analyze HF-QRS with the hope that additional features seen in the QRS complex would provide information enhancing the diagnostic value of the ECG. The development of computerized ECG-recording devices that made it possible to record ECG signals with high resolution in both time and amplitude, as well as better possibilities to store and process the signals digitally, offered new methods for analysis. Different techniques to extract the HF-QRS have been described. Several bandwidths and filter types have been applied for the extraction as well as different signal-averaging techniques for noise reduction. There is no standard method for acquiring and quantifying HF-QRS. The physiological mechanisms underlying HF-QRS are still not fully understood. One theory is that HF-QRS are related to the conduction velocity and the fragmentation of the depolarization wave in the myocardium. In a three-dimensional model of the ventricles with a fractal conduction system it was shown that high numbers of splitting branches are associated with HF-QRS. In this experiment, it was also shown that the changes seen in HF-QRS in patients with myocardial ischemia might be due to the slowing of the conduction velocity in the region of ischemia. This mechanism has been tested by Watanabe et al by infusing sodium channel blockers into the left anterior descending artery in dogs. In their study, 60 unipolar ECGs were recorded from the entire ventricular surface and were signal-averaged and filtered in the 30-250 Hz frequency range. The results showed that the decrease noted in the HF-QRS correlated linearly with the local conduction delay. The results suggest that HF-QRS is a potent indicator of disturbed local conduction. An alternative theory is that HF-QRS reflect the shape of the original electrocardiographic signal. Bennhagen et al showed that root mean square (RMS) voltage values of the depolarization signal correlate poorly with the signal amplitude but highly with the first and second derivatives, i.e. the velocity and the acceleration of the signal. It has also been suggested that the autonomic nervous system affects HF-QRS. For example, sitting up causes significant changes in HF-QRS in some leads compared to the supine position [Douglas et al., 2006]. Unpublished results indicate that familial dysautonomic patients (both vagal and sympathetic degeneration) have very little Reduced Amplitude Zones (RAZ) formation . Athletic individuals, especially elite athletes, who have vagally-mediated changes on the conventional ECG (i.e. early repolarization, bradycardia) have increased RAZ formation. Further electrophysiological studies are needed, however, to better understand the underlying mechanisms of HF-QRS. Several investigators have studied HF-QRS in different cardiac conditions, including acute myocardial ischemia and myocardial infarction (MI). However, in order for clinicians to confidently use HF-QRS as an adjunct to standard ECG, more knowledge about the characteristics of HF-QRS is needed.
Author
Electrocardiography; Frequency Ranges; Heart; High Frequencies

52
AEROSPACE MEDICINE

Includes the biological and physiological effects of atmospheric and space flight (weightlessness, space radiation, acceleration, and altitude stress) on the human being; and the prevention of adverse effects on those environments. For psychological and behavioral effects of aerospace environments, see *53 Behavioral Sciences*. For the effects of space on animals and plants see *51 Life Sciences*.

20060054295 PROTOS Research Inst., Trieste, Italy

Quantitative MR Imaging for the in Vivo Assessment of Trabecular Bone Quality

Toffanin, Renato; Strolka, Igor; Cova, Maria; Guglielmi, Giuseppe; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P123-P124; In English; See also 20060054289

Contract(s)/Grant(s): VEGA-1/0144/03; Copyright; Avail.: Other Sources

A major concern for space flight crews during long duration space mission is the effect of weightlessness on the skeletal system. In particular, bone loss has been noted in astronauts and cosmonauts exposed to microgravity from a few weeks to six months. Bone loss, which appears to increase in general proportion to mission length, may seriously enhance the risk of fracture during and after extended space flight. In past MIR and ISS missions, X-rays based techniques were used to assess pre- and post-flight cortical and trabecular bone mineral density (BMD). It has been shown, however, that BMD can explain only about 60% of the bone mechanical competence. Other methods are, therefore, required for the evaluation of bone quality. To this end, magnetic resonance imaging (MRI) has proved to be a promising technique, being able to provide information pertaining both to trabecular bone density and structure. The main purpose of this study was to assess the use of quantitative MRI of the calcaneus for the prediction of vertebral fractures. The results show that the effective transverse relaxation time (T2*) is sensitive to alterations in bone quality not capture by density. The potential application of MRI for the study of skeletal alterations in crewmembers after prolonged space mission is proposed.

Author

Bone Demineralization; Bone Mineral Content; Imaging Techniques; Magnetic Resonance; Gravitational Effects; Spacecrews

20060054374 Queensland Univ., Brisbane, Australia

MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity

Richardson, C. A.; Hides, J.; Wilson, S.; Belavy, D. L.; Stanton, W.; McCook, D.; Elmann-Larsen, B.; Rittweger, J.; Felsenberg, D.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P117-P118; In English; See also 20060054289; Copyright; Avail.: Other Sources

Exercise countermeasures to reverse muscle atrophy in microgravity should be based on the specific muscle changes occurring with unloading of the skeleton. Changes in measures of cross sectional areas (CSA's) of selected flexor and extensor lumbo-pelvic muscles were investigated using magnetic resonance imaging (MRI), as part of the European Space Agency's Berlin Bedrest Study. Nineteen subjects were exposed to 8 weeks of strict bedrest, with MRI assessments taken before, during and after bedrest. Only multifidus was significantly reduced in CSA during bedrest (with no change in CSA of the flexors), and remained so during the recovery period. There was a significant increase in the CSA of the erector spinae during the reloading (recovery) phase. These results have implications for exercise countermeasures in microgravity.

Author

Atrophy; Bed Rest; Imaging Techniques; Magnetic Resonance; Muscles; Flexors; Physical Exercise

20060054375 European Space Agency, unknown

Measures of Complexity to Quantify Bone Loss and Estimate Strength of Human Lumbar Vertebrae: Comparison of pQCT Image Analysis with Bone Histomorphometry and Biomechanical Tests

Saparin, Peter; Thomsen, Jesper Skovhus; Beller, Gisela; Gowin, Wolfgang; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P121-P122; In English; See also 20060054289; Copyright; Avail.: Other Sources

The trabecular bone architecture of normal, osteopenic, and osteoporotic lumbar vertebrae were used as a model for bone loss in microgravity conditions. Previously, a set of structural measures of complexity were introduced to quantify different aspects of bone organization from CT-images. In the present study we investigate whether this non-invasive and non-destructive approach is able to assess trabecular architecture of vertebrae by comparing it with static histomorphometry. The ability of these measures for predicting vertebral bone strength is demonstrated by use of biomechanical compression

tests. We conclude that the proposed non-invasive technique is able to predict compressive bone strength and quantify the structure of trabecular bone.
Author
Bone Demineralization; Bone Mineral Content; Gravitational Effects; Compression Tests; Image Analysis

20060054382 Academy of Sciences (Russia), Moscow, Russian Federation
Characteristics of the Eyes Pursuit Function during Readaptation to Terrestrial Gravity after Prolonged Flights Aboard the International Space Station
Kornilova, L.; Alekhina, M.; Temnikova, V.; Naumov, I.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P43-P44; In English; See also 20060054289; Copyright; Avail.: Other Sources

Studies of characteristics of the eyes pursuit function were performed after prolonged space flights by electrooculography and videooculography techniques. Objectives of the work were: to determine the effect of the prolonged microgravity exposure on characteristics of the eyes pursuit function, and to reveal the correlation between characteristics of the that and the vestibular function. It has been shown that after microgravity exposure, were registered alterations of the accuracy, velocity and time characteristics of the eyes pursuit function. These alterations differed in a depth, pattern and readaptation dynamics, were correlated with changes in vestibular function. It has been demonstrated that the structure of visual pursuit was altered in those cosmonauts who had central changes in oculomotor system.
Author
Gravitational Effects; Vestibular Tests; Visual Tasks; Saccadic Eye Movements

20060054445 NASA Ames Research Center, Moffett Field, CA, USA
Sensing Super-Position: Human Sensing Beyond the Visual Spectrum
Maluf, David A.; Schipper, John F.; [2007]; 8 pp.; In English; Hawaii International Conference on System Sciences, 3-6 Jan. 2007, HI, USA; Original contains black and white illustrations; No Copyright; ONLINE:
http://hdl.handle.net/2060/20060054445; Avail.: CASI: A02, Hardcopy

The coming decade of fast, cheap and miniaturized electronics and sensory devices opens new pathways for the development of sophisticated equipment to overcome limitations of the human senses. This paper addresses the technical feasibility of augmenting human vision through Sensing Super-position by mixing natural Human sensing. The current implementation of the device translates visual and other passive or active sensory instruments into sounds, which become relevant when the visual resolution is insufficient for very difficult and particular sensing tasks. A successful Sensing Super-position meets many human and pilot vehicle system requirements. The system can be further developed into cheap, portable, and low power taking into account the limited capabilities of the human user as well as the typical characteristics of his dynamic environment. The system operates in real time, giving the desired information for the particular augmented sensing tasks. The Sensing Super-position device increases the image resolution perception and is obtained via an auditory representation as well as the visual representation. Auditory mapping is performed to distribute an image in time. The three-dimensional spatial brightness and multi-spectral maps of a sensed image are processed using real-time image processing techniques (e.g. histogram normalization) and transformed into a two-dimensional map of an audio signal as a function of frequency and time. This paper details the approach of developing Sensing Super-position systems as a way to augment the human vision system by exploiting the capabilities of Lie human hearing system as an additional neural input. The human hearing system is capable of learning to process and interpret extremely complicated and rapidly changing auditory patterns. The known capabilities of the human hearing system to learn and understand complicated auditory patterns provided the basic motivation for developing an image-to-sound mapping system. The human brain is superior to most existing computer systems in rapidly extracting relevant information from blurred, noisy, and redundant images. From a theoretical viewpoint, this means that the available bandwidth is not exploited in an optimal way. While image-processing techniques can manipulate, condense and focus the information (e.g., Fourier Transforms), keeping the mapping as direct and simple as possible might also reduce the risk of accidentally filtering out important clues. After all, especially a perfect non-redundant sound representation is prone to loss of relevant information in the non-perfect human hearing system. Also, a complicated non-redundant image-to-sound mapping may well be far more difficult to learn and comprehend than a straightforward mapping, while the mapping system would increase in complexity and cost. This work will demonstrate some basic information processing for optimal information capture for headmounted systems.
Author
Detection; Visual Perception; Vision; Auditory Signals; Spectra

20060055233 Wyle Labs., Inc., Houston, TX, USA

Mitigation Strategies for Acute Radiation Exposure during Space Flight

Hamilton, Douglas R.; Epelman, Slava; [2006]; 2 pp.; In English; Aerospace Medicine Association Annual Conference, 8-12 May 2005, Kansas City, MO, USA; Copyright; Avail.: CASI: A01, Hardcopy

While there are many potential risks in a Moon or Mars mission, one of the most important and unpredictable is that of crew radiation exposure. The two forms of radiation that impact a mission far from the protective environment of low-earth orbit, are solar particle events (SPE) and galactic cosmic radiation (GCR). The effects of GCR occur as a long-term cumulative dose that results increased longer-term medical risks such as malignancy and neurological degeneration. Unfortunately, relatively little has been published on the medical management of an acute SPE that could potentially endanger the mission and harm the crew. Reanalysis of the largest SPE in August 1972 revealed that the dose rate was significantly higher than previously stated in the literature. The peak dose rate was 9 cGy h(sup -1) which exceeds the low dose-rate criteria for 25 hrs (National Council on Radiation Protection) and 16 hrs (United Nations Scientific Committee on the Effects of Atomic Radiation). The bone marrow dose accumulated was 0.8 Gy, which exceeded the 25 and 16 hour criteria and would pose a serious medical risk. Current spacesuits would not provide shielding from the damaging effects for an SPE as large as the 1972 event, as increased shielding from 1-5 grams per square centimeters would do little to shield the bone marrow from exposure. Medical management options for an acute radiation event are discussed based on recommendations from the Department of Homeland Security, Centers for Disease Control and evidence-based scientific literature. The discussion will also consider how to define acute exposure radiation safety limits with respect to exploration-class missions, and to determine the level of care necessary for a crew that may be exposed to an SPE similar to August 1972.

Derived from text

Radiation Dosage; Exposure; Manned Space Flight; Aerospace Medicine

20060055540 Naval Postgraduate School, Monterey, CA USA

Optimizing Daytime Short Sleep Episodes to Maximize Performance in a Stressful Environment

Godfrey, Alison G; Sep 2006; 109 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457128; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This study provides the baseline and initial assessment of the napping habits of the USA Military Academy Class of 2007. This portion of a 4-year longitudinal study examines data collected on 62 Cadets over 32 days from 4 October 2004 to 4 November 2004 using actigraphy data and sleep logs. Data were stratified and cleaned in accordance with nap infrastructure, a term used to differentiate between naps of different duration and times of day based upon the phases and waves with which they tend to be associated. A total of 607 naps were reported for a total of 73.3 hours of sleep in addition to primary nocturnal sleep (PNS). Naps ranged from 15 minutes to 6 hours in duration and occurred most frequently on weekdays. This finding contrasts with research on other adolescent college students. Weekend naps were shorter in duration, on average, than weekday naps. This finding was also a departure from current nap research findings. Consistent with other research, most naps were between 30 minutes to 1 1/2 hours in length. Frequency and duration of naps was greatest on Wednesdays. The primary type of nap taken was restorative as opposed to appetitive or prophylactic in nature. Afternoon naps were more prevalent than morning naps, possibly reflecting Cadet class schedules rather than sleep need. Suggestions for additional research are proposed.

DTIC

Daytime; Habits; Sleep

20060055565 Naval Postgraduate School, Monterey, CA USA

Sleep Patterns of Naval Aviation Personnel Conducting Mine Hunting Operations

Solberg, Bennett J; Sep 2006; 81 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457163; No Copyright; Avail.: CASI: A05, Hardcopy

Detailed research conducted over the past forty years has conclusively determined that varying degrees of sleep loss shifts in sleep cycle increased stress and even changes in time zone with respect to daylight transition result in a myriad of physiological and psychological degradations (Helmreich 2000). Fatigue affects human performance adversely resulting in predictable changes not only on the individual level but also on the system as a whole. This descriptive study investigates the amount and quality of sleep received by aviation personnel assigned to an operational squadron conducting mine hunting operations. Wrist activity monitors (actigraphs) were used to determine objective assessments of sleep quantity and quantity. Demographic variables and additional measures such as reported sleepiness fatigue ratings caffeine and alcohol use were also collected. Despite a number of factors which altered the original study design significant differences in amount of sleep, sleep

quality and predicted effectiveness of personnel by officer-enlisted status were identified.
DTIC
Flying Personnel; Military Aviation; Military Personnel; Sleep; Sleep Deprivation

20060055798 Aerospace Medical Research Labs., Wright-Patterson AFB, OH USA
Dynamic Response of the Human Head to + Gx Impact
Salerno, Mark D; Brinkley, James W; Orzech, Mary A; Jan 1987; 8 pp.; In English
Report No.(s): AD-A457586; No Copyright; Avail.: CASI: A02, Hardcopy

Current knowledge of the response of the human head to short-duration acceleration is largely based upon the tests of animals and human cadavers. These data have been used to develop injury-limit curves and, more recently to develop a variety of mathematical models intended to estimate the response of the head to any acceleration- time history. In order to evaluate the existing injury-limit curves and models, a test program was conducted to measure the dynamic response of the head during whole- body impact exposures. Volunteer subjects participated in 79 experimental-level tests performed under nine different impact conditions. A vertical impact tower was used to produce, + Gx acceleration-time profiles with amplitudes up to 45G, velocity changes up to 15.5 ft/sec., and rise times from 1 to 23 msec. The subjects were restrained to a couch instrumented to measure impact forces and acceleration. The impact surface for the head was a 4-inch diameter individually molded fiberglass occipital headrest. The head was restrained to prevent rotation or rebound. Measured head acceleration and headrest load indicated a system with a natural frequency of approximately 100 Hertz. The response of the head was similar to that of the Maximum Strain Criterion Model described by Stalnaker, McElhaney, and Roberts in 1970.
DTIC
Dynamic Response; Impact Strength; Injuries

20060056117 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
Aircraft Accidents and Incidents Associated With Visual Disturbances From Bright Lights During Nighttime Flight Operations
Nakagawara, Van B.; Montgomery, Ron W.; Wood, Kathryn; November 2006; 8 pp.; In English; Original contains color illustrations
Report No.(s): DOT/FAA/AM-06/28; No Copyright; Avail.: CASI: A02, Hardcopy

Preservation of optimal night vision is important for pilots operating an aircraft at night. When the eyes are adapted to low-light levels, exposure to bright light can result in temporary visual impairment due to glare, flashblindness, and afterimages. The purpose of this study was to investigate operational problems experienced by civilian airman exposed to bright light sources while performing nighttime aviation activities. The National Transportation Safety Board (NTSB) Aviation Accident and Incident Data System (January 1982 to February 2005) and the Federal Aviation Administration (FAA) Accident/Incident Data System (January 1978 to January 2005) were queried using terms associated with night vision problems. Accident and incident reports annotated with one or more of these terms were reviewed to determine whether vision difficulties resulting from exposure to bright lights contributed to the mishap. Vision problems resulting from exposure to bright lights at night were found to have contributed to the mishap. Vision problems resulting from exposure to bright lights at night were found to have contributed to 58 mishaps. Reports included 30 (NTSB) accidents and 28 (FAA/NTSB) incidents. The majority of accidents (57%) occurred during the approad and landing phase of flight. Incidents occurred most frequently while taxiing (54%) and during approach and landing (36%). Exposure to glare sources at night can affect an aviator's dark adaptation and has contributed to aviation accidents and incidents. The study of these events assists airport authorities in defining appropriate modification of existing airport lighting systems and eliminating hazardous lighting near flight paths and surface movement areas (e.g., ramps, taxiways, runways). Preventive measures for avoiding similar glare conditions that impair vision and compromise the safety of aviation operations at night will be discussed.
Author
Aircraft Accidents; Flight Operations; Illuminating; Night Vision; Brightness

20060056229 NASA Johnson Space Center, Houston, TX, USA
Mechanism of Action for Anti-Radiation Vaccine in Reducing the Biological Impact of High-Dose Irradiation
Maliev, Vladislav; Popov, Dmitri; Jones, Jeffrey A.; Casey, Rachael C.; [2006]; 14 pp.; In English; Copyright; Avail.: CASI: A03, Hardcopy

Ionizing radiation is a major health risk of long-term space travel, the biological consequences of which include genetic and oxidative damage. In this study, we propose an original mechanism by which high doses of ionizing radiation induce acute

toxicity. We identified biological components that appear in the lymphatic vessels shortly after gamma irradiation. These radiation-induced toxins, which we have named specific radiation determinants (SRD), were generated in the irradiated tissues and then collected and circulated throughout the body via the lymph circulation and bloodstream. Depending on the type of SRD elicited, different syndromes of acute radiation sickness (ARS) were expressed. The SRDs were developed into a vaccine used to confer active immunity against acute radiation toxicity in immunologically naive animals. Animals that were pretreated with SRDs exhibited resistance to lethal doses of gamma radiation, as measured by increased survival times and survival rates. In comparison, untreated animals that were exposed to similar large doses of gamma radiation developed acute radiation sickness and died within days. This phenomenon was observed in a number of mammalian species. We partially analyzed the biochemical characteristics of the SRDs. The SRDs were large molecular weight (200-250 kDa) molecules that were comprised of a mixture of protein, lipid, carbohydrate, and mineral. Further analysis is required to further identify the SRD molecules and the biological mechanism by which the mediate the toxicity associated with acute radiation sickness. By doing so, we may develop an effective specific immunoprophylaxis as a countermeasure against the acute effects of ionizing radiation.
Author
Ionizing Radiation; Radiation Effects; Biological Effects; Toxicity; Radiation Sickness; Radiation Protection

20060056238 NASA Johnson Space Center, Houston, TX, USA
WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women
Smith, Scott M.; Zwart, S. R.; Heer, M. A.; Lee, S. M. C.; Macias, B. R.; Schneider, S. M.; Trappe, S. M.; Hargens, A. R.; [2006]; 1 pp.; In English; Experimental Biology, 28 Apr. - 2 May 2007, Washington, DC, USA
Contract(s)/Grant(s): NNJ04HF71G; Copyright; Avail.: Other Sources; Abstract Only

Exercise can attenuate bone loss associated with disuse during bed rest (BR), an analog of space flight. Previous studies have examined the efficacy of aerobic or resistive exercise countermeasures, but not in combination. We sought to determine the effect of a combined resistive and aerobic exercise regimen on bone metabolism during BR. After a 20-d ambulatory adaptation to confinement and diet, 16 women participated in a 60-d head-down-tilt BR. Control subjects (CN, n=8) performed no countermeasures. Exercise subjects, (EX, n=8) participated in exercise alternating daily between supine treadmill exercise within lower body negative pressure and resistive fly-wheel exercise (6-d wk(sup -1)). In the last week of BR, bone resorption was greater (p less than 79 plus or minus 44%, mean plus or minus SD) and EX groups (64 50%). N-telopeptide also increased (CN: 51 plus or minus 34%; EX: 43 plus or minus 56%). However, bone-specific alkaline phosphatase, a bone formation marker, tended to be higher in EX (26 plus or minus 18%) than in CN (8 plus or minus 33%) groups. The combination of resistive and aerobic exercise does not prevent bone resorption, but may promote formation, potentially mitigating the net bone loss associated with simulated microgravity. This study was supported by CNES, CSA, ESA, NASA, and NASA grant NNJ04HF71G to ARH. MEDES (French Institute for Space Medicine and Physiology) organized the study.
Author
Aerospace Medicine; Bone Demineralization; Microgravity; Physical Exercise; Females; Resistance; Simulation

20060056383 NASA Johnson Space Center, Houston, TX, USA
Stability of Radiation Induced Chromosome Damage in Human Peripheral Blood Lymphocytes
Cucinotta, F. A.; George, K.; Willingham, V.; January 2006; 1 pp.; In English; Copyright; Avail.: Other Sources; Abstract Only

Chromosome damage in an individual's peripheral blood lymphocytes can be an indicator of radiation exposure and this data can be used to evaluate dose after accidental or occupational exposure. Evidence suggests that the yield of chromosome damage in lymphocytes is also a relevant biomarker of cancer risk in humans that reflects individual cancer susceptibility. It follows that biomonitoring studies can be used to uncover subjects who are particularly susceptible to radiation damage and therefore at higher risk of cancer. Translocations and other stable aberrations are commonly believed to persist in peripheral blood cells for many years after exposure, and it has been suggested that translocations can be used for assessing retrospective radiation doses or chronic exposures. However, recent investigations suggest that translocations might not always persist indefinitely. We measured chromosome aberrations in the blood lymphocytes of six astronauts before their respective missions of approximately 3 to 6 months onboard the international space station, and again at various intervals up to 5 years after flight. In samples collected a few days after return to earth, the yield of chromosome translocations had significantly increased compared with preflight values, and results indicate that biodosimetry estimates lie within the range expected from physical dosimetry. However, for five of the astronauts, follow up analysis revealed a temporal decline in translocations with half-lives ranging from 10 to 58 months. The yield of exchanges remained unchanged for the sixth astronaut during an observation

period of 5 months post-flight. These results may indicate complications with the use of stable aberrations for retrospective dose reconstruction and could affect cancer risk predictions that are estimated from yields of chromosome damage obtained shortly after exposure.
Author
Radiation Dosage; Radiation Effects; Chromosome Aberrations; Lymphocytes; Radiation Damage; Blood; Aberration

20060056461 NASA Johnson Space Center, Houston, TX, USA
Managing Space Radiation Risks on Lunar and Mars Missions: Risk Assessment and Mitigation
Cucinotta, F. A.; George, K.; Hu, X.; Kim, M. H.; Nikjoo, H.; [2006]; 1 pp.; In English; 1st Space Exploration Conference Continuing the Voyage of Discovery, 30 Jan. - 1 Feb. 2005, Orlando, FL, USA; No Copyright; Avail.: Other Sources; Abstract Only

Radiation-induced health risks are a primary concern for human exploration outside the Earth's magnetosphere, and require improved approaches to risk estimation and tools for mitigation including shielding and biological countermeasures. Solar proton events are the major concern for short-term lunar missions (\h60 d), and for long-term missions (\g60 d) such as Mars exploration, the exposures to the high energy and charge (HZE) ions that make-up the galactic cosmic rays are the major concern. Health risks from radiation exposure are chronic risks including carcinogenesis and degenerative tissue risks, central nervous system effects, and acute risk such as radiation sickness or early lethality. The current estimate is that a more than four-fold uncertainty exists in the projection of lifetime mortality risk from cosmic rays, which severely limits analysis of possible benefits of shielding or biological countermeasure designs. Uncertainties in risk projections are largely due to insufficient knowledge of HZE ion radiobiology, which has led NASA to develop a unique probabilistic approach to radiation protection. We review NASA's approach to radiation risk assessment including its impact on astronaut dose limits and application of the ALARA (As Low as Reasonably Achievable) principle. The recently opened NASA Space Radiation Laboratory (NSRL) provides the capability to simulate the cosmic rays in controlled ground-based experiments with biological and shielding models. We discuss how research at NSRL will lead to reductions in the uncertainties in risk projection models. In developing mission designs, the reduction of health risks and mission constraints including costs are competing concerns that need to be addressed through optimization procedures. Mitigating the risks from space radiation is a multi-factorial problem involving individual factors (age, gender, genetic makeup, and exposure history), operational factors (planetary destination, mission length, and period in the solar cycle), and shielding characteristics (materials, mass, and topology). We review optimization metrics for radiation protection including scenarios that integrate biophysics models of radiation risks, operational variables, and shielding design tools needed to assess exploration mission designs. We discuss the application of a crosscutting metric, based on probabilistic risk assessment, to lunar and Mars mission trade studies including the assessment of multi-factorial problems and the potential benefits of new radiation health research strategies or mitigation technologies. Author
Radiation Hazards; Manned Space Flight; Solar Radiation; Cosmic Rays; Aerospace Medicine; Risk

53
BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

20060054422 Academy of Sciences (USSR), Moscow, Russian Federation
Evaluation of Spare Capacities of the Respiratory Muscles during Hypokinesia
Baranov, V. M.; Aleksandrova, N. P.; Tikhonov, M. A.; Journal of Gravitational Physiology, Volume 12, Number 1; July 2005, pp. P109-P110; In English; See also 20060054289; Copyright; Avail.: Other Sources

Nowadays, the phenomenon of physical performance degradation after a long period of motor restraint or microgravity is universally interpreted as a result of deconditioning of the cardiovascular system and antigravity skeletal muscles. Yet, deconditioning affects not only the skeletal but also respiratory muscles exhaustion of which by relative hypoventilation brings about hypercapnia, hypoxia and pulmonary acidosis conducive to the sensations of painful breathlessness impacting the capacity for physical work. It should be emphasized that these developments are little known in spite of their theoretical and practical significance; therefore, our purpose was to study the functional state and spare capacity of the respiratory muscles in laboratory animals (Wistar rats) following 3-wk tail-suspension. The experiment strengthened the hypothesis according to

which simulation of the physiological effects of motor restraint and microgravity leads to fatigue and deconditioning of the respiratory muscles.
Author
Cardiovascular System; Hypokinesia; Muscular Fatigue; Physiological Effects; Gravitational Effects; Deconditioning

54
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human factors engineering, bionics, man-machine systems, life support, space suits and protective clothing. For related information see also *16 Space Transportation and Safety* and *52 Aerospace Medicine*.

20060054437 NASA Ames Research Center, Moffett Field, CA, USA
An Energetic Concept of Habitability for the Deep Subsurface
Hoehler, Tori M.; [2006]; 1 pp.; In English; IOPD-MI International Workshop (Integrated Ocean Drilling Program Management International, 3-5 Oct. 2006, Vancouver, Canada
Contract(s)/Grant(s): WBS 073-02-12; No Copyright; Avail.: Other Sources; Abstract Only

Universally, life must be characterized by a characteristic level of order and complexity. In the most general sense, habitability could then be defined as the set of factors required to allow the creation and maintenance of molecular complexity. These factors are: chemical raw materials; energy with which to assemble those materials into complex molecules and sustain the resultant state of complexity; a solvent that allows the interaction of complex molecules, promotes tertiary structure, and permits compartmentalization; and environmental conditions that permit the assembly and maintenance of complex molecules. On Earth, these general requirements correspond to the major biogenic elements C, H, O, N, P, S; chemical or light energy; the solvent water; and specific ranges of temperature, pH, radiation, ionic strength, and so forth, which have thus far been determined on and exclusively empirical basis. Importantly, while the complete absence of any of these factors ensures uninhabitable conditions, the mere presence of all four does not guarantee habitability. In each case - even that of water - it is a question of degree. This question can be couched in quantitative terms by considering the impact of each of these factors on cellular energy balance. More 'extreme' conditions (e.g., high temperature, high or low pH, etc.), lower water activity, and low concentrations of nutrients incur or have potential to be addressed by increased investment of energy on the part of the cell. This must be balanced by energy conservation in the cell, noting that biochemical, mass transport, and abiotic chemical limitations intervene between environmental energy availability and biological energy capture. Similarly, lower boundary conditions are emplaced on useful environmental energy yields by the 'quantized' nature of biological energy conservation, and upper boundary conditions are emplaced by energy levels or fluxes that are destructive with respect to complexity. This energetic framework, with boundary conditions supplied by the specifics of the biochemistry in question, offers a generalized, yet quantitative means of assessing the habitability of any system with respect to complex life.
Author
Habitability; Oxygen; Hydrogen; Solvents; Energy Levels; Boundary Conditions; Biochemistry; Molecules

20060055758 Space and Naval Warfare Systems Center, San Diego, CA USA
DARPA Improving Warfighter Information Intake Under Stress -- Augmented Cognition. Volume 1. Phase 2: Concept Validation Experiment
Morrison, J G; Kobus, D A; Brown, C M; Sep 2006; 66 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457526; SSC-TR-1940; No Copyright; Avail.: CASI: A04, Hardcopy

This report documents the successful completion of Phase II of the Defense Advanced Research Projects Agency (DARPA) Improving Warfighter Information Intake Under Stress (IWIIUS) program. It describes the successful results of four industry teams building Closed-Loop Integrated Prototype (CLIP) systems that demonstrate how the limitations of human cognition can be addressed by augmenting cognition with advanced cognitive state sensors that provide input to complex computational systems. A cognitive bottleneck was identified by each of the four development teams along with empirically testable goals. The bottlenecks were operationally defined in terms of the application environments addressed by each of the four teams.
DTIC
Augmentation; Cognition; Feedback Control

20060056138 Army Natick Research and Development Command, MA USA
Protective Clothing and Life Support Equipment Applicable to a Desert Environment
Perna, Joseph A; Jun 1976; 109 pp.; In English
Report No.(s): AD-A457272; NATICK/TR-76-34-CEMEL; CEMEL-156; No Copyright; Avail.: CASI: A06, Hardcopy

The Clothing and Life Support items listed in this report are the only items presently available that are applicable for use in a desert environment. The current Common Table of Allowance (CTA) 50-900, Clothing and Individual Equipment does not currently authorized the use of all these items in the desert environment. During the period 1963-1968, many new items of clothing and equipment entered the Army system to meet the needs of the soldiers in Southeast Asia. As a result of the urgency of the situation, many of these items were fielded without the benefit of extensive testing, and although there were shortcomings in some of the items, others became highly popular and are still in wide use today. Another aspect of this is that many of the items introduced for use in Southeast Asia may not be suitable for environments other than hot-wet. Today our attentions are focused on other parts of the world, some of which are characterized by the hot-wet environments similar to Southeast Asia, while still others are typical of hot-dry environments found in the desert areas of the Middle East. Our own experience in these areas, coupled with lessons learned from other nations which have had for conduct military operations under such conditions, has shown that there is considerable room for improvement in clothing and equipment items for these environments. Two other factors provided stimulus for the preparation of this report. One was the rapid technological changes occurring in industry. These changes are reducing our ability to depend on previous manufacturing technologies as pointed out in an earlier study performed at this Command. The second is the introduction of many new materials and fabrics in recent years which could be utilized to greater advantage by the Army.
DTIC
Deserts; Life Support Systems; Protective Clothing

20060056232 NASA Johnson Space Center, Houston, TX, USA
Exploration Life Support Directions
Lawson, B. Michael; [2006]; 1 pp.; In English; Space Technoogy and Applications International, 12-15 Feb. 207, Albuquerque, NM, USA
Contract(s)/Grant(s): WBS 572.01.04; No Copyright; Avail.: Other Sources; Abstract Only

The Exploration Life Support (ELS) Project is now developing new technologies for the Vision for Space Exploration announced in 2004. ELS project development work is organized around the three major vehicles of the Exploration Program. The first vehicle is the Orion Crew Exploration Vehicle (CEV). The ELS project will develop prototype hardware for this short duration orbital and trans-lunar vehicle s mission. The second vehicle is for sortie landings on the moon. Life support technology hardware for lunar surface access vehicles will include upgrades of existing CEV equipment and technologies to maximize commonality between the two vehicles as well as new technologies needed for the harsher thermal environments of the moon and the new element of dust. The third vehicle will be a longer duration lunar outpost. Crew stays of 180 days are planned for the lunar outpost. To minimize the need for consumables needed for resupply, a new set of hardware developments and processes better suited for long duration life support will be used. The water loop will be almost completely closed. The air revitalization will be partially closed. The outpost mission will have the continuous environment of 1/6th gravity making the separations of fluids and gases easier than the zero gravity for the CEV and orbital phases of lunar lander vehicles. This presentation will describe the planned technologies that are expected to be developed and considerations for how those technologies will be developed and demonstrated by the ELS project for these major program vehicles.
Author
Space Exploration; Life Support Systems; Crew Exploration Vehicle; Lunar Surface Vehicles; Thermal Environments; Weightlessness; Lunar Bases; Air Purification

59
MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

Includes general topics and overviews related to mathematics and computer science. For specific topics in these areas see *categories 60 through 67*.

20060054235 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Performance Monitoring of Parallel Scientific Applications
Skinner, D.; January 2006; 12 pp.; In English
Report No.(s): DE2006-881368; No Copyright; Avail.: National Technical Information Service (NTIS)

This paper introduces an infrastructure for efficiently collecting performance profiles from parallel HPC codes. Integrated Performance Monitoring (IPM) brings together multiple sources of performance metrics into a single profile that characterizes the overall performance and resource usage of the application. IPM maintains low overhead by using a unique hashing approach which allows a fixed memory footprint and minimal CPU usage. IPM is open source, relies on portable software technologies and is scalable to thousands of tasks.
NTIS
Parallel Processing (Computers); Computer Programs; Footprints

20060054267 Lawrence Livermore National Lab., Livermore, CA USA
Statement of Work for Studies in BlueGene/L Scalability and Reconfigurability
Henning, A.; McKee, S. A.; Sep. 15, 2005; 20 pp.; In English
Report No.(s): DE2006-883624; UCRL-SR-215372; No Copyright; Avail.: Department of Energy Information Bridge
As referenced in the subcontract, the work included three major goals: (1) study the performance of an ASCI application, (2) study tradeoffs in using the second CPU in coprocessor mode to optimize use of the L3 scratchpad memory for performing vector-like gather/scatter and streamlining operations, and (3) perform simulator studies of hardware phase detection and identification. We made some modifications to the work contract. Work involving the integration of a cache-conscious data placement algorithm to improve cache utilization on BlueGene/L has been added and work involving the L3 scratchpad memory has been eliminated. This was explained in the previous milestones. In this milestone, we continue to focus on the last goal by modifying a cycle-accurate simulator, sim-alpha (4). As premise to hardware phase detection and identification, we need to have an infrastructure for testing various cache-conscious data placement methods. For this milestone, we discuss the completed framework that handles cache-conscious placement optimizations, which includes profiling data accesses and handling remapped addresses. We will also introduce an algorithm (ccdp profiling tool) that we implemented for assigning remapped addresses for a given code. Our performance results show that by using our ccdp profiling tool, we achieve reduced miss rates and an improved overall simulation performance. For our test cases, we use four applications from the SPEC CPU 2000 suite (2). In our past milestones, we studied research that involves implementing cache-conscious data placement techniques. By becoming more familiar with previous research, we can make better decisions on designing our cache-conscious profiling tool. It is important to have a firm understanding of the existing techniques that have proven to be efficient at improving memory performance, since our tool will produce trace files as input to our enhanced simulator framework.
NTIS
Algorithms; Detection

20060054278 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, Calgary Univ., Alberta, Canada
Provably Secure Passwork-Based Authentication in TLS
Abdalla, M.; Bresson, E.; Chevassut, O.; Moeller, D.; Pointcheval, D.; January 2006; 16 pp.; In English
Report No.(s): DE2006-881394; No Copyright; Avail.: Department of Energy Information Bridge
In this paper, we show how to design an efficient, provably secure password-based authenticated key exchange mechanism specifically for the TLS (Transport Layer Security) protocol. The goal is to provide a technique that allows users to employ (short) passwords to securely identify themselves to servers. As our main contribution, we describe a new password-based technique for user authentication in TLS, called Simple Open Key Exchange (SOKE). Loosely speaking, the SOKE ciphersuites are unauthenticated Diffie- Hellman ciphersuites in which the clients Diffie-Hellman ephemeral public value is encrypted using a simple mask generation function. The mask is simply a constant value raised to the power of (a hash of) the password.
NTIS
Computer Information Security; Interprocessor Communication

20060056358 World Technology Evaluation Center, Baltimore, MD, USA
WTEC Panel Report on International Assessment of Research and Development in Robotics
Bekey, G.; Ambrose, R.; Kumar, V.; Sanderson, A.; Wilcox, B.; Jan. 2006; 289 pp.; In English
Contract(s)/Grant(s): NSF-ENG-0423742
Report No.(s): PB2007-102141; Copyright; Avail.: National Technical Information Service (NTIS)
The purpose of this study was to assess the state of robotics worldwide and to compare the R&D programs in this field between the U.S. and other countries. The comparison was to be based on the criteria of quality, scope, funding and potential

for commercialization. The panel found that robotics is a very active field, worldwide. Japan, Korea, and the European Community invest significantly larger funds in robotics research and development for the private sector than the U.S. There are numerous start-up companies in robotics, both in the U.S. and abroad. Venture capital appears to be available. The U.S. currently leads in such areas as robot navigation in outdoor environments, robot architectures, and in applications to space, defense, underwater systems and some aspects of service and personal robots. Japan and Korea lead in technology for robot mobility, humanoid robots, and some aspects of service and personal robots. Europe leads in mobility for structured environments, including urban transportation. Europe also has significant programs in eldercare and home service robotics. Australia leads in commercial applications of field robotics, particularly in such areas as cargo handling and mining, as well as in the theory and application of localization and navigation.
NTIS
Robotics; Research and Development

60
COMPUTER OPERATIONS AND HARDWARE

Includes hardware for computer graphics, firmware and data processing. For components see *33 Electronics and Electrical Engineering*. For computer vision see *63 Cybernetics, Artificial Intelligence and Robotics*.

20060055444 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
A General Framework for Analyzing, Characterizing, and Implementing Spectrally Modulated, Spectrally Encoded Signals
Roberts, Marcus L; Sep 2006; 250 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457087; AFIT/DS/ENG/06-06; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457087;
Avail.: CASI: A11, Hardcopy

Fourth generation (4G) communications will support many capabilities while providing universal, high speed access. One potential enabler for these capabilities is software defined radio (SDR). When controlled by cognitive radio (CR) principles, the required waveform diversity is achieved via a synergistic union called CR-based SDR. Research is rapidly progressing in SDR hardware and software venues, but current CR-based SDR research lacks the theoretical foundation and analytic framework to permit efficient implementation. This limitation is addressed here by introducing a general framework for analyzing, characterizing, and implementing spectrally modulated, spectrally encoded (SMSE) signals within CR-based SDR architectures. Given orthogonal frequency division multiplexing (OFDM) is a 4G candidate signal, OFDM-based signals are collectively classified as SMSE since modulation and encoding are spectrally applied. The proposed framework provides analytic commonality and unification of SMSE signals. Applicability is first shown for candidate 4G signals, and resultant analytic expressions agree with published results. Implementability is then demonstrated in multiple coexistence scenarios via modeling and simulation to reinforce practical utility.
DTIC
Coding; Computer Programs; Frequency Division Multiplexing; Radiotelephones; Wireless Communication

20060055583 Naval Postgraduate School, Monterey, CA USA
Design of an Object Oriented and Modular Architecture for a Naval Tactical Simulator using Delta3D's Game Manager
Toledo-Ramirez, Rommel; Sep 2006; 75 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457198; No Copyright; Avail.: CASI: A04, Hardcopy

The author proposes an architecture based on the Dynamic Actor Layer and the Game Manager in Delta3D to create a Networked Virtual Environment which could be used to train Navy Officers in tactics, allowing team training and doctrine rehearsal. The developed architecture is based on Object Oriented and Modular Design principles; while it explores the flexibility and strength of the Game Manager features in Delta3D game engine. The implementation of the proposed architecture is planned to be done in standard personal computers running Windows' OS, but as Delta3D is a multi-platform tool, the generated code can be easily ported to Linux or even Mac' platforms. The designed architecture includes also a proposal for fast scenario creation and modification based on XML technology.
DTIC
Computer Graphics; Computer Networks; Computerized Simulation; Game Theory; Simulators; Virtual Reality

20060055742 BBN Systems and Technologies Corp., Cambridge, MA USA
Toward a Real-Time Spoken Language System Using Commercial Hardware
Austin, Steve; Peterson, Pat; Placeway, Paul; Schwartz, Richard; Vandergrift, Jeff; Jan 1990; 7 pp.; In English
Contract(s)/Grant(s): N00014-89-C-0008
Report No.(s): AD-A457480; No Copyright; Avail.: CASI: A02, Hardcopy

We describe the methods and hardware that we are using to produce a real-tune demonstration of an integrated Spoken Language System. We describe algorithms that greatly reduce the computation needed to compute the N-Best sentence hypotheses. To avoid grammar coverage problems we use a fully-connected first-order statistical class grammar. The speech-search algorithm is implemented on a hoard with a single Intel i86O chip, which provides a factor of 5 speedup over a SUN 4 for straight C code. The board plugs directly into the VME bus of the SUN4, which controls the system and contains the natural language system and application back end.
DTIC
Natural Language (Computers); Real Time Operation; Speech

20060055752 Naval Postgraduate School, Monterey, CA USA
Preliminary Security Requirements for SecureCore Hardware
Nguyen, Thuy D; Levin, Timothy E; Irvin, Cynthia E; Benzel, Terry V; Bhaskara, Ganesha; Sep 2006; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): NSF-CNS-0430566
Report No.(s): AD-A457517; NPS-CS-06-014; ISI-TR-621; No Copyright; Avail.: CASI: A03, Hardcopy

This document describes a set of preliminary high level security requirements for the SecureCore hardware base (SCHW). A SecureCore (SC) component is anticipated to be a mobile networked device capable of operating in different modes with different levels of trust. To promote rapid user acceptability, it is essential that security features implemented in the SC architecture must minimize changes to existing application-level software. The SCHW security requirements are specified in terms of the following capabilities: hardware virtualization, protected processing environment, protected memory management, secure I/O channels, secure boot, secure system maintenance, concealed execution mode, trusted platform attestation and hardware isolation of security critical functions.
DTIC
Architecture (Computers); Computer Information Security; Networks; Security

20060055767 Naval Postgraduate School, Monterey, CA USA
Development of Future Course Content Requirements Supporting the Department of Defense's Internet Protocol Version 6 Transition and Implementation
Kay, James T; Jun 2006; 69 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457536; No Copyright; Avail.: CASI: A04, Hardcopy

This thesis will focus on academia, specifically the Naval Postgraduate School, and its requirement to implement an education program that allows facilitators to properly inform future students on the gradual implementation of Internet Protocol version 6 (IPv6) technology while phasing out Internet Protocol version 4 (IPv4) from the current curriculum as the transition to IPv6 progresses. The DoD's current goal is to complete the transition of all DoD networks from IPv4 to IPv6 by fiscal year 2008. With this deadline quickly approaching, it is imperative that a plan to educate military and DoD personnel be implemented in the very near future. It is my goal to research and suggest a program that facilitators can use that will show the similarities, changes, advantages, and challenges that exist for the transition.
DTIC
Communication Networks; Internets; Local Area Networks; Protocol (Computers)

61
COMPUTER PROGRAMMING AND SOFTWARE

Includes software engineering, computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM. For computer software applied to specific applications, see also the associated category.

20060054157 Nippon Telegraph and Telephone Public Corp., Yokosuka, Japan
Software Defined Radio Prototype (I): System Design and Performance Evaluation
Shiba, Hiroyuki; Shirato, Yushi; Yoshioka, Hiroshi; Toyoda, Ichihiko; NTT Technical Review, Volume 1, No. 4; July 2003, pp. 15-23; In English; See also 20060054147; Copyright; Avail.: Other Sources

We discuss the design of an IEEE 802.11 wireless local area network (WLAN) based on our prototype software defined radio (SDR) transceiver that supports both Personal Handy-phone System (PHS) and WLAN. The most difficult problem in implementing the WLAN in this way is meeting the short interframe space (SIFS) requirement of the IEEE 802.11 standard. We describe the software architecture of the prototype and explain how it can process IEEE 802.11 WLAN protocol. The hybrid programmable architecture of our SDR is a sophisticated combination of a general-purpose microprocessor, digital signal processors (DSPs), and programmable hardware. The media access control (MAC) layer functions are executed on the central processing unit (CPU), while the physical (PHY) layer functions such as modulation/demodulation (MODEM) are processed by the DSP; higher-speed digital signal processes run on a field programmable gate array (FPGA). We also describe an experimental evaluation of the prototype for IEEE 802.11 WLAN use.
Author
Microprocessors; Signal Analyzers; Transmitter Receivers; Access Control; Central Processing Units; Field-Programmable Gate Arrays; Local Area Networks; Protocol (Computers)

20060055432 Carnegie-Mellon Univ., Pittsburgh, PA USA
Learning Dynamic Time Preferences in Multi-Agent Meeting Scheduling
Crawford, Elisabeth; Veloso, Manuela; Jul 2005; 19 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): NBCHC030029
Report No.(s): AD-A457066; CMU-CS-05-153; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457066; Avail.: CASI: A03, Hardcopy

In many organizations, people are faced with the task of scheduling meetings subject to conflicting time constraints and preferences. We are working towards multi-agent scheduling systems in which each person has an agent that negotiates with other agents to schedule meetings. Such agents need to model the scheduling preferences of their users in order to make effective scheduling decisions. We consider that a user's preferences over meeting times are of two kinds: static time-of-day preferences, e.g., morning versus afternoon times; and dynamic preferences which change as meetings are added to a calendar, e.g., preferences to schedule meetings back-to-back (i.e. in succession). The dynamic nature of preferences has been understudied in previous work. In this paper, we present an algorithm that effectively learns static time-of-day preferences, as well as two important classes of dynamic preferences: back-to-back preferences and spread-out preferences (i.e. preferences for having gaps between meetings).
DTIC
Scheduling; Software Development Tools

20060055439 Virginia Univ., Charlottesville, VA USA
Issues in Developing Object-Oriented Database Systems for Real-Time Applications
Lee, Juhnyoung; Son, Sang H; Lee, Myung-Joon; Jan 1994; 6 pp.; In English
Report No.(s): AD-A457078; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457078; Avail.: CASI: A02, Hardcopy

Database systems for real time applications must satisfy timing constraints associated with transactions, in addition to maintaining data consistency. Recently, interests in object oriented databases have been growing for nontraditional applications of database systems, and several real time applications are being developed using an object oriented paradigm. The object-oriented approach seems promising for developing complex real-time database applications. However, it is not clear whether object oriented database systems would be superior than relational database systems for supporting real-time applications. In this paper, we address issues that must be investigated in order to design and develop an object oriented database system for realtime applications. Also, we present a model that integrates features for scheduling real-time transactions with the traditional object-oriented database model.
DTIC
Data Bases; Object-Oriented Programming; Real Time Operation

20060055440 Hewlett-Packard Labs., Palo Alto, CA USA
From Metacomputing to Metabusiness Processing
Jin, Li-jie; Grimshaw, Andrew; Jan 2000; 11 pp.; In English
Contract(s)/Grant(s): N66001-96-C-8527; DE-FG02-96ER25290
Report No.(s): AD-A457080; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457080; Avail.: CASI: A03, Hardcopy

The importance of large-scale electrical business processing is increasing today as recent Internet technologies build on the basic infrastructure. Simply integrating existing technologies and resources to form a platform that satisfies large-scale electrical business processing requirements is not enough, however. Legion is a wide-area distributed object system that offers mechanisms for describing, creating, and managing objects in a large-scale, heterogeneous, distributed computing environment. Its original design objective was to build a global virtual computer system that uses Legion as its operating system for computer intensive applications. This paper introduces our efforts to extend the Legion system into a backbone that supports business processing with consistent resource representations, identical service interfaces, and an easy-to-use developing environment. We will focus on a framework that supports CORBA from within the Legion system.
DTIC
Commerce; Grid Computing (Computer Networks); Object-Oriented Programming

20060055443 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Analysis of Layered Social Networks
Hamil, Jonathan T; Sep 2006; 361 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457086; AFIT/DS/ENS/06-03; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457086;
Avail.: CASI: A16, Hardcopy

Prevention of near-term terrorist attacks requires an understanding of current terrorist organizations to include their composition, the actors involved, and how they operate to achieve their objectives. To aid this understanding, operations research, sociological, and behavioral theory relevant to the study of social networks are applied, thereby providing theoretical foundations for new methodologies to analyze non-cooperative organizations, defined as those trying to hide their structure or are unwilling to provide information regarding their operations. Techniques applying information regarding multiple dimensions of interpersonal relationships, inferring from them the strengths of interpersonal ties, are explored. A layered network construct is offered that provides new analytic opportunities and insights generally unaccounted for in traditional social network analyses. These provide decision makers improved courses of action designed to impute influence upon an adversarial network, thereby achieving a desired influence, perception, or outcome to one or more actors within the target network. This knowledge may also be used to identify key individuals, relationships, and organizational practices. Subsequently, such analysis may lead to the identification of exploitable weaknesses to either eliminate the network as a whole, cause it to become operationally ineffective, or influence it to directly or indirectly support National Security Strategy.
DTIC
Decision Making; Network Analysis; Networks; Security

20060055445 Geological Survey, Nashville, TN USA
U.S. Geological Survey National Computer Technology Meeting (7th): Program and Abstracts, Held in New Orleans, Louisiana, April 10-15, 1994
Balthrop, Barbara H; Baker, Eva G; Jan 1994; 75 pp.; In English
Report No.(s): AD-A457088; OPEN-FILE REPORT 94-52; No Copyright; ONLINE:
http://hdl.handle.net/100.2/ADA457088; Avail.: CASI: A04, Hardcopy

The Distributed Information System-II (DIS-II) is actively in use in the U.S. Geological Survey (USGS) to support the USGS mission of providing the hydrologic information and understanding needed for the optimum use and management of the Nation's water resources. Initial plans are being made for augmenting DIS-II with new procurements for additional hardware and software to maintain state-of-the-art computer technology to support our mission. The 7th National Computer Technology Meeting (NCTM 94), which was held in New Orleans, Louisiana, in April 1994, included presentations on the current use of DIS-II hardware and software to solve scientific, administrative, and management problems. NCTM 94 also provided a forum for identifying additional immediate and future needs for enhancements in hardware and software to continue to meet the USGS mission. This report contains abstracts of technical papers and demonstrations of newly developed software running in the DIS-II computing environment that were presented at the NCTM 94 meeting. Several panel discussions at the meeting provided an exchange of information on issues concerning the use of Internet for scientific purposes, the administration of a relational data base system in support of the hydrologic and administrative data bases, and the use of a paperless report process. Training continued to be a major part of the NCTM 94. Short courses in system administration, programming languages, network use and analysis, computer security, application software, and data-base techniques were conducted.
DTIC
Abstracts; Computer Systems Design; Geological Surveys; Hydrology; Information Systems

20060055447 Carnegie-Mellon Univ., Pittsburgh, PA USA

Device-Enabled Authorization in the Grey System

Bauer, Lujo; Garriss, Scott; McCune, Jonathan M; Reiter, Michael K; Rouse, Jason; Rutenbar, Peter; Feb 2005; 27 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-04-1-0724

Report No.(s): AD-A457095; CMU-CS-05-111; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457095; Avail.: CASI: A03, Hardcopy

We describe the design and implementation of Grey, a set of software extensions that convert an off-the-shelf smartphone-class device into a tool by which its owner exercises and delegates her authority to both physical and virtual resources. We describe the software architecture and user interfaces of Grey, and then detail two initial case studies in which we have converted infrastructure to accommodate requests from Grey-enabled devices. The first is two floors (nearly 30,000 square feet) of office space, in which we are equipping over 65 doors for access control using Grey for a population of roughly 150 persons. The second is modifications to Windows XP that permit login via Grey-enabled phones. We provide preliminary evaluations of these efforts and directions for research to further the vision of a unified authorization framework for both physical and virtual resources.

DTIC

Portable Equipment; Software Development Tools; Telecommunication

20060055527 Newport News Shipbuilding and Drydock Co., VA USA

Producibility Evaluation Criteria Cost Estimating Computer Programs - Manual

Dec 1993; 98 pp.; In English

Report No.(s): AD-A457051; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This manual has been prepared to describe the use of a number of computer programs that have been developed for evaluating the producibility and desirability of different ship design alternatives. These programs are included on a floppy disk which accompanies this manual. The background of their development is descibed in reference 1 and will not be repeated here. This manual is intended as a How-To document and consequently will be presented primarily in the second person as if giving hands-on advice, looking over your shoulder. The description which follows assumes familiarity with entering data into personal computers. Specifically, rather than stating press the enter key each time that this statement is required, this will be assumed to be understood whenever the direction to enter data is given The commands to be entered will be shown in this manual in bold capitals, but when actually entering commands or data, lower case may be used. Whenever a line on a screen asks for entry of a single letter choice from several listed possibilities, such a Y or N for yes or no, the default choice will be bracketed by the \h\g symbols. In such cases, the enter key may be processed to select the default choice. The floppy disk which accompanies this manual includes the GW-BASIC application on the main directory. The programs on the disk are filed in one of the three subdirectories, which are identified as COST , PROD and DECH. Chapter 2 of this Manual addresses the use of the programs in the COST subdirectory, Chapters 3 and 4 address the programs in the PROD subdirectory and Chapter 5 describes the use of the DEC subdirectory files.

DTIC

Computer Programs; Cost Estimates; Dynamic Structural Analysis; Marine Technology

20060055528 Carnegie-Mellon Univ., Pittsburgh, PA USA

Building Self-configuring Services Using Service-specific Knowledge

Huang, An-Cheng; Dec 2004; 181 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F30602-99-1-0518

Report No.(s): AD-A457105; CMU-CS-04-186; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Network applications such as Web browsing, video conferencing, instant messaging, file sharing, and online gaming are becoming a necessity for more and more people. From a user's perspective, these network applications are used to access services offered by service providers through the Internet. Most of the services today are statically integrated, i.e., at design time, a service provider puts together a service configuration consisting of appropriate resources and components. One major problem with such services is that they cannot cope well with variations in user requirements and environment characteristics. Self-configuration is an emerging approach for addressing this limitation. A self-configuring service is able to find an 'optimal' service configuration automatically according to the user requirements and environment characteristics. There have been many previous research efforts in building such services. However, previous approaches either require a provider to build a custom self-configuration solution, resulting in high development cost, or they cannot take advantage of a provider's service-specific self-configuration knowledge, resulting in low effectiveness. In this dissertation, we show that providers' service-specific

knowledge can be abstracted from the lower-level self-configuration mechanisms such that service providers can build effective self-configuring services using a general, shared self-configuration framework. The use of a shared framework reduces the development cost, and being able to take advantage of a provider's service-specific knowledge increases the effectiveness of self-configuration. This dissertation describes how a provider can express its service-specific knowledge in a recipe and how the synthesizer, the core element of our recipe-based self-configuration architecture, can perform global configuration and local adaptation accordingly.
DTIC
Extremely Low Frequencies; Self Organizing Systems

20060055531 Swedish Defence Research Establishment, Linkoeping, Sweden
Benchmarking and Validation of IR Signature Programs: SensorVision, CAMEO-ESA and RadThermIR
Nelsson, Claes; Hermansson, Patrik; Winzell, Thomas; Sjoekvist, Stefan; Dec 1, 2005; 17 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457113; No Copyright; Avail.: CASI: A03, Hardcopy
No abstract available
Computer Programs; Infrared Signatures; Radiance; Sim; Surface Temperature

20060055548 Carnegie-Mellon Univ., Pittsburgh, PA USA
A Separate Compilation Extension to Standard ML (Revised and Expanded)
Swasey, David; Murphy, VII, Tom; Crary, Karl; Harper, Robert; Sep 17, 2006; 61 pp.; In English
Contract(s)/Grant(s): F196268-95-C-0050
Report No.(s): AD-A457137; CMU-CS-06-104R; No Copyright; Avail.: Defense Technical Information Center (DTIC)
We present an extension to Standard ML, called SMLSC, to support separate compilation. The system gives meaning to individual program fragments, called units. Units may depend on one another in a way specified by the programmer. A dependency may be mediated by an interface (the type of a unit); if so, the units can be compiled separately. Otherwise, they must be compiled in sequence. We also propose a methodology for programming in SMLSC that reflects code development practice and avoids syntactic repetition of interfaces. The language is given a formal semantics, and we argue that this semantics is implementable in a variety of compilers.
DTIC
Compilers; Programming Languages

20060055552 Carnegie-Mellon Univ., Pittsburgh, PA USA
Certifying Compilation for Standard ML in a Type Analysis Framework
Petersen, Leaf E; May 2005; 246 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F-19628-95-C-0050
Report No.(s): AD-A457143; CMU-CS-05-135; No Copyright; Avail.: Defense Technical Information Center (DTIC)
Certified code is native machine code that is annotated with an automatically checkable certificate attesting to the conformance of the program to a specified safety policy. Certified code frameworks have been built based on first-order logic (PCC) and on types (TAL). Compilers generating certified code have been built for safe subsets of C and for Java(tm). Type-preserving compilers such as the TILT/ML compiler implement compilation as transformations on typed internal languages. Types are used by the compiler for internal verification, and for optimization purposes. Type analysis can be used to implement optimizations such as non-uniform data representation and tag-free garbage collection. However, none of the existing type-preserving compilers for full-scale languages maintain type information all the way to the machine-code level, and hence are not yet able to generate certified code. In this thesis, I demonstrate that certified compilation is possible in a type analysis framework by extending the TILT/ML compiler to generate certified code in the form of typed assembly language without compromising the existing optimizations of the compiler. This work demonstrates that a compiler can use types to generate certified binaries for a full modern language even in the presence of aggressive type-analysis based optimization.
DTIC
Assembly Language; Certification

20060055566 Carnegie-Mellon Univ., Pittsburgh, PA USA

Proceedings of the Second Software Architecture Technology User Network (SATURN) Workshop

Nord, Robert L; Aug 2006; 71 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8721-05-C-0003

Report No.(s): AD-A457165; CMU/SEI-2006-TR-010; No Copyright; Avail.: CASI: A04, Hardcopy

The second Carnegie Mellon Software Engineering Institute (SEI) Software Architecture Technology User Network (SATURN) Workshop was held April 25-26, 2006 in Pittsburgh, Pennsylvania. A total of 61 software systems engineers, architects, technical managers, product managers, and researchers exchanged best practices and lessons learned in applying SEI software architecture technology in an architecture-driven development or acquisition project. In the closing session, workshop participants noted these highlights: presentations showing the methods in action, a comparison of multiple SEI Architecture Tradeoff Analysis Method (ATAM) evaluations and cross-wise analysis, the workshop format using interactive presentations, a good mix of academic and industry perspectives, and a sharing of workshop results. This report describes the workshop format, discussion, and results, as well as plans for future SATURN workshops. Key topics covered in the workshop and noted by the participants were the future plans of the SEI's Software Architecture Technology Initiative, the overall integration of software architecture methods and techniques, and the experiences others shared in applying the methods and transitioning them for use.

DTIC

Computer Programming; Conferences; Saturn Workshops; Software Engineering

20060055568 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Rijswijk, Netherlands

WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis)Mounted Soldier

Verhagen, Th L; Kemper, R; Huisjes, H; Knijnenburg, S G; Pronk, A; Klink, M H van; Mar 2006; 40 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457172; TNO-DV2-2006-A014; No Copyright; Avail.: CASI: A03, Hardcopy

Witness packs are widely used to enable the characterization of fragments generated during ballistic experiments. To assess the effect of fragment impact on an exposed (dis)mounted soldier a follow-up Vulnerability/Lethality (V/L) simulation is essential. The overall process is elaborative and time consuming. This paper presents a 'proof of concept' of WitnessMan, an integrated software tool to support: * the design of the witness pack, including experimental conditions and restrictions, V/L assessment demands and financial aspects; * the in-the-field 'real-time' analysis of the exposed witness pack for a first characterisation of the fragment cloud; * the in-the-field 'real-time' human V/L assessment in terms of the military and medical effects on an exposed, (un)protected soldier. WitnessMan incorporates knowledge of many different fields of TNO research and enables the ability to adapt the witness pack configuration during the experiments to improve the fragment discrimination and thus improve the overall value of experimental research.

DTIC

Ballistics; Computer Programs; Computerized Simulation; Lethality; Software Engineering; Vulnerability

20060055575 Naval Postgraduate School, Monterey, CA USA

Exploration of Force Transition in Stability Operations Using Multi-Agent Simulation

Vaughan, Jr, David P; Sep 2006; 173 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457183; No Copyright; Avail.: CASI: A08, Hardcopy

Stability Operations have become the most prevalent mission for U.S. forces in the current global security environment. This research explores new methods to assist in determining when it is acceptable to downsize a force in a stability operation. The methodology developed provides insight into the problem by quantifying force protection risk, mission failure risk, and time in the context of the operational threat environment. The Pythagoras Multi-Agent Simulation and Data Farming techniques are used to investigate force-level comparisons in a theoretical threat continuum based on a peacekeeping scenario similar to the Bosnian operation. The data from the simulation is used to construct simple tools for decision makers. These tools are used collectively to find the balance, according to a commander's priorities, between the conflicting issues of force protection, mission success, and time. Two areas are identified as significant in achieving success in a stability operation. They are troop posturing and troop employment. The problem is that they are often overlooked or under emphasized. The results of this research demonstrate that posturing and employment should be considered as factors equal to force size in contributing to the goal of maximizing force presence. In addition, the research provides a vehicle to assist military planners with ways in which a stability force can maximize and maintain near continuous presence, while simultaneously minimizing the risk to the force and adhering to operational timelines. Overall, the important conclusion is the significance of troop posture on force

size transitions. As a force is downsized, it is crucial to evaluate how to maintain presence with the smaller force. This is evident by the surprising success achieved by the smallest force in the simulation. It was able to project a greater presence by utilizing small dispersed units, much like the Combined Action Platoons in Vietnam.
DTIC
Decision Making; Manpower; Risk; Simulation; Stability

20060055582 Naval Postgraduate School, Monterey, CA USA
Evaluating the Effectiveness of Waterside Security Alternatives for Force Protection of Navy Ships and Installations Using X3D Graphics and Agent-Based Simulation
Sullivan, Patrick J; Sep 2006; 207 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457197; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The individuals charged with the task of planning, developing and implementing force protection measures both at the unit and installation level must consider numerous factors in formulating the best defensive posture. Currently, force protection professionals utilize multiple sources of information regarding capabilities of systems that are available, and combine that knowledge with the requirements of their installation to create an overall plan. A crucial element missing from this process is the ability to determine, prior to system procurement, the most effective combination of systems and employment for a wide range of possible terrorist attack scenarios. This thesis is inspired by the work done by James Harney, LT, USN (2003). The thesis will expand the Anti-Terrorism Force Protection Tool developed during the original thesis by including the capability of testing force protection measures in multiple scenarios by utilizing models of force protection equipment and forces, virtual worlds of existing naval facilities, and terrorist agents that exhibit intent and behavioral characteristics which can test the effectiveness of the force protection equipment used. The result of this work is a scalable and repeatable methodology for generating large-scale, agent-based simulations for AT/FP problem domains providing 3D visualization, report generation, and statistical analysis.
DTIC
Alternatives; Computer Programming; Java (Programming Language); Languages; Navy; Protection; Security; Simulation; Statistical Analysis

20060055584 Naval Postgraduate School, Monterey, CA USA
A Management Perspective of the Department of Defense (DoD) Internet Protocol Version 6 (IPv6) Transition Plan, Where it is Today, and Where it Needs to be by the Year 2008
Hart, Peter W; Sep 2006; 103 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457200; No Copyright; Avail.: CASI: A06, Hardcopy

This thesis focused on the management aspects of the DoD IPv6 Transition Plan. It addressed the management required to transition the DoD computer systems from IPv4 to IPv6. The study identified how computer systems will be affected by the transition from IPv4 to IPv6. The advantages, disadvantages, and risks associated with the transition were analyzed to determine potential areas of improvement. The study provided recommendations that can be used before, during and after the transition. This thesis investigated the ramifications of transitioning to IPv6. It compared the Transition Plan to the current state of preparedness by DoD agencies. It determined whether or not IPv6 can be implemented by 2008. When possible, it identified where the DoD will have to concentrate its effort to ensure the transition goes smoothly and on time.
DTIC
Computer Programs; Defense Program; Internets; Protocol (Computers)

20060055586 Naval Postgraduate School, Monterey, CA USA
A Need for Systems Architecture Approach for Next Generation Mine Warfare Capability
Hibbert, Kirk R; Sep 2006; 107 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457204; No Copyright; Avail.: CASI: A06, Hardcopy

When operating in a sea borne environment, sea mines can prevent U.S. Navy vessels from meeting operational objectives. Sea mines have the potential of damaging, or destroying ships at sea. The U.S. Navy conducts mine warfare (MIW) operations to meet this threat. Although effective against mining, our countermining operations are currently employing 1960 s technology in an attempt to keep pace with new Concepts of Operations (CONOPS). Today's legacy MIW processes currently employed by the warfighter, although capable of countering the mining threat, are a reactive process that is slow to engage and employ assets that are cumbersome to operate. With the advent of new technologies, a transformation of MIW capability is on the horizon and has the potential of influencing how the U.S. Navy maintains maritime dominance in the

open-oceans and littoral environments. The influence that technologies bring to MIW includes multi-spectral sensors, laser imagery, compact modular systems, unmanned and semi-autonomous weapons, as well as new communications architecture and tactics. Although these technical innovations present a level of capability superior to the existing legacy systems, developmental barriers and the lack of an overarching systems architecture will hinder or prevent these systems from being effectively integrated into tomorrow's CONOPS.
DTIC
Architecture (Computers); Warfare

20060055591 Naval Postgraduate School, Monterey, CA USA
A Computer Graphics-Based Target Detection Model
Jones, Brian E; Sep 2006; 105 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457211; No Copyright; Avail.: CASI: A06, Hardcopy

Modeling of visual perception for computer-generated forces and intelligent software agents is usually fairly feeble in computer games and military simulations. Most of the time, tricks or shortcuts are employed in the perceptual model. Under certain conditions, these shortcuts cause unrealistic behavior and detract from military training and user immersion into the simulated environment. Many computer games and simulations trace a ray between the target and observer to determine if the observer can see the target. More complex models are sometime used in military simulations. One of these models used in Army simulations is the ACQUIRE model. This model still may produce debatable results. The ACQUIRE visual perception model uses a single value for the target's contrast with its background. This can cause unrealistic results in certain conditions, allowing computer-generated forces to see targets that should not be seen and not see targets that should. Testing these more complex models needs to be completed to determine the conditions under which the model gives questionable results. Testing ACQUIRE against human subjects helped determine when ACQUIRE behaves reasonably. The study consisted of multiple scenes with a target in many positions, multiple postures, and many different lighting and fog conditions. Now that testing and analysis is complete, modifications can be made to the visual perception model allowing it to give better results in more varied conditions, such as: low light, excessive fog conditions, and partially hidden targets.
DTIC
Computer Graphics; Computer Programming; Detection; Software Engineering; Target Acquisition

20060055596 Remcom, Inc., State College, PA USA
Radio Propagation Prediction Software for Complex Mixed Path Physical Channels
Fast, Stephen A; Aug 14, 2006; 91 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W31P4Q-04-C-R245; ARPA ORDER-S241-20; Proj-RTW9T04
Report No.(s): AD-A457220; No Copyright; Avail.: CASI: A05, Hardcopy

It has become increasingly clear that the customers for the Mixed Path project desire API to the various Wireless InSite calculation engines. Thus the WI engines can be incorporated into tools such as OPNET and QualNet for network analysis or into various signal processing software. For network analysis all that is required is an extremely fast computing propagation model that captures the mixed path propagation at an acceptable resolution and fidelity. For signal processing analyses, the propagation channel is required. Thus a time domain capability API is required within WI. Lastly an easy to use graphics GUI is required by all of WI customers to allow the scene to be more easily rendered and modified. Thus the thrust for this effort was to develop rapid urban ray tracing and propagation computation methods that compute urban propagation predictions in less than one millisecond with an API that allows easy integration into network modeling tools. This was accomplished and an urban propagation API is now available for network simulation users.
DTIC
Electromagnetic Wave Transmission; Frequencies; Models; Radio Transmission

20060055598 Naval Postgraduate School, Monterey, CA USA
An Object-Oriented View of Backend Databases in a Mobile Environment for Navy and Marine Corps Applications
Lawrence, Lemuel S; Miller, Kasey C; Sep 2006; 87 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457223; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A Database Management System (DBMS) is system software for managing a large amount of data in secondary memory. The standard DBMS used today in both industry and the military is the Relational DBMS (RDBMS). The RDBMS is based upon the relational paradigm, whereas modern software development technologies that interact with the RDBMS are based upon the object-oriented paradigm. This difference in paradigms presents a conceptual mismatch which greatly reduces

programmer and developer productivity. Additionally, wireless handheld devices have become ubiquitous both in the military and in the community at large. These handheld devices provide a convenient means of information access. To date, the military has failed to capitalize on the use of handheld devices as a convenient means of information access with respect to the large amounts of information stored in its databases. This thesis investigates various database application architectures and proposes an architecture that will not only overcome the conceptual mismatch between the relational and object-oriented paradigms, but also allows handheld device access to the database. A proof-of-concept prototype database application that provides handheld device access to a military personnel database is built to show the viability of the proposed architecture.
DTIC
Computer Programming; Data Bases; Data Management; Navy; Object-Oriented Programming; Software Engineering

20060055609 Naval Postgraduate School, Monterey, CA USA
Integrating Stakeholder Requirements Across Generations of Technology
Perz, Michael R; Sep 2006; 115 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457241; No Copyright; Avail.: CASI: A06, Hardcopy

Complex defense acquisition programs like that for the GPS have many requirements engineering challenges to overcome in order to deliver capabilities to customers and satisfy other stakeholders. To meet these challenges and stay within cost and schedule constraints, engineers and managers need system requirements information organized in a clear, complete, and efficient manner to support decision making. An effective methodology tailored to the needs of the program decision makers will ensure that important information is correct, organized, and readily accessible. The GPS program is implementing a methodology that includes standardized processes across its segments. However, the GPS program refrained from implementing a better requirements engineering approach and using its current requirements engineering tool to take advantage of this approach.
DTIC
Global Positioning System; Object-Oriented Programming; Requirements

20060055612 Naval Postgraduate School, Monterey, CA USA
Implementation of a Quadrature Mirror Filter Bank on an SRC Reconfigurable Computer for Real-Time Signal Processing
Stoffell, Kevin M; Sep 2006; 134 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457245; No Copyright; Avail.: CASI: A07, Hardcopy

This thesis describes the design and implementation of a Quadrature Mirror Filter Bank on a general purpose Field Programmable Gate Array. The physical connections and signaling specifications for connecting an Analog to Digital converter to a Reconfigurable Computer system manufactured by SRC Computers Incorporated are discussed. Design and implementation of a fully functional prototype Quadrature Mirror Filter Bank is detailed, with a discussion for extending the functionality to larger more practical designs. Performance and device utilization results between the Quadrature Mirror Filter Bank implemented in VHDL, design elements implemented in the C programming language, and calculations made using high precision mathematical tools are compared, along with relative effort levels required to achieve results using the different hardware instantiation methods.
DTIC
C (Programming Language); Computers; Mirrors; Quadratures; Real Time Operation; Reconfigurable Hardware; Signal Processing

20060055626 Naval Postgraduate School, Monterey, CA USA
Survey of Available Artificial Intelligence Technologies for Addition Into Delta3D
Mueller, Aaron J; Sep 2006; 69 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457268; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This thesis explores the addition of Artificial Intelligence (AI) capability to the Delta3D Gaming and Simulation engine developed at the Naval Postgraduate School. A look at what types of AI capabilities exist and their potential to add value to the project is presented. This look includes the use of specific AI technologies, such as State Machines and Pathfinding, as well as the potential use of existing open source packages. One growing trend in the commercial game industry is the use of AI Middleware packages, allowing developers to buy what technologies they need and reduce development time. This thesis covers the link between AI and animation, specifically comparing how animation is handled by Delta3D and UnrealEngine. One final area covered is the use of scripting to generate behaviors within a game or simulation. Again, UnrealEngine,

specifically UnrealScript, is considered as a potential model for a scripting language based on the Python programming language. Python was chosen based on its integration with the underlying C++ base code. By following the game industry's lead, one has a pool of potential options and avoids attempting to reinvent the wheel.
DTIC
Artificial Intelligence; Computerized Simulation; High Level Languages; Languages; Simulation; Surveys

20060055627 Naval Postgraduate School, Monterey, CA USA
Effectiveness of Non-Lethal Capabilities in a Maritime Environment
Sickinger, Lisa R; Sep 2006; 106 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457271; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The attack on the USS Cole within a civilian port, and the increased threat of pirating and terrorism on the high seas, underscore the immediate need for a maritime nonlethal capability. This research uses modeling and simulation to explore the requirements and tactical use of nonlethal capabilities in a maritime force protection mission. Specifically, a multi-agent simulation emulates a tactical-level mission in which a U.S. Navy vessel returning to Naval Station, Norfolk, VA, encounters a variety of maritime surface threats. Data farming is the method used to address the research questions by applying high-performance computing to the simulation model, with the intent of examining a wide range of possibilities and outcomes. The nonlethal capabilities are analyzed in their effectiveness to do the following: (1) determine intent, (2) deter inbound surface vessels, and (3) engage targets identified as hostile through the continuum of force.
DTIC
Military Operations; Protection; Tactics; Target Recognition

20060055628 Army Natick Research and Development Command, MA USA
A Photo-Computer Technique for Design and Analysis of Personal Protective Equipment
Lastnik, Abraham L; Gordon, Carl W; Oct 1975; 25 pp.; In English
Contract(s)/Grant(s): Proj-1Y763726D669
Report No.(s): AD-A457273; NATICK/TR-76-2-CEMEL; CEMEL-149; No Copyright; Avail.: CASI: A03, Hardcopy

Combined use of multi-exposure photography and computer analysis provides a reliable technique for measuring a target area presented to or 'perceived' by a ballistic fragment array. 'Perceived' area is a parameter necessary for casualty reduction analysis of body armor and headgear. The Photo-Computer analysis procedure may be applied to design analysis of the photographs and data matrix. The data matrix can be represented by a series of polynomials or equations. Other applications of the photo-computer techniques include determination of helmet off-set, fit of clothing, comparison of two or more helmets, component interface and development of contour drawings.
DTIC
Computer Techniques; Design Analysis; Protectors

20060055640 Carnegie-Mellon Univ., Pittsburgh, PA USA
Workshop on Program Generation and Model-Driven Architecture
Lewis, Grace A; Meyers, B C; Wallnau, Kurt; Aug 2006; 38 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8721-05-C-0003
Report No.(s): AD-A457297; CMU/SEI-2006-TN-031; No Copyright; Avail.: CASI: A03, Hardcopy

This technical note summarizes the results of a workshop held on June 2, 2006, at the Software Engineering Institute in Pittsburgh, Pennsylvania (USA). The workshop explored business and technical aspects of program generation in the context of the Object Management Group's model-driven architecture development approach. The workshop was structured around consideration of the perspectives of five different communities: standards body, vendor, acquisition, development, and research. This note recapitulates these individual perspectives and highlights important themes.
DTIC
Computer Programming; Software Engineering

20060055641 Carnegie-Mellon Univ., Pittsburgh, PA USA
Simulation Validation for Societal Systems
Yahja, Alex; Sep 2006; 247 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-01-2-0550; DOD-06806-01
Report No.(s): AD-A457298; CMU-ISRI-06-119; No Copyright; Avail.: CASI: A11, Hardcopy

Simulation models are growing in size and complexity. As the size and complexity of the model increases so does the time and resources needed to validate the model. Multi-agent network models pose an even greater challenge for validation as they can be validated at the individual actor, the network, and/or the population level. There are however, substantial obstacles to validation. The nature of modeling means that there are implicit model assumptions, a complex model space and interactions, emergent behaviors, and uncodified and inoperable simulation and validation knowledge. The nature of the data, particularly in the realm of complex socio-technical systems poses still further obstacles to validation. These include sparse, inconsistent, old, erroneous, and mixed scale data. Given all these obstacles, the process of validating modern multi-agent network simulation models of complex socio-technical systems is such a herculean task that it often takes large groups of people years to accomplish. Automated and semi-automated tools are needed to support validation activities and so reduce the time and number of personnel needed. This thesis proposes such a tool. It advances the state of the art of simulation validation by using knowledge and ontological representation and inference. Advances are made at both conceptual and implementation or tool level.
DTIC
Program Verification (Computers); Simulation

20060055642 Naval Postgraduate School, Monterey, CA USA
Offline Forensic Analysis Of Microsoft Windows XP Physical Memory
Schultz, John S; Sep 2006; 91 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457305; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The rise of cyber crimes combined with the recent use of computer viruses and malicious programs that reside only in volatile main memory demand further development of appropriate forensic tools. Existing forensic tools that analyze non-volatile memory are not capable of analyzing volatile memory and the few tools that are capable of detailed analysis of volatile memory are not openly available to the public. In this thesis, an open source tool is developed to analyze images of physical memory originating from the Windows XP and Windows 2003 Server operating systems. The tool, named Windows Physical Memory Offline Analyzer (WPMOA), scans the memory image and, utilizing input from the user, extracts relevant data from the various structures maintained by the Windows operating system. The WPMOA program automatically generates reports about the image and provides key information necessary for a user to perform additional manual investigation of the image beyond what is done automatically. This thesis details instructions on the preparation and use of the program, initial testing results of the program with actual physical memory images, and C language code for the program itself.
DTIC
Coding; Computer Storage Devices; Computer Viruses; Programming Languages

20060055648 Northrop Grumman Corp., Rome, NY USA
Simulation Development for Dynamic Situation Awareness and Prediction II
Trott, Kevin C; Aug 2006; 51 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-05-C-0087; Proj-459S
Report No.(s): AD-A457316; No Copyright; Avail.: CASI: A04, Hardcopy

The objective of this effort was to create a closed-loop simulation environment in which detailed mission plans can be developed, used as input to a set of distributed simulations, and be executed within the simulation environment. These simulations provide feedback to prototype C4ISR systems in the form of mission status reports, sensor tracks, and other ISR mission results reports, which can be used to maintain situation awareness and to dynamically adjust mission plans in response to events. This work was carried out within the context of the Joint Synthetic Battlespace for Research and Development (JSB-RD), a distributed C4ISR modeling and simulation environment at the AFRL Rome Research Site. The JSB-RD distributed simulation environment includes Joint Semi-Automated Forces (JSAF) simulation, a weather federate, a dynamic terrain federate, a culture/clutter simulation, a visualization architecture for controlling the simulation/mission and the GIESim communication simulation which provides Link-16 network modeling. The environment also includes tools for creating scenarios from existing Air Battle Plans, extracted from the Air Operations Data Base (AODB) within the Theater Battle Management Core System (TBMCS), as well as gateways for connecting simulations communicating using DMSO s HLA and/or the earlier DIS protocol, with C4ISR systems.
DTIC
Architecture (Computers); Command and Control; Feedback Control; Simulation

20060055661 Naval Postgraduate School, Monterey, CA USA

Electronic Warfare (EW) Historical Perspectives and Its Relationship to Information Operations (IO) - Considerations for Turkey

Kucukozyigit, Ali C; Sep 2006; 169 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457350; No Copyright; Avail.: CASI: A08, Hardcopy

The purpose of this thesis is the exploration of the relationship and interaction between Electronic Warfare (EW) and Information Operations (IO) core, supporting and related competencies. Understanding the definitions of information and its value, information superiority, and the decision making cycle provides the foundation for the thesis. Investigation of the historical transformation of EW from the U.S. Civil War to the First Gulf War, and also examining how the concept of IO has developed and evolved contributes to this study by helping to comprehend the modern day interaction between EW and each IO competency separately. This interaction is constructed upon the guidance and standards provided by the latest U.S. Joint Chiefs of Staff Publication Joint Publication 3-13 Information Operations. This study concludes that the relationship between EW and IO is increasingly interactive and consists of two aspects: limiting and interfering, and reinforcing and supporting. Also, the relationship between EW and each IO competency is not consistent between the core and supporting competencies. In addition to these conclusions, this study expresses some considerations for EW and IO applications with respect to the unique environment and requirements of the Turkish Republic.

DTIC

Computer Networks; Data Processing; Electronic Warfare; Histories

20060055684 Micro Analysis and Design, Boulder, CO USA

A Simulation-Based Tool to Train Rapid Decision-Making Skills for the Digital Battlefield

Archer, Rick; Brockett, Alan T; McDermott, Patricia L; Warwick, Walter; Christ, Richard E; Aug 2006; 38 pp.; In English

Contract(s)/Grant(s): DASW01-04-C-0007; Proj-M770

Report No.(s): AD-A457395; No Copyright; Avail.: CASI: A03, Hardcopy

This report was developed under the Army Phase II Small Business Innovation Research (SBIR) program. The Simulated Field Exercise (SimFX) tool was designed to help small unit leaders make good decisions while immersed in an ever widening array of information technologies. Rather than focus training on the specifications and capabilities of new technologies, we provide students with computer-based scenarios that force them to resolve ambiguous or contradictory input from remote sensors, fuse disparate sources of information, filter information, and manage resources. SimFX exploits the cognitive realism that comes from engaging a trainee in a branching story in which the trainee must make a series of decisions that ultimately affect how the story plays out. The consequences and feedback are predicated not just on the alternative chosen but on the information sources used to make the decision. Thus, emphasis is placed on the student's ability to collect and use information. SimFX consists of two components: the Player presents a scenario to the trainee and the Author allows training developers to create story- based scenarios or deliberate practice exercises. SimFX is a low-cost, easy to use training tool that has been favorably received by potential users in the Army training community.

DTIC

Computerized Simulation; Decision Making; Digital Systems; Simulation; Training Devices

20060055685 Army Research Inst. for the Behavioral and Social Sciences, Alexandria, VA USA

Videogame-Based Training Success: The Impact of Trainee Characteristics - Year 2

Orvis, Karin A; Horn, Daniel B; Belanich, James; Jul 2006; 42 pp.; In English

Contract(s)/Grant(s): Proj-A792

Report No.(s): AD-A457396; ARI-TR-1188; No Copyright; Avail.: CASI: A03, Hardcopy

Personal computer (PC)-based videogames are emerging as an increasingly popular training tool in the U.S. Army. The present research represents a follow-up investigation to Orvis, Orvis, Belanich, and Mull in (2005) with regards to the impact of trainee characteristics in videogame-based training environments. Specifically, this follow-up research examines prior videogame experience, videogame self-efficacy, and goal orientation as antecedents that maximize trainee motivation, as well as other learner choices and outcomes, in PC game-based training. In this research, participants played a first-person-perspective videogame that began with a single-player section to introduce game- specific tasks, followed by a multi-player section where participants formed small teams to conduct several collaborative missions. Prior to and after the training exercise, participants completed online questionnaires. This research extends Orvis et al. (2005) by demonstrating that these trainee characteristics, as a set, had a positive impact on trainee motivation to use the training game, trainee satisfaction with the training experience, ease in using the training game interface, team cohesion, metacognitive strategies utilized during

training, and time spent engaging in the training game. The results of this research provide useful information to training game developers and instructors using videogames as training tools.
DTIC
Education; Game Theory; Students

20060055686 Army Research Lab., Aberdeen Proving Ground, MD USA
Fracture of Grooved Kinetic Energy Rods Subject to Oblique Impact
Anderson, Robert L; Sep 2006; 26 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-62168AH80
Report No.(s): AD-A457398; ARL-TR-3923; No Copyright; Avail.: CASI: A03, Hardcopy

Kinetic energy penetrators often possess buttress grooves that are used to aid in the launching process. The shock physics code CTH has been used to analyze the effect that these grooves have on tungsten heavy alloy rods during oblique impacts that create asymmetric loading conditions. To examine this behavior, simulations were run in which grooved rods underwent 60 degree oblique impacts with finite thickness rolled homogeneous armor steel plates at 1300 m/s. Previous experimental work done by Raftenberg and Bjerke has shown that buttress grooves make the rods more susceptible to fracture, and it has been shown that CTH can predict the occurrence of fracture due to stress concentrations in bending loading when the simulation is run using reverse ballistics. The use of reverse ballistics has been shown to decrease the loss of groove definition.
DTIC
Coding; Fracturing; Kinetic Energy; Projectiles; Rods

20060055693 Naval Postgraduate School, Monterey, CA USA
Analysis of Operational Pace Versus Logistical Support Rate in the Ground Combat Element of a Marine Expeditionary Brigade
Miner, Roy; Sep 2006; 99 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457409; No Copyright; Avail.: CASI: A05, Hardcopy

The execution of maneuver warfare by the Marine Air Ground Task Force (MAGTF) places a large amount of stress on the supporting logistics infrastructure. Sustaining the movement of the Ground Combat Element (GCE) as the battlefield expands becomes increasingly difficult to accomplish by the Combat Service Support Element (CSSE) with finite assets. We assert the days of supply the GCE is capable of carrying, the reorder point for inventories carried by the GCE, and the transportation capacity assets within the CSSE dedicated to moving supplies are all significant contributing factors in sustaining the movement of the GCE. This thesis defines a logistics process and develops a simulation where the GCE consumes logistical resources necessary to sustain its movement toward assigned objectives while being supported by a CSSE in an expanding maneuver warfare environment. We define a successful sustainment of the GCE and using logistic regression, confirm the above three factors contribute significantly to the success rate of sustainment in the simulation. Through regression and leverage plots we determine which of the three factors contribute significantly more to the responses of success and time. We also conclude through a sample means comparison the combination of factor values that achieve a minimal delay in sustainment for the GCE in the simulation.
DTIC
Combat; Logistics Management; Simulation; Support Systems

20060055695 Naval Postgraduate School, Monterey, CA USA
Low Spectral Efficiency Trellis Coded Modulation Systems
Pyloudis, Konstantinos; Sep 2006; 101 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457412; No Copyright; Avail.: CASI: A06, Hardcopy

Trellis-coded modulation (TCM) is a known technique to increase the data rate without increasing the channel bandwidth when implementing error correction coding. TCM is a combination of M-ary modulation and error correction coding. This thesis investigates the performance of a low spectral efficiency TCM system, which is compared with three alternative systems having comparable bandwidth. The three alternative systems are all non-TCM systems and consist of QPSK with independent r=1/2 error correction coding on the in-phase and quadrature components, 8-ary biorthogonal keying (8-BOK) with r=2/3 error correction coding, and 16-BOK with r=3/4 error correction coding. The effects of both additive white Gaussian noise (AWGN) and pulse-noise interference (PNI) are considered. The TCM system shows mush better than expected performance and significant resistance to PNI, and performance improves as the number of memory element increases. The alternative QPSK system with soft decision decoding (SDD) experiences significant degradation with PNI. The 8-BOK with r=2/3 error

correction and 16-BOK with r=3/4 error correction systems occupy approximately the same bandwidth as the TCM system and show better performance in PNI than the alternative QPSK system.
DTIC
Coding; Decoding; Error Correcting Codes; Modulation; Spectra

20060055698 Naval Postgraduate School, Monterey, CA USA
Methodology for Evaluating the Effectiveness of Collaborative Tools for Coordinating MDA Emergency Response
Wagreich, Richard J; Sep 2006; 71 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457416; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Federal Government recognizes that collaboration between the various departments and local, federal, and private sector can best support maritime security. Of course the question is how to get these entities to collaborate? Collaborative technology can provide an answer to Maritime Domain Awareness (MDA) and Emergency Response collaboration, but the right tool for this mission must be selected. In order for the right tool to be selected, then the right criteria must be used to evaluate the tool for this particular mission. The criteria must not only look at the tool or the network, but the whole picture: cognitive processes, organizational structure, and the doctrine and procedures of the players involved. This thesis will focus on establishing criteria for evaluating collaborative tools in the tactical environment of MDA and Emergency Response collaboration. In this environment, an Incident Commander will need to coordinate military, coalition, federal, state, local entities, as well as non-governmental organizations. A methodology does exist that meets these criteria, the North Atlantic Treaty Organization Code of Best Practice for assessing Command and Control Systems.
DTIC
Command and Control; Emergencies; Responses

20060055726 Stottler Henke Associates, Inc., San Mateo, CA USA
Visually Based Timeline Debrief Toolset for Team Training AAR
Jensen, Randy; Nolan, Margaret; Harmon, Nancy; Caldwell, Gregory; Jan 2006; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457460; No Copyright; Avail.: CASI: A03, Hardcopy

Large-scale team training presents a challenge for instructors who must coordinate after action review for distributed teams. This paper presents a visual timeline-based debrief toolset that enables instructors to quickly construct and present playback vignettes for salient training points. The AAIRS (After Action Intelligent Review System) application being developed for the Marine Corps CACCTUS (Combined Arms Command and Control Trainer Upgrade System) identifies training points through the use of intelligent data collection and causal analysis methods. AAIRS records the training mission execution, which includes a synchronized collection of exercising force audio communications and human in the loop interaction with system components (operational C4I and simulator interface tools). Key exercise data relevant to training points is tabulated by the debrief construction tool and presented visually along a timeline for instructor review. The time consuming process of reviewing sequential recorded radio communications is eased by visually representing individual transmissions on the timeline, grouped into dialogs and annotated with speech analysis results. The tool's presentation capability allows instructors to preview their planned debrief presentation and customize it prior to formal debrief. This facilitates a highly configurable after action review, where the presentation of each training point in the debrief can include descriptive causal analysis text, voice communications playback, and 3D views of the battlefield, either frozen in time (visually, a 'snapshot') or played back as vignettes.
DTIC
Command and Control; Data Bases; Digital Systems; Education; Playbacks; Telecommunication

20060055741 BBN Systems and Technologies Corp., Cambridge, MA USA
Portability in the Janus Natural Language Interface
Weischedel, Ralph M; Bobrow, Robert J; Ayuso, Damaris; Ramshaw, Lance; Jan 1989; 7 pp.; In English
Contract(s)/Grant(s): N00014-85-C-0079; N00014-85-C-0016
Report No.(s): AD-A457478; No Copyright; Avail.: CASI: A02, Hardcopy

Although natural language technology has achieved a high degree of domain independence through separating domain-independent modules from domain-dependent knowledge bases, portability, as measured by effort to move from one application to another, is still a problem. Here we describe a knowledge acquisition tool (KNACQ) that has sharply decreased

our effort in building knowledge bases. The knowledge bases acquired with KNACQ are used by both the understanding components and the generation components of Janus.
DTIC
Janus; Knowledge Based Systems; Natural Language (Computers)

20060055749 Naval Postgraduate School, Monterey, CA USA
The Evaluation of Project Management Performance on Two Software Maintenance Projects Based on a CMMI Framework
LaFond, Karen; Jun 2006; 114 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457511; No Copyright; Avail.: CASI: A06, Hardcopy

As software systems increase in size and complexity, so does the need to predict and control scope, schedule, and costs. The USA General Accountability Office has acknowledged weaknesses in the software acquisition process. Industry data indicates that improving the software development process can have significant effect on a project team's ability to generate products within planned scope, schedule, and cost estimates. This thesis focus is on software maintenance, one phase of the Army's acquisition process, to demonstrate that stronger management practices are needed to make better predictions and assessments in those areas. Two software maintenance projects were evaluated for success in project management performance against CMMI practices. This research results in a set of recommendations and predicted benefits are provided for use by the organization as input to the next process improvement effort.
DTIC
Computer Programming; Computer Systems Programs; Maintenance; Project Management; Software Engineering

20060055754 Naval Postgraduate School, Monterey, CA USA
Developing Software Requirements Supporting Open Architecture Performance Goals in Critical DoD System-of-Systems
Naegle, Brad; Sep 15, 2006; 55 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457519; NPS-GSBPP-06-012; No Copyright; Avail.: CASI: A04, Hardcopy

To implement the capabilities conceptualized in the National Military Strategy complex secure networks of weapon systems intelligence platforms and command-and-control mechanisms must be seamlessly integrated and maintained over time. Accurate and timely information will enable National Military Strategy key tenets to be realized. These networks are central warfighting platforms in the information age. As these capabilities are developed over time in an evolutionary manner interoperability on the Net-Centric Warfare (NCW) networks is essential and both hardware and software systems must be designed in an Open-systems Architecture (QA) fashion to accommodate the vast number of changes anticipated. Professional Program Management will be needed to successfully develop these key warfighting platforms. Materiel Developers will need to recognize the relatively immature nature of the software engineering domains and actively compensate for this immaturity. System software performance capabilities must be much more detailed than typical hardware-centric systems as the current state of software engineering disciplines is unlikely to satisfy implied yet critical performance requirements. Essential QA performance characteristics including Maintainability Upgradability lnterfaces/lnteroperability Reliability Safety and Security (MUIRSS) must be fully analyzed and clearly communicated to the software developer to ensure the DoD obtains the flexibility and longevity desired from NCW systems.
DTIC
Computer Programming; Computer Programs; Goals; Interoperability; Software Engineering

20060055759 Naval Postgraduate School, Monterey, CA USA
Usable Knowledge Gained or Refined for Personnel Serving in the Operating Forces Through Naval Postgraduate School's Distributed Learning Program
Hortman, Billy S; Jun 2006; 117 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457527; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This research examines the usable knowledge gained or refined through Distributed Learning from Naval Postgraduate School for personnel serving in operational billets. The population studied was students currently enrolled or students that had completed the Information Systems and Operations certificate program. The study used a web based survey for data collection and used that data to answer four research questions. The data clearly demonstrates that Distributed Learning is equivalent to resident coursework in terms of usable knowledge gained or refined and distributes that usable knowledge quickly and efficiently to individual servicemembers. Beyond the individual, a direct transfer to the organization of a portion of the

knowledge gained or refined occurs. The data suggest that frequency of use of skills can be used as a measure of effectiveness for the Distributed Learning program at Naval Postgraduate School, but more data are needed to be conclusive. Additionally, the results provide evidence that Distributed Learning provides a strong, social interaction learning context. This evidence challenges the assertion that social interaction between students and faculty is primarily a characteristic of resident coursework and a limitation of Distributed Learning.
DTIC
Data Acquisition; Distributed Processing; Information Management; Learning; Personnel; Refining; Schools

20060055760 Naval Postgraduate School, Monterey, CA USA
The Design and Implementation of a Prototype Web-Portal for the Integrated Mobile Alerting System (IMAS)
Le, Phong D; Hsu, Michael; Jun 2006; 165 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457528; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Integrated Mobile Alert System (IMAS) is a mobile device message alerting system that provides a means for people to stay connected and receive information in a modality that is constantly available to them. The focus of this research is to develop a proof of concept for the common data format and common platform aspect of the proposed architecture. This project concentrates on the design characteristics of the IMAS-portal and server-side database. The thesis determines a way to aggregate, integrate, and sort different message formats in order to be easily displayed on a variety of mobile devices according to user profiles. It demonstrates that a web-portal written in PHP script supported by a relational database is a good configuration for IMAS. Additionally, a proof of concept system that converts messages into disseminated mobile alerts is presented. This thesis marks the founding steps in developing the IMAS.
DTIC
Internets; Prototypes; Systems Integration

20060055761 Naval Postgraduate School, Monterey, CA USA
Simulation of Cylinder Implosion Initiated by Underwater Explosion
Krueger, Seth R; Jun 2006; 119 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457530; No Copyright; Avail.: CASI: A06, Hardcopy

The traditional study of underwater explosions (UNDEX) with respect to ship damage became of interest during World War II when torpedo explosions near a ship created more damage than a direct hit. Following the war, many full scale ship shock trials were conducted that provided much of the empirical data that is used in the field today. However, one type of shock phenomena became of interest in the late 1960s that potentially could be more damaging than a typical underwater explosion; an implosion. Crude implosion experiments were conducted in the late 1960s. Although these experiments collected data on pressure waves, more emphasis was placed on the acoustical properties associated with an implosion event. Today, one of the Navy's concerns is about the potential for the implosion of a pressure vessel in close proximity to a submarine hull. A computational approach is desired that will predict the source strength of an implosion. This thesis will cover the basic principals of underwater shock phenomena, including explosions and implosions. Drawing from previous experiments and computational simulations, a detailed investigation of the implosion event will be made using, DYSMAS, a coupled Eulerian-Lagrangian solver. DYSMAS will be used to compare the characteristics of implosion and explosion events.
DTIC
Computerized Simulation; Implosions; Simulation; Underwater Explosions

20060055768 Naval Postgraduate School, Monterey, CA USA
Field Programmable Gate Array Hysteresis Control of Parallel Connected Inverters
Lund, John J; Jun 2006; 127 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457537; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This thesis presents the use of a Field Programmable Gate Array (FPGA) to control two Commercial-Off- The-Shelf (COTS) Power Electronic Building Blocks (PEBB) configured to produce a three-phase low distortion sine wave output. The next generation warship is expected to contain more electric loads that require quality variable frequency output. A typical propulsion motor in the 40MW range will probably require the current Total Harmonic Distortion to be less than 3% (MIL-STD-1399). However, high power low distortion inverters usually have associated high cost and weight penalties. This thesis presents a parallel hybrid converter which demonstrates the use of a high power low fidelity bulk inverter with a low power high fidelity active filter. The high power low fidelity output is sourced using a six-step inverter which produces the entire fundamental current. The low power hysteresis controlled active filter section produces only cancelling harmonic

current. The paralleled result is a pristine output sine wave with a 1% current Total Harmonic Distortion (THD). This solution should offer the Navy a high fidelity high power inverter without the cost and weight penalties.
DTIC
Computer Programming; Field-Programmable Gate Arrays; Hysteresis; Inverters; Parallel Processing (Computers)

20060055770 Naval Postgraduate School, Monterey, CA USA
Experimentation in a Collaborative Planning Environment
McClain, Bryan J; Smith, Diane M; Jun 2006; 89 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457540; No Copyright; Avail.: CASI: A05, Hardcopy

Research details the Oracle Database and Collaboration software technologies, the Trident Warrior (TW) planning and experimentation process, and how the utilization of those software technologies, coupled with the Knowledge Management (KM) methodologies, affect large scale military experimentation processes. Of specific focus is how the FORCEnet Innovation & Research Enterprise (FIRE) system at NPS has facilitated rapid advancement of TW scope and capabilities as well as delivered a significantly improved final product to NETWARCOM.
DTIC
Computer Programming; Data Bases; Information Management; Software Engineering

20060055777 Naval Postgraduate School, Monterey, CA USA
An Upgradeable Agent-Based Model to Explore Non-Linearity and Intangibles in Peacekeeping Operations
Lehmann, Wolfgang; Jun 2006; 135 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457548; No Copyright; Avail.: CASI: A07, Hardcopy

Peacekeeping operations (PKO) have become a significant challenge to the German Armed Forces. For the development of tactics, techniques, procedures and equipment with combat operations, agent-based models have been developed, used and exploited for many years. Modeling and simulation of PKO, however, is still in a very early stage. This thesis develops and agent-based model to analyze PKO. Unlike many other multi-agent systems (MAS), it implements the rules of discrete event simulation. The chosen software architecture makes the model upgradeable and useful for a breadth of future applications. The model's open architecture and the underlying principle of loosely coupled components make it easy to change or enhance the model. The software agent's design incorporates individuality, which is characterized by personality factors. Furthermore, the model is data-farmable. Required data inputs into the simulation tool, i.e., PKO scenarios, are formatted utilizing a state-of-the-art technology called Extensible Markup Language (XML), which facilitates use of the data in nearly all computer software packages. The model executes multiple runs of multiple scenarios automatically, demonstrating a robust nature. Finally, an exemplary analysis demonstrates data-farming concepts on the affect of personality factor setting on the potential escalation of a PKO scenario.
DTIC
Architecture (Computers); Linearity; Models; Simulation; Tactics

20060055786 Naval Postgraduate School, Monterey, CA USA
Hit-to-Kill Guidance Algorithm for the Interception of Ballistic Missiles During the Boost Phase
Lukacas, IV, John A; Jun 2006; 157 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457566; No Copyright; Avail.: Defense Technical Information Center (DTIC)

A near-optimal guidance law has been developed using the direct method of calculus of variations that maximizes the kinetic energy transfer from a surface-launched missile upon interception to a ballistic missile target during the boost phase of flight. Mathematical models of a North Korean Taep'o-dong II (TD-2) medium-range ballistic missile and a Raytheon Standard Missile 6 (SM-6) interceptor are used to demonstrate the guidance law's performance. This law will utilize the SM-6 s onboard computer and active radar sensors to independently predict an intercept point, solve the two-point boundary value problem, and determine a near-optimal flight path to that point. Determining a truly optimal flight path would require significant computing power and time, while a near-optimal flight path can be calculated onboard the interceptor and updated in real time without significant changes to the interceptor s hardware. That near-optimal guidance path is then converted into a set of command functions and fed back into the control computer of the interceptor. By modifying the second and third derivatives of the two-point boundary value problem, the intercept conditions can be varied to study their effects upon the optimal flight path regarding the maximization of kinetic energy upon impact.
DTIC
Acceleration (Physics); Algorithms; Ballistic Missiles; Interception; Missiles; Surface to Surface Missiles; Targets

20060055805 Air Force Research Lab., Wright-Patterson AFB, OH USA

Analyzing Divisia Rules Extracted from a Feedforward Neural Network

Schmidt, Vincent A; Binner, Jane M; Mar 2006; 10 pp.; In English

Contract(s)/Grant(s): Proj-2830

Report No.(s): AD-A457596; No Copyright; Avail.: CASI: A02, Hardcopy

This paper introduces a mechanism for generating a series of rules that characterize the money-price relationship, defined as the relationship between the rate of growth of the money supply and inflation. Division component data is used to train a selection of candidate feedforward neural networks. The selected network is mined for rules, expressed in human-readable and machine-executable form. The rule and network accuracy are compared, and expert commentary is made on the readability and reliability of the extracted rule set. The ultimate goal of this research is to produce rules that meaningfully and accurately describe inflation in terms of Division component dataset.

DTIC

Computer Programming; Feedforward Control; Neural Nets; Software Engineering

20060055806 Naval Postgraduate School, Monterey, CA USA

A Framework for the Management of Evolving Requirements in Software Systems Supporting Network-Centric Warfare

Reynolds, Linda K; Jun 2006; 121 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457597; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Network-centric warfare (NCW) has changed the way the Department of Defense addresses technological improvements for its military forces. No longer is the emphasis on enhancing the capabilities of a single platform, but the focus is now on networking people, processes and technology to enable knowledge sharing and rapid decision-making. The capabilities required to support network-centric operations (NCO) in the NCW environment must be supported by new, innovative networked communication technologies. There are many sources of requirements for these software systems supporting NCO, which may increase in number as the Services continue to develop the capabilities necessary for the transformation to a fully networked military force. Requirements may also emerge and continue to evolve following the fielding of a NCO capability because new technology has the potential to change how warfighters work. Requirements evolution results in requirements engineering challenges associated with the acquisition and development of network-centric software systems. As such, an approach is needed to provide for consistency in elicitation, management and documentation of evolving requirements for technological capabilities supporting NCO. The purpose of this research is to address the problem of evolving requirements. The requirements engineering framework proposed by this thesis incorporates classification theory and requirements modeling principles, and is supported by the Extensible Markup Language (XML) family of technologies. Particular attention has been paid to the selection of nonproprietary, platform independent technology to ensure data can be exchanged between organizations. The framework demonstrates a means by which requirements can be classified and structured in a standardized format.

DTIC

Computer Networks; Computer Programming; Computer Systems Programs; Software Engineering; Warfare

20060055817 Massachusetts Inst. of Tech., Cambridge, MA USA

Collaboration Technology in Military Operations: Lessons Learned from the Corporate Domain

Scott, Stacey D; Cummings, Mary L; Graeber, David A; Nelson, W T; Bolia, Robert S; Feb 2006; 19 pp.; In English

Contract(s)/Grant(s): Proj-7184

Report No.(s): AD-A457615; No Copyright; Avail.: CASI: A03, Hardcopy

Collaboration technologies used in current military operations, such as email, instant messaging, and desktop conferencing, assist explicit communications between distributed team members. However, research in corporate environments has shown that explicit communication, while an important aspect of collaboration, is often used together with more subtle interactions to help teams communicate and coordinate their joint work. For example, monitoring other team members' on-going task activities help teams integrate related task activities, identify appropriate interruption opportunities, and provide assistance when necessary. When physically distributed, as is often the case in command and control environments, it is difficult to engage such subtle behaviors because team members' activities are not visibly accessible. Instead, people must resort to explicit methods, such as asking for a status update. These explicit methods require effort from both parties and can be disruptive. To address these issues in corporate work settings, collaboration technologies have been developed to help people remain apprised of remote colleagues' activities, while minimizing disruption. This paper examines the suitability of these corporate technologies for supporting military team interactions, with a focus on identifying aspects of

military teamwork that are well supported by these approaches and aspects requiring new methods.
DTIC
Information Management; Organizations

20060055823 Maryland Univ., College Park, MD USA
Dataflow Interchange Format and a Framework for Processing Dataflow Graphs
Keceli, Fuat; Jan 2004; 130 pp.; In English
Contract(s)/Grant(s): F30602-01-C-0171
Report No.(s): AD-A457630; No Copyright; Avail.: CASI: A07, Hardcopy

Digital Signal Processing (DSP) applications are often designed with tools based on dataflow graphs and the increasing number of such tools shows the need for a common intermediate graph representation for exchanging dataflow information. In this work, we present the dataflow interchange format (DIF), a platform-independent textual language that is geared towards capturing the semantics of graphical design tools for DSP system design. A key objective of DIF is to facilitate technology transfer across dataflow-based DSP design tools by providing a common, extensible semantics for representing coarse-grain dataflow graphs, and recognizing useful subclasses of dataflow models. This thesis also develops the framework for a Java-based software repository that provides dataflow analysis and optimization algorithms for DIF representations. The featured framework is accompanied by toolboxes for hierarchical design support and visualization of graphs.
DTIC
Digital Systems; Signal Processing

20060055825 Maryland Univ., College Park, MD USA
First Version of a Dataflow Interchange Format
Kecelli, Fuat; Ko, Mingyung; Shahparnia, Shahrooz; Bhattacharyya, Shuvra S; Nov 2002; 18 pp.; In English
Contract(s)/Grant(s): F30602-01-C-0171
Report No.(s): AD-A457633; UMIACS-TR-2002-98; No Copyright; Avail.: CASI: A03, Hardcopy

The dataflow interchange format (DIF) is a textual language that is geared towards capturing the semantics of graphical design tools for DSP system design. A key objective of DIF is to facilitate technology transfer across dataflow-based DSP design tools by providing a common, extensible semantics for representing coarse-grain dataflow graphs, and recognizing useful sub-classes of dataflow models. DIF captures essential modeling information that is required in dataflow-based analysis and optimization techniques, such as algorithms for consistency analysis, scheduling, memory management, and block processing, while optionally hiding proprietary details such as the actual code that implements the dataflow blocks. Accompanying DIF is a software package of intermediate representations and algorithms that operate on application models that are captured through DIF. This paper describes the structure of the DIF language together with several implementation and usage examples.
DTIC
Digital Systems; Optimization; Signal Processing

20060055828 Maryland Univ., College Park, MD USA
System Synthesis for Polymorphous Computing Architectures
Lohani, Sumit; Bhattachrayya, Shuvra S; Feb 2002; 104 pp.; In English
Contract(s)/Grant(s): F030602-01-C-0171; MIP9734275
Report No.(s): AD-A457640; UMIACS-TR-2002-12; CS-TR-4330; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In general, polymorphous computing architectures are architectures that can be dynamically customized to various applications. This report is concerned with metrics, formulations, and algorithms for systematically synthesizing architectural configurations and software for such architectures, particularly in the domain of digital signal processing (DSP). In polymorphous system synthesis for DSP, one central aspect is managing trade-offs between latency and throughput, which are critical metrics for DSP applications. In Sections 1-4 of the report, we develop a model for latency that is more appropriate than conventional models of latency for DSP system synthesis, and that takes into account central issues related to transient-state time, and we develop precise relationships between latency and throughput using this framework. Schedule post-processing strategies based on simulation and retiming that reduce the latency and transient for a given throughput constraint are then presented, and their efficacy is substantiated with experimental results on a number of practical DSP benchmarks. Also, a streamlined approach based on a graph-theoretic framework is suggested that leads to much faster

execution of the proposed schedule post-processing techniques. Sections 5-6 of the report then deal with the problem of efficient mapping of an application with stochastic execution times to a polymorphous computing architecture in accordance with the time-varying performance requirements for several metrics, which may include even non-trivial metrics such as the coupled latency/throughput metrics that are addressed earlier in the report. A comprehensive model for system synthesis in this context is developed; results are developed on the complexity of system synthesis under this model; and preliminary algorithms that address the synthesis problem are presented, and evaluated experimentally.
DTIC
Polymorphism

20060056132 Military Academy, West Point, NY USA
The Army Digital Terrain Catalog II (ADTC)
Goerger, Niki C; Goerger, Simon R; Wong, Ernest Y; Keeter, Robert R; Jun 2006; 48 pp.; In English
Contract(s)/Grant(s): Proj-DSE-R-0602
Report No.(s): AD-A456501; DSE-TR-0602; No Copyright; Avail.: CASI: A03, Hardcopy

Used to improve military effectiveness, enhance warfighting readiness, and reduce operating costs, simulations have become commonplace in nearly all areas of the U.S. Armed Forces. From material acquisition to force Structure analysis, from first-person video-game shooters to network-centric battle staff exercises, simulations have progressed into becoming intrinsic components of nearly all aspects of the military landscape. As the military has become more accustomed to using simulations and its expectations have grown about simulation capabilities, the demand and need for more realistic virtual and constructive environments have increased. Accordingly, there have been escalating demands on the modeling and simulation (M&S) community to incorporate greater fidelity and resolution of the natural and manmade environment and systems interaction in the battlespace to make the simulation experience increasingly more realistic and complete. Unfortunately, this has increased the cost of developing simulations and their associated terrain databases, both in terms of price as well as time. This report documents how the Operations Research Center of Excellence at the U.S. Military Academy has employed systems engineering principles to help address the rising cost of M&S development. Specifically, this report discusses the design and development of the Army Digital Terrain Catalog (ADTC) to help promote discovery, accessibility, and reuse of digital terrain databases.
DTIC
Catalogs (Publications); Computerized Simulation; Data Bases; Terrain

20060056154 Carnegie-Mellon Univ., Pittsburgh, PA USA
ORA 2006: User's Guide
Carley, Kathleen M; DeReno, Matt; Aug 2006; 164 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-06-1-0104
Report No.(s): AD-A457301; CMU-ISRI-06-113; No Copyright; Avail.: Defense Technical Information Center (DTIC)

ORA is a network analysis tool that detects risks or vulnerabilities of an organization's design structure. The design structure of an organization is the relationship among its personnel, knowledge, resources, and tasks entities. These entities and relationships are represented by the Meta-Matrix. Measures that take as input a Meta-Matrix are used to analyze the structural properties of an organization for potential risk. ORA contains over 50 measures which are categorized by which type of risk they detect. Measures are also organized by input requirements and by output. ORA generates formatted reports viewable on screen or in log files, and reads and writes networks in multiple data formats to be interoperable with existing network analysis packages. In addition, it has tools for graphically visualizing Meta-Matrix data and for optimizing a network's design structure. ORA uses a Java interface for ease of use, and a C++ computational backend.
DTIC
Network Analysis; C++ (Programming Language); Java (Programming Language)

20060056155 Maryland Univ., College Park, MD USA
Implementing OWL Defaults
Kolovski, Vladimir; Parsia, Bijan; Katz, Yarden; Jan 2006; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457362; No Copyright; Avail.: CASI: A03, Hardcopy

While it has been argued that knowledge representation for the World Wide Web must respect the open world assumption due to the 'open' nature of the Web, users of the Web Ontology Language (OWL) have often requested some form of non-monotonic reasoning. In this paper, we present preliminary optimizations and an implementation of a restricted version

of Reiter's default logic as an extension to the description logic fragment of OWL, OWL DL. We implement the decision procedure for this logic in the OWL DL reasoner Pellet, and exploit its support for incremental reasoning through update to improve performance. We also extend an open source ontology editor SWOOP with default rules editing support.
DTIC
Internets; Knowledge Representation; World Wide Web; Editing

20060056156 Naval Postgraduate School, Monterey, CA USA
A Measurement Study of BGP Blackhole Routing Performance
Stamatelatos, Nikolaos; Sep 2006; 111 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457366; No Copyright; Avail.: Defense Technical Information Center (DTIC)

BGP Blackhole routing is a mechanism used to protect networks from DDoS attacks. During the last several years, a number of variations of BGP Blackhole routing have been proposed. However, even though these methods have been used by many organizations and ISPs for some years, the academic community has provided only a limited evaluation of BGP Blackhole routing, using mainly network simulations. The objective of this research was to evaluate the basic methods of BGP Blackhole routing in a real test-bed network in various environments. By using the response time, the CPU load, and the link load as performance metrics, we first evaluated the performance of those methods in networks where the routers CPU load was the limiting factor. Then we examined the effect of the high link load and the effect of routers preconfiguration on the BGP Blackhole routing's performance. The results showed that the BGP Blackhole routing may not be effective under stressful situations, that is, a high link load, because its dependence on TCP and the underlying routing protocols. Of the three basic Blackhole routing methods, the best method is the destination-based, followed closely by the source-based. The third method, customer-triggered Blackhole routing, in all cases had very degraded performance.
DTIC
Computer Networks; Protocol (Computers); Organizations

20060056158 California Univ., Santa Cruz, CA USA
Robust Loop-Free On-Demand Routing in Ad Hoc Networks
Rangarajan, Hari; Jun 2006; 224 pp.; In English
Report No.(s): AD-A457397; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In this thesis, we explore new techniques for robust, efficient, loop-free on-demand routing in Mobile Ad hoc Networks (MANETs) using the same information (i.e., topology information, sequence numbers, etc.,) used in prior on-demand routing protocol proposals. We provide new insights into the robustness of protocols based on destination-sequence numbers when operating with node failures and loss of routing information, and present a new destination-sequence number framework that works correctly even with failure conditions. We also show how destination-sequence numbers can be manipulated as routing labels for improving performance, rather than being strictly treated as time-stamps. We present two different routing approaches that exploit the topology information that can be collected on-demand during the route request ood search. The first approach translates topology information into labels that are then stored at nodes in strict lexicographic ordering along any successor path to a destination. Loop-freedom is maintained by allowing nodes to only pick 'smaller' labels. The second approach maintains a list of topology information that should not be trusted in-addition to the known path to a destination. Using the notion of trusted topology, nodes can always make routingWe conclude our research with a new on-demand routing technique that exploits the route request search process, which is an integral part of any on-demand routing protocol. Without requiring any additional mechanisms or information, we use the uniqueness of route requests to realize a on-demand routing framework. We, then, present extensions to the basic framework to improve performance using more information that can be collected during the flood search process.
DTIC
Communication Networks; Robustness (Mathematics); Routes

20060056162 Naval Postgraduate School, Monterey, CA USA
Assessing the Potential Value of FORCEnet Technologies Within the JFMCC Planning Process Using the Knowledge Value Added Methodology
Kovats, Keith E; Jun 2006; 73 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457509; No Copyright; Avail.: CASI: A04, Hardcopy

In the FORCEnet Functional Concept document published by the Chief of Naval Operations and the Commandant of the Marine Corps, the leaders of the US Naval Forces called for the development of adaptive, distributed networks of

commanders, staffs, operating units, supporting organizations, sensors, weapons and other equipment interacting with one another on an underlying infrastructure, as well as the associated command and control policies, concepts, organizations& to allow them to interact. Posed to invest in the development of the FORCEnet architecture, the Navy and Marine Corps require a means of analysis to determine the value of information technologies prior to development and acquisition. The Knowledge Value Added (KVA) methodology can provide the decision makers with quantitative tools to make informed and accurate decisions in the acquisitions process of information technologies within the FORCEnet Functional Concept framework. Historically, these decisions were based on costs, schedule, and capabilities, with the emphasis on cost. A Proof of Concept analyzing the Joint Forces Maritime Component Command Planning Process was developed to demonstrate the utility of the KVA method. This analysis demonstrates the current inefficiencies within the process and the potential value of notional information technologies that could be developed to support the planning process.
DTIC
Information Management; Control Theory; Navy; Schedules

20060056172 Naval Postgraduate School, Monterey, CA USA
A New Framework for Software Visualization: A Multi-Layer Approach
Spyrou, Dimitrious; Sep 2006; 145 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457166; No Copyright; Avail.: CASI: A07, Hardcopy

Software Visualization can play a significant role in our fight against Software's inherent complexity. Despite all efforts made so far, Software Visualization tools have not succeeded to be a part of Software Engineers everyday practice. We believe that a properly defined taxonomy that will provide a framework for discussion, analysis and research guidance by offering a systematic and systemic overview of the area, covering all the concerns and challenges, is a starting point for a new approach for the field. After analyzing existing taxonomies and exploring existing tools, we approach Software Visualization as an interface between humans and software and we propose a multi-layered framework that incorporates all the concerns and the challenges of our field, in a neat, systematic and expandable way that can also serve as a roadmap for a research area and that can promote communication of existing and new ideas.
DTIC
Computer Programs; Taxonomy; Engineers

20060056274 Carnegie-Mellon Univ., Pittsburgh, PA USA
Understanding and Evolving the ML Module System
Dreyer, Derek; May 2005; 255 pp.; In English
Contract(s)/Grant(s): F19628-95-C-0050
Report No.(s): AD-A457064; CMU-CS-05-131; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457064; Avail.: CASI: A12, Hardcopy

The ML module system stands as a high-water mark of programming language support for data abstraction. Nevertheless, it is not in a fully evolved state. It is important to come to a clear assessment of the existing design space and consolidate what is meant by 'the ML module system' before embarking on such a major extension as recursive modules. In this dissertation I contribute to the understanding and evolution of the ML module system by: (1) developing a unifying account of the ML module system in which existing variants may be understood as subsystems that pick and choose different features, (2) exploring how to extend ML with recursive modules in a way that does not inhibit data abstraction, and (3) incorporating the understanding gained from (1) and (2) into the design of a new, evolved dialect of ML. I formalize the language of part (3) using the framework of Harper and Stone, in which the meanings of 'external' ML programs are interpreted by translation into an 'internal' type system. In my exploration of the recursive module problem, I also propose a type system for statically detecting whether or not recursive module definitions are 'safe' -- that is, whether they can be evaluated without referring to one another prematurely -- thus enabling more efficient compilation of recursive modules. Future work remains, however, with regard to type inference and type system complexity, before my proposal can be feasibly incorporated into ML.
DTIC
Programming Languages; Modules

20060056277 Carnegie-Mellon Univ., Pittsburgh, PA USA
Adding Faster with Application Specific Early Termination
Koes, David; Chelcea, Tiberiu; Onyeama, Charles; Goldstein, Seth C; Jan 2005; 21 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-01-1-0659

Report No.(s): AD-A457103; CMU-CS-05-101; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457103; Avail.: CASI: A03, Hardcopy

This paper presents a methodology for improving the speed of high-speed adders. As a starting point, a previously proposed method, called 'speculative completion,' is used in which fast-terminating additions are automatically detected. Unlike the previous design, the method proposed in this paper is able to adapt dynamically to (1) application-specific behavior and (2) to adder-specific behavior, resulting in a higher detection rate of fast additions and, consequently, a faster average-case speed for addition. Our experimental results show detection rates of over 99%, and adder average-case speed improvements of up to 14.8%.

DTIC

Computers; Adding Circuits

62
COMPUTER SYSTEMS

Includes computer networks and distributed processing systems. For information systems see *82 Documentation and Information Science*. For computer systems applied to specific applications, see the associated category.

20060054148 Nippon Telegraph and Telephone Public Corp., Yokosuka, Japan

Real-Time Application Traffic Monitoring System for Streaming Data Quality Evaluation

Murooka, Takahiro; Hashimoto, Masashi; Miyazaki, Toshiaki; NTT Technical Review, Volume 1, No. 4; July 2003, pp. 59-64; In English; See also 20060054147; Copyright; Avail.: Other Sources

Our innovative traffic-monitoring system lets operators observe data-communication traffic as an oscilloscope-style trace, which provides an efficient way of directly evaluating the quality of data streaming services. Te monitoring system has a high resolution (1 ms) sampling function and a real-time data representation/recording mechanism that operates in synchrony.

Author

Data Transmission; Oscilloscopes; Real Time Operation; Internet Resources

20060054151 Nippon Telegraph and Telephone Public Corp., Musashino, Japan

High Availability Server Platform for Operations Support System

Kimura, Nobuhiro; Yamada, Akira; Seshake, Hikaru; Nishizono, Toshihiro; NTT Technical Review, Volume 1, No. 4; July 2003, pp. 40-48; In English; See also 20060054147; Copyright; Avail.: Other Sources

In the near future, operations support systems (OSSs) will be required to have higher availability. To cope with this we propose these methods: (1) distributed server restart, (2) domain division restart by HA-SP, our high availability server platform, and (3) service recover by application process functions. Our methods concern the platform of a computer system and require no changes in the application processes, so they are applicable to other kinds of systems. Applying these methods to an OSS for the intelligent network service of IMT2000 (International Mobile Telecommunications 2000) reduced the service down-time by 40%.

Author

Support Systems; Telecommunication; Internets; Downtime

20060054152 Nippon Telegraph and Telephone Public Corp., Musashino, Japan

Service Management System for IP Services

Yamane, Kenichi; Furukawa, Tsuyoshi; Nishizono, Toshihiro; NTT Technical Review, Volume 1, No. 4; July 2003, pp. 50-58; In English; See also 20060054147; Copyright; Avail.: Other Sources

This paper proposes interface techniques that enable service management systems (SMSs) to make flexible connections with customer relationship management systems (CRMs) and network elements (NEs). In the service ordering process for new IP services, the proposed methods achieve high flexibility in the SMS implementation. The XML-based service order information description at the cRM-SMS interface allows quick IP service addition because the XML parsing mechanism means that interface programs hardly have to be changed. The virtual NE structure which divides NE functions into atomic primitives, can introduce NE's provided by new vendors without modifying service order applications. We discuss some development results and evaluate the flexibility of the CRM and NE interfaces and the SMS performance.

Author

Flexibility; Management Systems; Internets; Internet Resources

20060054153 Nippon Telegraph and Telephone Public Corp., Yokosuka, Japan

Software Defined Radio Prototype (II): Implementation and Evaluation of IEEE 802.11 Wireless LAN

Shono, Takashi; Matsui, Munehiro; NTT Technical Review, Volume 1, No. 4; July 2003, pp. 24-30; In English; See also 20060054147; Copyright; Avail.: Other Sources

We discuss the design of an IEEE 802.11 wireless local area network (WLAN) based on our prototype software defined radio (SDR) transceiver that supported both personal Handy Phone System and WLAN. The most difficult problem in implementing the WLAN in this way is meeting the short interframe space (SIFS) requirement of the IEEE 802.11 standard. We describe the software architecture of the prototype and explain how it can process the IEEE 802.11 WLAN protocol. The hybrid programmable architecture of our SDR is a sophisticated combination of a general purpose microprocessor, digital signal processors (DSPs), and programmable hardware. The media access control (MAC) layer functions are executed on the central processing unit (CPU), while the physical (PHY) layer functions such as modulation/demodulation (MODEM) are processed by the DSP; higher speed digital signal process run on a field programmable gate array (FPGA). We also describe an experimental evaluation of the prototype for IEEE 802.11 WLAN use.

Author

Local Area Networks; Wireless Communication; Radio Communication

20060054211 NASA Ames Research Center, Moffett Field, CA, USA

Model-Unified Planning and Execution for Distributed Autonomous System Control

Aschwanden, Pascal; Baskaran, Vijay; Bernardini, Sara; Fry, Chuck; Moreno, Maria; Muscettola, Nicola; Plaunt, Chris; Rijsman, David; Tompkins, Paul; [2006]; 10 pp.; In English; AAAI Fall Symposium 2006, 13-15 Oct. 2006, Washington, DC, USA; Original contains black and white illustrations; Copyright; Avail.: Other Sources

The Intelligent Distributed Execution Architecture (IDEA) is a real-time architecture that exploits artificial intelligence planning as the core reasoning engine for interacting autonomous agents. Rather than enforcing separate deliberation and execution layers, IDEA unifies them under a single planning technology. Deliberative and reactive planners reason about and act according to a single representation of the past, present and future domain state. The domain state behaves the rules dictated by a declarative model of the subsystem to be controlled, internal processes of the IDEA controller, and interactions with other agents. We present IDEA concepts - modeling, the IDEA core architecture, the unification of deliberation and reaction under planning - and illustrate its use in a simple example. Finally, we present several real-world applications of IDEA, and compare IDEA to other high-level control approaches.

Author

Automatic Control; Autonomy; Architecture (Computers); Controllers

20060054444 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Data Structure and Parallel Decomposition Considerations on a Fibonacci Grid

Michalakes, John; Purser,James; Swinbank, Richard; [1999]; 1 pp.; In English; 13th Conference on NWP, 13-17 Sep. 1999, Denver, CO, USA; Copyright; Avail.: Other Sources; Abstract Only

The Fibonacci grid, proposed by Swinbank and Purser (see companion abstract), provides attractive properties for global numerical atmospheric prediction by offering an optimally homogeneous, geometrically regular, and approximately isotropic discretization, with only the polar regions requiring special numerical treatment. It is a mathematical idealization, applied to the sphere, of the multi-spiral patterns often found in botanical structures, such as in pine cones and sunflower heads. Computationally, it is natural to organize the domain, into zones, in each of which the same pair, or triple, of 'Fibonacci spirals' dominate. But the further subdivision of such zones into 'tiles' of a shape and size suitable for distribution to the processors of a massively parallel computer requires very careful consideration if the subsequent spatial computations along the respective spirals, especially those computations (such as compact differencing schemes) that involve recursion, can be implemented in an efficient 'load-balanced 'manner without requiring excessive amounts of inter-processor communications. In this paper we show how certain 'number theoretic' properties of the Fibonacci sequence (whose numbers prescribe the multiplicity of successive spirals) may be exploited in the decomposition of grid zones into tidy arrangements of triangular grid tiles, each tile possessing one side approximately parallel to the constant-latitude zone boundary. We also describe how the spatially recursive processes may be decomposed across such a tiling, and the directionality of the recursions reversed on alternate grid lines, to ensure a very high degree of load balancing throughout the execution of the computations required for one time step of a global model.

Author

Data Structures; Decomposition; Parallel Processing (Computers); Computational Grids; Fibonacci Numbers

20060055401 Carnegie-Mellon Univ., Pittsburgh, PA USA

On System Scalability

Weinstock, Charles B; Goodenough, John B; Mar 2006; 62 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): FA8721-05-C-0003

Report No.(s): AD-A457003; CMU/SEI-2006-TN-012; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457003; Avail.: CASI: A04, Hardcopy

A significant number of systems fail in initial use or even during integration because factors that have a negligible effect when systems are lightly used have a harmful effect as the level of use increases. This scalability problem (i.e. the inability of a system to accommodate an increased workload) is not new. However the increasing size (more lines of code, greater number of users, widened scope of demands and the like) of US Department of Defense systems makes the problem more critical today than in the past. This technical note presents an analysis of what is meant by scalability and a description of factors to be considered when assessing the potential for system scalability. The factors to be considered are captured in a scalability audit, a process intended to expose issues that if overlooked can lead to scalability problems

DTIC

Computers; Workloads (Psychophysiology)

20060055408 State Univ. of New York, Buffalo, NY USA

A Comprehensive Reasoning Framework for Information Survivability (User Intent Encapsulation and Reasoning About Intrusion: Implementation and Performance Assessment)

Upadhyaya, Shambhu; Aug 2006; 41 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F30602-00-1-0507; DARPA ORDER-Q010/00; Proj-2301

Report No.(s): AD-A457032; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457032; Avail.: CASI: A03, Hardcopy

This effort approaches the problem of user-level intrusion detection by investigating the design and implementation of a practical online user-level intrusion detection system. The outcome of this research is a Dynamic Reasoning based User Intent Driven (DRUID) intrusion detection system. It is important to pay attention to deployment-time issues such as usability and evasion, otherwise it may lead to a situation where the security system is deployed but is either unusable or is deliberately bypassed. A variation of sequential hypothesis testing is proposed to address these issues. Data plays a very important role in the validation of any new approaches or models that are proposed. Unfortunately, in the user-level intrusion detection domain, due to concerns of privacy, there are too few datasets available to the research community. This issue is addressed by devising a data generation algorithm called RACOON based on a model used to profile users.

DTIC

Encapsulating; Information; Security

20060055438 Virginia Univ., Charlottesville, VA USA

Dispelling Seven Myths about Grid Resource Management

Natrajan, Anand; Grimshaw, Andrew S; Humphrey, Marty A; Nguyen-Tuong, Anh; Jan 2004; 25 pp.; In English

Contract(s)/Grant(s): DAHC94-96-C-0008; NSF-EIA99-74968

Report No.(s): AD-A457077; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457077; Avail.: CASI: A03, Hardcopy

Grid resource management is often viewed as scheduling for large long running computer intensive parallel applications. This view is narrow, as we will argue in this article. Grids today encompass diverse resources including machines users and applications. Moreover, grid users make different demands from different resources. Therefore grid infrastructures must adopt a greater responsibility than before for managing resources. Grid resource management cannot mean just scheduling jobs on the fastest machines but must also include scheduling special jobs on matched machines preserving site autonomy, determining usage policies, respecting permissions for use, and so on. In this article we will present seven 'myths' or common beliefs about grid resource management and dispel each myth by presenting counter-examples or 'observations.' These observations have been culled from our experience as well as work done by several experts in major grid-related projects.

DTIC

Computer Networks; Resources Management; Scheduling

20060055441 Virginia Univ., Charlottesville, VA USA

A Scalable Logical Coordinates Framework for Routing in Wireless Sensor Networks

Cao, Qing; Abdelzaher, Tarek; Jan 2004; 11 pp.; In English

Contract(s)/Grant(s): F33615-01-C-1905; N00014-01-1-0576

Report No.(s): AD-A457083; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457083; Avail.: CASI: A03, Hardcopy

Routing is one of the key challenges in sensor networks that directly affects the information throughput and energy expenditure. Geographic routing is the most scalable routing scheme for statically placed nodes in that it uses only a constant amount of per-node state regardless of network size. The location information needed for this scheme, however, is not easy to compute accurately using current localization algorithms. In this paper, we propose a novel logical coordinate framework that encodes connectivity information for routing purposes without the benefit of geographic knowledge, while retaining the constant-state advantage of geographic routing. In addition to ef ciency in the absence of geographic knowledge, our scheme has two important advantages: (i) it improves robustness in the presence of voids compared to other logical coordinate frameworks, and (ii) it allows inferring bounds on route hop count from the logical coordinates of the source and destination nodes, which makes it a candidate for use in soft real time systems. The scheme is evaluated in simulation demonstrating the advantages of the new protocol.

DTIC

Communication Networks; Coordinates; Wireless Communication

20060055446 Ecole Nationale Superieure des Telecommunications, Sevigne, France

Selecting Appropriate Counter-Measures in an Intrusion Detection Framework

Cuppens, F; Combault, S; Sans, T; Apr 20, 2004; 27 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457091; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457091; Avail.: CASI: A03, Hardcopy

No abstract available

Countermeasures; Detection; Warning Systems

20060055454 Air Force Research Lab., Rome, NY USA

100X Joint Battlespace Infosphere (JBI)

Ramseyer, George O; Kwong-Yan, Lok; Linderman, Richard W; Aug 2006; 62 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-459T

Report No.(s): AD-A457108; AFRL-IF-RS-TR-2006-265; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457108; Avail.: CASI: A04, Hardcopy

The 100X Joint Battlespace Infosphere (JBI) program is developing a high-performance information management architecture that is based upon the JBI reference implementation. The JBI reference implementation, developed at AFRL, specifies core services and a Common Application Program Interface (CAPI) for a network-centric platform to support Command and Control communications. The 100X JBI meets the conceptual goals of the JBI by implementing the JBI CAPI and adhering to the standards established for the JBI core services. The 100X JBI was used in several experiments to evaluate its performance and test the CAPI and core services implementation. This report summarizes the experience in developing the 100X JBI reference implementation and the results of performance experiments.

DTIC

Information Management; Information Systems; Management Systems

20060055541 Naval Postgraduate School, Monterey, CA USA

Light Reconnaissance Vehicle (LRV): Enhancing Command, Control, Communications, and Computers and Information Systems (C4I) to Tactically Employed Forces via a Mobile Platform

Haines, Thomas J; McFerron, Michael P; Sep 2006; 93 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457129; No Copyright; Avail.: CASI: A05, Hardcopy

The theories supporting Network Centric Warfare (NCW) continue to mold the tactical use of U.S. forces throughout the global warfare environment. This thesis will correlate the four tenets of NCW to the tactical employment of the Naval Postgraduate School's (NPS's) Light Reconnaissance Vehicle (LRV). The four tenets of NCW are as follows: (1) a robustly networked force improves information sharing, (2) information sharing and collaboration enhance the quality of information

and shared situational awareness, to maximize the combat effectiveness of U.S. and allied forces. In teaming with its primary sponsor, U.S. Special Operations Command (SOCOM), NPS has developed the Tactical Network Topology (TNT) series of experiments aimed at providing the warfighter with information solutions for the battle space. The NPS LRV was derived from an operational requirement to have a mobile C4I/ISR platform that provides enhanced real-time information sharing to tactically employed units. Total force combat effectiveness is growing more reliant on agile means of information sharing. Wireless communications and collaborative technologies are essential to ensuring that dynamic, forward-deployed forces have the ability to transmit and receive critical information when and where it is needed. Through past TNT experimentation, the LRV has not demonstrated itself as a stable platform providing a high-bandwidth information sharing capability. This research advances the LRV concept by bridging the multiple wireless technologies and providing a reliable high-bandwidth communications link.
DTIC
Broadband; Command and Control; Communication; Communication Networks; Computers; Information; Local Area Networks; Reconnaissance; Wireless Communication

20060055580 Logistics Management Inst., McLean, VA USA
Logistics Maturity Evaluator
Reay, James H; Colaianni, A J; Harleston, Evelyn F; Maletic, Amy; Marcus, John G; Apr 2006; 88 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457193; IR509R1; No Copyright; Avail.: Defense Technical Information Center (DTIC)

To operate effectively, federal civil agencies should continuously develop new, more integrated logistics systems to acquire, maintain, and deliver needed equipment, materials, and infrastructures that are optimized in terms of investment and benefits. Agency managers generally recognize that existing logistics systems are not as effective or efficient as they could be; however, there is no available benchmark to readily assess current systems without significant investment. The challenge is to reduce the costs of operations and support, increase workforce productivity, reduce costs of managing inventory, and increase the effectiveness of delivering support material and services. To achieve these objectives, the logistics systems of each agency should be evaluated to determine how well operations are being supported, whether meaningful improvement initiatives are planned or in place, and what the end cost will be. LMI wishes to help government logistics managers determine the current state of their logistics processes, prioritize resource application, and identify future direction. To do so, we embarked on a research effort to develop a logistics maturity evaluator (LME). By accomplishing this independent research and development task, we hope to develop LMI's analytical capability to provide a structured high- level assessment of federal agencies logistics status, progress, and proficiency and help agency managers target areas for improving performance and reducing support costs. The LME borrows heavily from the capability maturity model concept being applied in many organizations to meet management's need for an unbiased assessment tool. Our intention is to develop a repeatable system that gives logistics managers an objective comparison of the present status of their agencies business processes and technologies for delivering goods and services. We completed the first of two phases for this research task.
DTIC
Logistics; Logistics Management; Personnel; Systems Integration

20060055589 DNK, LLC, Albuquerque, NM USA
National Strategy to Secure Cyberspace
Schwalm, Keith T; Aug 2006; 27 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-05-C-0044; Proj-DHSA
Report No.(s): AD-A457208; No Copyright; Avail.: CASI: A03, Hardcopy

The objective of this effort was to coordinate research and development activities throughout private industry, academic laboratories, and private research laboratories to support the development of a national strategy for securing cyberspace. The approach explored the development of cyber technology strategies and programs related to the mission and roles of Homeland Security Advanced Research Projects Agency. Program goals with external clients including IT industry, critical infrastructure sectors, and academics were also explored.
DTIC
Internets; Security

20060055590 Naval Postgraduate School, Monterey, CA USA

Sample Entropy and Random Forests: A Methodology for Anomaly-based Intrusion Detection and Classification of Low-bandwidth Malware Attacks

Hyla, Bret M; Sep 2006; 81 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457209; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Sample Entropy examines changes in the normal distribution of network traffic to identify anomalies. Normalized Information examines the overall probability distribution in a data set. Random Forests is a supervised learning algorithm which is efficient at classifying highlyimbalanced data. Anomalies are exceedingly rare compared to the overall volume of network traffic. The combination of these methods enables low-bandwidth anomalies to easily be identified in high-bandwidth network traffic. Using only low-dimensional network information allows for near real-time identification of anomalies. The data set was collected from 1999 DARPA intrusion detection evaluation data set. The experiments compare a baseline f-score to the observed entropy and normalized information of the network. Anomalies that are disguised in network flow analysis were detected. Random Forests prove to be capable of classifying anomalies using the sample entropy and normalized information. Our experiment divided the data set into five-minute time slices and found that sample entropy and normalized information metrics were successful in classifying bad traffic with a recall of .99 and a f-score .50 which was 185% better than our baseline.

DTIC

Anomalies; Bandwidth; Classifications; Computer Networks; Detection; Entropy; Warning Systems

20060055668 California Univ., Santa Cruz, CA USA

Performance Analysis of Wireless Networks

de Moraes, Renato M; Dec 2005; 168 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-04-1-0224; W911NF-05-1-0245

Report No.(s): AD-A457359; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In this thesis, we investigate the performance of wireless ad hoc networks. First, we propose a multi-copy relaying scheme for packets in mobile ad hoc networks (MANETs), which reduces the delivery delay without changing the throughput order. We also present a method for computing the interference caused from other nodes. Second, we study the trade-off among mobility, capacity, and delay for wireless ad hoc networks. By considering nodes that are subject to restrained movements, we found that mobility is an entity that can be exchanged with capacity and delay. Furthermore, the throughput-delay trade-off is investigated for nodes employing directional antennas and the results are compared with previous work. Third, we propose a new communication scheme based on collaboration among nodes where the transmission (exchange) of packets is concurrently possible by employing a many-to-many communication framework. We present the principles of operation for such a technique, followed by two practical examples of implementation using FDMA/CDMA, and FDMA/MIMO systems. Shannon capacity, throughput and delay are computed and compared with related works.

DTIC

Communication Networks; Performance Tests; Reliability Analysis; Telecommunication

20060055672 Naval Postgraduate School, Monterey, CA USA

Identifying Supervisory Control and Data Acquisition (SCADA) Systems on a Network via Remote Reconnaissance

Wiberg, Kenneth C; Sep 2006; 147 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457371; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Presidential Decision Directive (PDD) 63 calls for improving the security of Supervisory Control And Data Acquisition (SCADA) and other control systems which operate the critical infrastructure of the USA. In the past, these industrial computer systems relied on security through obscurity. Recent economic and technical shifts within the controls industry have increased their vulnerability to cyber attack. Concurrently, their value as a target has been recognized by terrorist organizations and competing nation states. Network reconnaissance is a basic tool that allows computer security managers to understand their complex systems. However, existing reconnaissance tools incorporate little or no understanding of control systems. This thesis provided a conceptual analysis for the creation of a SCADA network exploration/reconnaissance tool. Several reconnaissance techniques were research and reviewed in a laboratory environment to determine their utility for SCADA system discovery. Additionally, an application framework using common non-SCADA security tools was created to provide a proof of concept. Development of a viable tool for identifying SCADA systems remotely will help improve critical infrastructure security by improving situational awareness for network managers.

DTIC

Computer Networks; Control; Data Acquisition; Identifying; Information Systems; Reconnaissance; Security

20060055674 California Univ., Santa Cruz, CA USA

A Simple MPLS-based Flow Aggregation Scheme for Providing Scalable Quality of Service

Vutukury, Srinivas; Garcia-Luna-Aceves, J J; Jan 2006; 8 pp.; In English

Contract(s)/Grant(s): F30602-97-1-0291; N66001-00-1-8942

Report No.(s): AD-A457375; No Copyright; Avail.: CASI: A02, Hardcopy

Providing Quality of Service (QoS) capabilities in IP networks is the focus of much research in the Internet community today. The Intserv architecture proposed by IETF for supporting QoS in IP networks is known not to scale well to large networks due to the per-flow mechanisms it uses. While the connection-less approach has been the central design paradigm of IP networks, many researchers today believe connection-oriented mechanisms similar to virtual-circuits in ATM must be incorporated in IP networks in order to provide scalable QoS. Towards this end, the MPLS (Multi-Protocol Label Switching) technology has been put forward by the IETF. A crucial scaling issue with MPLS is that a large number of LSPs (Label Switched Paths) may be required in the routers resulting in an increase of state size in the routers. In this paper, we introduce the notion of Label-Switched Multipaths (LSMPs) and propose a simple technique for aggregating LSP into LSMPs such that the number of labels required in the routers is significantly reduced. Based on LSMPs we describe an architecture for providing deterministic guarantees that is far more scalable than architectures based on simple LSPs or those that use only multipoint-to-point LSP aggregation.

DTIC

Communication Networks; Multipath Transmission; Network Analysis; Protocol (Computers); Switching

20060055678 Carnegie-Mellon Univ., Pittsburgh, PA USA

Semantic Web Services with Web Ontology Language (OWL-S) - Specification of Agent-Services for DARPA Agent Markup Language (DAML)

Sycara, Katia P; Aug 2006; 144 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F30602-00-C-0592; Proj-DAML

Report No.(s): AD-A457387; No Copyright; Avail.: Defense Technical Information Center (DTIC)

CMU did research and development on semantic web services using OWL-S, the semantic web service language under the Defense Advanced Research Projects Agency- DARPA Agent Markup Language (DARPA-DAML) program. The objective was to develop a markup language to allow intelligent agents to communicate. The DAML program resulted in the Web Ontology Language (OWL) Markup as a W3 recommendation. OWL-S is a markup language based on OWL to create computer discoverable web services. The report includes documentation of research on the OWL-S profile, process model and grounding. The research also includes intelligent web service composition, brokering and an OWL-S virtual machine.

DTIC

Document Markup Languages

20060055681 California Univ., Santa Cruz, CA USA

MPATH: A Loop-free Multipath Routing Algorithm

Vutukury, Srinivas; Garcia-Luna-Aceves, J J; Oct 2000; 7 pp.; In English

Contract(s)/Grant(s): F30602-97-1-0291; F19628-96-C-0038

Report No.(s): AD-A457391; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We present a distributed routing algorithm for computing multiple paths between each source-destination pair in a computer network, such that the paths are loop-free at all times and are not necessarily of equal length. In this algorithm, routers exchange second-to-last hop on the shortest path to destinations in addition to shortest distances, which are used to prevent the well-know count-to-infinity problem. The safety and liveness properties of the algorithm are proved and its performance is analyzed.

DTIC

Algorithms; Multipath Transmission

20060055688 California Univ., Santa Cruz, CA USA

Analytical Modeling of Medium Access Control Protocols in Wireless Networks

Menezes de Carvalho, Marcelo; Mar 2006; 235 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911NF-04-1-0224; W911NF-05-1-0246

Report No.(s): AD-A457403; No Copyright; Avail.: CASI: A11, Hardcopy

A new modeling framework is introduced for the analytical study of medium access control (MAC) protocols operating

in multihop wireless ad hoc networks, i.e., wireless networks characterized by the lack of any pre-existent infrastructure and where participating devices must cooperatively provide the basic functionalities that are common to any computer network. The proposed modeling framework focuses on the interactions between the physical (PHY) and MAC layers, and on the impact that each node has on the dynamics of every other node in the network. To account for the effects of both cross-layer interactions and the interference among all nodes, a novel linear model is introduced with which topology and PHY/MAC-layer aspects are naturally incorporated in what we define as interference matrices. A key feature of the model is that nodes can be modeled individually, i.e., it allows a per-node setup of many layer-specific parameters. Moreover, no spatial probability distribution or special arrangement of nodes is assumed; the model allows the computation of individual (per-node) performance metrics for any given network topology and radio channel model.
DTIC
Access Control; Computer Networks; Mathematical Models; Numerical Control; Protocol (Computers); Wireless Communication

20060055697 Santa Clara Univ., CA USA
Network Support for Group Coordination
Dommel, Hans-Peter; Garcia-Luna-Aceves, J J; Jan 2000; 7 pp.; In English
Contract(s)/Grant(s): F19628-96-C-0038
Report No.(s): AD-A457415; No Copyright; Avail.: CASI: A02, Hardcopy

Recent advances in computer hardware and networking technology have incited the deployment of wide-area streaming media services in the Internet. While such efforts as video-on-demand are largely limited to unidirectional delivery of content to the desktop, synchronously interactive group-oriented application services are foreseeable. In such applications, users collaborate on a shared workspace and freely exchange information in real-time under the premise of coordination and conflict freedom. Telecollaborative applications such as telemedicine or distance learning may profit from such coordination services. Ultimately, group coordination allows for groupware-style computing at Internet scope. The current IP-multicast framework contains provisions for group membership control and reliable dissemination services, however, it lacks support for group coordination. In this paper, we present a framework on network control and coordination functions to orchestrate synchronous multimedia groupwork. Our goal is to achieve a better understanding of the group coordination problem as an important component of future Internet multimedia collaboration tools.
DTIC
Coordination

20060055762 Naval Postgraduate School, Monterey, CA USA
The Performance and Compatibility of Thin Client Computing with Fleet Operations
Landry, Kenneth J; Jun 2006; 105 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457531; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This research will explore the feasibility of replacing traditional networked desktop personal computers (PC) with a thin client/server-based computing (TCSBC) architecture. After becoming nearly extinct in the early 1990s, thin clients are emerging on the forefront of technology with numerous bandwidth improvements and cost reduction benefits. The results show that TCSBC could provide a practical and financially sound solution in meeting the Navy s need to reduce costs and propagate the latest technology to all personnel. This solution may not meet the requirements of all naval commands. A thorough performance analysis should be conducted of the applications employed and the overall expenditures prior to implementation.
DTIC
Client Server Systems; Compatibility; Military Operations

20060055774 Naval Postgraduate School, Monterey, CA USA
Development of Methodical Social Engineering Taxonomy Project
Laribee, Lena; Jun 2006; 69 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457544; No Copyright; Avail.: CASI: A04, Hardcopy

Since security is based on trust in authenticity as well as trust in protection, the weakest link in the security chain is often between the keyboard and chair. We have a natural human willingness to accept someone at his or her word. Attacking computer systems via information gained from social interactions is a form of social engineering. Attackers know how much easier it is to trick insiders instead of targeting the complex technological protections of systems. In an effort to formalize

social engineering, we are building two models: Trust and Attack. Because social-engineering attacks are complex and typically require multiple visits and targets, these two models can be applied, individually or together, at various times to each individual attack goal.
DTIC
Computer Information Security; Taxonomy

20060055782 Naval Postgraduate School, Monterey, CA USA
Statistical Analysis of Wireless Networks: Predicting Performance in Multiple Environments
Miller, Christopher R; Jun 2006; 79 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457561; No Copyright; Avail.: CASI: A05, Hardcopy

With the advent of easily accessible, deployable, and usable 802.11 technology, users can connect and network with practically any infrastructure that exists today. Due to that simplicity and ease of use, it only seems logical that the military and tactical users should also employ these technologies. The questions regarding 802.11 network performances in a hostile and signal-unfriendly environment (i.e., high temperature and high humidity) have yet to be answered. The goal of this thesis is to quantify 802.11 network capabilities, in terms of throughput, while it is employed in those areas. Ultimately, the objective is to produce statistical models able to represent any variations in the 802.11 signals and network due to those environmental factors.
DTIC
Computer Networks; Performance Prediction; Statistical Analysis; Wireless Communication

20060055787 Space and Naval Warfare Systems Command, Charleston, SC USA
Are Service Oriented Architectures the Only Valid Architectural Approach for the Transformation to Network Centric Warfare?
Lenahan, Jack; Jun 2005; 23 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457568; No Copyright; Avail.: CASI: A03, Hardcopy

The use of a Service Oriented Architecture (SOA) as the dominant single architectural design paradigm of Network Centric Warfare (NCW) introduces architectural infrastructure stability risk levels which may be unacceptable in C4ISR mission frameworks. Service reliability, service performance, and service availability represent a key set of requirements which must be satisfactorily implemented or mission risk will accelerate. The purpose of this research is to demonstrate that a complex adaptive architecture solution to the reliability, performance, and availability requirements imposed by NCW transformation provides a richer and more stable approach to DoD legacy capability exploitation than does a pure SOA approach. Using the Network Centric C4ISR Architecture Quality of Service (QoS) rating scale developed for this research paper as a behavioral classification methodology, the analysis concludes that a complex adaptive architectural model composed of at least Event Driven Components, Service Oriented Components, MOMS Components and GRID Components may present a more risk tolerant solution in terms of satisfactory implementation of NCW reliability, performance, and availability requirements. In simpler terms, a stand-alone SOA will be insufficient in terms of providing infrastructure stability. I propose that a highly available, disaster recoverable, GRID model (overlain with availability and performance monitoring agents) be implemented in order to sufficiently cover the reliability, performance, and availability issues needed for combat missions.
DTIC
Command and Control; Risk; Warfare

20060055804 Carnegie-Mellon Univ., Pittsburgh, PA USA
GEM: Graph EMbedding for Routing and Data-Centric Storage in Sensor Networks without Geographic Information
Newsome, James; Song, Dawn; Mar 2003; 25 pp.; In English
Contract(s)/Grant(s): DAAD19-02-1-0389
Report No.(s): AD-A457595; CMU-CS-03-112; No Copyright; Avail.: CASI: A03, Hardcopy

In this paper, the authors introduce GEM (Graph EMbedding for sensor networks), an infrastructure for node-to-node routing and data-centric storage and information processing in sensor networks. In GEM, they construct a labeled graph that can be embedded in the original network topology in an efficient and distributed fashion. In that graph, each node is given a label that encodes its position in the original network topology. This allows messages to be efficiently routed through the network, while each node only needs to know the labels of its neighbors. To demonstrate how GEM can be applied, the authors have developed a concrete graph embedding method, VPCS (Virtual Polar Coordinate Space), which embeds a ringed tree into

the network topology. They also have developed VPCR, an efficient routing algorithm that uses VPCS. VPCR is the first algorithm for node-to-node routing that guarantees reachability, requires each node to keep state only about its immediate neighbors, and requires no geographic information. Simulation results show that VPCR is robust on dynamic networks, works well in the face of voids and obstacles, and scales well with network size and density.
DTIC
Computer Storage Devices; Data Storage; Embedding; Information Retrieval; Topology

20060056157 California Univ., Santa Cruz, CA USA
WiNN: An Efficient Method for Routing Short-Lived Flows
Vutukury, Srinivas; Garcia-Luna-Aceves, J J; Jan 2006; 7 pp.; In English
Contract(s)/Grant(s): N66001-00-1-8942
Report No.(s): AD-A457376; No Copyright; Avail.: CASI: A02, Hardcopy

Delivering real-time streaming content requires finding paths with a minimum required bandwidth. Finding such paths when requested should be fast (low start-up latency) and efficient (high call acceptance rates). However, current algorithms for finding such QoS paths, are ineffective when the bulk of the flows are short-lived. First, these algorithms are computationally expensive to justify invoking them on a per-request basis, and they add substantial latency to the signaling process. Moreover, they rely on frequent advertisement of residual link bandwidth, which is prohibitively expensive to perform on a short time-scale. Considering these drawbacks, we propose a simple heuristic WiNN (Widest Next-hop Neighbor) that has low start-up latency and provides good call acceptance rates. The heuristic uses neither link state updates nor complex path selection algorithms.
DTIC
Network Analysis; Bandwidth; Heuristic Methods; Real Time Operation

20060056159 California Univ., Santa Cruz, CA USA
On-demand Loop-Free Routing in Ad Hoc Networks Using Source Sequence Numbers
Rangarajan, Hari; Garcia-Luna-Aceves, J J; Nov 2005; 11 pp.; In English
Contract(s)/Grant(s): W911NF-05-1-0246; CNS-0435522
Report No.(s): AD-A457400; No Copyright; Avail.: CASI: A03, Hardcopy

In any on-demand routing protocol, sources flood route requests (RREQ) to build routes to destinations, and each new RREQ is identified uniquely with a source-sequenced label (SSL) consisting of the source identifier and a locally generated sequence number. As a RREQ propagates, it creates a directed acyclic graph (DAG), because nodes relay each RREQ only once. We present the first framework for loop-free on-demand routing in ad hoc networks that is based directly on SSLs, rather than on independent mechanisms, which has been the way in which prior on-demand routing protocols have been designed. Extensive simulation results for simple protocol instantiations of our new framework operating in scenarios with 50 and 100-nodes under different traffic patterns show that our new protocols outperform AODV (Ad hoc On Demand Distance Vector), DSR (Dynamic Source Routing), and OLSR (Optimized Link State Routing).
DTIC
Data Transmission; Graph Theory; Simulation; Protocol (Computers)

20060056165 Network Resonance, Inc., Palo Alto, CA USA
Authoritative SSL Auditor
Rescoria, Eric; Dick, Kevin; Jul 2006; 18 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8750-05-C-0295; Proj-DHSF
Report No.(s): AD-A457576; No Copyright; Avail.: CASI: A03, Hardcopy

The Authoritative SSL Auditor provides evidence on demand of any interaction over the network. It is a completely self-contained and absolutely passive device, yielding very low total cost of ownership and very low impact on running applications. It records both unencrypted and encrypted network interactions, then signs them with a US Government certified hardware security module. This process creates extremely strong evidence for unencrypted traffic and practically unimpeachable evidence for encrypted traffic. Because the original network communications is its source, the ASA reflects what actually happened instead of what a particular system thinks happened.
DTIC
Computer Networks; Interactions

20060056177 Mitre Corp., Bedford, MA USA
The Core Protocol Set for the Global Grid
Rajkowski, Joseph; Brayer, Kenneth; Dec 2000; 8 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F19628-99-C-0001
Report No.(s): AD-A457246; No Copyright; Avail.: CASI: A02, Hardcopy

The protocol set for the Global Grid is addressed. A rationale for specifying a core protocol set, the methodology for determining the protocols included, and a discussion of the extensibility of the core protocol set to address support for user-specific applications are provided.
DTIC
Protocol (Computers); Grids; Communication Networks

20060056275 Centre d'Electronique de l'Armement, Bruz, France
Contracting out Governmental Web Services (Externalisation de l'hebergement de sites web gouvernementaux)
Roger, Laurent; Apr 20, 2004; 25 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457092; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457092; Avail.: CASI: A03, Hardcopy

No abstract available
Security; World Wide Web; Contracts

63
CYBERNETICS, ARTIFICIAL INTELLIGENCE AND ROBOTICS

Includes feedback and control theory, information theory, machine learning, and expert systems. For related information see also *54 Man/System Technology and Life Support*.

20060054213 NASA Ames Research Center, Moffett Field, CA, USA
Space Robotics: AWIMR an Overview
Wagner, Rick; August 31, 2006; 21 pp.; In English; International Conference on Robotics and Automation, 10-14 Apr. 2007, Rome, Italy; Original contains black and white illustrations
Contract(s)/Grant(s): NNA05BE51C; No Copyright; ONLINE: http://hdl.handle.net/2060/20060054213; Avail.: CASI: A03, Hardcopy

This viewgraph presentation reviews the usages of Autonomous Walking Inspection and Maintenance Robots (AWIMR) in space. Some of the uses that these robots in support of space exploration can have are: inspection of a space craft, cleaning, astronaut assistance, assembly of a structure, repair of structures, and replenishment of supplies.
CASI
Autonomy; Robots; Walking; Robotics; Robot Control

20060054288 NASA Ames Research Center, Moffett Field, CA, USA
Are You Talking to Me? Dialogue Systems Supporting Mixed Teams of Humans and Robots
Dowding, John; Clancey, William J.; Graham, Jeffrey; [2006]; 5 pp.; In English; AIAA Fall Symposium 'Annually Informed Performance: Integrating Machine Listing and Auditory Presentation in Robotic Systems', 13-15 Oct. 2006, Washington, DC, USA; No Copyright; ONLINE: http://hdl.handle.net/2060/20060054288; Avail.: CASI: A01, Hardcopy

This position paper describes an approach to building spoken dialogue systems for environments containing multiple human speakers and hearers, and multiple robotic speakers and hearers. We address the issue, for robotic hearers, of whether the speech they hear is intended for them, or more likely to be intended for some other hearer. We will describe data collected during a series of experiments involving teams of multiple human and robots (and other software participants), and some preliminary results for distinguishing robot-directed speech from human-directed speech. The domain of these experiments is Mars-analogue planetary exploration. These Mars-analogue field studies involve two subjects in simulated planetary space suits doing geological exploration with the help of 1-2 robots, supporting software agents, a habitat communicator and links to a remote science team. The two subjects are performing a task (geological exploration) which requires them to speak with each other while also speaking with their assistants. The technique used here is to use a probabilistic context-free grammar language model in the speech recognizer that is trained on prior robot-directed speech. Intuitively, the recognizer will give

higher confidence to an utterance if it is similar to utterances that have been directed to the robot in the past.
Author
Robotics; Speech; Robots; Mars Exploration; Grammars; Analogs

20060055403 Naval Postgraduate School, Monterey, CA USA
Design, Implementation and Testing of a Common Data Model Supporting Autonomous Vehicle Compatibility and Interoperability
Davis, Duane T; Sep 2006; 359 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457026; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457026; Avail.: Defense Technical Information Center (DTIC)

Current autonomous vehicle interoperability is limited by vehicle-specific data formats and support systems. Until a standardized approach to autonomous vehicle command and control is adopted, true interoperability will remain elusive. This work explores the applicability of a data model supporting arbitrary vehicles using the Extensible Markup Language (XML). An exemplar, the Autonomous Vehicle Command Language (AVCL), encapsulates behavior-scripted mission definition, goalbased mission definition, inter-vehicle communication, and mission results. Broad applicability is obtained through the development of a behavior set capturing arbitrary vehicle activities, and automated conversion of AVCL to and from vehicle-specific formats. The former uses task-level behaviors suitable for mission scripting and goal decomposition. Translations use the Extensible Stylesheet Language for Transformation, XML data binding, context-free language parsing, and artificial intelligence machine learning and search techniques. Translation capability is demonstrated through mappings of AVCL to and from multiple vehicle-specific formats. A final demonstration of the power of a common autonomous vehicle data model is provided by the implementation of a hybrid control architecture. The model's vehicle-independence and the ability to generate vehicle-specific data are leveraged in the design of an architecture that provides increased autonomy by augmenting a vehicle s existing controller. The utility of this architecture is demonstrated through implementation on the Naval Postgraduate School s ARIES Unmanned Underwater Vehicle.
DTIC
Artificial Intelligence; Autonomic Nervous System; Autonomy; Compatibility; Interoperability; Robotics; Underwater Vehicles

20060055427 Massachusetts Inst. of Tech., Cambridge, MA USA
Exploiting Natural Dynamics in Robot Control
Williamson, Matthew M; Jan 1998; 7 pp.; In English
Report No.(s): AD-A457056; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457056; Avail.: CASI: A02, Hardcopy

This paper presents an approach to robot arm control based on exploiting the dynamical properties of an adaptive oscillator circuit coupled to the joints of an arm. The approach is implemented on a real robot arm, and swings pendulums at their natural frequencies, turns cranks and manipulates slinky toys. These actions are all achieved using the same architecture, without any modeling of the arm or its environment. The simple nature of the oscillators, and the lack of modeling results in a robust and very simple system.
DTIC
Robot Control; Robotics

20060055533 Defence Science and Technology Organisation, Edinburgh, Australia
Registration for Tactical Imagery: An Updated Taxonomy
Backman, R B; Apr 2006; 34 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457116; DSTO-TR-1855; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Registration is central to Image Processing problems which use Tactical Imagery. Any application, which involves comparing two or more images, requires some type of Registration algorithm. These algorithms have evolved over the years and are generally grouped into three categories: 2D, 3D, and the reasonably unusual combination of 2D/3D. An updated classification (or taxonomy) for the diverse collection of algorithms is presented here and is described in detail. Also, two new algorithms are elucidated: the terrain cube and the Hybrid registration method. Many examples are given demonstrating the usefulness of this taxonomy and algorithms. The Medical Imaging field is the source for many of these examples, as numerous algorithms have their origin there. Complementary Military Imaging examples are also presented and described in terms of relevant platforms.
DTIC
Algorithms; Image Processing; Pattern Registration; Taxonomy

20060055557 Naval Postgraduate School, Monterey, CA USA
The Importance of Artificial Intelligence for Naval Intelligence Training Simulations
Sweat, Patricia A; Sep 2006; 83 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457150; No Copyright; Avail.: CASI: A05, Hardcopy

Agent technology is widely deployed in numerous commercial areas such as networking, modeling, and software; however, this technology remains under-utilized by operational organizations within the USA Navy. This thesis will investigate the importance of artificial intelligence (AI) for military training simulations, particularly in the training of intelligence personnel in the Navy. The Computer Generated Forces (CGF) of the current Intelligence Team Trainer's (ITT) system initiate actions as a result of rigid scripted programming. Forces will execute the same actions regardless of what the user decides to do, resulting in highly unrealistic scenarios. For instance, in a scenario where an ARG (Amphibious Ready Group) transits the Strait of Hormuz, the response of Iranian P3 or an incoming dhow would be the same whether the battle group utilized frigate escorts or not. This thesis will produce very simple, but less rigid AI, which can easily be made more complex and intelligent in later phases. Demonstrations and assessments will validate the importance of AI integration for the ITT. Furthermore, this analysis of the requirements for the AI will assist training commands and combat information centers fleet wide with the range of realistic combat-related possibilities needed in order to ensure a fully capable 'combat ready' watch team.
DTIC
Artificial Intelligence; Education; Intelligence; Simulation

20060055574 Massachusetts Inst. of Tech., Cambridge, MA USA
Online and Unsupervised Face Recognition for Humanoid Robot: Toward Relationship with People
Aryananda, Lijin; Jan 2001; 9 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DABT63-00-C-10102
Report No.(s): AD-A457181; No Copyright; Avail.: CASI: A02, Hardcopy

The ability to recognize and remember individuals is crucial and has important implications for the evolution of animal social behavior, particularly complex interactions within groups. Male dolphins have been found to form coalitions, where each group possesses a fertile female. Observation of behavior within the coalitions indicates complex social behavior where dolphins often form coalitions of coalitions , but each sub-coalition mates only with its own female. This implies the existence of complex social interaction, such as preferential treatment, cooperative behavior, and reciprocity [2]. Such a relationship demands the ability to distinguish conspecific group members as individuals and as kin, remember their relative ranks and past affiliations, and in some cases, remembers the personal histories of help given and received from others [3].
DTIC
Human Relations; Robots; Social Factors

20060055638 Georgia Inst. of Tech., Atlanta, GA USA
Integrated Mission Specification and Task Allocation for Robot Teams - Part 2: Testing and Evaluation
Ulam, Patrick; Endo, Yochiro; Wagner, Alan; Arkin, Ronald; Jan 2006; 7 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457295; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This work presents the evaluation of two mission specification and task allocation architectures. These architectures, described in part 1 of this paper, present novel means with which to integrate a case-based reasoning (CBR) mission planner with contract net protocol (CNP) based task allocation. In the first design, the CBR and runtime-CNP architecture, the case-based mission planner generates mission plans that support necessary behaviors for CNP-based task allocation and execution. In the second design, the CBR and premission-CNP architecture, task allocation takes place during mission specification. The results of an empirical evaluation of the CBR and runtime-CNP across three naval scenarios is described. Finally, we briefly describe an earlier usability evaluation of the CBR and premission-CNP architecture using goals, operators, methods, and selection rules modeling.
DTIC
Robotics; Robots

20060055639 Georgia Inst. of Tech., Atlanta, GA USA
Integrated Mission Specification and Task Allocation for Robot Teams - Part 1: Design and Implementation
Ulam, Patrick; Endo, Yochiro; Wagner, Alan; Arkin, Ronald; Jan 2006; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457296; No Copyright; Avail.: CASI: A02, Hardcopy

As the capabilities, range of missions, and the size of robot teams increase, the ability for a human operator to account for all the factors in these complex scenarios can become exceedingly difficult. Our previous research has studied the use of case-based reasoning (CBR) tools to assist a user in the generation of multi-robot missions. These tools, however, typically assume that the robots available for the mission are of the same type (i.e., homogeneous). We loosen this assumption through the integration of contract-net protocol (CNP) based task allocation coupled with a CBR-based mission specification wizard. Two alternative designs are explored for combining case-based mission specification and CNP-based team allocation as well as the tradeoffs that result from the selection of one of these approaches over the other.
DTIC
Robotics; Robots

20060055652 Army Tank-Automotive Research and Development Command, Warren, MI USA
Operator Control Units for the Dismounted Soldier
Kania, Robert; Frederick, Phil; Thayer, Scott; Ommert, Bill; Jun 11, 2003; 30 pp.; In English
Report No.(s): AD-A457321; No Copyright; Avail.: CASI: A03, Hardcopy

As the army focuses on bringing fewer men to the forefront of the battle, robotic assets will become more prevalent. The soldier will need to be able to control these assets from a portable, rugged, and robust Operator Control Unit(OCU). It is important that the soldier's mobility and situational awareness not be adversely affected by this task. Although many of today's fielded systems are wearable or fit within a brief case, they still can cause a deterioration in the soldiers overall performance. A lightweight, non- intrusive solution is required with an interface that is easy to use, but robust enough to control multiple assets and their many functions. This paper will focus on the in-house development of an OCU for a lab-robot that parallels the OCU developed to support the Dismounted Mule operations that were a part of the Vetronics Technology Integration (VTI) effort in February, March, and April of 2003.
DTIC
Control; Robotics

20060055658 Maryland Univ., College Park, MD USA
Detecting, Classifying, and Handling Contradictions in a Large, Dynamic Information Environment
Perlis, Donald; Anderson, Michael; Josyula, Darsana; Chong, Waiyian; Fults, Scott; Oct 11, 2006; 12 pp.; In English
Contract(s)/Grant(s): F49620-03-1-0065
Report No.(s): AD-A457343; No Copyright; Avail.: CASI: A03, Hardcopy

A new approach to perturbation tolerance was identified -- the Meta-Cognitive Loop (MCL) -- for responding to contradictions and other anomalies in complex settings. Further investigations with MCL included identifying architectural requirements, and applying MCL to various domains including reinforcement learning, common-sense reasoning, and a task-oriented natural-language interface system. A series of experiments empirically demonstrated the efficacy of MCL in improving the perturbation tolerance of certain machine learning techniques, including Q-learning, SARSA and Prioritized Sweeping. Formal metrics were given for measuring the complexity, dynamicity and overall difficulty of test domains, which allow for derivative measures of perturbation tolerance. A semantics was developed for Active Logic -- the underlying logic on which MCL's contradiction handling is based -- in the propositional case.
DTIC
Anomalies; Detection; Perturbation

20060055691 California Univ., Santa Cruz, CA USA
Floor Acquisition Multiple Access (FAMA) for Packet-Radio Networks
Fullmer, Chane L; Garcia-Luna-Aceves, J J; Jan 1995; 13 pp.; In English
Contract(s)/Grant(s): N00014-92-J-1807; N00014-94-1-0688
Report No.(s): AD-A457407; No Copyright; Avail.: CASI: A03, Hardcopy

A family of medium access control protocols for single-channel packet radio networks is specified and analyzed. These protocols are based on a new channel access discipline called floor acquisition multiple access (FAMA), which consists of both carrier sensing and a collision-avoidance dialogue between a source and the intended receiver of a packet. Control of the channel (the floor) is assigned to at most one station in the network at any given time, and this station is guaranteed to be able to transmit one or more data packets to different destinations with no collision with transmissions from other stations. The minimum length needed in control packets to acquire the floor is specified as a function of the channel propagation time. The medium access collision avoidance (MACA) protocol proposed by Karn and variants of CSMA based on collision avoidance

are shown to be variants of FAMA protocols when control packets last long enough compared to the channel propagation delay. The throughput of FAMA protocols is analyzed and compared with the throughput of non-persistent CSMA. This analysis shows that using carrier sensing as an integral part of the floor acquisition strategy provides the benefits of MACA in the presence of hidden terminals, and can provide a throughput comparable to, or better than, that of non-persistent CSMA when no hidden terminals exist.
DTIC
Floors; Multiple Access; Packet Switching; Protocol (Computers)

20060055692 California Univ., Santa Cruz, CA USA
A Comparison of Known Classes of Reliable Multicast Protocols
Levine, Brian N; Garcia-Luna-Aceves, J J; Jan 1996; 11 pp.; In English
Contract(s)/Grant(s): N00014-94-1-0688
Report No.(s): AD-A457408; No Copyright; Avail.: CASI: A03, Hardcopy

We analyze the maximum throughput that the known classes of reliable multicast protocols can attain. A new taxonomy of reliable multicast protocols is introduced based on the premise that the mechanisms used to release data at the source after correct delivery should be decoupled from the mechanisms used to pace the transmission of data and to effect error recovery. Receiver-initiated protocols, which are based entirely on negative acknowledgments (NAKs) sent from the receivers to the sender, have been proposed to avoid the implosion of acknowledgments (ACKs) to the source. However, these protocols are shown to require infinite buffers in order to prevent deadlocks. Two other solutions to the ACK-implosion problem are tree-based protocols and ring-based protocols. The first organize the receivers in a tree and send ACKs along the tree; the latter send ACKs to the sender along a ring of receivers. These two classes of protocols are shown to operate correctly with finite buffers. Following our taxonomy, the maximum attainable throughput by the known classes of reliable multicast protocols is analyzed. It is shown that tree-based protocols constitute the most scalable class of all reliable multicast protocols proposed to date.
DTIC
Data Transmission; Protocol (Computers)

20060055699 Siemens Corp. Research, Princeton, NJ USA
Detecting Instances of Shape Classes That Exhibit Variable Structure
Athitsos, Vassilis; Wang, Jingbin; Sclaroff, Stan; Betke, Margrit; Feb 17, 2006; 16 pp.; In English
Contract(s)/Grant(s): N00014-03-1-0108; IIS-0329009
Report No.(s): AD-A457419; No Copyright; Avail.: CASI: A03, Hardcopy

This paper proposes a method for detecting shapes of variable structure in images with clutter. The term variable structure means that some shape parts can be repeated an arbitrary number of times, some parts can be optional, and some parts can have several alternative appearances. The particular variation of the shape structure that occurs in a given image is not known a priori. Existing computer vision methods, including deformable model methods, were not designed to detect shapes of variable structure; they may only be used to detect shapes that can be decomposed into a fixed, a priori known, number of parts. The proposed method can handle both variations in shape structure and variations in the appearance of individual shape parts. A new class of shape models is introduced, called Hidden State Shape Models, that can naturally represent shapes of variable structure. A detection algorithm is described that finds instances of such shapes in images with large amounts of clutter by finding globally optimal correspondences between image features and shape models. Experiments with real images demonstrate that our method can localize plant branches that consist of an a priori unknown number of leaves and can detect hands more accurately than a hand detector based on the chamfer distance.
DTIC
Computer Vision; Detection; Shapes

20060055721 Carnegie-Mellon Univ., Pittsburgh, PA USA
Social Structure Simulation and Inference Using Artificial Intelligence Techniques
Tsvetovat, Maksim; Jun 15, 2005; 273 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-02-1-0973
Report No.(s): AD-A457453; CMU-ISRI-05-115; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The study of complex social and technological systems, such as organizations, requires a sophisticated approach that accounts for the underlying psychological and sociological principles, communication patterns and the technologies within

these systems. Social Network Analysis and link analysis have since inception operated on the cutting edge bringing together mathematical analysis of social structures and qualitative reasoning and interpretation. As available computing power grew, social network-based models have become not only an analysis tool, but also a methodology for building new theories of social behaviour and organizational evolution, frequently through the creation of simulation models. This work examines the past approaches of creating Social Network-based semantically consistent and interpretable models of social structure and social networks, as well as social simulation tools. I propose the creation of a multi-theory, multi-level simulation model of social structure that relies on social network theory and Artificial Intelligence algorithms. I further propose the creation of a robust and scalable social structure semantic that facilitates interpretable reasoning about evolution of social structure.
DTIC
Artificial Intelligence; Inference; Network Analysis; Simulation

20060055812 Carnegie-Mellon Univ., Pittsburgh, PA USA
Person Tracking From a Dynamic Balancing Platform
Govindaraju, Dinesh; Browning, Brett; Veloso, Manuela; Nov 2004; 17 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DABT63-99-1-0013
Report No.(s): AD-A457604; CMU-CS-04-181; No Copyright; Avail.: CASI: A03, Hardcopy

Recently, we have begun investigating a new robot soccer domain built around the concept of human-robot team's in a peer setting. One of the key challenges for addressing effective human robot interaction is to robustly identify and track people and robot teammates without requiring undue prior knowledge of their appearance. For cost and complexity reasons, our robots are equipped with monocular color cameras. Thus, we seek an algorithm to enable reliable acquisition and tracking of people and robots from a robot armed with a monocular color camera. We have developed a novel algorithm for acquiring and tracking a single human subject from a dynamically balancing platform, a Segway KMP robot using a monocular color camera. Our technique uses a combination of known vision and tracking techniques including region growing, motion detection, and mean-shift color-template tracking. In this paper, we describe our approach, and analyze its performance and limitations, for both acquiring and tracking a single human target in an indoor environment. Our experiments demonstrate that acquisition and tracking are feasible with a monocular camera even for a dynamically balancing platform. Moreover, our results show that with current processor technology real-time tracking and robot response are achievable.
DTIC
Balancing; Robots

20060055816 Advanced Scientific Concepts, Inc., Santa Barbara, CA USA
Eye-Safe Laser Radar 3-D Imaging
Stettner, Roger; Bailey, Howard; Richmond, Richard; Dec 1, 2005; 23 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F33615-95-C-1656; F33615-96-C-1852
Report No.(s): AD-A457611; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available
Detection; Eye (Anatomy); Imaging Techniques; Laser Range Finders; Optical Radar; Target Acquisition

20060055818 SRI International Corp., Menlo Park, CA USA
Limited-Domain Speech-to-Speech Translation between English and Pashto
Precoda, Kristin; Franco, Horacio; Dost, Ascander; Frandsen, Michael; Fry, John; Kathol, Andreas; Richey, Colleen; Riehemann, Susanne; Vergyri, Dimitra; Zheng, Jing; May 2004; 5 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N66001-99-D-8504
Report No.(s): AD-A457619; No Copyright; Avail.: CASI: A01, Hardcopy

This paper describes a prototype system for near-real-time spontaneous, bidirectional translation between spoken English and Pashto, a language presenting many technological challenges because of its lack of resources, including both data and expert knowledge. Development of the prototype is ongoing, and we propose to demonstrate a fully functional version which shows the basic capabilities, though not yet their final depth and breadth.
DTIC
Machine Translation; Speech Recognition; Translating

20060056167 Carnegie-Mellon Univ., Pittsburgh, PA USA

The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop

Steinfeld, Aaron; Bennett, Rachael; Cunningham, Kyle; Lahut, Matt; Quinones, Pablo-Alejandro; Wexler, Django; Siewiorek, Dan; Cohen, Paul; Fitzgerald, Julie; Hansson, Othar; Oct 2006; 25 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457300; CMU-CS-06-125; CMU-HCII-06-102; No Copyright; Avail.: CASI: A03, Hardcopy

The RADAR (Reflective Agents with Distributed Adaptive Reasoning) project involves a collection of machine learning research thrusts that are integrated into a cognitive personal assistant. Progress is examined with a test developed to measure the impact of learning when used by a human user. Three conditions (conventional tools, Radar without learning, and Radar with learning) are evaluated in a large-scale, between-subjects study. This paper describes the RADAR Test with a focus on test design, test harness development, experiment execution, and analysis. Results for the 1.1 version of Radar illustrate the measurement and diagnostic capability of the test. General lessons on such efforts are also discussed.

DTIC

Machine Learning; Radar Measurement; Thrust

20060056173 Wisconsin Univ., Madison, WI USA

Knowledge-Intensive, Interactive and Efficient Relational Pattern Learning

Page, David; Shavlik, Jude; Sep 2006; 218 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F30602-01-2-0571; DARPA ORDER-L835/50; Proj-EELD

Report No.(s): AD-A457195; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This report describes the work to develop and evaluate state-of-the-art relational pattern learning algorithms for the Evidence Assessment, Grouping, Linking and Evaluation (EAGLE) program. The University of Wisconsin team consisted of leaders in relational data mining and relational machine learning, in particular inductive logic programming (ILP). Major contributions by the team included the development of an ILP system implemented entirely in database operations, FOIL-D, and a statistical relational learning (SRL) system that incorporates explicit probabilistic constraints into ILP, CLP(BN). CLP(BN) incorporates all the representational power of probabilistic relational models (PRMs) but uses an ILP approach to learning. Another major contribution is the definition and development of View Learning, an approach to change of representation for SRL. Though SRL systems are particularly well-suited to the goals of EAGLE - indeed, the field of SRL received much of its impetus for growth from EAGLE - these systems have been constrained to work with the input representation, typically a relational schema. View Learning in SRL permits the definition of a new schema - a new view of the database - better suited to the learning goals. This project also made advances within learning ensembles, including the DECORATE approach to diverse ensembles, the use of bagging within ILP, the GLEANER algorithm to construct ensembles of relational rules having varying trade-offs of precision and recall, and a parallel implementation of bagging in ILP. The project also contributed novel stochastic search algorithms for ILP.

DTIC

Machine Learning; Logic Programming

20060056276 California Univ., Santa Cruz, CA USA

Sociable Interfaces

de Alfaro, Luca; da Silva, Leandro D; Faella, Marco; Legay, Axel; Roy, Pritam; Sorea, Maria; Jan 2005; 27 pp.; In English

Contract(s)/Grant(s): CCR-0132780; N00014-02-1-0671

Report No.(s): AD-A457093; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457093; Avail.: CASI: A03, Hardcopy

Interface formalisms are able to model both the input requirements and the output behavior of system components; they support both bottom-up component-based design, and top-down design refinement. In this paper, we propose sociable interface formalisms, endowed with a rich compositional semantics that facilitates their use in design and modeling. Specifically, we introduce interface models that can communicate via both actions and shared variables, and where communication and synchronization covers the full spectrum, from one-toone, to one-to-many, many-to-one, and many-to-many. Thanks to the expressive power of interface formalisms, this rich compositional semantics can be realized in an economical way, on the basis of a few basic principles. We show how the algorithms for composing, checking the compatibility, and refining the resulting sociable interfaces can be implemented symbolically, leading to efficient implementations.

DTIC

Robots; Computer Components; Communication

20060056403 NASA Johnson Space Center, Houston, TX, USA
Integrated Human-Robotic Missions to the Moon and Mars: Mission Operations Design Implications
Korth, David; LeBlanc, Troy; Mishkin, Andrew; Lee, Young; [2006]; 8 pp.; In English; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056403; Avail.: CASI: A02, Hardcopy

For most of the history of space exploration, human and robotic programs have been independent, and have responded to distinct requirements. The NASA Vision for Space Exploration calls for the return of humans to the Moon, and the eventual human exploration of Mars; the complexity of this range of missions will require an unprecedented use of automation and robotics in support of human crews. The challenges of human Mars missions, including roundtrip communications time delays of 6 to 40 minutes, interplanetary transit times of many months, and the need to manage lifecycle costs, will require the evolution of a new mission operations paradigm far less dependent on real-time monitoring and response by an Earthbound operations team. Robotic systems and automation will augment human capability, increase human safety by providing means to perform many tasks without requiring immediate human presence, and enable the transfer of traditional mission control tasks from the ground to crews. Developing and validating the new paradigm and its associated infrastructure may place requirements on operations design for nearer-term lunar missions. The authors, representing both the human and robotic mission operations communities, assess human lunar and Mars mission challenges, and consider how human-robot operations may be integrated to enable efficient joint operations, with the eventual emergence of a unified exploration operations culture. Author

Mission Planning; Human Performance; Robotics; Space Exploration; Moon; Mars Missions; Robots

20060056494 NASA Ames Research Center, Moffett Field, CA, USA
The K9 On-Board Rover Architecture
Bresina, John L.; Bualat, Maria; Fair, Michael; Washington, Richard; Wright, Anne; [2006]; 5 pp.; In English; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056494; Avail.: CASI: A01, Hardcopy

This paper describes the software architecture of NASA Ames Research Center s K9 rover. The goal of the onboard software architecture team was to develop a modular, flexible framework that would allow both high- and low-level control of the K9 hardware. Examples of low-level control are the simple drive or pan/tilt commands which are handled by the resource managers, and examples of high-level control are the command sequences which are handled by the conditional executive. In between these two control levels are complex behavioral commands which are handled by the pilot, such as drive to goal with obstacle avoidance or visually servo to a target. This paper presents the design of the architecture as of Fall 2000. We describe the state of the architecture implementation as well as its current evolution. An early version of the architecture was used for K9 operations during a dual-rover field experiment conducted by NASA Ames Research Center (ARC) and the Jet Propulsion Laboratory (JPL) from May 14 to May 16, 2000.
Author

Roving Vehicles; Control Units (Computers); Microprocessors; Architecture (Computers); Computer Programs; Software Engineering

64
NUMERICAL ANALYSIS

Includes iteration, differential and difference equations, and numerical approximation.

20060055409 Carnegie-Mellon Univ., Pittsburgh, PA USA
Algorithmic and Domain Centralization in Distributed Constraint Optimization Problems
Davin, John P; Jul 2005; 61 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): NBCHD030010
Report No.(s): AD-A457033; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457033; Avail.: CASI: A04, Hardcopy

A class of problems known as Distributed Constraint Optimization Problems (DCOP) has become a growing research interest in computer science because of its difficulty (NP-Complete) and many real-world applications (meeting scheduling, sensor networks, military planning). In this thesis we identify two types of centralization relevant to DCOPs: algorithmic centralization, in which a DCOP algorithm actively centralizes part (or all) of the problem structure, and domain centralization, in which inherent centralization already exists in the domain specification. We explore algorithmic centralization by empirically studying Adopt and OptAPO, two DCOP algorithms which differ in the amount of centralization they use. Our

results show that centralizing a problem's structure decreases communication overhead, but increases local computation. We compare the algorithms through our contribution of a new performance metric, Cycle-Based Runtime, which takes both communication costs and local computation time into account. We then explore domain centralization by studying meeting scheduling, which has problem structure clustered at scheduling agents. We present a novel variant of Adopt, called AdoptMVA, which uses a centralized search within agents to take advantage of the partially centralized structure. We show that when agent ordering is controlled for, AdoptMVA outperforms Adopt in situations where communication costs are high. We contribute a Branch & Bound search heuristic which works well for meeting scheduling problems with multiple variables per agent. We also empirically experiment with meeting scheduling, showing that meeting size is in some cases a better indicator of solution difficulty than the number of agents in a problem.
DTIC
Algorithms; Heuristic Methods; Optimization

20060055419 Massachusetts Inst. of Tech., Cambridge, MA USA
A Faster Strongly Polynomial Minimum Cost Flow Algorithm
Orlin, James B; Aug 1989; 39 pp.; In English
Contract(s)/Grant(s): 8451517-ECS; AFOSR-88-0088
Report No.(s): AD-A457043; 3060-89-MS; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457043; Avail.: CASI: A03, Hardcopy

We present a new strongly polynomial algorithm for the minimum cost flow problem, based on a refinement of the Edmonds-Karp scaling technique. Our algorithm solves the uncapacitated minimum cost flow problem as a sequence of O(n log n) shortest path problems on networks with n nodes and m arcs and runs in O(n log n (m + n log n)) time. Using a standard transformation, this approach yields an O(m log n (m + n log n)) algorithm for the capacitated minimum cost flow problem. This algorithm improves the best previous strongly polynomial algorithm due to Galil and Tardos, by a factor of n2/m. Our algorithm for the capacitated minimum cost flow problem is even more efficient if the number of arcs with finite upper bounds, say m', is much less than m. In this case, the number of shortest path problems solved is O((m + n) log n).
DTIC
Algorithms; Cost Effectiveness; Polynomials

20060055420 Massachusetts Inst. of Tech., Cambridge, MA USA
A Faster Strongly Polynomial Minimum Cost Flow Algorithm
Orlin, James B; Mar 1988; 13 pp.; In English
Report No.(s): AD-A457044; 2042-88; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457044; Avail.: CASI: A03, Hardcopy

We present a new strongly polynomial algorithm for the minimum cost flow problem, based on a refinement of the Edmonds-Karp scaling technique. Our algorithm solves the uncapacitated minimum cost flow problem as a sequence of O(n log n) shortest path problems on networks with n nodes and m arcs and runs in o(n log n (m + n log n)) steps. Using a standard transformation, this approach yields an O(m log n (m + n log n)) algorithm for the capacitated minimum cost flow problem. This algorithm improves the best previous strongly polynomial algorithm due to Galil and Tardos, by a factor of m/n. Our algorithm is even more efficient if the number of arcs with finite upper bounds, say m', is much less than m. In this case, the number of shortest path problems solved is O((m + n) log n).
DTIC
Algorithms; Cost Effectiveness; Polynomials

20060055645 Naval Postgraduate School, Monterey, CA USA
An Analytic Framework for the War of Ideas
Schramm, Harrison C; Sep 2006; 85 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457312; No Copyright; Avail.: Defense Technical Information Center (DTIC)

One of the objectives listed in the 2003 'National Strategy for Combating Terrorism' is to win the 'War of Ideas.' This thesis seeks to place an analytic framework around this war. The goal is to create a methodology for considering alternatives and some concrete metrics with which to compare courses of action. The fundamental assumption is that one-to-one (i.e., interpersonal) communication is the most important in spreading ideas. The tools used are deterministic and stochastic models that were originally developed for infectious diseases and rumor propagation. The fundamental idea is that when two people in the population connect (e.g., through direct contact, phone, or e-mail, etc.), the ideology may be spread. These models are

similar to traditional epidemic models. Many extensions to the idea of the spread of ideology as disease are possible and some are explored in this work. The author extends previous work by placing ideology in a greater social context. He introduces two diametrically opposed ideas and models their flow. He refers to the proponents of these ideas as the 'supporters' and 'contrarians.' He considers the case in which both the supporters and contrarians openly vie for a greater share of support from the public. This case is similar to a political campaign in the USA without the influence of media. He also considers the case in which the supporters are able to openly propagate their message, but the contrarians only interact when supporters try to convert them. He believes this is the case where there is a small but dedicated extremist subpopulation. The results show that under the model assumptions, a relatively small number of contrarians are required to overcome a large increase in the supporters.
DTIC
Human Relations; Mathematical Models; Populations; Warfare

20060055676 Naval Postgraduate School, Monterey, CA USA
Exploring Fields with Shift Registers
Radowicz, Jody L; Sep 2006; 99 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457383; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The S-Boxes used in the AES algorithm are generated by field extensions of the Galois field over two elements, called GF(2). Therefore, understanding the field extensions provides a method of analysis, potentially efficient implementation, and efficient attacks. Different polynomials can be used to generate the fields, and we explore the set of polynomials x to the 2nd power + x + a to the j power over GF(2 to the nth power) where alpha is a primitive element of GF(2 to the nth power).
DTIC
Algorithms; Exponential Functions; Shift Registers

20060055680 Air Force Research Lab., Rome, NY USA
A Review of Polyphase Filter Banks and Their Application
Zhou, Daniel; Sep 2006; 36 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-459E
Report No.(s): AD-A457390; AFRL-IF-RS-TR-2006-277; No Copyright; Avail.: CASI: A03, Hardcopy

In this report we review and compare numbers of different filter bank approaches which include discrete Fourier transform (DFT) filter bank, modified discrete Fourier transform (MDFT) filter bank, and cosine modulated filter bank. Our simulation results show that there is no one best overall method that gives the best performance. One method can perform better than others under one scenario, but not as well as others under different scenarios. Given a particular situation or specific application, the best method in terms of reconstruction and dealing with channel distortion may vary.
DTIC
Discrete Functions; Fourier Transformation

20060055682 California Univ., Santa Cruz, CA USA
Using Dominating Sets to Improve the Performance of Mobile Ad Hoc Networks
Spohn, Marco A; Sep 2005; 165 pp.; In English
Report No.(s): AD-A457392; No Copyright; Avail.: CASI: A08, Hardcopy

A mobile ad hoc network (MANET) is a wireless network that does not rely on any fixed infrastructure (i.e., routing facilities, such as wired networks and access points), and whose nodes must coordinate among themselves to determine connectivity and routing. Coordination in ad hoc networks includes operations such as neighborhood discovery, organization of nodes (i.e., topology control and clustering), and routing. Most mechanisms performing these operations employ broadcasting of signaling messages as the underlying mechanism. The broadcast can target a portion of the network (e.g., gathering neighborhood information), or the entire network (e.g., discovering routes on demand). The focus of this thesis is the design and analysis of algorithms that improve broadcasting and hierarchical organization in ad hoc networks. To design such algorithms, concepts from domination in graphs are explored, because of their similarities to the problems arising with the broadcasting of signaling and data in MANETs.
DTIC
Algorithms; Communication Networks

20060055689 Boston Univ., Boston, MA USA

An Invariant Representation for Matching Trajectories Across Uncalibrated Video Streams

Nunziati, Walter; Sclaroff, Stan; Del Bimbo, Alberto; May 2005; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): N00014-03-1-0108

Report No.(s): AD-A457405; BU-2005-016; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We introduce a view point invariant representation of moving object trajectories that can be used in video database applications. It is assumed that trajectories lie on a surface that can be locally approximated with a plane. Raw trajectory data is first locally approximated with a cubic spline via least squares fitting. For each sampled point of the obtained curve, a projective invariant feature is computed using a small number of points in its neighborhood. The resulting sequence of invariant features computed along the entire trajectory forms the view invariant descriptor of the trajectory itself. Time parameterization has been exploited to compute cross ratios without ambiguity due to point ordering.

DTIC

Invariance; Sequencing; Streams; Trajectories; Video Signals

20060055694 Naval Postgraduate School, Monterey, CA USA

Absolute Position Measurement for Automated Guided Vehicles using the Greedy DeBruijn Sequence

Ortiz, John E; Sep 2006; 169 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457411; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Automated Guided Vehicles (AGVs) use different techniques to help locate their position with respect to a point of origin. This thesis compares two approaches that utilize a binary track laid on the floor for the AGV to follow. Both approaches use equally spaced n-tuples on the track that the AGV can use to compute its position. Both approaches also have the special feature that every n-tuple on the binary track is unique and can be used to designate the position of an AGV. The first approach, developed by E.M. Petriu, uses a Pseudo-Random Binary Sequence (PRBS) as a model for the binary track. In the second approach, we use a Greedy DeBruijn Sequence (GDBS) as a model for the binary track. Unlike the PRBS model, the GDBS model has a natural ordering which can be used to determine the position of the AGV more quickly and efficiently than the PRBS model.

DTIC

Binary Data; Central Processing Units; Measurement

20060055722 Naval Observatory, Washington, DC USA

GPS Carrier Phase Analysis Noise on the USNO-PTB Baselines

Matsakis, Demetrios; Lee, Mark; Dach, Rolf; Hugentobler, Urs; Jiang, Z; Jan 2006; 7 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457454; No Copyright; Avail.: CASI: A02, Hardcopy

Carrier Phase GPS observations between a geodetic receiver at the Physikalisch-Technische Bundesanstalt (PTB) and two geodetic receivers at the USNO are processed using applications and extensions of the GIPSY and Bernese GPS Software packages. Their results are compared with Two Way Satellite Time and Frequency Transfer (TWSTFT) data. It is found that algorithms that eliminate day-boundary effects require careful handling in the presence of receiver instrumental delays. Depending upon the approach chosen, time differences of several ns and frequency differences of up to 100 ps/day can develop between solution types.

DTIC

Data Processing; Frequencies; Global Positioning System; Networks

20060055723 Massachusetts Univ., Amherst, MA USA

Study of Buffer Size in Internet Routers

Towsley, Don; Aug 2006; 59 pp.; In English

Contract(s)/Grant(s): W911NF-05-1-0253

Report No.(s): AD-A457457; No Copyright; Avail.: CASI: A04, Hardcopy

In this report, we summarize the results of our small buffer project. The goals of the project were (1) to model the behavior of TCP in a network where the routers have very small buffers, (2) to determine a rule for sizing buffers in such networks, and (3) to improve on TCP so that it can operate well in such a network. The main outcomes of the project were as follows: We developed an algorithm based on the use of rational approximations coupled with a Hierarchical Markovian model of network traffic to study the effect of small buffers of TCP performance. This algorithm is computationally efficient and yields

accurate estimates of buffer overflow probability. We developed model and analytical techniques for studying and quantifying oscillatory behavior in small buffer networks handling TCP flows. These were shown to be accurate compared to Matlab simulation. Last, we developed new TCP congestion avoidance algorithms suitable for a small buffer Internet.
DTIC
Buffer Storage; Internets

20060055737 BBN Systems and Technologies Corp., Cambridge, MA USA
Search Algorithms for Software-Only Real-Time Recognition with Very Large Vocabularies
Nguyen, Long; Schwartz, Richard; Kubala, Francis; Placeway, Paul; Jan 1993; 6 pp.; In English
Contract(s)/Grant(s): N00014-91-C-0115; N00014-92-C-0035
Report No.(s): AD-A457473; No Copyright; Avail.: CASI: A02, Hardcopy

This paper deals with search algorithms for real-time speech recognition. We argue that software-only speech recognition has several critical advantages over using special or parallel hardware. We present a history of several advances in search algorithms, which together, have made it possible to implement real-time recognition of large vocabularies on a single workstation without the need for any hardware accelerators. We discuss the Forward-Backward Search algorithm in detail, as this is the key algorithm that has made possible recognition of very large vocabularies in real-time. The result is that we can recognize continuous speech with a vocabulary of 20,000 words strictly in real-time entirely in software on a high-end workstation with large memory. We demonstrate that the computation needed grows as the cube root of the vocabulary size.
DTIC
Algorithms; Real Time Operation; Speech Recognition

20060055822 Maryland Univ., College Park, MD USA
Contention-Conscious Transaction Ordering in Embedded Multiprocessors Systems
Khandelia, Mukul; Bhattacharyya, Shuvra S; Mar 2000; 35 pp.; In English
Contract(s)/Grant(s): DAAL01-98-K-0075; MIP9734275
Report No.(s): AD-A457629; UMIACS-TR-2000-09; No Copyright; Avail.: CASI: A03, Hardcopy

This paper explores the problem of efficiently ordering interprocessor communication operations in statically-scheduled multiprocessors for iterative dataflow graphs. In most digital signal processing applications, the throughput of the system is significantly affected by communication costs. By explicitly modeling these costs within an effective graph-theoretic analysis framework, we show that ordered transaction schedules can significantly outperform self-timed schedules even when synchronization costs are low. However, we also show that when communication latencies are non-negligible, finding an optimal transaction order given a static schedule is an NP-complete problem, and that this intractability holds both under iterative and non-iterative execution. We develop new heuristics for finding efficient transaction orders, and perform an experimental comparison to gauge the performance of these heuristics.
DTIC
Digital Systems; Multiprocessing (Computers)

20060056386 NASA Goddard Space Flight Center, Albuquerque, NM, USA
Fibonacci Grids
Swinbank, Richard; Purser, James; [2006]; 1 pp.; In English; No Copyright; Avail.: Other Sources; Abstract Only

Recent years have seen a resurgence of interest in a variety of non-standard computational grids for global numerical prediction. The motivation has been to reduce problems associated with the converging meridians and the polar singularities of conventional regular latitude-longitude grids. A further impetus has come from the adoption of massively parallel computers, for which it is necessary to distribute work equitably across the processors; this is more practicable for some non-standard grids. Desirable attributes of a grid for high-order spatial finite differencing are: (i) geometrical regularity; (ii) a homogeneous and approximately isotropic spatial resolution; (iii) a low proportion of the grid points where the numerical procedures require special customization (such as near coordinate singularities or grid edges). One family of grid arrangements which, to our knowledge, has never before been applied to numerical weather prediction, but which appears to offer several technical advantages, are what we shall refer to as ‘Fibonacci grids’. They can be thought of as mathematically ideal generalizations of the patterns occurring naturally in the spiral arrangements of seeds and fruit found in sunflower heads and pineapples (to give two of the many botanical examples). These grids possess virtually uniform and highly isotropic resolution, with an equal area for each grid point. There are only two compact singular regions on a sphere that require customized numerics. We demonstrate the practicality of these grids in shallow water simulations, and discuss the prospects for efficiently

using these frameworks in three-dimensional semi-implicit and semi-Lagrangian weather prediction or climate models.
Author
Computational Grids; Massively Parallel Processors; Numerical Weather Forecasting; Climate Models; Finite Difference Theory; Lagrangian Function; Parallel Processing (Computers)

65
STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; time series analysis; and stochastic processes.

20060055393 Carnegie-Mellon Univ., Pittsburgh, PA USA
Probabilistic Reuse of Past Policies
Fernandez, Fernando; Veloso, Manuela; Jul 2005; 15 pp.; In English
Contract(s)/Grant(s): W911W6-04-C-0058; FA8760-04-C-0002
Report No.(s): AD-A456806; CMU-CS-05-173; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA456806; Avail.: Defense Technical Information Center (DTIC)

A past policy provides a bias to guide the exploration of the environment and speed up the learning of a new action policy. The success of this bias depends on whether the past policy is 'similar' to the actual policy or not. In this report, the authors describe a new algorithm, PRQ-Learning, that reuses a set of past policies to bias the learning of a new one. The past policies are ranked following a similarity metric that estimates how useful it is to reuse each of those past policies. This ranking provides a probabilistic bias for the exploration in the new learning process. Several experiments demonstrate that PRQ-Learning finds a balance between exploitation of the ongoing learned policy, exploration of random actions, and exploration toward the past policies.
DTIC
Algorithms; Artificial Intelligence; Computer Programming; Machine Learning; Markov Processes; Policies; Robots; Software Engineering

20060055394 Carnegie-Mellon Univ., Pittsburgh, PA USA
Exploration and Policy Reuse
Fernandez, Fernando; Veloso, Manuela; Jul 2005; 16 pp.; In English
Contract(s)/Grant(s): W911W6-04-C-0058; FA8760-04-C-0002
Report No.(s): AD-A456807; CMU-CS-05-172; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA456807; Avail.: CASI: A03, Hardcopy

The authors define Policy Reuse as a learning technique that is guided by past policies and that offers the challenge of balancing three choices: exploitation of the ongoing learned policy, exploration of random actions, and exploration towards the past policies. In this work, they introduce a new exploration strategy, pi-reuse, as an intelligent bias to reuse a past policy when learning a new one. Interestingly, this strategy also provides a similarity metric among a set of past policies and the new one. The authors therefore define a pi-reuse-based similarity metric between policies. They introduce a new algorithm that combines the selection and reuse of past policies using this similarity metric. They then show empirical results that demonstrate the usefulness of their exploration strategy, pi-reuse, as an intelligent bias to reuse past policies, and its effectiveness in defining the similarity between policies.
DTIC
Artificial Intelligence; Computer Programming; Machine Learning; Markov Processes; Policies; Robots; Software Engineering

20060055449 Carnegie-Mellon Univ., Pittsburgh, PA USA
A Programming Language for Probabilistic Computation
Park, Sungwoo; Aug 2005; 116 pp.; In English
Contract(s)/Grant(s): F19628-95-C-0050; F30602-98-2-0137
Report No.(s): AD-A457098; CMU-CS-05-137; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457098; Avail.: CASI: A06, Hardcopy

As probabilistic computations play an increasing role in solving various problems, researchers have designed probabilistic languages to facilitate their modeling. Most of the existing probabilistic languages, however, focus only on discrete distributions, and there has been little effort to develop probabilistic languages whose expressive power is beyond discrete

distributions. This dissertation presents a probabilistic language, called PTP (ProbabilisTic Programming), which supports all kinds of probability distributions. The key idea behind PTP is to use sampling functions, i.e., mappings from the unit interval (0.0, 1.0] to probability domains, to specify probability distributions. By using sampling functions as its mathematical basis, PTP provides a unified representation scheme for probability distributions, without drawing a syntactic or semantic distinction between different kinds of probability distributions. Independently of PTP, we develop a linguistic framework to account for computational effects in general. [The framework] extends a monadic language by applying the possible world interpretation of modal logic. A characteristic feature of [the framework] is the distinction between stateful computational effects, called world effects, and contextual computational effects, called control effects. PTP arises as an instance of [the framework] with a language construct for probabilistic choices. We use a sound and complete translator of PTP to embed it in Objective CAML. The use of PTP is demonstrated with three applications in robotics: robot localization, people tracking, and robotic mapping. Thus PTP serves as another example of high-level language applied to a problem domain where imperative languages have been traditionally dominant.
DTIC
Computation; High Level Languages; Probability Theory; Programming Languages

20060055452 Naval Undersea Warfare Center, Newport, RI USA
Computing the Observed Information Matrix for Dynamic Mixture Models
Walsh, Michael J; Sep 25, 2006; 87 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457101; NUWC-NPT-TR-11768; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457101; Avail.: Defense Technical Information Center (DTIC)

The observed information matrix for an important class of finite mixture models, called dynamic mixture models, is derived in this report. Dynamic mixture models are useful probability models for random data originating from a number of distinct moving sources. The multiple-target tracking problem is one application of these models. For these models, the inverse of the observed information matrix is a consistent estimate of the error-covariance matrix for the mixture parameters. Measurement-to-source assignment uncertainty is unavoidable in these problems, and increases as the distance between sources in the sample space decreases. The observed information matrix computations presented here account for this uncertainty by subtracting the information in the unobserved assignments, treated as missing data, from the information in the expected complete data sample. Two target tracking examples are given that demonstrate these computations for the linear Gauss-Markov mixture model for multiple target tracking. In each case, the consistency of the resulting error-covariance matrices is examined.
DTIC
Dynamic Models; Mathematical Models; Statistical Analysis

20060055579 University of Southern California, Marina del Rey, CA USA
KOJAK Group Finder: Scalable Group Detecllon via Integrated Knowledge-Based and Statistical Reasoning
Chalupsky, Hans; Adibi, Jafar; Russ, Thomas A; Sep 2006; 129 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00173-05-1-G006; Proj-55-7035-05
Report No.(s): AD-A457191; No Copyright; Avail.: CASI: A07, Hardcopy

This report describes the KOJAK Group Finder which is a highly scalable, hybrid logic-based statistical link discovery system designed to solve group detection problems. The system takes primary and secondary evidence as input and produces group hypotheses with ranked lists of group members as output. Under funding of this project, the Group Finder was developed from a research prototype into a mature software component that can be transitioned into operational environments. Among the many improvements, scalability and processing speed was improved by over a factor of 10, the software is now available in C++ and Java versions for Linux, as well as Windows platforms and now also supports Oracle databases in addition to MySQL. A Java-based GUI was added to facilitate usage by non-experts.
DTIC
Architecture (Computers); Computer Programming; Computer Programs; Computers; Knowledge Based Systems; Systems Engineering

20060055647 Naval Postgraduate School, Monterey, CA USA
Quantifying the Probabilities of Selection of Surface Warfare Officers to Executive Officer
Sirkin, Jeffrey M; Sep 2006; 73 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457315; No Copyright; Avail.: CASI: A04, Hardcopy

This thesis seeks to identify factors affecting the probability of selection of a Surface Warfare Officer (SWO) to Executive Officer (XO) in the U.S. Navy. Selections to XO are made by a board that meets annually. Because a candidate is considered for selection in up to three consecutive boards, the possible outcomes in this process are selection to XO in one of three annual boards, failure to be selected to XO in the third board, or attrition from the process between boards. Using data on the board's selections over a 3-year period (2002-2004), a hazards-based logistic regression model is developed to estimate the probabilities associated with a candidate's disposition based on his or her career profile. The model confirms that a candidate's recent fitness and evaluation report (FITREP) is the single most important factor affecting selection. Additionally, officers who have completed a tour in Washington D.C. or at the Bureau of Naval Personnel have a higher probability of selection than those who have completed other shore tours. But when an officer receives a poor FITREP, the probability of selection is low, regardless of other factors. A nonparametric statistical analysis is used to confirm these findings.
DTIC
Military Personnel; Personnel; Personnel Selection; Probability Theory; Warfare

20060055772 Pyrodyne, Inc., Glenwood, MD USA
Improved Modeling Tools For High Speed Reacting Flows
Kielb, R; White, J; Eiseman, P; Sep 2006; 41 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8650-05-M-2594; Proj-3005
Report No.(s): AD-A457542; No Copyright; Avail.: Defense Technical Information Center (DTIC)

This report was developed under SBIR contract for Topic AF05-194. The objective of this work was to develop and demonstrate a means for the efficient integration of detailed numerical analysis into the design-optimization process. An integrated design optimization and engineering analysis tool has been demonstrated. This tool leverages the significant work required to set-up a detailed numerical analysis. The additional work required to execute the optimization includes formally defining the figure of merits, setting up the DAKOTA input file and possibly re-defining the geometry and topology for parametric grid generation. Setting up the DAKOTA input file is a straight forward task. Since the process requires a formal definition of the figure of merits, the system documents itself and is very repeatable. Including grid generation in the loop requires some additional effort, however, the potential gains in component performance and system operability are substantial.
DTIC
High Speed; Numerical Analysis; Reacting Flow

20060055776 Naval Postgraduate School, Monterey, CA USA
A Game-Theoretic Model for Repeated Helicopter Allocation Between Two Squads
Lennon, Clifton G; McGowan, Jason M; Jun 2006; 53 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457547; No Copyright; Avail.: CASI: A04, Hardcopy

A platoon commander has a helicopter to support two squads, which encounter two types of missions critical or routine on a daily basis. During a mission, a squad always benefits from having the helicopter, but the benefit is greater during a critical mission than during a routine mission. Because the commander cannot verify the mission type beforehand, a selfish squad would always claim a critical mission to compete for the helicopter which leaves the commander no choice but to assign the helicopter at random. In order to encourage truthful reports from the squads, we design a token system that works as follows. Each squad keeps a token bank, with tokens deposited at a certain frequency. A squad must spend either 1 or 2 tokens to request the helicopter, while the commander assigns the helicopter to the squad who spends more tokens, or breaks a tie at random. The two selfish squads become players in a two-person non-zero-sum game. We find the Nash Equilibrium of this game, and use numerical examples to illustrate the benefit of the token system.
DTIC
Game Theory; Helicopters; Markov Processes

20060055780 Carnegie-Mellon Univ., Pittsburgh, PA USA
Tree-Based Hierarchical Reinforcement Learning
Uther, William T; Aug 2002; 164 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-00-2-0549; F30602-98-2-0135
Report No.(s): AD-A457553; CMU-CS-02-169; No Copyright; Avail.: CASI: A08, Hardcopy

In this thesis, the author investigates methods for speeding up automatic control algorithms. Specifically, he provides new abstraction techniques for Reinforcement Learning and Semi-Markov Decision Processes (SMDPs). He also introduces the use of policies as temporally abstract actions. This is different from previous definitions of temporally abstract actions as he

does not have termination criteria. He provides an approach for processing previously solved problems to extract these policies. He also contributes a method for using supplied or extracted policies to guide and speed up the solving of new problems. He treats extracting policies as a supervised learning task and introduces the Lumberjack algorithm, which extracts repeated sub-structure within a decision tree. He then introduces the TTree algorithm, which combines state and temporal abstraction to increase problem solving speed on new problems. TTree solves SMDPs by using both user- and machine-supplied policies as temporally abstract actions while generating its own tree-based abstract state representation. By combining state and temporal abstraction in this way, TTree is the only known SMDP algorithm that is able to ignore irrelevant or harmful subregions within a supplied abstract action while still making use of other parts of the abstract action.
DTIC
Algorithms; Automatic Control; Control; Machine Learning; Markov Processes; Problem Solving; Robotics

66
SYSTEMS ANALYSIS AND OPERATIONS RESEARCH

Includes mathematical modeling of systems; network analysis; mathematical programming; decision theory; and game theory.

20060055442 Carnegie-Mellon Univ., Pittsburgh, PA USA
Endpoint-Based Routing Strategies for Improving Internet Performance and Resilience
Akella, Aditya; Sep 29, 2005; 182 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAD19-02-1-0389; F30602-99-1-0518
Report No.(s): AD-A457085; CMU-CS-05-183; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457085; Avail.: CASI: A09, Hardcopy

Internet access speeds of large enterprises and educational institutions have improved dramatically over the past few years. However, this higher-speed connectivity is still ineffective at providing end-users with good download performance and robustness from service interruptions. This arises due to the prevalence of constrained links with little spare capacity inside Internet Service Provider (ISP) networks. In this dissertation, we first investigate the location, latency and traffic load characteristics of network links that limit the Internet performance of well-connected end-networks. More importantly, we show how end-networks can employ a clever Internet route selection technique, called Multihoming Route Control, to avoid these performance bottlenecks and obtain much better Internet performance. Using Internet-scale measurements conducted over Akamai's content distribution infrastructure, we show that by multihoming to three ISPs, and intelligently scheduling transfers across the ISPs, an end-network could potentially improve its Internet round-trip times (RTTs), throughputs and reliability by up as much as 30%. We also compare the Internet performance and reliability from route control against more powerful route selection paradigms such as overlay routing. We show that the RTTs and transfer speeds from multihoming are within 5-10% of overlay routing. While multihoming cannot offer the nearly perfect resilience of overlays, we show that it can eliminate almost all failures experienced by a singly-homed end-network. We also describe the design and performance evaluation of a route control system that can be deployed by large multihomed enterprises. We show that, in practice, simple route control techniques can offer Web performance within 10% of the optimal performance from multihoming.
DTIC
Data Links; Internets; Reliability; Resilience; User Requirements

20060055535 Army Engineer Research and Development Center, Vicksburg, MS USA
Risk and Reliability of Infrastructure Asset Management Workshop
Aug 2006; 90 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457119; No Copyright; Avail.: CASI: A05, Hardcopy

A workshop was held August 15-18 in Alexandria, Virginia to begin the dialog on the methodologies available and the status of how the US Army Corps of Engineers assesses its Civil Works infrastructure and applies risk and reliability in the management of that infrastructure. The workshop was organized by the US Army Engineer Research and Development Center (ERDC) in collaboration with Headquarters, USACE and in support of the initiatives on asset management. Over 75 people attended representing 6 of 8 Corps divisions, many districts, HQ, ERDC, Institute for Water Resources and academia. The group included a diverse representation of planners, economists, engineers, operators, researchers and managers. The reliability of many USACE structures has been reduced and the risk of failure has been increased due to age and insufficient funds for proper maintenance and rehabilitation. A sustainable infrastructure plan based on intelligent asset management, is the fundamental principal of both the USACE Campaign Goal 3C and the Presidents initiative through Executive Order 13327, Federal Real Property Asset Management. Implementation of a robust plan is the best way to prioritize needed infrastructure

improvements with limited funds. A critical component in establishment of an asset portfolio and an adaptive management strategy is the knowledge of an assets condition, its functional reliability, and the risks and consequences of poor performance or failure. A plan for Intelligent Asset Management does not exist for the entire portfolio of Corps assets at this time due to lack of assembled information, standardized assessment practices, and integrated policies for addressing information about structures condition, functional reliability and the risks and consequences of failure.
DTIC
Reliability; Risk

20060055551 Carnegie-Mellon Univ., Pittsburgh, PA USA
On-line Robot Adaptation to Environmental Change
Lenser, Scott; Aug 2005; 168 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DABT63-99-1-0013
Report No.(s): AD-A457142; CMU-CS-05-165; No Copyright; Avail.: CASI: A08, Hardcopy

Robots performing tasks constantly encounter changing environmental conditions. These changes in the environment vary from the dramatic, such as rearrangement of furniture, to the subtle, such as a burnt out light bulb or a different carpeting. We do not recognize many of these changes, especially subtle changes, but robots do. These changes often lead to the failure of robots. In this thesis, we develop an algorithm for detecting these changes. Traditional sensor models do not capture all of the dependencies in the sensor data and are not capable of detecting all types of signal changes while maintaining a strong probabilistic foundation. This thesis corrects these shortcomings. We show how detecting the current conditions in which the robot is operating can lead to increased performance and lower failure rates. The methods in this thesis are tested on real tasks performed by a real robot, namely a Sony AIBO robot.
DTIC
Adaptation; Change Detection; On-Line Systems; Robotics; Robots

20060055553 Carnegie-Mellon Univ., Pittsburgh, PA USA
Privacy-Preserving Set Operations
Kissner, Lea; Song, Dawn; Jun 2005; 40 pp.; In English
Contract(s)/Grant(s): DAAD19-02-1-0389
Report No.(s): AD-A457144; CMU-CS-05-113; No Copyright; Avail.: Defense Technical Information Center (DTIC)

In many important applications, a collection of mutually distrustful parties must perform private computation over multisets. Each party's input to the function is his private input multiset. In order to protect these private sets, the players perform privacy-preserving computation; that is, no party learns more information about other parties' private input sets than what can be deduced from the result. In this paper, we propose efficient techniques for privacy-preserving operations on multisets. By employing the mathematical properties of polynomials, we build a framework of efficient, secure, and composable multiset operations: the union, intersection, and element reduction operations. We apply these techniques to a wide range of practical problems, achieving more efficient results than those of previous work.
DTIC
Privacy; Protocol (Computers)

20060055555 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Fast Scene Based Nonuniformity Correction with Minimal Temporal Latency
Rice, Christopher A; Sep 2006; 58 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457146; AFIT/GE/ENG/06-59; No Copyright; Avail.: CASI: A04, Hardcopy

The focus of this research was to derive a new algorithm for correction of gain nonuniformities in LIDAR focal plane arrays using as few frames as possible. Because of the current low production rate of LIDAR focal plane arrays there is a natural tendency for extreme nonuniformities to exist on a pixel by pixel basis as the manufacturing technique has not yet been perfected. Generally, nonuniformity correction techniques require a large number of frames and/or have obscure requirements on the translational shifts in the input image frames. This thesis presents a solution for finding multiplicative nonuniformities that exist in a focal plane array and mitigating the effect those nonuniformities.
DTIC
Image Processing; Nonuniformity; Optical Radar

20060055572 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, The Hague, Netherlands
Inventory of Simulation and Modeling for the Analysis of Ground Manoeuvre Performance (inventarisatie van vragen en modellen voor de analyse van het grondgebonden optreden)
Wiersum, C J; Smeenk, B J; Van Scheepstal, P G; Hasberg, M P; Barros, A I; Fiamingo, C; Apr 2006; 163 pp.; In Dutch; Original contains color illustrations
Report No.(s): AD-A457176; TNO-DV1-2006-A059; No Copyright; Avail.: CASI: A08, Hardcopy

Modelling and simulation can be used to analyze ground maneuver units with respect to future doctrine, command and control, training, organization, material and personnel. In the research program Analysis of Ground based Operations (AGO), the available suite of models for this purpose is examined and will be further improved. This reports describes the available suite of models in the Netherlands and in a few other nations.
DTIC
Inventories; Maneuvers; Models; Performance Prediction; Simulation

20060055616 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Soesterberg, Netherlands
Analysis of Adaptive Team Concept through Simulation Models: A Survey (toetsing van adaptieve teamconcepten door middel van simulatiemodellen: een verkenning)
van den Broek, J; Feb 2006; 48 pp.; In Dutch; Original contains color illustrations
Report No.(s): AD-A457250; TNO-DV3-2005-A261; No Copyright; Avail.: CASI: A03, Hardcopy

In order to face-up to future mission challenges, the RNLN needs new dynamic organizations and ways of work on board future vessels. The aim of this project is to develop new team concepts. The concepts need to integrate and address the functions of the Command Information Center, Technical Center, and bridge. The team concepts need to be testes. For this purpose we developed an analytical framework that consists of five models: task model, crew model, organization model, resource model, and an environmental model. The primary goal of the simulation model is to determine, which organizational structures best fit the demands of different mission environments and how and when these changes are best effectuated. Based on literature on adaptive organizations and the design of effective and stress resistant organizations, we presented an overview of elements that a simulation environment should contain. The design model and the elements described will be applied in simulation runs that are planned for the next phase of the Human-system task integration program. For this purpose, a number of experiments have been formulated that seek answers on specific research questions.
DTIC
Doors; Simulation; Surveys

20060055618 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Soesterberg, Netherlands
Analysis Methods and Models for Small Unit Operations
Brandsma, M G; van Vliet, A J; Griffioen-Young, H J; Jul 2006; 65 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457252; TNO-DV-2006-A228; No Copyright; Avail.: Defense Technical Information Center (DTIC)

One of the primary goals of the Netherlands Armed Forces is to have at their disposal units that are adequately equipped and outfitted to carry out tasks across the complete range of peace-supporting missions, varying in levels of hostility. To this end a scientific research program was formulated which encompasses a number of projects which focus on various aspects of operations of teams of dismounted soldiers. The aim of this project is to identify scientific methods and models which facilitate the measurement of operational effectiveness of dismounted small units. Measuring operational effectiveness of dismounted small units requires the use of methods models and simulations. Within this project we have made an inventory of the available methods and models within the TNO technology portfolio. In order to be able to asses the usefulness of these methods and models for the tasks the dismounted small units are confronted with, the task decomposition developed in the project Small unit tactics in peace keeping operations' (Smeenk et al., 2004) was used as a guideline. The usefulness of the methods and models was established by classifying these into three categories, i.e. logically possible, theoretically feasible and practically applicable. For each of the tasks the models and methods were reviewed with respect to the mentioned categories. This resulted in one matrix of tasks and models/methods. The analysis of the matrix suggests that not one single method/model is practically applicable to all the identified tasks of the dismounted small unit. Furthermore, although TNO has access to a range of models/methods which are practically applicable to a number of tasks, these tasks can al be considered as high intensity tasks. TNO does not have access to methods/models which are explicitly and practical applicable in the low intensity range of the task spectrum. A small number of models seem to have the potential to fill the identified gap.
DTIC
Maintainability; Military Personnel; System Effectiveness

20060055624 Naval Postgraduate School, Monterey, CA USA
Real Estate Site Selection: An Application of Artificial Intelligence for Military Retail Facilities
Shangle, Eric L; Sep 2006; 85 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457266; No Copyright; Avail.: CASI: A05, Hardcopy

The purpose of this MBA Project is to investigate and provide a comprehensive overview of the current real estate site selection industry while showing applications of how artificial intelligence can improve the selection process. The goal is to identify and document both the specific industry practices primarily utilized and the principal uses of artificial intelligent algorithms for site selection and sales forecasting. The results of this project can be applied to military retail facilities (exchanges and commissaries). The current business model for military retail facilities may not be optimized based upon current trends market data. Optimizing the location and allocation of goods and services through artificial intelligent algorithms can provide previously unrealized cost savings to the Department of Defense.
DTIC
Algorithms; Artificial Intelligence; Optimization; Site Selection

20060055637 Drexel Univ., Philadelphia, PA USA
Drexel Object Occlusion Repository (DOOR)
Denton, Trip; Novatnack, John; Shokoufandeh, Ali; Jul 2005; 6 pp.; In English
Contract(s)/Grant(s): N00014-04-1-0363
Report No.(s): AD-A457294; DU-CS-05-08; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Drexel Object Occlusion Repository is a reference set of images for computer vision and object recognition researchers. The images are constructed by overlapping input objects from the COIL-20 database and occluding them by various amounts. The amount of occlusion for each image is measured at the pixel level. An accompanying text file for each occlusion image describes the input files, occlusion rates etc.
DTIC
Computer Vision; Doors; Occlusion

20060055653 California Univ., Santa Cruz, CA USA
Game Models for Open Systems
de Alfaro, Luca; Jan 2006; 22 pp.; In English
Contract(s)/Grant(s): N00014-02-1-0671
Report No.(s): AD-A457326; NSF-CCR-0132780; NSF-CCR-0234690; No Copyright; Avail.: CASI: A03, Hardcopy

An open system is a system whose behavior is jointly determined by its internal structure and by the input it receives from the environment. To solve control and verification problem open systems have often been modeled as games between the System and the environment; we argue that the game view of open systems should be extended also to the definitions of system refinement and composition. We give a symmetrical interpretation to games between system and environment: the moves of the system represent the outputs that the system can generate (the output guarantees) and symmetrical the moves of the environment represent the inputs that the System can accept (the input assumptions). We argue in favor of defining refinement of open systems in terms of alternating simulation, which is the relation between games that plays the same role of simulation between transition systems. Alternating simulation captures the principle that a component refines another if it has weaker input assumptions, and Stronger output guarantees. Furthermore, we argue in favor of a notion of composition that accounts for the compatibility between input assumptions and output guarantees, and that enables the synthesis of new input guarantees for the composed System. These game-theoretical notions of refinement and compatibility are related to the type-theoretical notions of subtyping and type compatibility, and give rise to an expressive modeling framework for component-based design and verification.
DTIC
Computer Programs; Game Theory

20060055775 Naval Postgraduate School, Monterey, CA USA
Optimizing CAT-ASVAB Item Selection Using Form Assembly Techniques
Lee, Toby; Jun 2006; 57 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457546; No Copyright; Avail.: CASI: A04, Hardcopy

The Armed Services Vocational Aptitude Battery (ASVAB) is a test that approximately 700,000 students in 12,000 high schools take each year to determine military occupation placement. Form Assembly for the ASVAB refers to the selection of

20-35 questions, known as items, from an item pool of approximately 300 items to create a paper and pencil test in one of its ten topics. Previous research formulates form assembly as an Integer Linear Program (ILP). The current ASVAB mostly uses a Computer Adaptive Test (CAT), which estimates an examinee's ability after the examinee answers each item and selects the next item based on prior performance. The current CAT-ASVAB implementation does not control the number of items selected from each subject (taxonomy group) for a test. This thesis introduces ILPs, previously used for form assembly, that impose taxonomy restrictions and applies them to the CAT-ASVAB. We create four ILP variations and test them against the current method of item selection, by simulating 3,500 examinees (500 examinees each for seven given ability levels). The results show that all of the ILPs have acceptable solution times for CAT use, and taxonomy restrictions can be imposed while also having more even exposure rates (the number of times an item is administered divided by the number of examinees) than the current implementation of the CAT-ASVAB. A variation that relaxes most of the binary variables and constrains the difficulty of each item to be within a predetermined magnitude of the current ability estimate, performs the best in terms of item exposure (for both under and over-utilized items) and error between an examinee's estimated ability level and actual ability level.
DTIC
Adaptation; Aptitude; Linear Programming; Operations Research; Optimization; Psychological Tests

20060055810 Air Force Research Lab., Wright-Patterson AFB, OH USA
HCI Design Patterns for C2: A Vision for a DoD Design Reference Library
Stanard, Terry; Wampler, Jeffrey L; Conrad, Kendall; Osga, Glenn; Mar 2006; 22 pp.; In English
Contract(s)/Grant(s): F33601-03-0065; Proj-4923
Report No.(s): AD-A457602; No Copyright; Avail.: CASI: A03, Hardcopy

The concept of Net Centric Ops offers the opportunity for sharing information between distributed warfighters and systems like never before. C2 centers are a natural benefactor of NCO since, by design, they coordinate and direct operations that are distributed. However, NCO is a double edged sword for C2 centers. While it offers information sharing like never before, it creates new task demands of info management with the potential for warfighters to get lost in the sea of data. With NCO in C2 centers, the HCI becomes the gateway into the distributed network, with the dual job of accessing and presenting information in useful manner, while filtering out what is irrelevant. But currently, there are no established HCI solutions for command and control. There is also no standard methodology for translating the cognitive work requirements associated with C2 into work-aiding HCI designs or C2. As a result, each HCI design for C2 tends to be one-of-a-kind solution. One-of-a-kind solutions means longer development time and cost. They also mean there can be no guarantee early in the stages of a design project that the finished product will assist human operators in their work within C2. We advocate developing a library of HCI templates designed specifically to help with C2 operations. The HCI templates can be reused in different HCI design projects where the work requirements are similar. Cognitive systems engineering has collectively amassed enough experience modeling work and designing work-aiding HCIs, that we should be able to build a library of reusable HCI templates for C2. My goal for this presentation is to acquaint you with the problem and our approach, and attract your participation in this effort. Reusable HCI templates can provide HCI designers with proto-designs that are known to assist human operators perform certain C2 work functions.
DTIC
Command and Control; Human-Computer Interface; Libraries; Standardization; Templates

67
THEORETICAL MATHEMATICS

Includes algebra, functional analysis, geometry, topology, set theory, group theory and number theory.

20060055549 California Univ., Santa Cruz, CA USA
Model Checking Discounted Temporal Properties
de Alfaro, Luca; Faella, Marco; Henzinger, Thomas A; Majumdar, Rupak; Stoelinga, Marieelle; Mar 13, 2005; 38 pp.; In English
Contract(s)/Grant(s): F49620-00-1-0327; N00014-02-1-0671
Report No.(s): AD-A457138; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Temporal logic is two-valued: formulas are interpreted as either true or false. When applied to the analysis of stochastic systems, or systems with imprecise formal models, temporal logic is therefore fragile: even small changes in the model can lead to opposite truth values for a specification. We present a generalization of the branching-time logic C(sub TL) which

achieves robustness with respect to model perturbations by giving a quantitative interpretation to predicates and logical operators, and by discounting the importance of events according to how late they occur. In every state, the value of a formula is a real number in the interval [0,1], where 1 corresponds to truth and 0 to falsehood. The boolean operators and or are replaced by min and max, the path quantifiers for all possible futures and some possible futures determine sup and inf over all paths from a given state, and the temporal operators for always and eventually specify sup and inf over a given path; a new operator averages all values along a path. Furthermore, all path operators are discounted by a parameter that can be chosen to give more weight to states that are closer to the beginning of the path. We interpret the resulting logic D(sub C(SUB TL)) over transition systems, Markov chains, and Markov decision processes. We present two semantics for D(sub C(SUB TL)): a path semantics, inspired by the standard interpretation of state and path formulas in C(sub TL), and a fixpoint semantics, inspired by the micro-calculus evaluation of C(sub TL) formulas. We show that, while these semantics coincide for C(sub TL), they differ for D(sub CTL), and we provide model-checking algorithms for both semantics.
DTIC
Boolean Algebra; Mathematical Logic; Mathematical Models; Semantics; Stochastic Processes; Temporal Logic

20060055651 Logistics Management Inst., McLean, VA USA
Analytic Methods for Tactical Air Warfare - 2006. Air Campaign and Mathematical Analysis
Hemm, Robert V; Lee, David A; Eckhause, Jeremy M; Dukovich, John A; Jul 2006; 43 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): GS-00F-0026M
Report No.(s): AD-A457319; LMI-PA504T1; No Copyright; Avail.: CASI: A03, Hardcopy

The report describes analytical tasks performed for OSD/PA&E TACAIR during the period from June 2005 through July 2006. The report describes use of and extension to the stochastic Lanchester Air-to-Air Campaign model (SLAACM) probabilistic model of campaigns for air superiority between two opponents, described in previous reports. The current report describes the current model structure and battle management analysis features. In a separate section, the report discusses the mathematics of battle management and SLAACM integer programming capability. The report also contains mathematical analyses of strategies for defensive combat air patrol time phasing. The final section discusses proposed future model development.
DTIC
Military Operations; Models; Planning; Warfare

20060055690 Texas Univ., Austin, TX USA
Improving the Performance of Perfectly Matched Layers by Means of hp-Adaptivity
Michler, C; Demkowicz, L; Kurtz, J; Pardo, D; Jan 2006; 26 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA9550-04-1-0050
Report No.(s): AD-A457406; No Copyright; Avail.: Defense Technical Information Center (DTIC)

We improve the performance of the Perfectly Matched Layer by using an automatic hp-adaptive discretization. By means of hp-adaptivity, we obtain a sequence of discrete solutions that converges exponentially to the continuum solution. Asymptotically, we thus recover the property of the PML of having a zero reflection coefficient for all angles of incidence and all frequencies on the continuum level. This allows us to minimize the reflections from the discrete PML to an arbitrary level of accuracy while retaining optimal computational efficiency. Since our hp-adaptive scheme is automatic, no interaction with the user is required. This renders tedious parameter tuning of the PML obsolete. We demonstrate the improvement of the PML performance by hp-adaptivity through numerical results for acoustic, elastodynamic and electromagnetic wave-propagation problems in the frequency domain and in different systems of coordinates.
DTIC
Adaptation; Perfectly Matched Layers; Wave Propagation

70
PHYSICS (GENERAL)

Includes general research topics related to mechanics, kinetics, magnetism, and electrodynamics. For specific areas of physics see *categories 71 through 77*. For related instrumentation see *35 Instrumentation and Photography*; for geophysics, astrophysics, or solar physics see *46 Geophysics, 90 Astrophysics*, or *92 Solar Physics*.

20060054230 Stanford Linear Accelerator Center, CA, USA, California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, Deutsches Elektronen-Synchrotron, Hamburg, Germany

Single-Bunch Instability Driven by The Electron Cloud Effect in the Positron Damping Ring of the International Linear Collider

Pivi, M.; Raubenheimer, T.; Ghalam, A.; Harkay, K.; January 2006; 8 pp.; In English

Report No.(s): DE2006-881392; No Copyright; Avail.: National Technical Information Service (NTIS)

Collective instabilities caused by the formation of an electron cloud (EC) are a potential limitation to the performances of the damping rings for a future linear collider. In this paper, we present recent simulation results for the electron cloud build-up in damping rings of different circumferences and discuss the single-bunch instabilities driven by the electron cloud. NTIS

Damping; Electron Clouds; Positrons

20060054233 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, Science Applications International Corp., Alamo, CA, USA

Helical Pulse Line Structures for Ion Acceleration

Briggs, R. J.; Reginato, L. L.; Waldron, W. L.; January 2006; 8 pp.; In English

Report No.(s): DE2006-881390; No Copyright; Avail.: National Technical Information Service (NTIS)

The basic concept of the 'Pulse Line Ion Accelerator' is presented, where pulse power sources create a ramped traveling wave voltage pulse on a helical pulse line. Ions can surf on this traveling wave and achieve energy gains much larger than the peak applied voltage. Tapered and untapered lines are compared, and a transformer coupling technique for launching the wave is described.

NTIS

Accelerators; Ion Accelerators

20060054241 Brookhaven National Lab., Upton, NY USA

Recent Progress Designing Compact Superconducting Final Focus Magnets for the ILC

Parker, B.; Mar. 26, 2006; 16 pp.; In English

Report No.(s): DE2006-878908; BNL-75691; No Copyright; Avail.: Department of Energy Information Bridge

QDO, the final focus (FF) magnet closest to the interaction point (P) for the ILC 20 mr crossing angle layout, must provide strong focusing yet be adjustable to accommodate collision energy changes for energy scans and low energy calibration ruling. But it must be compact to allow disrupted beam and Beamstrahlung coming from the IP to pass outside into an independent instrumented beam line to a high-power beam absorber. The QDO design builds upon BNL experience making direct wind superconducting magnets. We present test results for a QDO magnetic test prototype and introduce a new shielded magnet design, to replace the previous side-by-side design concept, that greatly simplifies the field correction scheme and holds promise of working for crossing angles as small as 14 mr.

NTIS

Superconducting Magnets; Collisions; Adjusting

20060054250 Stanford Linear Accelerator Center, CA, USA, Academia Sinica, Beijing, China, Bergen Univ., Norway, California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA

Observation of B(sup o) Meson Decay to A (sup plus or minus)(sub 1) (1260) pi (sup plus or minus)

Aubert, B.; Barate, R.; Bona, M.; Boutigny, D.; Couerc, F.; Mar. 2006; 14 pp.; In English

Report No.(s): DE2006-878353; SLAC-PUB-11769; No Copyright; Avail.: Department of Energy Information Bridge

The authors present a measurement of the branching fraction of the decay B(sup 0) (yields) a(sub 1)(sup (+-))(1260)(pi)(sup (-+)) with a(sub 1)(sup (+-))(1260) (yields) (pi)(sup (-+))(pi)(sup (+-))(pi)(sup (+-)). The data sample corresponds to 218 x 10(sup 6) B(bar B) pairs produced in e(sup +)e(sup -) annihilation through the (Upsilon)(4S) resonance. The authors measure the branching fraction (Beta)(B(sup 0) (yields) a(sub 1)(sup (+-))(1260)(pi))sup (-+)))(Beta)(a(sub 1)(sup

(+-))(1260)(yields) (pi)(sup (-+))(pi)(sup (+-))(pi)(sup (+-)))=(16.6 (+-) 1.9 (+-) 1.5) x 10(sup -6), where the first error quoted is statistical and the second is systematic.
NTIS
Mesons; Particle Decay

20060054269 Academy of Sciences (USSR), Novosibirsk, Russian Federation
B-Meson Semileptonic Decays at BABAR
Golubev, V. B.; January 2006; 8 pp.; In English
Report No.(s): DE2006-882843; No Copyright; Avail.: Department of Energy Information Bridge
We report on the measurements of B-meson semileptonic decays at BABAR. The studies include precision measurement of (V(sub cb)) by a combined HQE fit to hadronic mass and electron energy spectral moments in inclusive B (yields) X(sub c)(ell)(nu) decays, measurements of (V(sub cb)) in inclusive and exclusive B (yields) X(sub u)(ell)(nu) decays, and measurements of B (yields) ((pi),(rho))(ell)(nu) decay rates.
NTIS
Invariance; Mesons; Particle Decay

20060054271 Stanford Linear Accelerator Center, CA, USA, Bari Univ., Italy, Academia Sinica, Beijing, China, Bergen Univ., Norway
Search for B(sup +) Yields phi pi(sup +) and B(sup o) Decays
Abuert, B.; Barate, R.; Bona, M.; Boutigny, D.; Coudrec, F.; January 2006; 12 pp.; In English
Report No.(s): DE2006-882836; SLAC-PUB-11854; No Copyright; Avail.: Department of Energy Information Bridge
No abstract available
Industrial Plants; Mesons

20060055390 NASA Johnson Space Center, Houston, TX, USA
Carbon Nanotube Activities at NASA-Johnson Space Center
Arepalli, Sivaram; [2006]; 48 pp.; In English; Original contains black and white illustrations
Contract(s)/Grant(s): NAS9-19100; No Copyright; ONLINE: http://hdl.handle.net/2060/20060055390; Avail.: CASI: A03, Hardcopy
Research activities on carbon nanotubes at NASA-Johnson Space Center include production, purification, characterization and their applications for human space flight. In-situ diagnostics during nanotube production by laser oven process include collection of spatial and temporal data of passive emission and laser induced fluorescence from C2, C3 and Nickel atoms in the plume. Details of the results from the 'parametric study' of the pulsed laser ablation process indicate the effect of production parameters including temperature, buffer gas, flow rate, pressure, and laser fluence. Improvement of the purity by a variety of steps in the purification process is monitored by characterization techniques including SEM, TEM, Raman, UV-VIS-NIR and TGA. A recently established NASA-JSC protocol for SWCNT characterization is undergoing revision with feedback from nanotube community. Efforts at JSC over the past five years in composites have centered on structural polymednanotube systems. Recent activities broadened this focus to multifunctional materials, supercapacitors, fuel cells, regenerable CO2 absorbers, electromagnetic shielding, radiation dosimetry and thermal management systems of interest for human space flight. Preliminary tests indicate improvement of performance in most of these applications because of the large surface area as well as high electrical and thermal conductivity exhibited by SWCNTs.
Author
Carbon Nanotubes; Thermal Conductivity; Radiation Shielding; Radiation Dosage; Nanostructure Growth; Carbon Dioxide; Flow Velocity

20060055399 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Natural Frequencies and Mode Shapes of a Nonlinear, Uniform Cantilevered Beam
Marquez-Chisolm, Daniel J; Sep 2006; 207 pp.; In English
Report No.(s): AD-A456991; AFIT/GAE/ENY/06-S06; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA456991; Avail.: CASI: A10, Hardcopy
A series of experiments in 1975, referred to as the Princeton Beam Experiments, were performed to measure natural frequencies and create a nonlinear elastic deformation model to improve helicopter main beam designs. These experiments used a homogeneous 7075 aluminum beam and have been referenced as a baseline for the past thirty years to validate

computer models and theories in an effort to build beams capable of withstanding aero-elastic, static, and dynamic loading. The purpose of this study is to measure the dynamic nonlinear bending and torsion response of a cantilever beam. The natural frequencies are measured in the flatwise and edgewise directions at different static root pitch angles with varying levels of tip weights. The measured natural frequencies were compared to linear equations of motion, a nonlinear computer model and previous experiments to verify the nonlinear effects of root pitch angle and tip weights. The experiment produced promising results in that the first mode in the edgewise and flatwise directions were within the error bands of the Princeton Beam Experiment and that the linear model matched the experimental case with no tip weights. Further experimentation is needed in order to properly calculate the edgewise frequencies and estimate mode shapes.
DTIC
Cantilever Beams; Models; Nonlinearity; Resonant Frequencies; Vibration Mode

20060055418 Naval Research Advisory Committee, Arlington, VA USA
Naval Electromagnetic (EM) Gun Technology Assessment
Bachkosky, J; Katz, D; Rumpf, R; Weldon, W; Sep 9, 2003; 64 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457042; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457042; Avail.: CASI: A04, Hardcopy

The Naval Research Advisory Committee was asked in May 2003 to conduct an assessment of the current maturity of electromagnetic (EM) gun technology for the Assistant Secretary of the Navy (Research, Development & Acquisition). Specifically, the Committee was tasked to: review and assess the technical and operational performance capabilities necessary to achieve a militarily effective EM gun system for naval application; review the current and anticipated state of the technology and provide an assessment of the performance, manufacturability and maintainability of an EM gun system; and evaluate the technical and developmental risks in producing a projectile that will perform throughout the mission profile, i.e., launch to precision impact on target.
DTIC
Electromagnetic Fields; Technology Assessment

20060055426 Peterson Builders, Inc., Sturgeon Bay, WI USA
Metrication of U.S. Shipbuilding - The Challenges and the Opportunities
Oct 1993; 217 pp.; In English
Report No.(s): AD-A457054; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457054; Avail.: CASI: A10, Hardcopy

Major findings of a study of the issues affecting the introduction of metric practices throughout the U.S. shipbuilding industry are presented in this report. The study aimed to determine how the industry's markets, supplies, and operations would be affected by the external influences driving, not only shipbuilding, but the entire national industrial base toward the metric system of weights and measures. This report identifies the forces which make conversion to metric usage necessary or desirable, identifies cultural and operational impediments to the conversion process, and proposes pragmatic recommendations for dealing with the major issues at both the individual shipyard and industry levels. This report is the result of extensive discussions with individuals in industry and government who are actually involved in metrication, as well as members of the marine industry with and without experience in metrication. Surveys of shipbuilders and suppliers provided valuable insight on the perceptions and experiences of these sectors. These views became the basis for further investigation and discussion.
DTIC
International System of Units; Marine Technology; Metrication; Ships

20060055788 Ljubljana Univ., Ljubljana, Slovenia
International Seminar on The Role of Dosimetry in High-Quality EMF Risk Assessment Held in Ljubljana, Slovenia and Zagreb, Croatia on 13-15 September 2006
Valic, Blaz; Gajsek, Peter; Sep 2006; 92 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): FA8655-06-1-5063
Report No.(s): AD-A457571; No Copyright; Avail.: CASI: A05, Hardcopy

Abstracts for the international seminar on The Role of dosimetry in high quality risk assessment, 13 September 2006 - 15 September 2006. In the last three decades, the use of devices that emit electromagnetic fields (EMF) has increased dramatically. The proliferation of EMF devices has been accompanied by increased concern about ensuring the safety of their use. Thus, accurate dosimetry represents an essential element of the research in determining the biological effects of

electromagnetic fields. The seminar is covering the state of the science in the numerical and experimental dosimetry, exposure assessment and problems in assessment of the corresponding uncertainty. It is extremely important to assess the uncertainty of the results due to the compliance requirements of the Directive of the European Parliament and of the Council 2004/40/EC. The aim of the EMF seminar is a proactive discussion of upcoming issues of human exposure assessment to reassure high-quality of the assessment and reliable results, which can further on contribute to the needed human health protecting strategies. The seminar is organized in following areas: numerical and experimental methods oriented to deal with uncertainty, exposure assessment in environment and workplaces, standardization, legislation and accreditation.
DTIC
Assessments; Croatia; Dosimeters; Electromagnetic Fields; Risk

20060056198 Lawrence Livermore National Lab., Livermore, CA USA
Low-Frequency Electromagnetic Backscatter from Buries Tunnels
Casey, K.; Pao, H. Y.; Jun. 22, 2006; 26 pp.; In English
Report No.(s): DE2006-891712; UCRL-TR-222335; No Copyright; Avail.: National Technical Information Service (NTIS)
This progress report is submitted under a contract between the Special Project Office of DARPA and Lawrence Livermore National Laboratory. The Project Manager at DARPA is Dr. Michael Zatman. Our purpose under this contract is to investigate interactions between electromagnetic waves and a class of buried targets located in multilayered media with rough interfaces.
NTIS
Backscattering; Electromagnetic Scattering; Low Frequencies

20060056200 Lawrence Livermore National Lab., Livermore, CA USA
X-Ray Digital Radiography and Computed Tomography of ICF and HEDP Materials, Subassemblies and Targets
Brown, W. D.; Martz, H. E.; Jun. 01, 2006; 8 pp.; In English
Report No.(s): DE2006-891716; UCRL-PROC-221772; No Copyright; Avail.: Department of Energy Information Bridge
Inertial confinement fusion (ICF) and high energy density physics (HEDP) research are being conducted at large laser facilities, such as the University of Rochester's Laboratory for Laser Energetics OMEGA facility and the Lawrence Livermore National Laboratory's (LLNL) National Ignition Facility (NIF). At such facilities, millimeter-sized targets with micrometer structures are studied in a variety of hydrodynamic, radiation transport, equation-of-state, inertial confinement fusion and high-energy density experiments. The extreme temperatures and pressures achieved in these experiments make the results susceptible to imperfections in the fabricated targets. Targets include materials varying widely in composition, density, geometry (planar to spherical) and embedded structures (joints to subassemblies). Fabricating these targets with structures to the tolerances required is a challenging engineering problem the ICF3 and HEDP4 community are currently undertaking.
NTIS
Inertial Confinement Fusion; Radiography; Subassemblies; Targets; Tomography; X Rays

20060056204 Lawrence Livermore National Lab., Livermore, CA USA, Sandia National Labs., Albuquerque, NM USA
Use of Antineutrino Detectors for Nuclear Reactor Safeguards Effectiveness Assessment
Bernsterin, A.; Lambert, H. E.; Elayat, H. A.; O'Connell, W. J.; Rexroth, P.; Jun. 15, 2006; 11 pp.; In English
Report No.(s): DE2006-891722; UCRL-CONF-222067; No Copyright; Avail.: Department of Energy Information Bridge
As described in an earlier article, important information regarding reactor power and the amount and type of fissile material in reactor cores can be determined by measuring the antineutrino rate and energy spectrum, using a cubic meter scale antineutrino detector at tens of meters standoff from the core. Current International Atomic Energy Agency (IAEA) safeguards techniques do not provide such real-time quantitative information regarding core power levels and isotopic composition. The possible benefits of this approach are several and have been discussed in the earlier article. One key advantage is that the method gives the inspecting agency completely independent access to real-time information on the operational status and fissile content of the core. Furthermore, the unattended and non-intrusive nature of the technology may reduce the monitoring burden on the plant operator, even though more information is being provided than is available within the current IAEA safeguards regime.
NTIS
Antineutrinos; Neutrinos; Nuclear Reactors

20060056205 Lawrence Livermore National Lab., Livermore, CA USA
Comparison of Techniques to Reduce Bremsstrahlung Background Radiation from Monoenergetic Photon Beams
Johnson, M. S.; McNabb, D. P.; Jun. 30, 2006; 5 pp.; In English
Report No.(s): DE2006-891720; UCRL-TR-222530; No Copyright; Avail.: Department of Energy Information Bridge

An important applied technology is a tunable mono-energetic photon source. These sources are made of relativstic electron accelerators coupled to low-energy lasers, which produce high-energy, mono-energetic x-rays. One challenge associated with systems such as this is a continuum of bremsstrahlung background created when an electron beam passes through an aperture of some sort and the electron bunch or its halo impinges on the aperture pictured in this document. For instance, in the current T-REX design for the interaction point between the laser- and electron-beam, the electron-beam passes through the center of a mirror used to reflect the laser. There is a potential with this design that bremsstrahlung radiation may be produced at the edges of the mirror openings and contaminate the mono-energetic photon beam. Certain applications may be sensitive to this contamination.
NTIS
Background Radiation; Bremsstrahlung; Photon Beams; Photons

20060056210 Lawrence Livermore National Lab., Livermore, CA USA
X-Ray Digital Radiography and Computed Tomography of High Energy Density Physics (HEDP) Material, Subassemblies and Targets
Brown, W. D.; Martz, H. E.; Jul. 19, 2006; 36 pp.; In English
Report No.(s): DE2006-891725; UCRL-PROC-222949; No Copyright; Avail.: National Technical Information Service (NTIS)
The presentation outline lists: (1) LLNL DR/CT mesoscale system; (2) X-ray DR system performance: MTF and SNR; (3) Mesoscale phase effects; (4) Programmatic applications: Low-Temperature Rayleigh-Taylor Targets and Double-Shell Target; and (5) Summary.
NTIS
Inertial Confinement Fusion; Radiography; Subassemblies; Targets; Tomography; X Rays

20060056303 Brookhaven National Lab., Upton, NY, USA
Can We Discover the QCD Critical Point at RHIC
Ludlam, T.; Ritter, H.; Stephans, G.; Gazdzicki, M.; Friman, B.; January 2006; 190 pp.; In English
Report No.(s): DE2006-878909; BNL-75692; No Copyright; Avail.: Department of Energy Information Bridge
In this dcoument the matter produced in top-energy RHIC experiments, as it cools, undergoes a rapid cross-over from quark gluon plasma to a hadron gas, but does not undergo a first-order phase transition. Direct evidence for a first-order phase transition, and measurement of the existence and properties of the critical point, would provide an essential quantitative understanding of the phase diagram, and would be a major step forward in the effort to determine the properties of QCD at high temperature and density. This workshop brought leading theorists in the field together with experimentalists from the SPS, the RHIC program, and the planned FAIR facility, along with RHIC accelerator scientists, to examine the current understanding from data and theory, and to see if an experimental search should be carried out with the RHIC colliding beams and the PHENIX and STAR detectors.
NTIS
Critical Point; Quantum Chromodynamics

20060056305 Princeton Univ., NJ, USA
Configurational Forces in Solid Nanostructures
Jun. 2003; 12 pp.; In English
Report No.(s): DE2006-883314; No Copyright; Avail.: National Technical Information Service (NTIS)
No abstract available
Nanostructures (Devices); Configurations

20060056341 Stanford Linear Accelerator Center, Stanford, CA, USA, Academia Sinica, Beijing, China, Bergen Univ., Norway, Lawrence Livermore National Lab., Livermore, CA USA
Study of Inclusive B- and overbar B (sup o) Decays to Flavor-Tagged D, D(sub s) and lambda (sup +)(sub c)
Abuert, B.; Barate, R.; Bona, M.; Boutigny, D.; Couderc, F.; January 2006; 20 pp.; In English
Report No.(s): DE2006-883704; SLAC-PUB-11898; No Copyright; Avail.: National Technical Information Service (NTIS)
No abstract available
Particle Decay; Flavor (Particle Physics)

20060056342 Stanford Linear Accelerator Center, Stanford, CA, USA

Marx Modulator Development Program for the International Linear Collider

Leyh, G. E.; January 2006; 8 pp.; In English

Report No.(s): DE2006-883705; SLAC-PUB-11868; No Copyright; Avail.: National Technical Information Service (NTIS)

The ILC Marx Modulator Development Program at SLAC is working towards developing a full-scale ILC Marx 'Reference Design' modulator prototype, with the goal of significantly reducing the size and cost of the ILC modulator while improving overall modulator efficiency and availability. The ILC Reference Design prototype will provide a proof-of-concept model to industry in advance of Phase II SBIR funding, and also allow operation of the new 10MW L-Band Klystron prototypes immediately upon their arrival at SLAC.

NTIS

Klystrons; Modulators

20060056345 Illinois Inst. of Tech., Chicago, IL, USA, Thomas Jefferson National Accelerator Facility, Newport News, VA, USA

Simulations of MANX, A Practical Six Dimensional Muon Beam Cooling Experiment

Yonehara, K.; Beard, K.; Bogacz, A.; Derbenev, Y.; Johnson, R. P.; January 2006; 10 pp.; In English

Report No.(s): DE2006-883724; No Copyright; Avail.: National Technical Information Service (NTIS)

A helical cooling channel (HCC) has been proposed to quickly reduce the six-dimensional phase space of muon beams for muon colliders, neutrino factories, and intense muon sources. Simulation studies of the HCC have already verified the use of a channel with solenoidal, and helical magnetic fields of constant amplitude where, by moving to a rotating frame, a z or time-independent Hamiltonian can be obtained for detailed analytic treatment. In the discussion below, the HCC concept has been extended to have momentum-dependent magnetic field strengths for a six-dimensional Muon collider and Neutrino factory muon beam cooling demonstration experiment (MANX). The simulation studies reported here for this experiment have shown that liquid helium can be used as an energy absorber and coolant for superconducting magnetic coils and that the HCC parameters can be varied to reduce the maximum required field magnitudes. These developments make the experiment more practical in that safety requirements are relaxed and the required fields can be achieved with existing technology.

NTIS

Cooling; Muons; Simulation

20060056352 Choate, Hall and Stewart, Boston, MA, USA

Fullerenic Structures and Such Structures Tethered to Carbon Materials

Goel, A.; Howard, J. B.; Vande Sande, J. B.; 30 Sep 03; 16 pp.; In English

Patent Info.: Filed Filed 30 Sep 03; US-Patent-Appl-SN-10-675-140

Report No.(s): PB2007-100833; No Copyright; Avail.: CASI: A03, Hardcopy

The fullerenic structures include fullerenes having molecular weights less than that of C(Sub 60) with the exception of C(sub 36) and fullerenes having molecular weights greater than C(sub 60). Examples include fullerenes C(sub 50), C(sub 58), C(sub 130), and C(sub 176). Fullerenic structure chemically bonded to a carbon surface is also disclosed along with a method for tethering fullerenes to a carbon material. The method includes adding functionalized fullerene to a liquid suspension containing carbon material drying the suspension to product a powder, and heat treating the powder.

NTIS

Carbon; Patent Applications; Tethering

20060056374 Brookhaven National Lab., Upton, NY USA

Measurements and Modeling of Eddy Current Effects in BNL's AGS Booster

Brown, K. A.; Ahrens, L.; Gardner, C.; Glenn, J. W.; Harvey, M.; January 2006; 10 pp.; In English

Report No.(s): DE2006-884997; BNL-75491-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

Recent beam experiments at BNL's AGS Booster have enabled us to study in more detail the effects of eddy currents on the lattice structure and our control over the betatron tune. The Booster is capable of operating at ramp rates as high as 9 T/sec. At these ramp rates eddy currents in the vacuum chambers significantly alter the fields and gradients seen by the beam as it is accelerated. The Booster was designed with these effects in mind and to help control the field uniformity and linearity in the Booster Dipoles special vacuum chambers were designed with current windings to negate the'affect of the induced eddy currents. In this report results from betatron tune measurements and eddy current simulations will be presented. We will then

present results from modeling the accelerator using the results of the magnetic field simulations and compare these to the measurements.
NTIS
Betatrons; Eddy Currents

20060056454 Lawrence Livermore National Lab., Livermore, CA USA
Science and Technology Review. Tomorrow's Scientists and Engineers, June 2006
Jun. 2006; 36 pp.; In English
Report No.(s): DE2006-885150; No Copyright; Avail.: National Technical Information Service (NTIS)
This month's issue has the following articles: (1) Maintaining Excellence through Intellectual Vitality--Commentary by Cherry A. Murray; (2) Next-Generation Scientists and Engineers Tap Lab's Resources--University of California Ph.D. candidates work with Livermore scientists and engineers to conduct fundamental research as part of their theses; (3) Adaptive Optics Provide a Clearer View--The Center for Adaptive Optics is sharpening the view of celestial objects and retinal cells; (4) Wired on the Nanoscale--A Lawrence Fellow at Livermore is using genetically engineered viruses to create nanostructures such as tiny gold wires; and (5) Too Hot to Handle--Livermore scientists couple carbon-cycle and climate models to predict the global effects of depleting Earth's fossil-fuel supply.
NTIS
Engineers; Research and Development; Scientists; Technologies

20060056464 Norfolk State Univ., VA, USA
Measurement of the Ratio GEP/GMP to Large Q(sub 2), Interesting Results form Jefferson Lab
Punjabi, V.; Jun. 2006; 14 pp.; In English
Report No.(s): DE2006-885176; No Copyright; Avail.: National Technical Information Service (NTIS)
In two experiments at Jefferson Lab the ratio of the electromagnetic form factors of the proton, GEp=GMp, was obtained in the four-momentum transfer squared range of 0.5 to 5.6 GeV2 with a polarization transfer technique, by measuring Pt and Pl, the transverse and longitudinal recoil proton polarization in ep --\g e'p reaction. In one-photon approximation GEp=GMp is proportional to Pt=Pl; the great strength of this method is the tight control of systematics it affords. The ratio mu GEp=GMp was found to decrease linearly with Q2, down to 0.29 at Q2=5.6 GeV2; revealing a definite difference between the spatial distributions of charge and magnetization at short distances. The combined results of the two JLab experiments were surprising as they appeared to contradict the consensus based on Rosenbluth separation results for (GEp)2 and (GMp)2: the ratio mu pGEp=GMp obtained with the Rosenbluth method is (approx)1 up to 5 GeV2. This unbridgeable difference between cross section and polarization experiments has been reinforced with two recent JLab Rosenbluth experiments; it appears increasingly difficult to explain it away by methodological or systematic errors. We are currently preparing a third experiment at JLab, this time in Hall C, to extend the Q2-range to 9 GeV2.
NTIS
Protons; Electromagnetism

20060056479 Stanford Linear Accelerator Center, CA, USA
Cavity BPM with Dipole-Mode-Selective Coupler
Li, Z.; Johnson, R.; Smith, S. R.; Naito, T.; Rifkin, J.; Jun. 2006; 8 pp.; In English
Report No.(s): DE2006-884883; SLAC-PUB-11913; No Copyright; Avail.: National Technical Information Service (NTIS)
In this paper, we present a novel position sensitive signal pickup scheme for a cavity BPM. The scheme utilizes the H-plane of the waveguide to couple magnetically to the side of the cavity, which results in a selective coupling to the dipole mode and a total rejection of the monopole mode. This scheme greatly simplifies the BPM geometry and relaxes machining tolerances. We will present detailed numerical studies on such a cavity BPM, analyze its resolution limit and tolerance requirements for a nanometer resolution. Finally present the measurement results of a X-band prototype.
NTIS
Cavities; Couplers; Dipoles

20060056482 Stanford Linear Accelerator Center, CA, USA, Queen Mary and Westfield Coll., London, UK, Quebec Univ., Montreal, Quebec, Canada
Combined Phase Space Characterization at the PEP-II IP Using Single-Beam and Luminous-Region Measurements
Bevan, A.; Kozanecki, W.; Viaud, B.; Jun. 2006; 8 pp.; In English
Report No.(s): DE2006-884879; SLAC-PUB-11904; No Copyright; Avail.: National Technical Information Service (NTIS)

We present a novel method to characterize the e(sup (+-)) phase space at the IP of the SLAC B-factory, that combines single-beam measurements with a detailed mapping of luminous-region observables. Transverse spot sizes are determined in the two rings with synchrotron-light monitors and extrapolated to the IP using measured lattice functions. The specific luminosity, which is proportional to the inverse product of the overlap IP beam sizes, is continuously monitored using radiative/Bhabha events. The spatial variation of the luminosity and of the transverse-boost distribution of the colliding e(sup (+-)), are measured using e(sup +)e(sup -) (yields) (mu)(sup +)(mu)(sup -) events reconstructed in the BABAR detector. The combination of these measurements provide constraints on the emittances, horizontal and vertical spot sizes, angular divergences and (beta) functions of both beams at the IP during physics data-taking. Preliminary results of this combined spot-size analysis are confronted with independent measurements of IP (beta)-functions and overlap IP beam sizes at low beam current.
NTIS
Beam Currents; Characterization; Luminosity

71
ACOUSTICS

Includes sound generation, transmission, and attenuation. For noise pollution see *45 Environment Pollution*. For aircraft noise see also *02 Aerodynamics* and *07 Aircraft Propulsion and Power*.

20060054282 NASA Langley Research Center, Hampton, VA, USA, Innovative Materials Testing Technologies, Inc., Ames, IA, USA
A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards
Sun, Yushi; Sun, Changhong; Zhu, Harry; Wincheski, Buzz; [2006]; 8 pp.; In English; 33rd Annual Review of Progress in Quantitative Nondestructive Evaluation, 30 Jul. - 4 Aug. 2006, Portland, OR, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 376-70-30-05; Copyright; Avail.: CASI: A02, Hardcopy
Stress corrosion cracking in the relief radius area of a space shuttle primary reaction control thruster is an issue of concern. The current approach for monitoring of potential crack growth is nondestructive inspection (NDI) of remaining thickness (RT) to the acoustic cavities using an eddy current or remote field eddy current probe. EDM manufacturers have difficulty in providing accurate RT calibration standards. Significant error in the RT values of NDI calibration standards could lead to a mistaken judgment of cracking condition of a thruster under inspection. A tool based on eddy current principle has been developed to measure the RT at each acoustic cavity of a calibration standard in order to validate that the standard meets the sample design criteria.
Author
Space Shuttles; Stress Corrosion Cracking; Thrustors; Reaction Control; Acoustics; Notches; Thickness; Cavities; Nondestructive Tests

20060055431 Army Test and Evaluation Command, Aberdeen Proving Ground, MD USA
Shallow Water UXO Technology Demonstration Site, Scoring Record Number 2
Rowe, Gary W; Burch, William; McClung, Christina; Sep 2006; 49 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-8-CO-160-UXO-016
Report No.(s): AD-A457065; ATC-9270; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457065; Avail.: CASI: A03, Hardcopy
This report documents the efforts of Tetra Tech EC, Inc., to detect and discriminate inert unexploded ordnance (UXO) using a Dual Acoustic and Magnetometer Array. Testing was conducted at ATC, Standardized Shallow Water UXO Technology Demonstration Site. A description of the tested system and an estimate of survey costs along with the analysis of the system performance are provided.
DTIC
Ammunition; Ordnance; Scoring; Shallow Water

20060055585 Naval Postgraduate School, Monterey, CA USA

Time-Frequency, Bi-Frequency Detection Analysis of Noise Technology Radar

Heuschel, Eugene R; Sep 2006; 124 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457203; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Enemy integrated air defense systems (IADS) using low probability of intercept (LPI) emitters can cause significant problems for suppression of enemy air defense (SEAD) techniques. New threat emitter configurations using low-power random noise modulation have a significant processing gain unavailable to non-cooperative intercept receivers. Consequently, the detection of these emitters can not be accomplished with conventional intercept receiver detection methods. This thesis examines the use of time-frequency, bi-frequency signal detection techniques to identify the parameters of the four types of continuous waveform noise radar recently reported. These include: (a) random noise, (b) noise plus frequency modulation continuous wave (FMCW), (c) noise FMCW plus sine and (d) random binary phase modulation. Quadrature mirror filtering for wavelet decomposition is used to investigate the four types of noise signals in order to extract the signal parameters. The FFT accumulation method for estimating the spectral correlation density function is also used to examine the cyclostationary bi-frequency properties of the waveforms. In addition, the periodic autocorrelation function and periodic ambiguity function are studied to determine the waveform properties in the delay- Doppler offset domain. Results show that non-cooperative intercept receivers can increase their processing gain using these types of signal processing techniques providing a more efficient response time to the threat.

DTIC

Continuous Wave Radar; Detection; Frequencies; Frequency Measurement; Sound Detecting and Ranging

20060055629 Naval Research Lab., Washington, DC USA

Report on Laminations in Plates - An Acoustical Method for Determination of

Apr 7, 1936; 20 pp.; In English

Report No.(s): AD-A457275; NRL-M-1260; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The following report describes an acoustical method for detecting and locating lamination in steel plates. It is based on the fact that the stiffness of a plate is decreased over a laminated area and the resulting fact that the velocity of flectural waver is decreased across such areas. The pressure of such defective areas is disclosed through sand patterns forced on the surface of the plate when it is vibrated at some resonant frequency. In practice the vibrating forces are applied in a manner that will make the sand patterns on a perfect plate consist of straight parallel lines. Laminated areas are disclosed through distortion of the sand pattern from this simple form.

DTIC

Laminates; Metal Plates; Sound Detecting and Ranging

20060055670 Naval Postgraduate School, Monterey, CA USA

Implementation of a Distributed Time Based Simulation of Underwater Acoustic Networking Using Java

Long, Brian S; Sep 2006; 115 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457361; No Copyright; Avail.: CASI: A06, Hardcopy

Underwater Acoustic Networks (UAN) have two immutable obstacles to overcome; the hostile environment in which it must operate; and the combination of the propagation speed of sound in water, and the latency in communication that this produces, and the dynamic nature of the water column with respect to its attenuation of the sound signal. These combined issues make it very costly and time consuming to setup a UAN just to test new protocols that may or may not be able to mitigate the limitations of this environment. There exists, then, a need for an ability to test a new protocol without the overhead of creating a physical UAN. The goal of this thesis is to provide a more hospitable, adaptable, flexible, and easily useable tool with which to test new protocols for UANs, as well as providing the ability for the Physics field to test new physical layer encodings. This simulation environment will provide the glue, or bridge, between the two disciplines by working as a common tool for both.

DTIC

Acoustics; Communication Networks; Simulation; Underwater Acoustics

20060055799 Space and Naval Warfare Systems Center, San Diego, CA USA

Discrimination of Complex Synthetic Echoes by an Echolocating Bottlenose Dolphin

Helweg, David A; Moore, Patrick W; Brill, Randall L; Dankiewicz, Lois A; Zafran, Justine M; Feb 2003; 8 pp.; In English

Report No.(s): AD-A457587; No Copyright; Avail.: CASI: A02, Hardcopy

Bottlenose dolphins (Tursiops truncatus) detect and discriminate underwater objects by interrogating the environment with their native echolocation capabilities. Study of dolphins' ability to detect complex (multihighlight) signals in noise suggest echolocation object detection using an approximate 265-microseconds energy integration time window sensitive to the echo region of highest energy or containing the highlight with highest energy. Backscatter from many real objects contains multiple highlights, distributed over multiple integration windows and with varying amplitude relationships. This study used synthetic echoes with complex highlight structures to test whether high-amplitude initial highlights would interfere with discrimination of low-amplitude trailing highlights. A dolphin was trained to discriminate two-highlight synthetic echoes using differences in the center frequencies of the second highlights. The energy ratio (DELTA dB) and the timing relationship (DELTA TAU) between the first and second highlights were manipulated. An iso-sensitivity function was derived using a factorial design testing DELTA dB at - 10, - 15-20, and -25 dB and AT at 10, 20,40, and 80 microseconds. The results suggest that the animal processed multiple echo highlights as separable analyzable features in the discrimination task, perhaps perceived through differences in spectral rippling across the duration of the echoes.
DTIC
Backscattering; Discriminant Analysis (Statistics); Dolphins; Echoes; Rangefinding; Sound Waves

72
ATOMIC AND MOLECULAR PHYSICS

Includes atomic and molecular structure, electron properties, and atomic and molecular spectra. For elementary particle physics see *73 Nuclear Physics*.

20060055832 Boston Coll., Chestnut Hill, MA USA
Spectral Irradiance Calibration in the Infrared. XVI. Improved Accuracy in the Infrared Spectra of the Secondary and Tertiary Standard Calibration Stars
Engelke, Charles W; Price, Stephan D; Kraemer, Kathleen E; Oct 2006; 20 pp.; In English
Contract(s)/Grant(s): F19628-03-C-0007; Proj-1010
Report No.(s): AD-A457647; No Copyright; Avail.: CASI: A03, Hardcopy

We have increased the spectral resolution and accuracy of the absolute infrared spectral flux for a subset of stellar standards created by Cohen and his collaborators in previous papers in this series. We combined the moderate-resolution spectroscopy obtained on infrared standard stars by the Short Wavelength Spectrometer on the Infrared Space Observatory with high-quality photometry that is tied to our recent absolute calibration from the Midcourse Space Experiment. New spectra were created for 33 stars, 9 of which are Cohen et al. secondary standards and another 20 of which are tertiary standards for which Cohen adopted spectral templates. The effective temperatures and angular diameters for the stars are derived from the absolute spectra and compare favorably with independent measures of these quantities in the literature. The present spectra display systematic differences with those of Cohen and colleagues in that they have 4%-7% lower fluxes in the 1-4 micrometer spectral region. Our spectra remove the A-K star calibration bias recently noted in the calibration of the Spitzer Space Telescope camera.
DTIC
Calibrating; Emittance; Infrared Radiation; Infrared Spectra; Light (Visible Radiation); Radiance; Spectra; Spectral Emission

73
NUCLEAR PHYSICS

Includes nuclear particles; and reactor theory. For space radiation see *93 Space Radiation*. For atomic and molecular physics see *72 Atomic and Molecular Physics*. For elementary particle physics see *77 Physics of Elementary Particles and Fields*. For nuclear astrophysics see *90 Astrophysics*.

20060054260 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Compact Neutron Generators for Medical, Home Land Security and Planetary Exploration
Reijonen, J.; January 2006; 10 pp.; In English
Report No.(s): DE2006-881393; No Copyright; Avail.: Department of Energy Information Bridge

The Plasma and Ion Source Technology Group at Lawrence Berkeley National Laboratory has developed various types of advanced D-D (neutron energy 2.5 MeV), D-T (14 MeV) and T-T (0-9 MeV) neutron generators for wide range of applications. These applications include medical (Boron Neutron Capture Therapy), homeland security (Prompt Gamma

Activation Analysis, Fast Neutron Activation Analysis and Pulsed Fast Neutron Transmission Spectroscopy) and planetary exploration with a sub-surface material characterization on Mars. These neutron generators utilize RF induction discharge to ionize the deuterium/tritium gas. This discharge method provides high plasma density for high output current, high atomic species from molecular gases, long life operation and versatility for various discharge chamber geometries.
NTIS
Neutrons; Security; Space Exploration

20060054265 Bettis Atomic Power Lab., West Mifflin, PA, USA, Knolls Atomic Power Lab., Schenectady, NY, USA
Space Reflector Materials for a Prometheus Application
Jan. 31, 2006; 150 pp.; In English
Report No.(s): DE2006-883662; No Copyright; Avail.: National Technical Information Service (NTIS)

The two materials studied in depth which appear to have the most promise in a Prometheus reflector application are beryllium (Be) and beryllium oxide (BeO). Three additional materials, magnesium oxide (MgO), alumina (Al(sub 2)O(sub 3)), and magnesium aluminate spinel (MgAl(sub 2)O(sub 4)) were also recently identified to be of potential interest, and may have promise in a Prometheus application as well, but are expected to be somewhat higher mass than either a Be or BeO based reflector.
NTIS
High Flux Isotope Reactors; Prometheus; Reflectors; Spacecraft Construction Materials

20060054266 Knolls Atomic Power Lab., Schenectady, NY, USA
Documentation of Naval Reactors Papers and Presentations for the Space Technology and Applications International Forum (STAIF) 2006
Apr. 10, 2006; 560 pp.; In English
Report No.(s): DE2006-883626; SPP-SEC-0039; No Copyright; Avail.: National Technical Information Service (NTIS)

This letter provides internal documentation of the papers and presentations prepared by KAPL and Bettis for the 2006 STAIF conference that summarize our work on the Prometheus Project space reactor development. The intent of the papers and presentations is to provide future space reactor developers an overview of the Naval Reactors program work on Project Prometheus and direct them to the more complete documentation that will be stored in the Office of Scientific and Technology Information (OSTI) Databases.
NTIS
Aerospace Engineering; Propulsion; Technology Utilization

20060054268 Bettis Atomic Power Lab., West Mifflin, PA, USA, Knolls Atomic Power Lab., Schenectady, NY, USA
JOYO-1 Irradiation Test Campaign Technical Close-out
Jan. 31, 2006; 750 pp.; In English
Report No.(s): DE2006-883661; No Copyright; Avail.: National Technical Information Service (NTIS)

The JOYO-1 irradiation testing was designed to screen the irradiation performance of candidate cladding, structural and reflector materials in support of space reactor development. The JOYO-1 designation refers to the first of four planned irradiation tests in the JOYO reactor. Limited irradiated material performance data for the candidate materials exists for the expected Prometheus-1 duration, fluences and temperatures. Materials of interest include fuel element cladding and core materials (refractory metal alloys and silicon carbide (Sic)), vessel and plant structural materials (refractory metal alloys and nickel-base superalloys), and control and reflector materials (BeO). Key issues to be evaluated were long term microstructure and material property stability. The JOYO-1 test campaign was initiated to irradiate a matrix of specimens at prototypical temperatures and fluences anticipated for the Prometheus-1 reactor (Reference (1)). Enclosures 1 through 9 describe the specimen and temperature monitors/dosimetry fabrication efforts, capsule design, disposition of structural material irradiation rigs, and plans for post-irradiation examination. These enclosures provide a detailed overview of Naval Reactors Prime Contractor Team (NRPCT) progress in specific areas; however, efforts were in various states of completion at the termination of NRPCT involvement with and restructuring of Project Prometheus.
NTIS
Irradiation; Fabrication; Heat Resistant Alloys

20060054272 Bettis Atomic Power Lab., West Mifflin, PA, USA, Knolls Atomic Power Lab., Schenectady, NY, USA
Multiple Irradiation Capsule Experiment (MICE)-3B Irradiation Test of Space Fuel Specimens in the Advanced Test Reactor(ATR) -Closeout Documentation for Naval Reactors(NR) Information
Jan. 09, 2006; 184 pp.; In English
Report No.(s): DE2006-883628; B-MT(EDT)S-028; No Copyright; Avail.: National Technical Information Service (NTIS)

The purpose of this test was to provide the first UO(sub 2) fuel performance data at space reactor operating conditions. The schedule of this test included beginning of irradiation in March 2006 with post irradiation data becoming available beginning mid 2008. This test is now canceled upon the termination of the Naval Reactors program effort to deliver a space reactor for Project Prometheus.
NTIS
Irradiation; Propulsion

20060055720 ITT Industries, Inc., Alexandria, VA USA
Experiments on the Biological Action of Neutrons Performed in the Former Soviet Union: A Historical Review
Grachev, S A; Sverdlov, A G; Oct 2006; 86 pp.; In English
Contract(s)/Grant(s): DTRA01-03-D-0022; Proj-BD
Report No.(s): AD-A457452; No Copyright; Avail.: CASI: A05, Hardcopy

Data on the research of neutron biological effects in the USSR, the organization of this research, and the main results are presented in this review. Particular attention is paid to data that are important for analysis of the underlying mechanisms of the biological effect of neutrons and their dissimilarity from mechanisms of photon effect. Particular emphasis has been placed on elaboration of new methods of recognition and prediction of neutron damage to an organism. Efficacy of chemical protection of an organism against neutron effect is established. These results supplemented essential knowledge on neutron effects by original data that are important for the theory and practice of neutron radiobiology and medicine.
DTIC
Histories; Neutrons; Photons

20060056214 Lawrence Livermore National Lab., Livermore, CA USA
Criticality Safety Evaluation of a LLNL Training Assembly for Criticality Safety (TACS)
Heinrichs, D. P.; Apr. 27, 2006; 33 pp.; In English
Report No.(s): DE2006-891735; UCRL-TR-223207; No Copyright; Avail.: National Technical Information Service (NTIS)

Hands-on experimental training in the physical behavior of multiplying systems is one of ten key areas of training required for practitioners to become qualified in the discipline of criticality safety as identified in DOE-STD-1135-99, Guidance for Nuclear Criticality Safety Engineer Training and Qualification. This document is a criticality safety evaluation of the training activities (or operations) associated with HS-3200, Laboratory Class for Criticality Safety. These activities utilize the Training Assembly for Criticality Safety (TACS).
NTIS
Safety; Training Evaluation

20060056223 Bettis Atomic Power Lab., West Mifflin, PA, USA
Materials for the Control Drive Mechanisms
Dec. 14, 2005; 38 pp.; In English
Report No.(s): DE2006-883696; No Copyright; Avail.: Department of Energy Information Bridge

This report addresses materials that were identified, tested and used for the Control Drive Mechanisms (CDM) for the SNAP and SP-100 space nuclear power programs. Included in the repoirt is a description of the proposed CDM for the Prometheus Project and the Status of the materials, as identified in the previous two space nuclear power programs. The materials for the CDM's for an extended lifetime, in an adverse environment without the benefit of periodic maintenance.
NTIS
Controllers; Mechanical Drives; Reactor Materials; Space Power Reactors

20060056330 Knolls Atomic Power Lab., Schenectady, NY, USA
Evaluation of Lithium Hydride for Use in a Space Nuclear Reactor Shield, Including a Historical Perspective, for NR Information
Dec. 09, 2005; 150 pp.; In English
Report No.(s): DE2006-883692; No Copyright; Avail.: National Technical Information Service (NTIS)

This letter provides a summary of the Naval Reactors Prime Contractor Team (NRPCT) evaluation of lithium hydride (LiH) as a space reactor shield material. LiH was one of the five primary shield materials the NRPCT intended to develop (along with beryllium, boron carbide, tungsten, and water) for potential Prometheus application. It was also anticipated that (sup 10)B metal would be investigated for feasibility at a low level of effort. LiH historically has been selected as a low mass, neutron absorption material for space shields (Systems for Nuclear Auxiliary Power (SNAP), Topaz, SP-100). Initial NRPCT investigations did not produce convincing evidence that LiH was desirable or feasible for a Prometheus mission due to material property issues (primarily swelling and hydrogen cover gas containment), and related thermal design complexity. Furthermore, if mass limits allowed, an option to avoid use of LiH was being contemplated to lower development costs and associated risks. However, LiH remains theoretically the most efficient neutron shield material per unit mass, and, with sufficient testing and development, could be an optimal material choice for future flights.
NTIS
Histories; Lithium Hydrides; Nuclear Reactors; Shielding; Space Power Reactors

20060056340 Bettis Atomic Power Lab., West Mifflin, PA, USA
Alternator Electrical Feedthrough Insulator Materials for Project Prometheus(B-MT(AMSI)-44)
D'Antonio, J. P.; Datesman, A. M.; Jan. 04, 2006; 160 pp.; In English
Report No.(s): DE2006-883697; No Copyright; Avail.: National Technical Information Service (NTIS)
This report explores the insulator materials options available and provides recommendations for future actions that could have been implemented had the space program continued in Naval Reactors (NR). Based on the initial evaluation of vendor capabilities, hermetic electrical feedthrough technology should currently be available to meet the requirements of a Prometheus mission. A limited development effort may be required in refine the feedthrough materials and design. Exhaustive testing would be essential to verify component integrity throughout the fifteen year maintenance-free lifetime.
NTIS
AC Generators; Insulators; Space Power Reactors

20060056354 Knolls Atomic Power Lab., Schenectady, NY, USA
Reflector and Shield Material Properties for Project Prometheus
Nov. 02, 2005; 80 pp.; In English
Report No.(s): DE2006-883658; No Copyright; Avail.: Department of Energy Information Bridge
This letter provides updated reflector and shield preliminary material property information to support reactor design efforts. The information provided herein supersedes the applicable portions of Revision 1 to the Space Power Program Preliminary Reactor Design Basis (Reference (a)). This letter partially answers the request in Reference (b) to provide unirradiated and irradiated material properties for beryllium, beryllium oxide, isotopically enriched boron carbide ((sup 11)B(sub 4)C) and lithium hydride. With the exception of (sup 11)B(sub 4)C, the information is provided in Attachments 1 and 2.
NTIS
Beryllium; Beryllium Oxides; Prometheus; Reflectors; Space Power Reactors

20060056447 Brookhaven National Lab., Upton, NY USA
Symplectic Interpolation
MacKay, W. W.; Luccio, A. U.; Jun. 2006; 10 pp.; In English
Report No.(s): DE2006-884999; BNL-75463-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge
It is important to have symplectic maps for the various electromagnetic elements in an accelerator ring. For some tracking problems we must consider elements which evolve during a ramp. Rather than performing a computationally intensive numerical integration for every turn, it should be possible to integrate the trajectory for a few sets of parameters, and then interpolate the transport map as a function of one or more parameters, such as energy. We present two methods for interpolation of symplectic matrices as a function of parameters: one method is based on the calculation of a representation in terms of a basis of group generators and the other is based on the related but simpler symplectification method of Healy. Both algorithms guarantee a symplectic result.
NTIS
Interpolation; Mathematical Models; Particle Trajectories

74
OPTICS

Includes light phenomena and the theory of optical devices; for specific optical devices see also *35 Instrumentation and Photography*. For lasers see *36 Lasers and Masers*.

20060054155 Nippon Telegraph and Telephone Public Corp., Atsugi, Japan

'GMPLS Signaling Protocol Interoperability Test in Multilayer Network': Toward a Global Standard for the Next-Generation Photonic Network

NTT Technical Review, Volume 1, No. 4; July 2003, pp. 71-73; In English; See also 20060054147; Copyright; Avail.: Other Sources

NTT, NEC Corporation, Fujitsu Laboratories Ltd., The Furukawa Electric Co., Ltd., and Mitsubishi Electric Corporation announced the successful conclusion to the world's first Generalized Multi-Protocol Label Switching (GMPLS) signaling interoperability test using a multilayer network consisting of packet, Time Division Multiplexer (TDM) wavelength, and fiber layers. Given the quality requirements set by the application or traffic state, it is possible to select the optimal communication path from among all possible paths that can be established on the multilayer network. The results of this experiment were reported on May 22, 2003 in the Workshop held in Kagoshima University organized by the Technical Group on the Photonic-Network-based Internet and the Technical Group of Photonic Switching in the Institute of Electronics, Information and Communication Engineers of Japan.

Derived from text

Internets; Interoperability; Protocol (Computers); Optical Data Processing; Photonics

20060054201 Hoffmann and Baron, LLP, Syosset, NY, USA

Method and System for Mass Spectroscopy

Krutchinsky, A.; Cohen, H.; Kalkum, M.; Sherman, V.; Chalt, B.; 28 Sep 04; 15 pp.; In English

Contract(s)/Grant(s): NIH-RR-00862

Patent Info.: Filed Filed 28 Sep 04; US-Patent-Appl-SN-10-952-529

Report No.(s): PB2007-100811; No Copyright; Avail.: CASI: A03, Hardcopy

A system for determining the ratio of mass to charge of an ion including a pulsed ionizer, a high pressure co-linear ion guide/accelerator, and a mass analyzer. The pulsed ionizer generates intact analyte ions from a sample of matter to be analyzed. The high pressure co-linear ion guide/accelerator is interfaced with the ion source for receipt of the intact ions of the sample. The ion guide/accelerator simultaneously dampens and linearly accelerates the intact ions in the substantial absence of fragmentation of the ions to provide a substantially continuous beam of the intact ions for mass analysis. The mass analyzer is connected to the ion guide/accelerator for receipt of the beam of ions and determines the mass to charge ratio of the intact ions.

NTIS

Ions; Mass Spectroscopy; Linear Accelerators; Particle Mass

20060054436 NASA Ames Research Center, Moffett Field, CA, USA

New Optical Constants for Amorphous and Crystalline H2O-ice

Mastrapa, Rachel; Bernstein, Max; Sandford, Scott; [2006]; 1 pp.; In English; American Geophysical Union Fall Meeting, 11-15 Dec. 2006, San Francisco, CA, USA; No Copyright; Avail.: Other Sources; Abstract Only

We have used the infrared spectra of laboratory ices to calculate the real and imaginary indices of refraction for amorphous and crystalline H2O-ice. We create H2O-ice samples in vacuum (approx. 10(exp ^-8)Torr). We measure the thickness of the sample by reflecting a He-Ne laser off of the sample and counting interference fringes as it grows and then collect transmission spectra of the samples in the wavelength range 1.25-22 micrometers. Using the ice thickness and transmission spectrum we calculate the imaginary part of the index of refraction. A Kramers-Kronig calculation is then used to calculate the real part of the index of refraction (Berland et al. 1994; Hudgins et al. 1993). These optical constants can be used to create model spectra for comparison to spectra from Solar System objects. We will summarize the differences between the amorphous and crystalline H2O-ice spectra. These include weakening of features and shifting of features to shorter wavelength in amorphous H,O-ice spectra. We will also discuss methods of using band area ratios to quickly estimate the fraction of amorphous to crystalline H2O-ice. We acknowledge financial support from the NASA Origins of the Solar System Program, the NASA Planetary Geology and Geophysics Program, and the NASA Postdoctoral Program.

Author

Amorphous Materials; Crystallinity; Ice; Planetary Geology; Refraction

20060055435 Messina Univ., Italy

Optical Properties of Biological Aerosols

Saija, Rosalba; Denti, Paolo; Borghese, Ferdinando; Jan 2006; 19 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457072; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457072; Avail.: CASI: A03, Hardcopy

The study of the optical properties of biological aerosols, i.e. aerosols composed of biological spores and other organic compounds, presents unique difficulties both on the experimental and on the theoretical side. On the experimental side, we cite, as an example, the fact that all organic materials, both spores and organic compounds present a luminescence spectrum whose most carachteritic features occur in the range of wavelength in which the atmosphere is most absorbing. The presence of organic compounds, on the other hand, may come from combustion of mineral hydrocarbons. Moreover the spores of interest, such as anthrax, are often dangerous and possibly fatal to humans. For this reason special precautions must be taken in manipulating such spores.

DTIC

Aerosols; Optical Properties; Organic Compounds; Spores

20060055546 Army Communications-Electronics Command, Fort Belvoir, VA USA

Camouflaging Vehicles Using Field Expedient Materials, Commercial Hardware Store Materials, Camouflage Nets, and Rubber Conveyer Belt Material

Papa, Joseph W; Fahlsing, George A; Dec 1, 2005; 48 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457135; No Copyright; Avail.: CASI: A03, Hardcopy

No abstract available

Camouflage; Conveyors; Nets; Rubber

20060055620 Naval Research Lab., Washington, DC USA

Physical Optics of Metal Plate Media Part 1, Theoretical Considerations

Lengyel, B A; Sep 19, 1949; 42 pp.; In English

Report No.(s): AD-A457260; NRL-3534; No Copyright; Avail.: CASI: A03, Hardcopy

Reflection and transmission of electromagnetic plane waves at the surface of parallel-plate metal structures are studied both theoretically and experimentally. This report, Part I of the study, is the theoretical presentation; Part II will deal with apparatus and experimental findings. The study is confined to rays with polarization parallel to the edges of the plates and a plane of incidence perpendicular to these edges. The theory of Carlson and Heins is extended and made amenable to numerical predictions. Tables and graphs are provided for the coefficients pertaining to an air -metal-plate medium Interface. A method is developed for the analysis of reflecting and transmitting properties of slabs, or media of finite depth.

DTIC

Electromagnetic Radiation; Metal Plates; Physical Optics

20060055751 Oregon Univ., Eugene, OR USA

Spin-Based Photonics via Electromagnetically Induced Transparency

Wang, Hailin; Furdyna, J; Binder, R; Nov 2006; 4 pp.; In English

Contract(s)/Grant(s): N00014-03-1-0827

Report No.(s): AD-A457516; No Copyright; Avail.: CASI: A01, Hardcopy

Research efforts have focused on the development and implementation of electromagnetically-induced transparency (EIT) from electron spin coherence in a semiconductor quantum well waveguide. Experimental studies have shown an induced transmission resonance arising from the electron spin coherence in the differential transmission spectrum. The induced resonance can be viewed as a signature of EIT from the electron spin coherence. Studies of the polarization and magnetic field dependence further confirm the physical mechanism of the induced resonance. The experimental results are in good agreement with the theoretical calculation. In addition, extensive experimental efforts have also been carried out to understand how electron spin coherence contributes to coherent nonlinear optical processes in semiconductors with the aim of further optimizing the EIT process.

DTIC

Electron Paramagnetic Resonance; Magnetic Induction; Photonics; Transparence

20060056199 Lawrence Livermore National Lab., Livermore, CA USA
CThC7 25 nJ Passively Mode-Locked Fiber Laser at 1080 nm
Messerly, M. J.; Dawson, J. W.; Barty, C. P. J.; An, J.; Kim, D.; May 19, 2006; 17 pp.; In English
Report No.(s): DE2006-891713; UCRL-CONF-221589; No Copyright; Avail.: National Technical Information Service (NTIS)

This document reports a fiber laser that produces 25 nJ, sub-200 fs pulses, an energy 60% higher than previous reports. We attribute the improvement to increased pump power and spectral filtering by the oscillator's waveplates.
NTIS
Fiber Lasers; Fiber Optics; Lasers

20060056218 Lawrence Livermore National Lab., Livermore, CA USA
Titan Laser at LLNL
Stuart, B. C.; Bonlie, J. D.; Britten, J. A.; Caird, J. A.; Cross, R.; May 22, 2006; 23 pp.; In English
Report No.(s): DE2006-891736; UCRL-CONF-221530; No Copyright; Avail.: National Technical Information Service (NTIS)

Titan brings high-energy short-pulse capability to the Jupiter facility. Titan couples a high-energy Petawatt-class laser with a kJ long-pulse drive laser. Titan has utilized both existing and new technologies in its design and construction.
NTIS
Lasers; Titan

20060056296 Lawrence Livermore National Lab., Livermore, CA USA
Relay Telescope, High Power Laser Alignment System, and Laser Peening Method and System Using Same
Dane, C. B.; Hackel, L.; Harris, F.; 28 Jan 04; 20 pp.; In English
Contract(s)/Grant(s): DE-W-7405-ENG-48
Patent Info.: Filed Filed 28 Jan 04; US-Patent-Appl-SN-10-766-224
Report No.(s): PB2007-100824; No Copyright; Avail.: CASI: A03, Hardcopy

A laser system includes an optical path having an intracavity relay telescope with a telescope focal point for imaging an output of the gain medium between an image location at or near the gain medium and an image location at or near an output coupler for the laser system. A kinematic mount is provided within a vacuum chamber, and adapted to secure beam baffles near the telescope focal point. An access port on the vacuum chamber is adapted for allowing insertion and removal of the beam baffles. A first baffle formed using an alignment pinhole aperture is used during alignment of the laser system. A second tapered baffle replaces the alignment aperture during operation and acts as a far-field baffle in which off angle beams strike the baffle a grazing angle of incidence, reducing fluence levels at the impact areas.
NTIS
Alignment; High Power Lasers; Lasers; Patent Applications; Peening; Telescopes

20060056297 Lawrence Livermore National Lab., Livermore, CA USA
Stimulated Brillouin Scattering Mirror System, High Power Laser and Laser Peening Method and System Using Same
Dane, C. B.; Hackel, L.; Harris, F.; 28 Jan 04; 20 pp.; In English
Contract(s)/Grant(s): DE-W-7405-ENG-48
Patent Info.: Filed Filed 28 Jan 04; US-Patent-Appl-SN-10-766-635
Report No.(s): PB2007-100825; No Copyright; Avail.: CASI: A03, Hardcopy

A laser system, such as master oscillator/power amplifier system, comprises a gain medium and a stimulated Brillouin scattering SBS mirror system. The SBS mirror system included an in situ filtered SBS medium that comprises a compound having a small negative non-linear index of refraction, such as a perfluoro compound. An SBS relay telescope having a telescope focal point includes a baffle at the telescope focal point which blocks off angle beams. A beam splitter is placed between the SBS mirror system and the SBS relay telescope, directing a fraction of the beam to an alternate beam path for an alignment fiducial. The SBS mirror system has a collimated SBS cell and a focused SBS cell. An adjustable attenuator is placed between the collimated SBS cell and the focused SBS cell, by which pulse width of the reflected beam can be adjusted.
NTIS
Brillouin Effect; High Power Lasers; Lasers; Mirrors; Patent Applications; Peening

20060056302 Agilent Technologies, Inc., USA
Optical Multistage Networks
Stone, T. W.; 4 Nov 03; 12 pp.; In English
Contract(s)/Grant(s): AF-F30602-98-C-0079
Patent Info.: Filed Filed 4 Nov 03; US-Patent-Appl-SN-10/700/982
Report No.(s): PB2007-100832; No Copyright; Avail.: CASI: A03, Hardcopy

Systems and methods for low loss, high speed exchange optical switching. The optical switch of this invention includes one or more a switchable diffraction gratings. The optical switch of this invention in capable of connecting two or more input optical beams to tow more output locations. Optical noise suppression means for switchable diffraction gratings can be utilized to suppress crosstalk.
NTIS
Optical Switching; Patent Applications

75
PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

20060056202 Lawrence Livermore National Lab., Livermore, CA USA
Scrape-Off Layer Plasmas for ITER with 2nd X-Point and Convective Transport Effects
Rognlien, T. D.; Bulmer, R. H.; Resink, M. E.; Brooks, J. N.; May 22, 2006; 15 pp.; In English
Report No.(s): DE2006-891717; UCRL-CONF-221544; No Copyright; Avail.: Department of Energy Information Bridge

Plasma fluxes to the divertor region in ITER near the magnetic separatrix have been modeled extensively in the past. The smaller, but potentially very important fluxes to the main chamber and outer divertor regions are the focus of the present paper. Two main additions to the usual transport modeling are investigated: namely, convective radial transport from intermittent, rapidly propagating 'blob' events, and inclusion of the magnetic flux-surface region beyond the second X-point that actually contacts the main-chamber wall. The two-dimensional fluid transport code UEDGE is use to model the plasma, while the energy spectrum of charge-exchange neutrals to the main chamber wall is calculated by DEGAS 2 Monte Carlo code. Additionally, the spatial distribution of Be sputtered from the main chamber wall is determined in the fluid limit.
NTIS
Convection; Fusion Reactors; Plasma Diagnostics; Plasmas (Physics); Thermonuclear Reactions

20060056251 NASA Ames Research Center, Moffett Field, CA, USA
Langmuir Probe Distortions and Probe Compensation in an Inductively Coupled Plasma
Ji, J. S.; Cappelli, M. A.; Kim, J. S.; Rao, M. V. V. S.; Sharma, S. P.; [1999]; 1 pp.; In English; 52nd Annual Gaseons Electronics Conference, 5-8 Oct. 1999, Norfolk, VA, USA
Contract(s)/Grant(s): RTOP 632-10-01; No Copyright; Avail.: Other Sources; Abstract Only

In many RF discharges, Langmuir probe measurements are usually made against a background of sinusoidal (and not so sinusoidal) fluctuations in the plasma parameters such as the plasma potential (Vp), the electron number density (ne), and the electron temperature (Te). The compensation of sinusoidal fluctuations in Vp has been extensively studied and is relatively well understood. Less attention has been paid to the possible distortions introduced by small fluctuations in plasma density and/or plasma temperature, which may arise in the sheath and pre-sheath regions of RF discharges. Here, we present the results of a model simulation of probe characteristics subject to fluctuations in both Vp and ne. The modeling of probe distortion due to possible fluctuations in Te is less straightforward. A comparison is presented of calculations with experimental measurements using a compensated and uncompensated Langmuir probe in an inductively coupled GEC reference cell plasma, operating on Ar and Ar/CF4 mixtures. The plasma parameters determined from the compensated probe characteristics are compared to previous measurements of others made in similar discharges, and to our own measurements of the average electron density derived from electrical impedance measurements.
Author
Distortion; Electrostatic Probes; Inductively Coupled Plasma Mass Spectrometry; Electron Energy

76
SOLID-STATE PHYSICS

Includes condensed matter physics, crystallography, and superconductivity. For related information see also *33 Electronics and Electrical Engineering*; and *36 Lasers and Masers*.

20060055429 Army Research Lab., Aberdeen Proving Ground, MD USA
Dynamic Plasticity and Fracture in High Density Polycrystals: Constitutive Modeling and Numerical Simulation
Clayton, J D; Sep 2006; 47 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): Proj-WHPR01B
Report No.(s): AD-A457061; ARL-RP-151; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457061; Avail.: CASI: A03, Hardcopy

Presented is a constitutive framework for modeling the dynamic response of polycrystalline microstructures, posed in a thermodynamically consistent manner and accounting for finite deformation, strain rate dependence of flow stress, thermal softening, thermal expansion, heat conduction, and thermoelastic coupling. Assumptions of linear and square-root dependencies, respectively, of the stored energy and flow stresses upon the total dislocation density enable calculation of the time-dependent fraction of plastic work converted to heat energy. Fracture at grain boundary interfaces is represented explicitly by cohesive zone models.
DTIC
Crystals; Fracturing; Mathematical Models; Plastic Properties

20060056450 Brookhaven National Lab., Upton, NY USA
Acceleration of Polarized Protons in the AGS with Two Helical Partial Snakes
Ahrens, L. A.; Bai, M.; Huang, H.; Bravar, A.; Courant, E. D.; Jun. 2006; 10 pp.; In English
Report No.(s): DE2006-885005; BNL-75488-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

Acceleration of polarized protons in the energy range of 5 to 25 GeV is particularly difficult: the depolarizing resonances are strong enough to cause significant depolarization but full Siberian snakes cause intolerably large orbit excursions and are not feasible in the Alternating Gradient Synchrotron (AGS) since straight sections are too short. Recently, two helical partial snakes with double pitch design have been built and installed in the AGS. With careful setup of optics at injection and along the ramp, this combination can eliminate the intrinsic and imperfection depolarizing resonances encountered during acceleration. This paper presents the accelerator setup and preliminary results.
NTIS
Protons; Particle Acceleration

20060056486 Stanford Linear Accelerator Center, CA, USA
Optimization of the X-Band Structure for the JLC/NLC
Li, Z.; Adolphsen, C.; Burke, D. L.; Dolgashev, V.; Jones, R. M.; Jun. 2006; 8 pp.; In English
Report No.(s): DE2006-884882; SLAC-PUB-11916; No Copyright; Avail.: National Technical Information Service (NTIS)

In this paper, we present design considerations to address the high gradient, wakefields, and RF efficiency issues for the JLC/NLC structures. We will present the rationale for the choices of phase advance, structure length, structure aperture, and other design aspects in the optimization of the structure. We will study the impact of parameter choices for the JLC/NLC beam environment and discuss approaches being taken for an optimal JLC/NLC structure design.
NTIS
Particle Accelerators; Superhigh Frequencies; Design Optimization

77
PHYSICS OF ELEMENTARY PARTICLES AND FIELDS

Includes quantum mechanics; theoretical physics; and statistical mechanics. For related information see also *72 Atomic and Molecular Physics, 73 Nuclear Physics*, and *25 Inorganic, Organic and Physical Chemistry*.

20060055708 Army Research Lab., Aberdeen Proving Ground, MD USA
Coupling Between CTH and LS-DYNA for Thermal Postprocessing: Application to Propellant Cookoff From a Residual Penetrator
Raftenberg, Martin N; Meyer, Jr, Huber W; Clarke, Jerry A; Sep 2006; 56 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457434; ARL-TR-3924; No Copyright; Avail.: CASI: A04, Hardcopy

A procedure was developed for performing a postprocessing heat conduction analysis from a CTH solution for a residual penetrator's shape and temperature field. LS-DYNA was employed for the heat conduction analysis. The interface between CTH and LS-DYNA involved the codes EnSight and HyperMesh. The procedure was applied to perforation of a titanium plate by a steel right circular cylinder at 433 m/s, followed by cookoff of an M30A1 grain by contact with the hot steel residual. The temperature field as a function of time within the M30A1 grain was compared with published data for initiation time as a function of temperature. In an appendix, an analytical solution for heat conduction between two semi-infinite layers is used to assess mesh adequacy in the residual-propellant simulation.
DTIC
Firing (Igniting); Metal Plates; Penetration; Propellants; Thermodynamic Properties

20060055815 Ceramic Composites, Inc., Millersville, MD USA
Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems
Duston, Christopher; Watts, Roland; Seghi, Steve; Carney, Barbara; Jan 2004; 10 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F33615-03-M-5039; DE-FG02-03ER83627
Report No.(s): AD-A457609; No Copyright; Avail.: CASI: A02, Hardcopy

Carbon foam is recognized as having the great potential to replacement for metal fins in thermal management systems such as heat exchangers, space radiators, and thermal protection systems. An initial barrier to implementation was the inherent weakness and friability of the carbon foams. Ceramic Composites Inc. has demonstrated the ability to increase the compressive strength by 2 times through the treatment of the carbon foam ligaments with a uniform silicon carbide coating, serving to enhance strength and reduce friability, with minimal influence upon the thermal properties. The process is amenable to automation using commercially available equipment. An overview of the technical approach will be presented, along with the envelope of enhanced material properties achieved under the program. Carbon foams of various pedigrees have been studied since the late 1960s when the first reticulated foams were produced. These foams were thermally insulating and remained so for many years with research in the 1970s focused primarily upon producing carbon foams from alternative precursors. In the early 1990's, researchers at the Wright Patterson Air Force Base Materials Lab pioneered mesophase pitch derived graphitic foams, specifically for replacing expensive 3-D woven fiber performs in polymer composites and as replacements for honeycomb materials. This was one of the first high thermal conductivity carbon foams and the technology was licensed by MER Corporation of Tucson, AZ.
DTIC
Augmentation; Carbon; Ceramics; Compressive Strength; Foams; Management Systems; Temperature Control; Thermodynamic Properties

20060056445 Brookhaven National Lab., Upton, NY USA
Feasibility of a Spin Decoherence Measurement
MacKay, W. W.; Jun. 2006; 10 pp.; In English
Report No.(s): DE2006-884998; BNL-75457-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

In this paper, the author studies the feasibility of making a turn-by-turn spin measurement to extract the spin tune from a polarized beam injected perpendicular to the stable spin direction. For the ideal case of a zero-emittance beam with no spin-tune spread, there would be no spin decoherence, and a measurement of the spin tune could easily be made by collecting turn-indexed polarization data over several million turns. However, in a real beam there is a momentum spread which provides a spin-tune spread. With a coasting beam the tune spread can cause decoherence of the spins resulting in a fast depolarization of the beam in as few as a thousand turns. With synchrotron oscillations the decoherence time can be greatly increased, so that a measurement becomes feasible with summation of the turn-by-turn data from a reasonable number of bunches ((approx.)\h 100). Three cases of 1, 2, and 2 1/2, Siberian snakes are considered. By using spin tune measurements for both the single and double snake cases, we could vastly improve the calibration of the optimum settings for the Relativistic Heavy Ion Collider (RHIC) snakes.
NTIS
Particle Spin; Polarization (Charge Separation); Calibrating

20060056446 Brookhaven National Lab., Upton, NY USA
Successful Bunched Beam Stochastic Cooling in RHIC
Brennan, J. M.; Blaskiewicz, M.; Severino, F.; January 2005; 10 pp.; In English
Report No.(s): DE2006-885003; BNL-75451-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

We report on a successful test of bunch-beam stochastic cooling in Relativistic Heavy Ion Collider (RHIC) at 100 GeV. The cooling system is designed for heavy ions but was tested in the recent RHIC run which operated only with polarized protons. To make an analog of the ion beam a special bunch was prepared with very low intensity. This bunch had (approx.) 1.5 x 10(sup 9) protons, while the other 100 bunches contained (approx.) 1.2 x 10(sup 11) protons each. With this bunch a cooling time on the order 1 hour was observed through shortening of the bunch length and increase in the peak bunch current, together with a narrowing of the spectral line width of the Scottky power at 4 GHz. The low level signal processing electronics and the isolated-frequency kicker cavities are described.
NTIS
Cooling; Stochastic Processes; Protons

20060056448 Brookhaven National Lab., Upton, NY USA
Beam Pipe Desorption Rate in RHIC
Huang, H.; Fischer, W.; He, P.; Hseuh, H. C.; Iriso, U.; Jun. 2006; 10 pp.; In English
Report No.(s): DE2006-885004; BNL-75489-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge
In the past, an increase of beam intensity in the Relativistic Heavy Ion Collider (RHIC) has caused several decades of pressure rises in the warm sections during operation. This has been a major factor limiting the RHIC luminosity. About 430 meters of NEG coated beam pipes have been installed in the warm sections to ameliorate this problem. Beam ion induced desorption is one possible cause of pressure rises. A series beam studies in RHIC has been dedicated to estimate the desorption rate of various beam pipes (regular and NEG coated) at various warm sections. Correctors were used to generate local beam losses and consequently local pressure rises. The experimental results are presented and analyzed in this paper.
NTIS
Desorption; Ion Beams

20060056449 Brookhaven National Lab., Upton, NY USA
Choice of Proton Driver Parameters For a Neutrino Factory
Kirk, H. G.; Berg, J. S.; Ferno, R. C.; Gallardo, J. C.; Jun. 2006; 10 pp.; In English
Report No.(s): DE2006-885000; BNL-75477-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge
We discuss criteria for designing an optimal ‘green field’ proton driver for a neutrino factory. The driver parameters are determined by considerations of space charge, power capabilities of the target, beam loading and available RF peak power.
NTIS
Neutrinos; Protons; Proton Beams

20060056451 Brookhaven National Lab., Upton, NY USA
Observation of Long-Range Beam-Beam Effect in RHIC and Plans for Compensation
Fischer, W.; Calaga, R.; Dorda, U.; Koutchouk, J. P.; Zimmermann, F.; Jun. 2006; 10 pp.; In English
Report No.(s): DE2006-885001; BNL-75459-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge
At large distances the electromagnetic field of a wire is the same as the field produced by a bunch. Such a long-range beam-beam wire compensator was proposed for the LHC, and single beam tests with wire compensators were successfully done in the SPS. Relativistic Heavy Ion Collider (RHIC) offers the possibility to test the compensation scheme with colliding beams. We report on measurements of beam losses as a function of transverse separation in RHIC at 1OOGeV, and comparisons with simulations. We present a design for a long-range wire compensator in RHIC.
NTIS
Particle Accelerators; Particle Collisions; Compensators; Particle Beams; Beam Interactions

20060056452 Brookhaven National Lab., Upton, NY USA
Summary of Coupling and Tune Feedback Results During RHIC Run 6, and Possible Implications for LHC Commissioning
Cameron, P.; DellaPenna, A.; Hoff, L.; Luo, Y.; Marusic, A.; Jun. 2006; 10 pp.; In English
Report No.(s): DE2006-885006; BNL-754540-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge
Early efforts to implement tune feedback during the acceleration ramp in RHIC were hampered by large betatron coupling, as well as the requirement for large dynamic range. Both problems have been addressed, the first by implementation of continuous measurement of coupling, and the second by the development of an improved analog front end. With these improvements, simultaneous coupling and tune feedback were successfully implemented for acceleration ramp development

during RHIC Run 6. During the course of this work it became clear that direct excitation of the betatron resonances by high harmonics of the 60Hz power frequency was an obstacle to making the system operational. We report here on these results from RHIC Run 6, and implications for LHC commissioning.
NTIS
Betatrons; Feedback

20060056453 Brookhaven National Lab., Upton, NY USA
ERL High-Energy Cooler for RHIC
Ben-Zvi, I.; Jun. 2006; 12 pp.; In English
Report No.(s): DE2006-885002; BNL-75453-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge
Electron cooling entered a new era with the July 2005 cooling of the Tevatron recycler ring at Fermilab, using (gamma)=9.5. Considering that the cooling rate decreases as faster than (gamma)(sup 2) and the electron energy forces higher electron currents, new acceleration techniques, high-energy electron cooling presents special challenges to the accelerator scientists and engineers. For example, electron cooling of Relativistic Heavy Ion Collider (RHIC) at collisions requires electron beam energy up to about 54 MeV at an average current of between 50 to 100 mA and a particularly bright electron beam. The accelerator chosen to generate this electron beam is a superconducting Energy Recovery Linac (ERL) with a superconducting RF gun with a laser-photocathode.
NTIS
Coolers; Cooling; Electron Acceleration; Electron Beams

20060056468 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA
Nucleon Compton Scattering
Wojtsekhowski, B.; January 2006; 20 pp.; In English
Report No.(s): DE2006-885187; No Copyright; Avail.: National Technical Information Service (NTIS)
Review of Nucleon Compton Scattering in wide angle regime is presented. JLab experimental data strongly support dominance of handbag mechanism in the RCS process. The approved ALLRCS experiment with polarized target and future plans with 12 GeV beam are discussed.
NTIS
Compton Effect; Nucleons; Elementary Particle Interactions; Quantum Chromodynamics

20060056478 Stanford Linear Accelerator Center, CA, USA, Deutsches Elektronen-Synchrotron, Hamburg, Germany, European Organization for Nuclear Research, Geneva, Switzerland
Simulation of the Electron Cloud for Various Configurations of a Damping Ring for the ILC
Pivi, M.; Wang, L.; Ohmi, K.; Wanzenberg, R.; January 2006; 8 pp.; In English
Report No.(s): DE2006-884877; SLAC-PUB-119222; No Copyright; Avail.: National Technical Information Service (NTIS)
In the beam pipe of the positron damping ring of the International Linear Collider (ILC), an electron cloud may be first produced by photoelectrons and ionization of residual gases and then increased by the secondary emission process. This paper reports the assessment of electron cloud effects in a number of configuration options for the ILC baseline configuration. Careful estimates were made of the secondary electron yield threshold for electron cloud build-up, and the related single- and coupled-bunch instabilities, as a function of beam current and surface properties for a variety of optics designs. When the configuration for the ILC damping rings was chosen at the end of 2005, the results from these studies were important considerations. On the basis of the theoretical and experimental work, the baseline configuration currently specifies a pair of 6 km damping rings for the positron beam, to mitigate the effects of the electron cloud that could present difficulties in a single 6 km ring.
NTIS
Damping; Electron Clouds; Particle Accelerators; Simulation

20060056480 Stanford Research Inst., Menlo Park, CA, USA
Doubling the PEP-II Luminosity in Simulations
Cai, Y.; Seeman, J.; Sonnad, K.; Wienands, U.; Jun. 2006; 8 pp.; In English
Report No.(s): DE2006-884878; SLAC-PUB-11919; No Copyright; Avail.: National Technical Information Service (NTIS)
Simulations show that luminosity of the PEP-II B-factory can be doubled from its present peak value of 1 x 10(sup

34)cm(sup -2)s(sup -1). The particle simulation code BBI developed for studying beam-beam interaction was used to perform the simulations. It was first found that the parasitic collisions significantly degrade the simulated luminosity as the beam currents are increased from 3A and 1.7A to 4A and 2.2A in the low and high energy rings, respectively. The effect of changes in various accelerator parameters on luminosity was then studied in detail from a rough starting point based on analytic estimates and in the process we systematically optimized the luminosity and showed that a luminosity of over 2 x 10(sup 34)cm(sup -2)s(sup -1) is achievable within feasible limits.
NTIS
Luminosity; Particle Accelerators; Computerized Simulation

20060056481 Stanford Linear Accelerator Center, CA, USA, Stanford Univ., Stanford, CA USA
Is Naturalness Unnatural
Richter, B.; January 2006; 14 pp.; In English
Report No.(s): DE2006-884886; SLAC-PUB-11911; No Copyright; Avail.: Department of Energy Information Bridge

I have asked many theorists to define naturalness. I received many variations on a central theme which I would put as follows: a constant that is smaller than it ought to be has to be kept there by some sort of symmetry. If, for example, the Higgs mass is quadratically divergent, invent super-symmetry to make it only logarithmically divergent and keep it small. The price of this invention is 124 new constants which I always thought to be to high a price to pay. Progress in physics almost always is made by simplification. In this case a conceptual nicety was accompanied by an explosion in arbitrary parameters. Experiment has forced a retreat in the expected value of the mass of the lightest super-symmetric particle. However, the LHC starts taking data in 2008 and we will know in a couple of years if there is anything there. If nothing is found, the natural theory of super-symmetry will be gone.
NTIS
Supersymmetry; Unified Field Theory

20060056484 SRI International Corp., Menlo Park, CA, USA
Luminosity Improvement at PEP-II Based on Optics Model and Beam-Beam Simulation
Cai, Y.; Colocho, W.; Decker, F. J.; Nosochkov, Y.; Raimondi, P.; Jun. 2006; 8 pp.; In English
Report No.(s): DE2006-884881; SLAC-PUB-11912; No Copyright; Avail.: National Technical Information Service (NTIS)

Since the beginning of this year, we have made significant improvements in the machine optics at PEP-II. As a result, the specific luminosity increased nearly 20%. The largest luminosity gain actually came from minimizing nonlinear chromatic effects and running both rings much closer to the half integer resonance in the horizontal plane.
NTIS
Luminosity; Particle Accelerators; Simulation; Beam Interactions

82
DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography. For computer program documentation see *61 Computer Programming and Software*.

20060055417 Air Force Research Lab., Wright-Patterson AFB, OH USA
The SAFIRE and an Initial Network-Centric Warfare Evaluation
Haas, Michael W; Middenorf, Matthew S; Ulring, Shari; Aug 2006; 59 pp.; In English
Contract(s)/Grant(s): Proj-7184
Report No.(s): AD-A457041; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457041; Avail.: CASI: A04, Hardcopy

Two major purposes are served by this report. The first is to describe the Synthesized and Human Aerospace Forces in an immersive Research Environment (SAFIRE), a simulation capability linking many of the Warfighter Interface Division's (AFRL/HEC) human-in-the-loop simulations together as well as with external AFRL and AFMC assets. The second purpose is to document the initial use of the SAFIRE architecture in its intended role, as a tool supporting evaluations of crew-system interfaces used in a network-centric environment. Information availability was manipulated experimentally during simulated air-to-air combat simulations of an air base defense mission scenario that involved multiple friendly and adversary aircraft as well as simulated airborne command and control. Statistical analysis of resultant data indicated that the manipulation of information availability did affect both objective measures of performance and subjective measures of situation awareness.

The presence of these effects clearly demonstrates SAFIRE's ability to support crew-system interface evaluations. In addition, the presence of a practice effect was observed indicating more attention should be focused on experimental design issues for future studies to reduce this effect or to compensate for its presence.
DTIC
Combat; Command and Control; Flight Crews; Situational Awareness; Software Development Tools; Warfare

20060055436 North Carolina Univ., Chapel Hill, NC USA
Content Locality in Distributed Digital Libraries
Viles, Charles L; French, James C; Jan 1999; 21 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N66001-97-C-8542
Report No.(s): AD-A457074; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457074; Avail.: CASI: A03, Hardcopy

This paper introduces the notion of content locality in distributed document collections. Content locality is the degree to which content-similar documents are colocated in a distributed collection. We propose two metrics for measurement of content locality, one based on topic signatures and the other based on collection statistics. We provide derivations and analysis of both metrics and use them to measure the content locality in two kinds of document collections, the well-known TREC corpus and the Networked Computer Science Technical Report Library (NCSTRL), an operational digital library. We also show that content locality can be thought of temporally as well as spatially and provide evidence of its existence in temporally ordered document collections like news feeds.
DTIC
Information Retrieval; Libraries

20060055450 Joint Chiefs of Staff, Washington, DC USA
Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Consequences Management
Oct 2, 2006; 159 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457099; JCS-PUB-3-41; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457099; Avail.: CASI: A08, Hardcopy

This publication provides overarching guidelines and principles to assist commanders and their staffs in planning and conducting joint chemical, biological, radiological, nuclear, and high-yield explosives consequence management operations. This publication has been prepared under the direction of the Chairman of the Joint Chiefs of Staff. It sets forth joint doctrine to govern the activities and performance of the Armed Forces of the USA in operations and provides the doctrinal basis for interagency coordination and for US military involvement in multinational operations. It provides military guidance for the exercise of authority by combatant commanders and other joint force commanders (JFCs) and prescribes joint doctrine for operations and training. It provides military guidance for use by the Armed Forces in preparing their appropriate plans. It is not the intent of this publication to restrict the authority of the JFC from organizing the force and executing the mission in a manner the JFC deems most appropriate to ensure unity of effort in the accomplishment of the overall objective.
DTIC
Chemical Explosions; Chemical Warfare; Guidance (Motion); Nuclear Warfare; Radiology; Warfare

20060055451 Simon Fraser Univ., Burnaby, British Columbia Canada
Development and Evaluation of a Korean Treebank and its Application to NLP
Han, Chung-Hye; Han, Na-Rare; Ko, Eon-Suk; Palmer, Martha; Jan 2002; 9 pp.; In English
Contract(s)/Grant(s): DAAD17-99-C-0008; N66001-00-1-8915
Report No.(s): AD-A457100; No Copyright; ONLINE: http://hdl.handle.net/100.2/ADA457100; Avail.: CASI: A02, Hardcopy

This paper discusses issues involved in building a 54-thousand-word Korean Treebank using a phrase structure annotation and the development of annotation guidelines based on the morpho-syntactic phenomena represented in the corpus. The various methods that were employed for quality control are described. An evaluation of the quality of the Treebank and some of the Natural Language Processing (NLP) applications under development using the Treebank also are described.
DTIC
Grammars; Languages; Linguistics; Morphology; Natural Language Processing; Syntax

20060055530 Massachusetts Univ., Amherst, MA USA
Web Page Clustering using Heuristic Search in the Web Graph
Bekkerman, Ron; Zilberstein, Shlomo; Allan, James; Jan 2006; 7 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): HR0011-06-C-0023
Report No.(s): AD-A457111; No Copyright; Avail.: CASI: A02, Hardcopy

Effective representation of Web search results remains an open problem in the Information Retrieval community. For ambiguous queries, a traditional approach is to organize search results into groups (clusters), one for each meaning of the query. These groups are usually constructed according to the topical similarity of the retrieved documents, but it is possible for documents to be totally dissimilar and still correspond to the same meaning of the query. To overcome this problem, we exploit the thematic locality of the Web-- relevant Web pages are often located close to each other in the Web graph of hyperlinks. We estimate the level of relevance between each pair of retrieved pages by the length of a path between them. The path is constructed using multi-agent beam search: each agent starts with one Web page and attempts to meet as many other agents as possible with some bounded resources. We test the system on two types of queries: ambiguous English words and people names. The Web appears to be tightly connected; about 70% of the agents meet with each other after only three iterations of exhaustive breadth-first search. However, when heuristics are applied, the search becomes more focused and the obtained results are substantially more accurate. Combined with a content-driven Web page clustering technique, our heuristic search system significantly improves the clustering results.
DTIC
Heuristic Methods; Internets

20060055534 Carnegie-Mellon Univ., Pittsburgh, PA USA
Access Control to Information in Pervasive Computing Environments
Hengartner, Urs; Aug 2005; 218 pp.; In English
Contract(s)/Grant(s): DAAD19-02-1-0389; N66001-99-2-891801
Report No.(s): AD-A457117; CMU-CS-05-160; No Copyright; Avail.: CASI: A10, Hardcopy

Pervasive computing envisions a world in which we are surrounded by embedded, networked devices, which gather and share information about people, such as their location, activity, or even their feelings. Some of this information is confidential and should be released only to authorized entities. In this thesis, I show how existing solutions for controlling access to information are not sufficient for pervasive computing. This thesis presents a distributed access-control architecture for pervasive computing that supports complex and derived information and confidential context-sensitive constraints. Namely, the thesis makes the following contributions: First, I introduce a distributed access-control architecture, in which a client proves to a service that the client is authorized to access the requested information. Second, I incorporate the semantics of complex information as a first-class citizen into this architecture, based on information relationships. Third, I propose derivation-constrained access control, which reduces the influence of intruders into a service by making the service prove that it is accessing information on behalf of an authorized client. Fourth, I study the kinds of information leaks that confidential context-sensitive constraints can cause, and I introduce access-rights graphs and hidden constraints to address these leaks. Fifth, I present obscured proof-of-access descriptions, which allow a service to inform a client of the required proof of access without leaking confidential information being part of this description. Sixth, as an alternative approach, I introduce an encryption-based access-control architecture for pervasive computing, in which a service gives information to any client, but only in an encrypted form.
DTIC
Access Control; Cryptography; Identities; Numerical Control; Security

20060055537 Space and Naval Warfare Systems Command, San Diego, CA USA
Beyond MARC: New Trends for the Library of the Future
Mayes, Bessie; Jan 2003; 4 pp.; In English
Report No.(s): AD-A457122; No Copyright; Avail.: CASI: A01, Hardcopy

It is vitally important that the library profession keep pace with new technologies being developed for the public by industries across the world. The library has to adapt to changing trends and lifestyle issues. Some changes may necessitate a different approach to the traditional roles and methods of operation. Most libraries are meeting a host of challenges presented by industries and new technologies, and are incorporating new ideas into the profession to better serve their clients. The influence of recent industrial changes has resulted in some libraries experiencing change in their methods of operating. For example, some functions of technical services are being outsourced to private businesses. Some libraries find outsourcing easier and more cost-effective than hiring personnel to perform these traditionally held functions. Another profound change

that has already affected how libraries operate as service providers is the change in how they present and describe content. MARC, once the traditional language of choice for libraries in describing format and content, is now being questioned as to its relevance. As a library-specific language, it lacks interoperability with other more modern languages used on the internet such as HTML, SGML, and XML. MARC's inability to be offered as an industry-wide standard was cause for concern among vendors that historically provided service to libraries. Unlike MARC, however, XML is derived from HGML and SGML, and is better suited to describe the attributes of the technological offerings of the private sector, colleges, hospitals, and institutions. XML is extensible, interoperable with other ML languages, and its use has opened the collections of libraries across the world for viewing, unlike a unique program or stand-alone application could. The author focuses specifically on DC-XML (Dublin Core-Extensible Markup Language), OCLC's first attempt at migration from MARC to an extensible markup language.
DTIC
Coding; Document Markup Languages; Libraries; Metadata; Replacing; Trends

20060055550 Carnegie-Mellon Univ., Pittsburgh, PA USA
Parameter-Free Spatial and Stream Mining
Papadimitriou, Spiros; Sep 2005; 241 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N66001-00-1-8936
Report No.(s): AD-A457141; CMU-CS-05-170; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Data mining is the extraction of knowledge from large amounts of data and brings together the fields of databases, machine learning and statistics. From a database perspective, the emphasis is often placed on scalability and efficiency. Recently, in addition to the data warehouse model where data from multiple sources are integrated into a large store, the streaming model is emerging as an alternative data processing paradigm. In this thesis we develop spatial and stream mining tools for discovery of interesting patterns. These patterns summarize the data, enable forecasting of future trends and spotting of anomalies or outliers. Beyond the emphasis on efficiency and scalability, we focus on simplifying or eliminating user intervention. Data mining algorithms must make the discovery task easy for average users. Eliminating the requirement for user intervention should be a top priority in designing data mining methods. We show that multi-resolution analysis (i.e., examining the data at multiple resolutions or scales) is a powerful tool towards these goals. In particular, for spatial data we employ the correlation integral. For time series streams we use the wavelet transform and related techniques. Furthermore, we leverage tools from signal processing (again wavelets and, also, subspace tracking algorithms) to extract patterns from streams. Finally, we also employ compression principles coupled with multi-level partitionings to automatically cluster spatial data.
DTIC
Data Bases; Information Retrieval; Mining

20060055600 Naval Postgraduate School, Monterey, CA USA
A Concept of Operations for the Use of Emergent Open Internet Technologies as the Basis for a Network-Centric Environment
O'Sullivan, Joshua D; Sep 2006; 190 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457225; No Copyright; Avail.: Defense Technical Information Center (DTIC)

The Industrial Age spawned a revolution that brought fundamental changes to the business of commerce, the structures of society, and the theories of warfare that are used to this day. With the dawn of the Information Age a similar revolution has begun, with the realization of the science of networks and their effects on complex systems, such as command and control and sharing information both internally and externally of a traditional military organization. Recognizing the power of Network-Centric Warfare, the US Military is transforming to develop that means. This has translated into the holistic requirement of agile, interoperable networks to achieve information superiority in fighting future wars and maintaining peace. The purpose of this thesis is to provide a concept of operations for the use of emergent open Internet technologies as the basis for a network-centric environment. Examining current relevant research on networks and their application in the US military, a system of information systems will be presented to demonstrate current and potential capabilities in information sharing. Developing constructs such as web feeds, portals, blogs, and wikis will be used to create an interconnected framework for use with coalition partners, other government agencies, non-government organizations, and internal communications.
DTIC
Information Systems; Internets; Networks; Organizations; Telecommunication

20060055646 Naval Undersea Warfare Center, Newport, RI USA

Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results

Lazauski, Colin J; Campbell, Ryan J; Damon, Christopher; LaBash, Charles; Frederickson, Joshua M; August, Peter; Apr 10, 2006; 19 pp.; In English; Original contains color illustrations

Report No.(s): AD-A457314; No Copyright; Avail.: CASI: A03, Hardcopy

Improved representation of acoustic model outputs and exploration of methods of multidimensional visualization are key elements of NUWC Division Newport's Mission Environmental Planning (MEP) Program's current three-phase model maintenance and upgrade initiative 'Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment.' Phase 1 of the project, initiated on 26 October 2005, consisted of a feasibility study to evaluate, test, and assess the capabilities of various software packages deemed capable of multidimensional analysis. Through partnership with the University of Rhode Island Environmental Data Center, phase 1 has been completed, the results of which are presented in this document.

DTIC

Acoustics; Computer Programs; Feasibility; Geographic Information Systems; Models; Sound Transmission

20060055710 Micro Analysis and Design, Boulder, CO USA

Agent-based Modeling of Dismounted Infantry Through Inclusion of Perceptions, Inferences and Associations Phase 1

Warwick, Walter; Nov 2006; 28 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): W911QY-06-C-0005

Report No.(s): AD-A457438; No Copyright; Avail.: CASI: A03, Hardcopy

Report developed under Small Business Innovation Research contract. Where human behavior is often thought of in terms of a perception-action cycle, rich with interdependencies and fuzzy boundaries between processes, human behavior representations of a computer-generated force implement a one-way process where exact, unambiguous data drive discrete, monolithic models of decision-making. The objective was to imbue human behavior representations with some complexities that characterize human perception and action. In more specific terms, Micro Analysis Design's Phase I effort revolved around two related objectives. The first to design and prototype a 'Perceptual Editor' that could be integrated within the Infantry Warrior Simulation (IWARS) environment and allow a user to define different kinds of transformations between ground truth variables and agent-based perceptions. The second was to investigate examples of the kinds of transformations that might be implemented using such an editor. We describe progress toward both objectives. We begin with a discussion of the software developed to implement our 'Perceptual Editor.' We then characterize performance of two different mechanisms for transforming ground truth into 'perceptions.' We conclude with some general methodological remarks about the process of integrating perceptual inferences within the IWARS.

DTIC

Decision Making; Human Behavior; Inference; Perception; Software Development Tools; Systems Integration; Warfare

20060055791 Maryland Univ., College Park, MD USA

CLIR Experiments at Maryland for TREC-2002: Evidence Combination for Arabic-English Retrieval

Darwish, Kareem; Oard, Douglas W; Jan 2002; 9 pp.; In English

Contract(s)/Grant(s): N66000-10-0-28910

Report No.(s): AD-A457575; No Copyright; Avail.: CASI: A02, Hardcopy

The focus of the experiments reported in this paper was techniques for combining evidence for crosslanguage retrieval, searching Arabic documents using English queries. Evidence from multiple sources of translation knowledge was combined to estimate translation probabilities, and four techniques for estimating query-language term weights from document-language evidence were tried. A new technique that exploits translation probability information was found to outperform a comparable technique in which that information was not used. Comparative results for three variants of Arabic light stemming are also presented. A simple variant of an existing stemming algorithm was found to result in significantly better retrieval effectiveness.

DTIC

English Language; Information Retrieval; Translating

20060055797 Carnegie-Mellon Univ., Pittsburgh, PA USA

Data Mining on an OLTP System (Nearly) for Free

Riedel, Erik; Faloutsos, Christos; Ganger, Greg; Nagle, David; Jun 1999; 16 pp.; In English

Contract(s)/Grant(s): N00174-96-0002; ARPA ORDER-D306

Report No.(s): AD-A457583; CMU-CS-99-151; No Copyright; Avail.: CASI: A03, Hardcopy

This paper proposes a scheme for scheduling disk requests that takes advantage of the ability of high-level functions to operate directly at individual disk drives. We show that such a scheme makes it possible to support a Data Mining workload on an OLTP system almost for free: there is only a small impact on the throughput and response time of the existing workload. Specifically, we show that an OLTP system has the disk resources to provide a consistent one third of its sequential bandwidth to a background Data Mining task with close to zero impact on OLTP throughput and response time at high transaction loads. At low transaction loads, we show much lower impact than observed in previous work. This means that a production OLTP system can be used for Data Mining tasks without the expense of a second dedicated system. Our scheme takes advantage of close interaction with the on-disk scheduler by reading blocks for the Data Mining workload as the disk head passes over them while satisfying demand blocks from the OLTP request stream. We show that this scheme provides a consistent level of throughput for the background workload even at very high foreground loads. Such a scheme is of most benefit in combination with an Active Disk environment that allows the background Data Mining application to also take advantage of the processing power and memory available directly on the disk drives.

DTIC

Data Mining; Information Retrieval; Mining

20060055807 Carnegie-Mellon Univ., Pittsburgh, PA USA

Interactive Electronic Technical Manuals (IETMs) Annotated Bibliography

Siegel, Jane; Nawrocki, Elise; Oct 22, 2002; 77 pp.; In English

Report No.(s): AD-A457598; CSU-CS-02-160; No Copyright; Avail.: CASI: A05, Hardcopy

This annotated bibliography is a collection of relevant literature for researchers, designers, and developers of advanced Interactive Electronic Technical Manuals (IETMs). It focuses especially on natural language dialog and speech recognition for use in tutoring, training, and performance aiding systems to support military or civilian technicians or mechanics engaged in inspection, diagnosis, or repair of aircraft, ships, etc.. Books, articles, and standards documents are briefly described and evaluated to provide professionals with an efficient means to identify resources for use in IETM development, natural language dialog prototyping, and evaluation of such systems.

DTIC

Annotations; Bibliographies; Manuals; Natural Language (Computers); Speech Recognition

20060056120 Darnall Army Hospital, Fort Hood, TX USA

Diagnosis and Treatment of Combat Related Post-Traumatic Stress Disorder. An Abstract Bibliography

Cathy A , Newell; Oct 2006; 20 pp.; In English

Report No.(s): AD-A457437; No Copyright; Avail.: CASI: A03, Hardcopy

Information with reference to the diagnosis and medical treatment of combat related Post Traumatic Stress Disorder (PTSD) is constantly being updated. Many PTSD related complaints are treated in our medical facilities everyday and this new information is vital to the knowledge base of our providers. This abstract bibliography lists books, web documents, journal articles, and internet sites related to this topic. The majority of items cited date from 2000 to the present. Because of the abundance of articles written, I chose to concentrate my research on information written in the last 6 years. All journal articles cited are available at the CRDAMC Medical Library or from the Internet. The books, web documents and internet sites have call numbers or links at the end of the citation.

DTIC

Abstracts; Bibliographies; Combat; Diagnosis; Injuries; Medical Services

20060056228 SRI International Corp., Menlo Park, CA USA

Coherence and Coreference

Hobbs, Jerry R; Aug 4, 1978; 36 pp.; In English

Contract(s)/Grant(s): MCS-76-22004; N00039-78-C0060

Report No.(s): AD-A457593; TN-168; No Copyright; Avail.: CASI: A03, Hardcopy

Coherence in conversations and in texts can be partially characterized by a set of coherence relations, motivated ultimately

by the speaker's or writer's need to be understood. In this paper, formal definitions are given for several coherence relations, based on the operations of an inference system; that is, the relations between successive portions of a discourse are characterized in terms of the inferences that can be drawn from each. In analyzing a discourse, it is frequently the case that we would recognize it as coherent, in that it would satisfy the formal definition of some coherence relation, if only we could assume certain noun phrases to be coreferential. In such cases, we will simply assume the identity of the entities referred to, in what might be called a 'petty conversational implicature', thereby solving the coherence and coreference problems simultaneously Three examples of different kinds of reference problems are presented. In each, it is shown how the coherence of the discourse can be recognized, and how the reference problems are solved, almost as a by-product, by means of these petty conversational implicatures.
DTIC
Coherence; Identities; Inference; Texts; By-Products

20060056350 Geological Survey, Reston, VA USA
User's Manual for the National Water Information System of the U.S. Geological Survey
January 2005; 364 pp.; In English
Report No.(s): PB2007-102649; USGS-OF-2005-1081; No Copyright; Avail.: CASI: A16, Hardcopy

This user documentation is designed to be a reference for the Water-Quality System (QWDATA) within the National Water Information System (NWIS). For the new user, the Introduction and Getting Started sections are the recommended places to begin. The experienced user may want to go straight to the details provided in the program section (section 3). Code lists and some miscellaneous reference materials are provided in the Appendices. The last section, Tip Sheets, is a collection of suggestions for accomplishing selected tasks, some of which are basic and some of which are advanced. Where appropriate, these Tip Sheets are referenced in the main text of the documentation.
NTIS
Geological Surveys; Information Systems; Manuals; User Manuals (Computer Programs); Water; Water Quality

85
TECHNOLOGY UTILIZATION AND SURFACE TRANSPORTATION

Includes aerospace technology transfer; urban technology; surface and mass transportation. For related information see also *03 Air Transportation and Safety, 16 Space Transportation and Safety*, and *44 Energy Production and Conversion*. For specific technology transfer applications see also the category where the subject is treated.

20060056379 NASA Johnson Space Center, Houston, TX, USA
Rationale for Suit and Airlock Dust Mitigation
Trevino, Luis A.; 2005; 1 pp.; In English; Dust Mitigation Technology Focus Group Meeting, 17-19 May 2005, Golden, CO, USA; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056379; Avail.: CASI: A01, Hardcopy

Technologies for suit and airlock dust mitigation is presented. The topics include: 1) Description; 2) Key findings; and 3) Challenges for Future Missions
CASI
Air Locks; Dust; Space Suits; Technology Utilization; Extravehicular Activity

88
SPACE SCIENCES (GENERAL)

Includes general research topics related to the natural space sciences. For specific topics in space sciences see *categories 89 through 93*.

20060054207 NASA Ames Research Center, Moffett Field, CA, USA
Intelligent Rover Execution for Detecting Life in the Atacama Desert
Baskaran, Vijayakumar; Muscettola, Nicola; Rijsman, David; Plaunt, Chris; Fry, Chuck; January 05, 2006; 8 pp.; In English; AAAI 2006 Fall Symposium on Spacecraft Autonomy, 12--15 Oct. 2006, Arlington, VA, USA; Copyright; Avail.: Other Sources

On-board supervisory execution is crucial for the deployment of more capable and autonomous remote explorers.

Planetary science is considering robotic explorers operating for long periods of time without ground supervision while interacting with a changing and often hostile environment. Effective and robust operations require on-board supervisory control with a high level of awareness of the principles of functioning of the environment and of the numerous internal subsystems that need to be coordinated. We describe an on-board rover executive that was deployed on a rover as past of the 'Limits of Life in the Atacama Desert (LITA)' field campaign sponsored by the NASA ASTEP program. The executive was built using the Intelligent Distributed Execution Architecture (IDEA), an execution framework that uses model-based and plan-based supervisory control of its fundamental computational paradigm. We present the results of the third field experiment conducted in the Atacama desert (Chile) in August - October 2005.
Author
Detection; Robotics; Deployment; Autonomy; Roving Vehicles

20060054215 NASA Ames Research Center, Moffett Field, CA, USA
Automated Classification of Thermal Infrared Spectra Using Self-organizing Maps
Roush, Ted L.; Hogan, Robert; [2006]; 1 pp.; In English; 38th Annual Division for Planetary Sciences Meeting, 9-13 Oct. 2006, Pasadena, CA, USA; No Copyright; Avail.: Other Sources; Abstract Only

Existing and planned space missions to a variety of planetary and satellite surfaces produce an ever increasing volume of spectral data. Understanding the scientific informational content in this large data volume is a daunting task. Fortunately various statistical approaches are available to assess such data sets. Here we discuss an automated classification scheme based on Kohonen Self-organizing maps (SOM) we have developed. The SUM process produces an output layer were spectra having similar properties lie in close proximity to each other. One major effort is partitioning this output layer into appropriate regions. This is prefonned by defining dosed regions based upon the strength of the boundaries between adjacent cells in the SOM output layer. We use the Davies-Bouldin index as a measure of the inter-class similarities and intra-class dissimilarities that determines the optimum partition of the output layer, and hence number of SOM clusters. This allows us to identify the natural number of clusters formed from the spectral data. Mineral spectral libraries prepared at Arizona State University (ASU) and John Hopkins University (JHU) are used to test and evaluate the classification scheme. We label the library sample spectra in a hierarchical scheme with class, subclass, and mineral group names. We use a portion of the spectra to train the SOM, i.e. produce the output layer, while the remaining spectra are used to test the SOM. The test spectra are presented to the SOM output layer and assigned membership to the appropriate cluster. We then evaluate these assignments to assess the scientific meaning and accuracy of the derived SOM classes as they relate to the labels. We demonstrate that unsupervised classification by SOMs can be a useful component in autonomous systems designed to identify mineral species from reflectance and emissivity spectra in the therrnal IR.
Author
Autonomy; Classifications; Infrared Spectra; Space Missions

20060055383 NASA Johnson Space Center, Houston, TX, USA
Integrated Simulation Design Challenges to Support TPS Repair Operations
Quiocho, Leslie J.; Crues, Edwin Z.; Huynh, An; Nguyen, Hung T.; MacLean, John; [2006]; 2 pp.; In English; AIAA Guidance, Navigation, and Control Conference, 15-18 Aug. 2005, San Francisco, CA, USA; Copyright; Avail.: CASI: A01, Hardcopy

During the Orbiter Repair Maneuver (OM) operations planned for Return to Flight (RTF), the Shuttle Remote Manipulator System (SRMS) must grapple the International Space Station (ISS), undock the Orbiter, maneuver it through a long duration trajectory, and orient it to an EVA crewman poised at the end of the Space Station Remote Manipulator System (SSRMS) to facilitate the repair of the Thermal Protection System (TPS). Once repair has been completed and confirmed, then the SRMS proceeds back through the trajectory to dock the Orbiter to the Orbiter Docking System. In order to support analysis of the complex dynamic interactions of the integrated system formed by the Orbiter, ISS, SRMS, and SSMS during the ORM, simulation tools used for previous nominal mission support required substantial enhancements. These upgrades were necessary to provide analysts with the capabilities needed to study integrated system performance. Prevalent throughout this ORM operation is a dynamically varying topology. In other words, the ORM starts with the SRMS grappled to the mated Shuttle/ISS stack (closed loop topology), moves to an open loop chain topology consisting of the Shuttle, SRMS, and ISS, and then, at the repair configuration, extends the chain topology to one consisting of the Shuttle, SMS, ISS, and SSRMS/EVA crewman. The resulting long dynamic chain of vehicles and manipulators may exhibit significant motion between the Shuttle worksite and the EVA crewman due to the system flexibility throughout the topology (particularly within the SRMS/SSRMS joints and links). Since the attachment points of both manipulators span the flexible structure of the ISS, simulation analysis may also need to take that into consideration. Moreover, due to the lengthy time duration associated with the maneuver and

repair, orbital effects become a factor and require the ISS vehicle control system to maintain active attitude control. Several facets of the ORM operation make the associated analytical efforts different from previous mission support, including: (1) the magnitude of the SRMS handled payload (Le., Orbiter class), (2) the orbital effects induced on the integrated system consisting of the large Shuttle and ISS masses connected by a light flexible SRMS, (3) long duration environmental consequences due to the lengthy operational times associated with the maneuver and repair of the TPS, (4) active attitude control (as opposed to free drift) interacting with the SRMS and SSRMS manipulators (also due to the length of the maneuver and repair), (5) relative dynamics between the EVA crewman and thc worksite influenced by the extended flexible topology. In order to meet these analysis challenges, an O Msi mulation architecture was developed leveraging upon numerous pre-existing simulation elements to analyze the various subsystems individually. For example, core manipulator subsystem simulations for both the SRMS and SSRMS were originally combined to provide the dual-arm dynamics topology simulation (in the absence of orbital dynamics and vehicle control). This capability was later merged with the simulation used to analyze SRMS loading with a heavy payload in the orbital environment with an active payload control system (in this case, the ISS Attitude Control System (ACS)), configured for the ORM. The resulting worksite dynamics simulation, based off of the modified ORM simulation, provided the extended topological chain of vehicles and manipulators, while taking into account the orbital effects of both the Shuttle and ISS (as well as its ACS). Verification and validation (V&V) of these integrated simulations became a challenge in itself. A systematic approach needed to be developed such that integration simulation results could be tested against previous constituent simulations upon which these simulations were built. General V&V categories included: (1) core orbital state propagation, (2), stand-alone SRMS, (3) stand-alone SSRMS, (4) stand-alone ISS ACS, (5)ntegrated Shuttle, SRMS, ISS (with active ACS) in the orbital environment, and (5) dual-arm SRMS/SSRMS dynamics topology. Integrated simulation V&V run suites were created and correlated to verification runs from subsystem simulations, in order to establish the validity of the results. This paper discusses the simulation design challenges encountered while developing simulation capabilities to mirror the ORM operations. The paper also describes the incremental build approach that was utilized, starting with the subsystem simulation elements and integration into increasing more complex simulations until the resulting ORM worksite dynamics simulation had been assembled. Furthermore, the paper presents an overall integrated simulation V&V methodology based upon a subsystem level testing, integrated comparisons, and phased checkout.
Author
Computerized Simulation; Systems Integration; Thermal Protection; Spacecraft Maintenance; Systems Engineering

20060056067 NASA Johnson Space Center, Houston, TX, USA
The International Space Station: A Pathway to the Future
Kitmacher, Gary H.; Gerstenmaier, William H.; Bartoe, John-David F.; Mustachio, Nicholas; October 2004; 10 pp.; In English; International Astronautical Congress meeting, 4 Oct. 2004, Vancouver, Canada; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056067; Avail.: CASI: A02, Hardcopy

Nearly six years after the launch of the first International Space Station element, and four years after its initial occupation, the USA and our 16 international partners have made great strides in operating this impressive Earth orbiting research facility. This past year we have done so in the face of the adversity of operating without the benefit of the Space Shuttle. In his January 14, 2004, speech announcing a new vision for America's space program, President Bush affirmed the USA' commitment to completing construction of the International Space Station by 2010. The President also stated that we would focus our future research aboard the Station on the longterm effects of space travel on human biology. This research will help enable human crews to venture through the vast voids of space for months at a time. In addition, ISS affords a unique opportunity to serve as an engineering test bed for hardware and operations critical to the exploration tasks. NASA looks forward to working with our partners on International Space Station research that will help open up new pathways for future exploration and discovery beyond low Earth orbit. This paper provides an overview of the International Space Station Program focusing on a review of the events of the past year, as well as plans for next year and the future.
Author
International Space Station; Space Exploration; Space Shuttles; Earth Orbits; Low Earth Orbits

20060056136 Naval Postgraduate School, Monterey, CA USA
Efficient Calculation of Earth Penetrating Projectile Trajectories
Youch, Daniel F; Sep 2006; 119 pp.; In English; Original contains color illustrations
Report No.(s): AD-A457254; No Copyright; Avail.: Defense Technical Information Center (DTIC)

Currently, two methods exist to determine trajectory of a ballistic penetrator: Poncelet Analysis and Differential Area Force Law (DAFL) methods. An exact solution for the Poncelet Equation exists; making for easy computation. However, the one dimensional nature of the equation fails to capture the intricate three-dimensional nature of real world ballistic penetrator

trajectories. The DAFL methods employ empirically derived stress algorithms to calculate the forces acting on a differential area of a projectile. These stresses are then used to determine the forces and moments acting on the differential areas. These forces and moments are then used to solve the equations of motion to determine the trajectory of the ballistic penetrator. The DAFL methods accurately capture the three dimensional nature of the penetrator's trajectory, but are computationally intensive which make them slow. The Integrated Force Law (IFL) method combines the computational ease of the Poncelet Analysis with the accuracy of the DAFL methods. In IFL, the projectile shape is modeled as a polynomial. The stress algorithms used in the DAFL methods are then numerically integrated over the top and bottom surfaces of the projectile to determine the force and moment acting on the top and bottom half of the weapon. These two forces and moments are then used to solve the equations of motion. J-hook trajectories are solved in less than 40 seconds and stable trajectories are solved in less than three seconds.
DTIC
Ballistics; Earth Orbits; Penetration; Projectiles; Scattering Cross Sections; Trajectories

20060056241 NASA Johnson Space Center, Houston, TX, USA
Lunar Dust Activation and Related Studies
Jeevarajan, Antony; Bradley, Robert; Hurley, Elizabeth; Hammond, Dianne; [2006]; 1 pp.; In English; Lunar Airborne Dust toxicity Advisory Group, 7-8 Dec. 2006, USA; Copyright; Avail.: Other Sources; Abstract Only

The primary objective of the presentation is to identify a set of experiments to activate the lunar dust and monitor the mode of deactivation process using various analytical methods. To satisfy the objective, a large set of experiments will be carried out using lunar dust stimulant (JSC-1a-vf obtained from Dr. V. Carter from University of Texas at Dallas) to optimize the methodology. After refining the methodology to carry out the experiments using the simulant, real lunar dust will be used to obtain the necessary results. The secondary objective of the presentation is to identify a set of experiments to assess the potential toxicity of the dust using cellular systems. One of the cell lines that we identified is WI-38 human lung cell line.
Author
Lunar Dust; Deactivation; Stimulants

20060056243 NASA Johnson Space Center, Houston, TX, USA, University of Central Florida, Orlando, FL, USA
Personal Cooling for Extra-Vehicular Activities on Mars
Pu, Zhengxiang; Kapat, Jay; Chow, Louis; Recio, Jose; Rini, Dan; Trevino, Luis; [2004]; 1 pp.; In English; AIAA Space 2004 Conference, 28-30 Sep. 2004, San Diego, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

Extra-vehicular activities (EVA) on Mars will require suits with sophisticated thermal control systems so that astronauts can work comfortably for extended periods of time. Any use of consumables such as water that cannot be easily replaced should be of particular concern. In this aspect the EVA suits for Mars environment need to be different from the current Space Shuttle Extra Vehicular Mobility Units (EMU) that depend on water sublimation into space for removing heat from suits. Moreover, Mars environment is quite different from what a typical EMU may be exposed to. These variations call for careful analysis and innovative engineering for design and fabrication of an appropriate thermal control system. This paper presents a thermal analysis of astronaut suits for EVA with medium metabolic intensity under a typical hot and a nominal cold environment on Mars. The paper also describes possible options that would allow conservation of water with low usage of electrical power. The paper then presents the conceptual design of a portable cooling unit for one such solution.
Author
Extravehicular Activity; Mars Environment; Temperature Control; Cooling; Metabolism; Thermal Analysis; Consumables (Spacecraft); Astronauts

89
ASTRONOMY

Includes observations of celestial bodies; astronomical instruments and techniques; radio, gamma-ray, x-ray, ultraviolet, and infrared astronomy; and astrometry.

20060054274 Lawrence Livermore National Lab., Livermore, CA USA
Small Particle May Answer Large Physics Questions
Hazi, A.; Sep. 26, 2005; 14 pp.; In English
Report No.(s): DE2006-883622; UCRL-TR-215650; No Copyright; Avail.: National Technical Information Service (NTIS)

In one of those interesting intersections of particle physics, astrophysics, and cosmology, scientists from Lawrence

Livermore National Laboratory, the University of California at Berkeley (UCB), the University of Florida (UF), and the National Radio Astronomy Observatory (NRAO) have joined together to try to pin down an elusive particle. This particle, called the axion, if it is found to exist and is not just a hypothesis, would be a long-sought relic from the first fractional second of the birth of the universe and one of the most weakly interacting particles known. Experimental verification of the existence of the axion would not only help ''balance the budget'' for the missing mass of the universe but also clear up one of the thorniest issues in particle physics.
NTIS
Astrophysics; Bosons

20060054438 NASA Ames Research Center, Moffett Field, CA, USA
Recent Highlights in Ring Structure, Dynamics, and Composition
Cuzzi, Jeffrey N.; July 19, 2006; 1 pp.; In English; Workshop on Icy Formation, 8-19 Oct. 2006, Pasadena, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

While the Cassini orbiter has been in a near-equatorial orbit for most of the time since the last DPS meeting, the science teams have turned to preliminary analysis of many aspects of data taken over the first year of the mission. New understanding has been gained of several different aspects of ring structure and dynamics - especially the small-scale ring vertical structure related to marginal gravitational instabilities, and the diverse roles played by small moonlets sprinkled around and within the rings. In addition, a closer look is being taken at how ring composition varies locally and regionally and how this variation compares with models of ring compositional evolution. Cassini will re-emerge from the equator plane in late July, and new ring observations will again be available. In this talk we will review progress over the last year, highlight key outstanding issues and problems, and provide a context for the new observations reported at this meeting.
Author
Cassini Mission; Equatorial Orbits; Planetary Rings; Planetary Structure; Planetary Composition

20060056252 NASA Ames Research Center, Moffett Field, CA, USA
Spectroscopy of Kuiper Belt Objects and Centaurs
Cruikshank, Dale P.; Brown, Robert H.; Pendleton, Y. J.; Veeder, Glenn J.; [1998]; 1 pp.; In English; Protostars and Planets IV Conference, 6-10 Jul. 1998, Santa Barbara, CA, USA
Contract(s)/Grant(s): WBS 839-01-02-02; Copyright; Avail.: Other Sources; Abstract Only

Recent near-infrared spectroscopy of Kuiper Belt objects and Centaurs indicates considerable spectral diversity among them. Some have entirely bland spectra with no discernible spectral features (e.g., Chiron), while 5145 Pholus has a very active spectrum with absorption bands of H2O, CH3OH, and probably the mineral olivine present. In addition, the strong red color of Pholus indicates the presence of organic solids. Among the KBOs, 1993 SC has an active spectrum with the probably presence of hydrocarbons and possibly the ices of H2O and N2. The diversity among these spectra and the implications that such diversity has for models of the formation of the formation of the planets will be discussed.
Author
Kuiper Belt; Spectroscopy; Near Infrared Radiation; Comets; Gas Giant Planets

90
ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

20060054208 NASA Ames Research Center, Moffett Field, CA, USA
Astrochemistry: Recent Advances in the Study of Carbon Molecules in Space
Salama, Farid; [2006]; 1 pp.; In English; Recent Developments in Chemistry, 14-17 Nov. 2006; No Copyright; Avail.: Other Sources; Abstract Only

Carbon molecules and ions play an important role in space. Polycyclic Aromatic Hydrocarbons (PAHs) are the best-known candidates to account for the infrared emission bands (UIR bands) and PAH spectral features are now being used as probes of the interstellar medium in Galactic and extra-galactic environments. PAHs are also thought to be among the carriers of the diffuse interstellar absorption bands (DIBs). In the model dealing with the interstellar spectral features, PAHs are present as a mixture of radicals, ions and neutral species. PAH ionization states reflect the ionization balance of the medium while PAH size, composition, and structure reflect the energetic and chemical history of the medium. A major challenge for laboratory Astrochemistry is to reproduce (in a realistic way) the physical conditions that exist in the emission and absorption

interstellar zones. An extensive laboratory program has been developed in various laboratories to characterize the physical and chemical properties of PAHs in astrophysical environments and to describe how they influence the radiation and energy balance in space and the interstellar chemistry. In particular, laboratory experiments provide measurements of the spectral characteristics of interstellar PAH analogs from the ultraviolet and visible range to the infrared range for comparison with astronomical data. The harsh physical conditions of the interstellar medium - characterized by a low temperature, an absence of collisions and strong ultraviolet radiation fields - are simulated in the laboratory by associating a molecular beam with an ionizing discharge to generate a cold plasma expansion. PAH ions are formed from the neutral precursors in an isolated environment at low temperature (of the order of 100 K). The spectra of neutral and ionized PAHs are measured using the high sensitivity methods of cavity ring down spectroscopy (CRDS). These experiments provide unique information on the spectra of free, cold large carbon molecules and ions in the gas phase.
Author
Carbon; Molecules; Polycyclic Aromatic Hydrocarbons; Infrared Radiation; Interstellar Chemistry; Gas-Ion Interactions; Absorption Spectra; Astrophysics

20060054209 NASA Ames Research Center, Moffett Field, CA, USA
LISA Framework for Enhancing Gravitational Wave Signal Extraction Techniques
Thompson, David E.; Thirumalainambi, Rajkumar; January 05, 2006; 6 pp.; In English; LISA Science Analysis; Copyright; Avail.: CASI: A02, Hardcopy

This paper describes the development of a Framework for benchmarking and comparing signal-extraction and noise-interference-removal methods that are applicable to interferometric Gravitational Wave detector systems. The primary use is towards comparing signal and noise extraction techniques at LISA frequencies from multiple (possibly confused) ,gravitational wave sources. The Framework includes extensive hybrid learning/classification algorithms, as well as post-processing regularization methods, and is based on a unique plug-and-play (component) architecture. Published methods for signal extraction and interference removal at LISA Frequencies are being encoded, as well as multiple source noise models, so that the stiffness of GW Sensitivity Space can be explored under each combination of methods. Furthermore, synthetic datasets and source models can be created and imported into the Framework, and specific degraded numerical experiments can be run to test the flexibility of the analysis methods. The Framework also supports use of full current LISA Testbeds, Synthetic data systems, and Simulators already in existence through plug-ins and wrappers, thus preserving those legacy codes and systems in tact. Because of the component-based architecture, all selected procedures can be registered or de-registered at run-time, and are completely reusable, reconfigurable, and modular.
Author
Gravitational Waves; Data Systems; Detection; Classifications; Algorithms; Extraction

20060054276 Lawrence Livermore National Lab., Livermore, CA USA
Gamma-Ray Bursts Shower the Universe with Metals
Hazi, A.; Jan. 18, 2006; 59 pp.; In English
Report No.(s): DE2006-883619; UCRL-TR-218251; No Copyright; Avail.: Department of Energy Information Bridge

According to the results from a Livermore computer model, some of the small change jingling in your pocket contains zinc and copper created in massive gamma-ray bursts (GRBs) that rank as the most impressive light shows in the universe. Livermore astrophysicist Jason Pruet and his colleagues Rebecca Surman and Gail McLaughlin from North Carolina State University (NCSU) reported on their calculations in the February 20, 2004, issue of ''Astrophysical Journal Letters''. They found that GRBs from black holes surrounded by a disk of dense, hot plasma may have contributed heavily to the galactic inventory of elements such as calcium, scandium, titanium, zinc, and copper. ''A typical GRB of this kind briefly outshines all the stars in millions of galaxies combined'', says Pruet. ''Plus it makes about 100 times as much of some common elements as an ordinary supernova''.
NTIS
Black Holes (Astronomy); Gamma Ray Bursts; Metals; Universe

20060056239 NASA Johnson Space Center, Houston, TX, USA
Early Planetary Differentiation: Comparative Planetology
Jones, John H.; [2006]; 2 pp.; In English; LPI Early Planetary Differentiation Workshop, 9-11 Dec. 2006, Sonoma, CA, USA; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056239; Avail.: CASI: A01, Hardcopy

We currently have extensive data for four different terrestrial bodies of the inner solar system: Earth, the Moon, Mars, and

the Eucrite Parent Body [EPB]. All formed early cores; but all(?) have mantles with elevated concentrations of highly sidero-phile elements, suggestive of the addition of a late 'veneer'. Two appear to have undergone extensive differentiation consistent with a global magma ocean. One appears to be inconsistent with a simple model of 'low-pressure' chondritic differentiation. Thus, there seems to be no single, simple paradigm for understand-ing early differentiation.
Author
Meteoritic Composition; Planetology; Chondrites; Magma; Terrestrial Planets

20060056483 Stanford Linear Accelerator Center, CA, USA, Stanford Univ., Stanford, CA USA
Capella Corona Revisited: A Combined View from XMM-Newton RGS Chandra HETGS, and LETGS
Gu, M. F.; Gupta, R.; Peterson, J. R.; Sako, M.; Kahn, S. M.; Jun. 2006; 38 pp.; In English
Report No.(s): DE2006-884889; SLAC-PUB-11901; No Copyright; Avail.: National Technical Information Service (NTIS)

We present a combined analysis of the X-ray emission of the Capella corona obtained with XMM-Newton RGS, Chandra HETGS, and LETGS. An improved atomic line database and a new differential emission measure (DEM) deconvolution method are developed for this purpose. Our new atomic database is based on the Astrophysical Plasma Emission Database and incorporates improved calculations of ionization equilibrium and line emissivities for L-shell ions of abundant elements using the Flexible Atomic Code. The new DEM deconvolution method uses a Markov Chain Monte-Carlo (MCMC) technique which differs from existing MCMC or (chi)(sup 2)-fitting based methods. We analyze the advantages and disadvantages of each individual instrument in determining the DEM and elemental abundances. We conclude that results from either RGS or HETGS data alone are not robust enough due to their failure to constrain DEM in some temperature region or the lack of significant continuum emission in the wavelength band of the spectrometers, and that the combination of HETGS and RGS gives more stringent constraints on the DEM and abundance determinations. Using the LETGS data, we show that the recently discovered inconsistencies between the EUV and X-ray lines of Fe XVIII and XIX also exist in more highly charged iron ions, up to Fe XXIII, and that enhanced interstellar absorption due to partially ionized plasma along the Capella line of sight may explain some, but not all, of these discrepancies.
NTIS
Coronas; Space Plasmas; X Ray Astronomy; Astronomical Interferometry

91
LUNAR AND PLANETARY SCIENCE AND EXPLORATION

Includes planetology; selenology; meteorites; comets; and manned and unmanned planetary and lunar flights. For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance*.

20060054192 NASA Ames Research Center, Moffett Field, CA, USA
Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus?
Wooden, D. H.; Harker, D. E.; Woodward, C. E.; Ehrenfreund, P.; Geers, V. C.; Waters, L. B. F. M.; Cox, N.; January 2006; 1 pp.; In English; Europlanet 2006, 18-22 Oct. 2006, Lindau, Germany; Copyright; Avail.: Other Sources; Abstract Only

We report on imaging observations of comets 73P-B/Schwassmann-Wachmann 1 and 73P-C/Schwassmann-Wachmann 1 at the IRTF with SpeX (J, K) and MRSI (10 micron narrow band filter set) on 2006 Apr 17-19 UT and 2006 Jun 18-19, and at the VLT with VISIR (1 0 micron narrow band filters, 20 micron) on 2006 Apr 17 UT. Compared to when the comet was in the midst of breaking up in mid-April, in June the tail of 73P-B is much fainter and there is a compact coma detected well separated and ahead of its tail, and fainter than the tail. The width of the tail in J, K, and 10 micron images indicates that the pieces that were shed in April must still be outgassing and releasing small particles into the tail-shaped coma; small grains have relatively short lifetimes in the coma due to radiation pressure. The trailing tail is now well separated from the faint 'leader of the pack' compact coma that we suppose is a remaining piece of the nucleus. It will be interesting to see post-perihelion if this 'leading compact coma' object continues to gain distance on the debris and continues to weakly outgas and shed small grains. One wonders if it expended its volatiles (available to the surface) in breaking up; a short-lived release of volatiles occurred in the Deep Impact event with comet 9P/Tempel 1. 73P-C is extended with a more elongated coma structure closer to perihelion compared to 2006 Apr 18- 19 UT. The SEDs from 2006 Apr and Jun from SpeX-MIRSI (IRTF) are compared with VISIR (VLT) SEDs from 2006 Apr. Information on the heliocentric dependence of the activity and dust release yields insights into the origin of activity and the relationship between activity and grain size distribution/mineralogy.
Author
Space Observations (From Earth); Schwassmann-Wachmann Comet; Comet Heads; Comet Tails; Comet Nuclei

20060054214 NASA Ames Research Center, Moffett Field, CA, USA

Earth After the Moon Forming Impact

Zahnle, Kevin; [2006]; 1 pp.; In English; DPS Meeting, 8-13 Oct. 2006, Pasadena, CA, USA; No Copyright; Avail.: Other Sources; Abstract Only

The Hadean Earth is widely and enduringly pictured as a world of exuberant volcanism, exploding meteors, huge craters, infernal heat, and billowing sulfurous steams; i.e., a world of fire and brimstone punctuated with blows to the head. In the background the Moon looms gigantic in the sky. The popular image has given it a name that celebrates our mythic roots. A hot early Earth is an inevitable consequence of accretion. The Moon-forming impact ensured that Earth as we know it emerged from a fog of silicate vapor. The impact separated the volatiles from the silicates. It took -100 years to condense and rain out the bulk of the vaporized silicates, although relatively volatile elements may have remained present in the atmosphere throughout the magma ocena stage. The magma ocean lasted approx. 2 Myr, its lifetime prolonged by tidal heating and thermal blanketing by a thick (CO2-rich steam atmosphere. Water oceans condensed quickly after the mantle solidified, but for some 10-100 Myr the surface would have stayed warm (approx. 500 K) until the CO2 was removed into the mantle. Thereafter the faint young Sun suggests that a lifeless Earth would always have been evolving toward a bitterly cold ice world, but the cooling trend was frequently interrupted by volcanic or impact induced thaws.

Author

Moon; Earth (Planet); Volcanology; Precambrian Period

20060054231 NASA Ames Research Center, Moffett Field, CA, USA

A Historical Search for the Occurrence of Habitable Ground Ice at the Phoenix Landing Site

Zent, Aaron P.; [2006]; 1 pp.; In English; Fourth Mars Polar Science Conference, 2-6 Oct. 2006, Davos, Switzerland Contract(s)/Grant(s): 439654.02.01.03; No Copyright; ONLINE: http://hdl.handle.net/2060/20060054231; Avail.: CASI: A01, Hardcopy

A numerical model of the thermal history of Martian ground ice at the approximate location of the planned Phoenix landing site has been developed and used to identify instances of relatively warm ground ice over the last 10 Ma. Many terrestrial organisms are adapted to life at or below the freezing temperature of water, and we will use the approximate doubling time of terrestrial microbial populations as a function of temperature, is used as a metric against which to assess the 'habitability' of Martian ground ice.

Derived from text

Habitability; Ice; Microorganisms; Mars Landing Sites; Site Selection

20060054441 NASA Ames Research Center, Moffett Field, CA, USA

An Evaluation of the Vapor Phase Catalytic Ammonia Removal Process for Use in a Mars Transit Vehicle

Flynn, Michael; Borchers, Bruce; [1998]; 1 pp.; In English; Third International Conference Life Support and Biosphere Science, 11-15 Jan. 1998, Lake Buenas Vista, FL, USA; No Copyright; Avail.: Other Sources; Abstract Only

An experimental program has been developed to evaluate the potential of the Vapor Phase Catalytic Ammonia Reduction (VPCAR) technology for use as a Mars Transit Vehicle water purification system. Design modifications which will be required to ensure proper operation of the VPCAR system in reduced gravity are also evaluated. The VPCAR system is an integrated wastewater treatment technology that combines a distillation process with high temperature catalytic oxidation. The distillation portion of the system utilizes a vapor compression distillation process to provide an energy efficient phase change separation. This portion of the system removes any inorganic salts and large molecular weight, organic contaminates, i.e., non-volatile, from the product water stream and concentrates these contaminates into a byproduct stream. To oxidize the volatile organic compounds and ammonia, a vapor phase, high temperature catalytic oxidizer is used. This catalytic system converts these compounds along with the aqueous product into CO2, H2O, and N2O. A secondary catalytic bed can then be used to reduce the N2O to nitrogen and oxygen (although not evaluated in this study). This paper describes the design specification of the VPCAR process, the relative benefits of its utilization in a Mars Transit Vehicle, and the design modification which will be required to ensure its proper operation in reduced gravity. In addition, the results of an experimental evaluation of the processors is presented. This evaluation presents the processors performance based upon product water purity, water recovery rates, and power.

Author

Ammonia; Vapor Phases; Catalytic Activity; Technology Utilization; Mars Roving Vehicles

20060055229 NASA Johnson Space Center, Houston, TX, USA

A LEO Satellite Postmission Disposal Study using LEGEND

Liou, J.-C.; Johnson, Nicholas L.; [2006]; 6 pp.; In English; 55th International Astronautical Congress, 4-8 Oct. 2006, Vancouver, Canada

Contract(s)/Grant(s): WBS 090-28-AP

Report No.(s): IAC-04-IAA.5.12.3.06; Copyright; Avail.: CASI: A02, Hardcopy

This paper summarizes results from two postmission disposal parametric analyses based on the high fidelity NASA orbital debris evolutionary model LEGEND. The first analysis includes a nonmitigation reference scenario and four test scenarios, where the mission lifetimes of spacecraft are set to 5, 10, 20, and 30 years, respectively, before they are moved to the 25-year decay orbits. The comparison among the five scenarios quantifies how a prolonged spacecraft mission lifetime decreases the effectiveness of the 25-year decay rule in the low Earth orbit region. The second analysis includes three 25-year decay postmission disposal scenarios where the mission lifetimes of spacecraft are set to 5 years but with disposal success rates set to 50%, 70%, and 90%, respectively. It illustrates how the postmission disposal success rate impacts the long-term debris environment. The conclusion of this paper is that a prolonged spacecraft mission lifetime and a lower postmission disposal success rate can have noticeable negative impact on the debris environment in the long run.

Author

Low Earth Orbits; Space Debris; Space Missions; Models; Artificial Satellites

20060056230 NASA Johnson Space Center, Houston, TX, USA

Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview

Scheuring, R. A.; Jones, J. A.; Lee, P.; Comtois, J. M.; Chappell, S.; Rafiq, A.; Braham, S.; Hodgson, E.; Sullivan, P.; Wilkinson, N., et al.; [2006]; 1 pp.; In English; AsMA Annual Conference, 6-10 May 2007, New Orleans, LA, USA

Contract(s)/Grant(s): NAS9-02078; Copyright; Avail.: Other Sources; Abstract Only

Medical requirements are currently being developed for NASA's space exploration program. Lunar surface operations for crews returning to the moon will be performed on a daily basis to conduct scientific research and construct a lunar habitat. Inherent to aggressive surface activities is the potential risk of injury to crew members. To develop an evidence-base for handling medical contingencies on the lunar surface, a simulation project was conducted using the moon-Mars analog environment at Devon Island, Nunavut, high Canadian Arctic. A review of the Apollo lunar surface activities and personal communications with Apollo lunar crew members provided a knowledge base of plausible scenarios that could potentially injure an astronaut during a lunar extravehicular activity. Objectives were established to 1) demonstrate stabilization, field extraction and transfer an injured crew member to the habitat and 2) evaluate audio, visual and biomedical communication capabilities with ground controllers at multiple mission control centers. The simulation project s objectives were achieved. Among these objectives were 1) extracting a crew member from a sloped terrain by a two-member team in a 1-g analog environment, 2) establishing real-time communication to multiple space centers, 3) providing biomedical data to flight controllers and crew members, and 4) establishing a medical diagnosis and treatment plan from a remote site. The simulation project provided evidence for the types of equipment and methods needed for planetary space exploration. During the project, the crew members were confronted with a number of unexpected scenarios including environmental, communications, EVA suit, and navigation challenges. These trials provided insight into the challenges of carrying out a medical contingency in an austere environment. The knowledge gained from completing the objectives of this project will be incorporated into the exploration medical requirements involving an incapacited astronaut on the lunar surface.

Author

Lunar Surface; Simulation; General Overviews; NASA Space Programs; Contingency

20060056234 NASA Johnson Space Center, Houston, TX, USA

Metal-Silicate Segregation in Asteroidal Meteorites

Herrin, Jason S.; Mittlefehldt, D. W.; [2006]; 2 pp.; In English; Workshop on Early Planetary Differentiation, 8-10 Dec. 2006, Sonoma, CA, USA; Original contains color illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056234; Avail.: CASI: A01, Hardcopy

A fundamental process of planetary differentiation is the segregation of metal-sulfide and silicate phases, leading eventually to the formation of a metallic core. Asteroidal meteorites provide a glimpse of this process frozen in time from the early solar system. While chondrites represent starting materials, iron meteorites provide an end product where metal has been completely concentrated in a region of the parent asteroid. A complimentary end product is seen in metal-poor achondrites that have undergone significant igneous processing, such as angrites, HED's and the majority of aubrites. Metal-rich achondrites such as acapulcoite/lodranites, winonaites, ureilites, and metal-rich aubrites may represent intermediate stages in the metal

segregation process. Among these, acapulcoite-lodranites and ureilites are examples of primary metal-bearing mantle restites, and therefore provide an opportunity to observe the metal segregation process that was captured in progress. In this study we use bulk trace element compositions of acapulcoites-lodranites and ureilites for this purpose.
Derived from text
Silicates; Iron Meteorites; Asteroids; Metallicity; Separation

20060056235 NASA Johnson Space Center, Houston, TX, USA
Asteroidal Differentiation Processes Deduced from Ultramafic Achondrite Ureilite Meteorites
Downes, Hilary; Mittlefehldt, David W.; Hudson, Pierre; Romanek, Christopher S.; Franchi, Ian; [2006]; 2 pp.; In English; Workshop on Early Planetary Differentiation, 8-10 Dec. 2006, Sonoma, CA, USA; Original contains color illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Ureilites are the second largest achondrite group. They are ultramafic achondrites that have experienced igneous processing whilst retaining some degree of nebula-derived chemical heterogeneity. They differ from other achondrites in that they contain abundant carbon and their oxygen isotope compositions are very heterogeneous and similar to those of the carbonaceous chondrite anhydrous mineral line. Their carbonaceous nature and some compositional characteristics indicative of nebular origin suggest that they are primitive materials that form a link between nebular processes and early periods of planetesimal accretion. However, despite numerous studies, the exact origin of ureilites remains unclear. Current opinion is that they represent the residual mantle of an asteroid that underwent silicate and Fe-Ni-S partial melting and melt removal. Recent studies of short-lived chronometers indicate that the parent asteroid of the ureilites differentiated very early in the history of the Solar System. Therefore, they contain important information about processes that formed small rocky planetesimals in the early Solar System. In effect, they form a bridge between nebula processes and differentiation in small planetesimals prior to accretion into larger planets and so a correct interpretation of ureilite petrogenesis is essential for understanding this critical step.
Derived from text
Achondrites; Asteroids; Mineralogy; Petrogenesis; Ureilites

20060056236 NASA Johnson Space Center, Houston, TX, USA
Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater
Bruckner, J.; Dreibus, G.; Gellert, R.; Clark, B.C.; Cohen, B.; McCoy, T.; Ming, D.W.; Mittlefehldt, D.W.; Yen, A.; Athena Science Team; [2006]; 2 pp.; In English; AGU Fall Meeting, 11-15 Dec. 2006, San Francisco, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

The Alpha Particle X-ray Spectrometer (APXS) onboard the Mars Exploration Rover Spirit continues to determine the elemental composition of samples at Gusev Crater. Starting around sol 600 the rover descended Husband Hill, which is part of the Columbia Hills, visited the inner basin with a large dune field, called 'El Dorado', and parked at Low Ridge to conserve energy during the martian winter. Many unique samples were discovered by the instruments onboard Spirit during her downhill traverse. Here, we report only on the chemical data obtained by the APXS. The compositions of some of the soil samples are comparable to the mean soil determined along the earlier traverse. However, a light-toned subsurface sample (disturbed by the rover wheels), called Dead Sea Samra , showed the highest sulfur content of all soil samples, the lowest Na, Mg, Al, Cl, K, Ca, Ti, Mn, and Zn, among the lowest Si and P, and among the highest Cr, Fe and Ni. Assuming ferric sulfate as a major mineral, large amounts of a pure silica phase must be present. Color and quantity of Dead Sea Samra resemble somewhat an earlier soil called Paso Robles , though the latter is a mixture of sulfates with phosphate-rich soil. Manganese in Dead Sea Samra is so low that the Fe/Mn ratio exceeds 300, a value that has never been found previously on Mars (Fe/Mn ratio of 46 for Gusev basalts), indicating that only Fe(3+) occurs. The dune field El Dorado contained granulated material that exhibited the highest Mg and Ni concentrations and the lowest S and Cl compared to all other soils implying an enrichment of olivine-rich sands. Two outcrops, called Algonquin and Comanche , revealed compositions that differ significantly from those of earlier outcrops as they have the highest concentrations of Mg, Fe, and Ni (except for Ni in Independence) and the lowest of Al, K (detection limit), Ca, and Ti of all brushed and almost all abraded rocks. Normative estimates assign them the highest olivine contents ever found for martian rocks and a very mafic nature based on their high Mg/(Mg+Fe) and low Al, Ca and Na. Their significantly high Ni contents point to a different source than the Gusev plains basalts. The elemental compositions of samples encountered during the downhill traverse revealed a larger chemical diversity of the Columbia Hills than the uphill trek already published.
Author
Alpha Particles; Chemical Composition; Mars Exploration; X Ray Spectrometers; Mars Roving Vehicles; Mars Craters; Planetary Geology

20060056284 NASA Johnson Space Center, Houston, TX, USA

A Reusable Design for Precision Lunar Landing Systems

Fuhrman, Linda; Brand, Timothy; Fill, Tom; Norris, Lee; Paschall, Steve; April 19, 2005; 2 pp.; In English; International Lunar Conference, 18-23 Sept. 2005, Toronto, Canada

Contract(s)/Grant(s): NNJ05HB72C; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056284; Avail.: CASI: A01, Hardcopy

The top-level architecture to accomplish NASA's Vision for Space Exploration is to use Lunar missions and systems not just as an end in themselves, but also as testbeds for the more ambitious goals of Human Mars Exploration (HME). This approach means that Lunar missions and systems are most likely going to be targeted for (Lunar) polar missions, and also for long-duration (months) surface stays. This overacting theme creates basic top-level requirements for any next-generation lander system: 1) Long duration stays: a) Multiple landers in close proximity; b) Pinpoint landings for 'surface rendezvous"; c) Autonomous landing of pre-positioned assets; and d) Autonomous Hazard Detection and Avoidance. 2) Polar and deep-crater landings (dark); 3) Common/extensible systems for Moon and Mars, crew and cargo. These requirements pose challenging technology and capability needs. Compare and contrast: 4) Apollo: a) 1 km landing accuracy; b) Lunar near-side (well imaged and direct-to-Earth com. possible); c) Lunar equatorial (landing trajectories offer best navigation support from Earth); d) Limited lighting conditions; e) Significant ground-in-the-loop operations; 5) Lunar Access: a) 10-100m landing precision; b) 'Anywhere' access includes polar (potentially poor nav. support from Earth) and far side (poor gravity and imaging; no direct-to-Earth com); c) 'Anytime' access includes any lighting condition (including dark); d) Full autonomous landing capability; e) Extensible design for tele-operation or operator-in-the-loop; and f) Minimal ground support to reduce operations costs. The Lunar Access program objectives, therefore, are to: a) Develop a baseline Lunar Precision Landing System (PLS) design to enable pinpoint 'anywhere, anytime' landings; b) landing precision 10m-100m; c) Any LAT, LON; and d) Any lighting condition; This paper will characterize basic features of the next generation Lunar landing system, including trajectory types, sensor suite options and a reference system architecture.

Author

Lunar Landing; Precision; NASA Space Programs; Mars Exploration; Architecture (Computers)

20060056286 NASA Johnson Space Center, Houston, TX, USA

Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers

Klingelhoefer, Goestar; Morris, Richard V.; Schroeder, Christian; Rodionov, Daniel S.; Yen, Albert S.; Ming, Douglas W.; Cohen, Barbara A.; Fleischer, Iris; Mittlefehldt, David W.; McCoy, Tim; de Souza, Paulo Jr.; [2006]; 1 pp.; In English; AGU Fall Meeting, 11-15- Dec. 2006, San Francisco, CA, USA; Copyright; Avail.: Other Sources; Abstract Only

After sol 511 of its mission in Gusev Crater, Spirit traversed from the top of Husband Hill to its current Winter Haven on Low Ridge. M ssbauer analyses of several rock and soil targets along the traverse yielded further evidence for the wide-spread occurrence of aqueous processes in the Columbia Hills. The rock Independence was found on the flank of Husband Hill. It has low total Fe with about 24-30 % of its iron in ilmenite. This assemblage implies alteration under aqueous conditions; some phases were altered and elements such as Fe were leached out, while less soluble Fe-bearing phases such as ilmenite remain. The soil target Dead_Sea_Samra was found in subsurface soil revealed when the wheels dug into soil during the traverse from Husband Hill to Home Plate. Its M ssbauer spectrum shows a high abundance of ferric sulfate, similar to the Paso Robles soil targets found on Husband Hill. At its current location at Winter Haven Spirit investigated the target Halley which appears to be part of a wider-spread indurated layer underlying basaltic soil. This target shows the highest abundance of hematite in all Gusev soil and rock targets investigated to date. Opportunity at Meridiani Planum traversed from the 300 m diameter buried Erebus Crater towards 800 m Victoria Crater. The main components of Meridiani Planum jarosite-bearing outcrop rocks, basaltic soil, and a hematite lag remain remarkably constant in M ssbauer spectra throughout the traverse. Cobbles (rock fragments greater than 1 cm) show variability however. A meteorite (Barberton) has been identified based on kamacite peaks in the M ssbauer spectrum. Other cobbles show Mossbauer spectra similar to jarosite-bearing outcrops, or to basaltic rock, or mixtures thereof, suggesting an origin as impact breccias. Some cobbles were investigated at the edge of the annulus of Victoria Crater from which they may have been excavated. Mossbauer spectra reveal a basaltic signature, dominated by olivine and pyroxene. In general for both rovers the radioactive Mossbauer source became naturally weaker, but both instruments are still able to perform good quality measurements.

Author

Mossbauer Effect; Mars Craters; Mars Surface; Spectrometers; Winter; Mars Exploration

20060056388 NASA Glenn Research Center, Cleveland, OH, USA

Evaluation of Long Duration Flight on Venus

Landis, Geoffrey A.; Colozza, Anthony J.; November 2006; 27 pp.; In English; Original contains color illustrations

Report No.(s): NASA/TM-2006-214452; E-15716; Copyright; Avail.: CASI: A03, Hardcopy

An analysis was performed to evaluate the potential of utilizing either an airship or aircraft as a flight platform for long duration flight within the atmosphere of Venus. In order to achieve long-duration flight, the power system for the vehicle had to be capable of operating for extended periods of time. To accomplish these, two types of power systems were considered, a solar energy-based power system utilizing a photovoltaic array as the main power source and a radioisotope heat source power system utilizing a Stirling engine as the heat conversion device. Both types of vehicles and power systems were analyzed to determine their flight altitude range. This analysis was performed for a station-keeping mission where the vehicle had to maintain a flight over a location on the ground. This requires the vehicle to be capable of flying faster than the wind speed at a particular altitude. An analysis was also performed to evaluate the altitude range and maximum duration for a vehicle that was not required to maintain station over a specified location. The results of the analysis show that each type of flight vehicle and power system was capable of flight within certain portions of Venus s atmosphere. The aircraft, both solar and radioisotope power proved to be the most versatile and provided the greatest range of coverage both for station-keeping and non-station-keeping missions.

Author

Solar Energy; Radioisotope Heat Sources; Airships; Venus Atmosphere; Stirling Engines; Solar Arrays; Photovoltaic Cells

92
SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots. For related information see *93 Space Radiation*.

20060056192 NASA Glenn Research Center, Cleveland, OH, USA

Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation

deGroh, Kim, K.; Dever, Joyce A.; Snyder, Aaron; Kaminski, Sharon; McCarthy, Catherine E.; Rapoport, Alison L.; Rucker, Rochelle N.; October 2006; 21 pp.; In English; Materials Research Society (MRS) Spring Meeting (Symposium II: Materials in Extreme Environments), 17-21 apr. 2006, San Francisco, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 251.30.00

Report No.(s): NASA/TM-2006-212336; E-15572; Copyright; Avail.: CASI: A03, Hardcopy

A section of the retrieved Hubble Space Telescope (HST) solar array drive arm (SADA) multilayer insulation (MLI), which experienced 8.25 years of space exposure, was analyzed for environmental durability of the top layer of silver-Teflon (DuPont) fluorinated ethylene propylene (Ag-FEP). Because the SADA MLI had solar and anti-solar facing surfaces and was exposed to the space environment for a long duration, it provided a unique opportunity to study solar effects on the environmental degradation of Ag-FEP, a commonly used spacecraft thermal control material. Data obtained included tensile properties, solar absorptance, surface morphology and chemistry. The solar facing surface was found to be extremely embrittled and contained numerous through-thickness cracks. Tensile testing indicated that the solar facing surface lost 60% of its mechanical strength and 90% of its elasticity while the anti-solar facing surface had ductility similar to pristine FEP. The solar absorptance of both the solar facing surface (0.155 plus or minus 0.032) and the anti-solar facing surface (0.208 plus or minus 0.012) were found to be greater than pristine Ag-FEP (0.074). Solar facing and anti-solar facing surfaces were microscopically textured, and locations of isolated contamination were present on the anti-solar surface resulting in increased localized texturing. Yet, the overall texture was significantly more pronounced on the solar facing surface indicating a synergistic effect of combined solar exposure and increased heating with atomic oxygen erosion. The results indicate a very strong dependence of degradation, particularly embrittlement, upon solar exposure with orbital thermal cycling having a significant effect.

Author

Hubble Space Telescope; Silver; Teflon (Trademark); Optical Properties; Multilayer Insulation

93
SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth radiation belts. For biological effects of radiation on plants and animals see *51 Life Sciences*; on human beings see 52 Aerospace Medicine. For theory see *73 Nuclear Physics*.

20060056304 Oregon State Univ., Corvallis, OR, USA
Advanced Beta Dosimetry Techniques
January 2006; 14 pp.; In English
Report No.(s): DE2006-882787; No Copyright; Avail.: Department of Energy Information Bridge
No abstract available
Dosimeters; Radiation Sources

20060056405 NASA Johnson Space Center, Houston, TX, USA
Ionizing Radiation Environment on the International Space Station: Performance vs. Expectations for Avionics and Material
Koontz, Steven L.; Boeder, Paul A.; Pankop, Courtney; Reddell, Brandon; 2005; 8 pp.; In English; 2005 IEEE NSREC, 11-15 Jul. 2005, New York, NY, USA; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy

The role of structural shielding mass in the design, verification, and in-flight performance of International Space Station (ISS), in both the natural and induced orbital ionizing radiation (IR) environments, is reported. Detailed consideration of the effects of both the natural and induced ionizing radiation environment during ISS design, development, and flight operations has produced a safe, efficient manned space platform that is largely immune to deleterious effects of the LEO ionizing radiation environment. The assumption of a small shielding mass for purposes of design and verification has been shown to be a valid worst-case approximation approach to design for reliability, though predicted dependences of single event effect (SEE) effects on latitude, longitude, SEP events, and spacecraft structural shielding mass are not observed. The Figure of Merit (FOM) method over predicts the rate for median shielding masses of about 10g/cm(exp 2) by only a factor of 3, while the Scott Effective Flux Approach (SEFA) method overestimated by about one order of magnitude as expected. The Integral Rectangular Parallelepiped (IRPP), SEFA, and FOM methods for estimating on-orbit (Single Event Upsets) SEU rates all utilize some version of the CREME-96 treatment of energetic particle interaction with structural shielding, which has been shown to underestimate the production of secondary particles in heavily shielded manned spacecraft. The need for more work directed to development of a practical understanding of secondary particle production in massive structural shielding for SEE design and verification is indicated. In contrast, total dose estimates using CAD based shielding mass distributions functions and the Shieldose Code provided a reasonable accurate estimate of accumulated dose in Grays internal to the ISS pressurized elements, albeit as a result of using worst-on-worst case assumptions (500 km altitude x 2) that compensate for ignoring both GCR and secondary particle production in massive structural shielding.
Derived from text
Earth Orbital Environments; Ionizing Radiation; Radiation Shielding; International Space Station; Single Event Upsets; Radiation Dosage; Radiation Measurement

20060056470 Brookhaven National Lab., Upton, NY USA
Performance and Capabilities of the NASA Space Radiation Laboratory at BNL
Brown, K. A.; Ahrens, L.; Chiang, I. H.; Gardner, G.; Gassner, D.; Jun. 2006; 10 pp.; In English
Report No.(s): DE2006-884996; BNL-75454-2006-CP; No Copyright; Avail.: Department of Energy Information Bridge

The NASA Space Radiation Laboratory (NSRL) at BNL was commissioned in October 2002 and the facility became operational in July 2003. NSRL was constructed in collaboration with NASA for the purpose of performing radiation effect studies for the NASA space program. NSRL can accept a wide variety of ions from BNL's AGS Booster; these are slow extracted with kinetic energies ranging from 0.3 to 3 GeV/n. Fast extraction from Booster to NSRL has also been developed and used. Many different beam conditions have been produced for experiments at NSRL, including very low intensity. In this report we will describe the facility and its performance over the eight experimental run periods that have taken place since it became operational. We will also describe the current and future capabilities of the NSRL.
NTIS
Radiation Effects; Research Facilities; Laboratories

99
GENERAL

Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs such as Apollo, Gemini, and Mercury spacecraft, Earth Resources Technology Satellite (ERTS), and Skylab; NASA appropriations hearings.

20060056071 NASA Dryden Flight Research Center, Edwards, CA, USA
2004 Research Engineering Annual Report
Stoliker, Patrick, Compiler; Flick, Bradley, Compiler; Cruciani, Everlyn, Compiler; June 2006; 98 pp.; In English; See also 20060056072 - 20060056113; Original contains color and black and white illustrations
Report No.(s): NASA/TM-2006-213677; H-2638; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056071; Avail.: CASI: A05, Hardcopy

Selected research and technology activities at Dryden Flight Research Center are summarized. These activities exemplify the Center's varied and productive research efforts.
Author
Aerodynamics; Flight Control; Research and Development; Flight Tests; Structural Analysis

20060056072 NASA Dryden Flight Research Center, Edwards, CA, USA
Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program
Noffz, Greg; Vaughn, Kimberly; Lefkofsky, Ryan; Palumbo, Nathan; 2004 Research Engineering Annual Report; June 2006, pp. 39-41; In English; See also 20060056071; Original contains color and black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056072; Avail.: CASI: A01, Hardcopy

The loss of the Space Shuttle Columbia because of debris shed from the external tank (ET) has prompted an extensive effort to understand how and why debris is shed and what happens to it after enters the flow field. A spray-on, insulating foam forms the bulk of the thermal protection system (TPS) of the ET. The primary function of TPSs on most launch vehicles is to protect the vehicle from ascent heating. On the Shuttle ET, however, the primary purpose of the foam TPS is to prevent or reduce the formation of ice on the exterior of the tank after it is filled with liquid hydrogen and liquid oxygen, reducing the exposure of the Shuttle to ice shed during launch. Unfortunately, during the course of the program, it was discovered that some of the foam itself is shed during virtually every launch because of a variety of physical mechanisms (ref. 1). The shedded foam consistently takes the shape of a truncated cone called a 'divot.' The objective of the LIFT program was to eject foam divots from the F-15 Flight Test Fixture (FTF) at between 10 and 100 ft/s transverse to the flow field and record the trajectory with high-speed video. This research review summarizes the ground testing of candidate divot ejection systems prior to selection and integration with the aircraft.
Author
Insulation; Ground Tests; Foams; Thermal Protection; Launch Vehicles; Launching; Atmospheric Entry; Aerodynamic Heating; Flight Tests

20060056073 NASA Dryden Flight Research Center, Edwards, CA, USA
The C-17 Throttles-Only Control Evaluation and Simulation Validation
Hansen, Jennifer; McWherter, Shaun; Burcham, Bill; 2004 Research Engineering Annual Report; June 2006, pp. 21-22; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056073; Avail.: CASI: A01, Hardcopy

Throttles-only control (TOC) has been used several times by pilots whose airplanes have suffered degraded control or a loss of hydraulics. Throttles-only control involves throttle manipulation to change heading, control pitch oscillations, turn and bank, and direct all other aspects of control. Fortunately, the twinjet configuration popular in today's commercial fleet [such as the Boeing 757 and 767 (The Boeing Company, Chicago, Illinois), the Airbus A319 (Airbus, Hamburg, Germany), and the Airbus 320 (Airbus, Toulouse, France)] is especially responsive to TOC. The response of TOC on a four-engine configuration such as that of the 747 (The Boeing Company, Chicago, Illinois) and the C-17 (The Boeing Company, Chicago, Illinois) has been the subject of much debate. The NASA Dryden Flight Research Center (DFRC) conducted both simulation and flight tests using TOC to control a C-17 and develop TOC procedures specific to a 4-engine configuration. The flight tests demonstrated more ease of use than the simulation suggested, and further ground research would require a validation of the simulation using flight data.
Author
Control Simulation; Flight Simulation; Flight Tests; Boeing 757 Aircraft; European Airbus

20060056074 NASA Dryden Flight Research Center, Edwards, CA, USA

Development of Portable Fiber Bragg Grating Interrogation System

Parker, Allen R., Jr.; Richards, Lance; Piazza, Anthony; Williams, Gary; 2004 Research Engineering Annual Report; June 2006, pp. 62-63; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056074; Avail.: CASI: A01, Hardcopy

A portable ground-based interrogation system was developed for the study and characterization of fiber Bragg gratings. The system utilizes tunable microelectromechanical system (MEMS) laser technology with fiber Bragg gratings to measure surface strain. A modified wavelength-to-strain algorithm was implemented based on research initiated at the NASA Langley Research Center to maximize computational efficiency. To validate this technology and system, laboratory tests were performed with fiber optic sensors and collocated conventional strain gages. Testing on a cantilever beam showed that the fiber optic strain sensors correlated to within 3-5 percent. Overall, test results show that the system represents a viable laboratory interrogation tool for fiber Bragg gratings.

Author

Bragg Gratings; Fiber Optics; Interrogation; Portable Equipment; Fabrication

20060056075 NASA Dryden Flight Research Center, Edwards, CA, USA

Fiber Optic Sensor Attachment Development and Performance Evaluations

Piazza, Anthony; Hudson, Larry; Richards, Lance; 2004 Research Engineering Annual Report; June 2006, pp. 64-65; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056075; Avail.: CASI: A01, Hardcopy

Research conducted in the Flight Loads Laboratory (FLL) at the NASA Dryden Flight Research Center has subjected fiber optic (FO) sensors to hostile environments for inflight applications and hot-structures ground testing (hypersonic/reentry vehicles). Sensor attachment of both fiber Bragg gratings (FBG) and silica based extrinsic Fabry-Perot interferometers (EFPI) have been accomplished on metallic and composite substrates. The FO sensors have been successfully demonstrated: 1) At room and elevated temperatures (to 1850 F); 2) With combined applied thermal-mechanical loads 3) And on both small laboratory coupons and large-scale structures for ground testing. Further development is required to increase the upper temperature limits to 3000 F for sapphire EFPI sensors.

Author

Fiber Optics; High Temperature; Hypersonic Reentry; Reentry Vehicles; Bragg Gratings; Aerodynamic Loads

20060056076 NASA Dryden Flight Research Center, Edwards, CA, USA

Updating the Finite Element Model to Match Ground Vibration Test Data

Pak, Chan-gi; 2004 Research Engineering Annual Report; June 2006, pp. 70-71; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056076; Avail.: CASI: A01, Hardcopy

A simple and efficient approach for updating analytical finite element models (FEM) to match analytical frequencies and mode shapes to the experimental ground vibration test (GVT) data is introduced in this study. The proposed model updating procedure is based on a series of optimizations. This approach has been successfully applied to create an equivalent beam FEM for the inboard and outboard B-52H (The Boeing Company, Chicago, Illinois) airplane engines and the X-37 Advanced Technology Demonstrator Drogue Chute Test Fixture (DCTF) with the X-planes pylon. The goal was a simple model capable of being analyzed in a captive-carry configuration with the B-52H mother ship. This study has shown that natural frequencies and corresponding mode shapes from the updated FEM achieved at the final optimization iteration have excellent agreement with corresponding measured modal frequencies and mode shapes.

Author

Aircraft Engines; Finite Element Method; Mathematical Models; Vibration Tests; Ground Tests

20060056077 NASA Dryden Flight Research Center, Edwards, CA, USA

The NASA F-15 Intelligent Flight Control Systems: Generation II

Buschbacher, Mark; Bosworth, John; 2004 Research Engineering Annual Report; June 2006, pp. 25-27; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056077; Avail.: CASI: A01, Hardcopy

The Second Generation (Gen II) control system for the F-15 Intelligent Flight Control System (IFCS) program implements direct adaptive neural networks to demonstrate robust tolerance to faults and failures. The direct adaptive tracking controller integrates learning neural networks (NNs) with a dynamic inversion control law. The term direct adaptive is used because the error between the reference model and the aircraft response is being compensated or directly adapted to minimize

error without regard to knowing the cause of the error. No parameter estimation is needed for this direct adaptive control system. In the Gen II design, the feedback errors are regulated with a proportional-plus-integral (PI) compensator. This basic compensator is augmented with an online NN that changes the system gains via an error-based adaptation law to improve aircraft performance at all times, including normal flight, system failures, mispredicted behavior, or changes in behavior resulting from damage.
Author
F-15 Aircraft; Flight Control; Neural Nets; Control Systems Design

20060056078 NASA Dryden Flight Research Center, Edwards, CA, USA
Generic Guidance and Control Law Development for Six-Degree-of-Freedom (DOF) Simulation to Support Conceptual Aircraft Design
Cox, Timothy H.; Cotting, M. Christopher; 2004 Research Engineering Annual Report; June 2006, pp. 30-31; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056078; Avail.: CASI: A01, Hardcopy

Early stages of aircraft design often use trade studies involving simulation and analysis to determine the best design to meet requirements. Typically, models, such as aerodynamics, mass properties, sensors, and actuators frequently and significantly change as various aircraft configurations are studied. The frequency and significance of model variations require large control law changes if 6-DOF simulations are used in this phase of design. Developing a generic set of control laws that require no modifications based on model configuration changes would enhance the 6-DOF simulation as a conceptual aircraft design tool.
Author
Aircraft Design; Control Theory; Degrees of Freedom; Simulation; Aircraft Guidance

20060056079 NASA Dryden Flight Research Center, Edwards, CA, USA
Nonlinear Aeroelastic System Identification with Application to Experimental Data
Kukreja, Sunil L.; Brenner, Martin J.; 2004 Research Engineering Annual Report; June 2006, pp. 83-84; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056079; Avail.: CASI: A01, Hardcopy

Research is under way to identify and represent nonlinear aeroelastic systems as Nonlinear AutoRegressive Moving Average model with eXogenous variables (NARMAX). A nonlinear difference equation describing a simple nonlinear aeroelastic aircraft model was derived theoretically and shown to be of the NARMAX form. Identification methods for NARMAX models are being applied to aeroelastic dynamics, and their properties demonstrated via continuoustime simulations of experimental conditions. Simulation results show that the outputs of the NARMAX model match closely those generated using continuous-time methods and that NARMAX identification methods applied to aeroelastic dynamics provide accurate discrete-time parameter estimates. Application of NARMAX identification to experimental aeroelastic dynamics data gives a high-percent fit for cross-validated data.
Author
Aeroelasticity; Autoregressive Moving Average; Nonlinear Equations; Nonlinearity; System Identification

20060056080 NASA Dryden Flight Research Center, Edwards, CA, USA
A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification
Kukreja, Sunil, L.; Brenner, Marin J.; 2004 Research Engineering Annual Report; June 2006, pp. 85-86; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056080; Avail.: CASI: A01, Hardcopy

Identification of parametric nonlinear models involves estimating unknown parameters and detecting the underlying structure. Structure computation is concerned with selecting a subset of parameters to give a parsimonious description of the system, which may afford greater insight into the functionality of the system or a simpler controller design. In this research, a least absolute shrinkage and selection operator (LASSO) technique is being investigated for computing efficient model descriptions of nonlinear systems. The LASSO minimizes the residual sum of squares by the addition of a 1-norm penalty term on the parameter vector of the traditional 2-norm minimization problem. Use of the LASSO for structure detection is a natural extension of the constrained minimization approach to linear regression problems, which produces some model parameters that are exactly zero and, therefore, yields a parsimonious system description. The performance of this LASSO structure detection method was evaluated by using it to estimate the structure of two nonlinear polynomial models. The applicability of the method to more complex systems, such as those encountered in aerospace applications, was shown by identifying a parsimonious system description of the F/A-18 (McDonnell Douglas Corporation, St. Louis, Missouri and Northrop

Corporation, Newbury Park, California) Active Aeroelastic Wing (AAW) airplane using flight test data.
Author
Nonlinear Systems; Shrinkage; System Identification; Operators (Mathematics)

20060056081 NASA Dryden Flight Research Center, Edwards, CA, USA
Simultaneous Flight Demonstration of Three Wing Deflection Measurement Approaches
Lokos, William A.; Barrows, Danny A.; 2004 Research Engineering Annual Report; June 2006, pp. 81-82; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056081; Avail.: CASI: A01, Hardcopy

This work produced a demonstration of three simultaneous, independent wing elastic structural deflection measurement methods. The deflection measurement methods used were: 1) the electro-optical flight deflection measurement system (FDMS), 2) a standard video-based measurement method, and 3) a digital still-camera-based approach. These systems were flown on the Active Aeroelastic Wing (AAW) F/A-18 (McDonnell Douglas Corporation, St. Louis, Missouri and Northrop Corporation, Newbury Park, California) research airplane shown. The focus of the AAW flight research project was to use wing torsional elasticity as an aid to roll control using modified flight control laws. The left wing upper surface was viewed and tracked by all three systems. Data were produced for steady 1g level cruise, 5g wind-up-turns, and 360-deg rolls.
Author
Deflection; Flight Tests; Research Aircraft; Wings

20060056082 NASA Dryden Flight Research Center, Edwards, CA, USA
Flutter Analysis for the Centerline Instrumented Pylon (CLIP) with Airdata Boom Attachment
Ginn, Starr; 2004 Research Engineering Annual Report; June 2006, pp. 75-76; In English; See also 20060056071; Original contains color and black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056082; Avail.: CASI: A01, Hardcopy

A generic test fixture has been designed and is being fabricated to conduct aerodynamic tests on the F-15B (McDonnell Douglas Corporation, St. Louis, Missouri) test bed airplane. This Centerline Instrumented Pylon (CLIP) flight test fixture is comprised of a modified centerline pylon and splitter plate to shield, as best possible, the test article from the F-15B underside flow disturbances. A finite element model of the CLIP was created from hand measurements to conduct the flutter analysis for flight clearance. The CLIP has the same attachment to the F-15B airplane as a previous Cone Drag Experiment (CDE) which was analytically modeled, ground vibration tested (GVT), and model validated using the GVT data. The validated spring constants that defined the connection from the CDE to the F-15B were used in the CLIP analytical model. With this important structural information there was confidence in a flutter analysis for CLIP using only an analytical model. The flutter analysis showed over a 200 percent flutter margin which permitted no GVT validation. The mode matching technique used for the previous CDE model validation saved time for analyzing the CLIP flight test fixture by eliminating the need for a GVT and real-time monitoring in the control room.
Author
Fabrication; Flutter Analysis; Pylons; Flight Tests; F-15 Aircraft; Mathematical Models

20060056083 NASA Dryden Flight Research Center, Edwards, CA, USA
Displacement Theories for Inflight Deformed Shape Predictions of a Long Span Flying Wing
Ko, William L.; Richards, W. Lance; 2004 Research Engineering Annual Report; June 2006, pp. 78-80; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056083; Avail.: CASI: A01, Hardcopy

Displacement equations have been developed for describing the deformed shapes of a highly-flexible span-loaded high-aspect-ratio wing, typical of many unmanned aerial vehicle (UAV) designs. The displacement equations are expressed in terms of bending and distortion strains to be measured at multiple strain sensing stations on the wing spar surface. The bending and distortion strain data can then be input into the displacement equations for the calculations of slopes, deflections, and twisting of the wing spar at the strain sensing stations for generating the deformed shapes of the wing spar. The displacement equations are validated on a representative thin-walled composite tube using both conventional and fiber optic sensors. Fiber optic strain sensors, along with the computationally-efficient strain-displacement algorithm, form a powerful tool for inflight deformation monitoring of the Helios (AeroVironment, Inc., Monrovia, California) flying-wing-class vehicles.
Author
Deformation; Displacement; Wings; Shape Optimization; Aircraft Structures

20060056084 NASA Dryden Flight Research Center, Edwards, CA, USA

The F-15B Baseline Ground Vibration Testing

Spivey, Natalie; 2004 Research Engineering Annual Report; June 2006, pp. 72-74; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056084; Avail.: CASI: A01, Hardcopy

The NASA Dryden Flight Research Center (DFRC) uses a modified F-15B (McDonnell Douglas Corporation, St. Louis, Missouri) airplane, tail number 836, as a test bed for a variety of flight research experiments mounted underneath the airplane fuselage. This F-15B was selected to fly Gulfstream Aerospace Corporation s Quiet Spike (QS) project; however, this experiment is very unique and unlike any of the previous test bed experiments. The experiment involves the addition of a relatively long QS boom attached to the radar bulkhead of the airplane. This QS experiment is a stepping stone to airframe structural morphing technologies designed to mitigate sonic boom strength. Prior to flying the QS on the F-15B, the QS modal characteristics and coupling effects with the F-15B need to be understood. One of the first steps to understanding these effects is conducting a baseline ground vibration test (GVT) of the F-15B.

Author

Ground Tests; Vibration Tests; F-15 Aircraft; Test Stands

20060056085 NASA Dryden Flight Research Center, Edwards, CA, USA

Higher Resolution Strain Gage Data Acquisition

Hamory, Phil; 2004 Research Engineering Annual Report; June 2006, pp. 46-47; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056085; Avail.: CASI: A01, Hardcopy

Higher resolution and quieter strain gage measurements have been accomplished by means of new in-house electrical circuit board designs. The objective of this undertaking was to obtain strain gage measurement data with up to 16-bit resolution and to minimize the number of wires required to implement the measurements. A 16-bit analog-to-digital converter was integrated onto the strain gage signal-conditioning circuit board, locating the signal-conditioning board as close to the strain gages as possible to keep noise to a minimum. Multiple signal-conditioning boards were connected to a master controller card over a single bus to keep wires to a minimum. The master controller card was used to deliver the data to the aircraft pulse code modulation (PCM) system.

Author

Data Acquisition; Strain Gages; High Resolution; Pulse Code Modulation; Signal Processing; Analog to Digital Converters

20060056086 NASA Dryden Flight Research Center, Edwards, CA, USA

Verification and Validation of Neural Networks in Flight Control Systems

Richard, Michael; Guenther, Kurt; Hodgkinson, John; Soares, Fola; 2004 Research Engineering Annual Report; June 2006, pp. 28-29; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056086; Avail.: CASI: A01, Hardcopy

The Strategic Methodologies for Autonomous & Robust Technology Testing (SMART-T) project is developing verification and validation tools and guidelines for use with neural networks and other adaptive control systems.

Author

Autonomy; Flight Control; Neural Nets; Program Verification (Computers)

20060056087 NASA Dryden Flight Research Center, Edwards, CA, USA

Networked Unmanned Aerial Vehicle Teams (NUAVT)

Ryan, Jack; Hanson, Curt; Jacobson, Steve; 2004 Research Engineering Annual Report; June 2006, pp. 32-34; In English; See also 20060056071; Original contains color and black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056087; Avail.: CASI: A01, Hardcopy

A partnership between the NASA Ames Research Center and the NASA Dryden Flight Research Center (DFRC) explored the ability of small unmanned aircraft to support forest fire fighting using teaming behavior. The Networked UAV Teams project flight tested mission planning algorithms for multi-UAV cooperative transit, area search, and waypoint time-of-arrival that might someday allow the early detection of developing forest fires and support the gathering of images and atmospheric samples to help improve predictions of the future behavior of established fires.

Author

Pilotless Aircraft; Fire Fighting; Forest Fires; Air Sampling

20060056088 NASA Dryden Flight Research Center, Edwards, CA, USA

Meteorological Support for the Pathfinder- Plus Aeroelastic Research Flights

Donohue, Casey; 2004 Research Engineering Annual Report; June 2006, pp. 37-38; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056088; Avail.: CASI: A01, Hardcopy

During the summer and autumn of 2004, the Pathfinder-Plus (AeroVironment, Inc., Monrovia, California) solar-powered unmanned aerial vehicle (UAV) was deployed to the NASA Dryden Flight Research Center (DFRC) for a series of flight tests. The purpose of these flight tests was to better understand the aeroelastic properties of an aircraft with a flexible span loaded structure while flying in turbulence. The project required meteorological support from the NASA DFRC Research Aerodynamics (RA) branch who aided from the conceptual design of the Atmospheric Turbulence Measuring System (ATMS) to the operational, inflight, weather forecasting and analysis.

Author

Meteorological Services; Atmospheric Turbulence; Pilotless Aircraft; Aeroelasticity; Solar Powered Aircraft; Aerodynamics

20060056089 NASA Dryden Flight Research Center, Edwards, CA, USA

Space-based Telemetry and Range Safety (STARS) Phased Array Antenna Controller

Franz, Russ; 2004 Research Engineering Annual Report; June 2006, pp. 55-56; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056089; Avail.: CASI: A01, Hardcopy

A phased array antenna controller (PAAC) has been developed for tracking a Tracking and Data Relay Satellite System (TDRSS) satellite from a maneuvering aircraft. This system leverages work accomplished for the F-15B Embedded GPS/INS Instrumentation System Upgrade project.

Author

Antenna Arrays; Controllers; Phased Arrays; Range Safety; Telemetry

20060056090 NASA Dryden Flight Research Center, Edwards, CA, USA

Internet Protocol Over Telemetry Testing for Earth Science Capability Demo Summary

Franz, Russ; Pestana, Mark; Bessent, Shedrick; Hang, Richard; Ng, Howard; 2004 Research Engineering Annual Report; June 2006, pp. 48-50; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056090; Avail.: CASI: A01, Hardcopy

The development and flight tests described here focused on utilizing existing pulse code modulation (PCM) telemetry equipment to enable on-vehicle networks of instruments and computers to be a simple extension of the ground station network. This capability is envisioned as a necessary component of a global range that supports test and development of manned and unmanned airborne vehicles.

Author

Earth Sciences; Internets; Protocol (Computers); Pulse Code Modulation; Telemetry

20060056091 NASA Dryden Flight Research Center, Edwards, CA, USA

Low Cost Ku-Band Satellite Transmitter System

Whiteman, Donald E.; 2004 Research Engineering Annual Report; June 2006, pp. 51-52; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056091; Avail.: CASI: A01, Hardcopy

The NASA Space-based Telemetry and Range Safety (STARS) program has tested a low-cost Ku-Band transmitter alternative for Tracking and Data Relay Satellite System (TDRSS) applications based on an existing inter-range instrumentation group-106 (IRIG-106) shaped offset quadrature phase-shift keying (SOQPSK) transmitter. The data collected indicates that IRIG-based hardware should be capable of providing a low-cost TDRSS option for Ku-Band and S-Band TDRSS return link applications. The existing transmitter hardware is not currently space qualified, however, it can satisfy TDRSS transmitter requirements for suborbital applications such as uninhabited aerial vehicles (UAVs), a significant area of interest at the NASA Dryden Flight Research Center, Edwards, California

Author

Low Cost; Superhigh Frequencies; Range Safety; Radio Transmitters

20060056092 NASA Dryden Flight Research Center, Edwards, CA, USA

Reconfigurable Instrumentation Signal Conditioning

Hamory, Philip J.; Hang, RIchard; 2004 Research Engineering Annual Report; June 2006, pp. 53-54; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056092; Avail.: CASI: A01, Hardcopy

The schematic design of new signal conditioning circuitry for increasing flight research productivity is 80 percent complete. The new design maintains the functionality and research quality performance of existing designs and in addition, enables the remote adjustment of the gain, offset, and filtering settings.

Author

Signal Processing; Reconfigurable Hardware; Data Systems; Instruments; Circuit Boards

20060056093 NASA Dryden Flight Research Center, Edwards, CA, USA

Full Field Thermal Protection System Health Monitoring System for Crew Exploration Vehicles

Kostyk, Christopher; 2004 Research Engineering Annual Report; June 2006, pp. 77; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056093; Avail.: CASI: A01, Hardcopy

The thermal protection system (TPS) of a space vehicle is a very critical system, as the tragic Space Shuttle Columbia accident highlighted. Currently there is no system to monitor the health of a TPS. The instrumentation in use on flight vehicles today consists of traditional sensor systems: thermocouples, strain gages, pressure transducers, and a few others. These sensor systems are all far too heavy to consider for use in implementing a full field health monitoring system using current technology. Fiber optic sensors (specifically fiber Bragg grating (FBG) sensors), however, are extremely lightweight, and have the capability of multiplexing many sensors on one fiber, minimizing system weight and complexity.

Author

Systems Health Monitoring; Thermal Protection; Crew Exploration Vehicle; Aerospace Vehicles

20060056094 NASA Dryden Flight Research Center, Edwards, CA, USA

Flight Test of the Engine Fuel Schedules of the X-43A Hyper-X Research Vehicles

Jones, Thomas; 2004 Research Engineering Annual Report; June 2006, pp. 15-17; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056094; Avail.: CASI: A01, Hardcopy

The Hyper-X program flew two X-43A Hyper-X Research Vehicles (HXRVs) in 2004, referred to as Ship 2 and Ship 3. The scramjet engine of the X-43A research vehicle was autonomously controlled in flight to track a predetermined fueling schedule. Ship 2 flew at approximately Mach 7 and Ship 3 flew at approximately Mach 10.

Author

Flight Tests; Research Vehicles; Refueling; Flight Control; Hypersonic Speed

20060056095 NASA Dryden Flight Research Center, Edwards, CA, USA

Evaluation of Active Aeroelastic Wing Flight Controls Technology

Clarke, Robert; Allen, Michael J.; Dibley, Ryan P.; 2004 Research Engineering Annual Report; June 2006, pp. 18-19; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056095; Avail.: CASI: A01, Hardcopy

Flight tests of research control laws on the Active Aeroelastic Wing (AAW) airplane have been accomplished. Eighteen low-altitude transonic and supersonic test points were specifically selected by the project to evaluate AAW technology. In the first part of the three and one-half month flight test program, flight tests concentrated on safely addressing open questions about the aerodynamic modeling used for flight control design. Once those issues were put to rest, new overlays were developed in the last month of flying to allow additional testing at 13 of the 18 test points.

Author

Active Control; Flight Control; Aeroelasticity; Flight Tests

20060056096 NASA Dryden Flight Research Center, Edwards, CA, USA

The Dryden Aerospike Rocket Test

Bui, Trong; 2004 Research Engineering Annual Report; June 2006, pp. 61; In English; 41st AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit, July 2005, USA; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056096; Avail.: CASI: A01, Hardcopy

The Dryden Aerospike Rocket Test Director Discretionary Fund Project conducted atmospheric flight research of the

aerospike rocket nozzle using high-power rockets. Although the advantages of the aerospike rocket nozzles are well understood through analysis and ground testing, the lack of flight test data has precluded the use of these nozzles in the current generation of aerospace vehicles. Commercial high-power rockets provided a convenient, inexpensive test bed to conduct aerospike flight research. The conventional nozzles in high-power solid rocket motors were replaced by aerospike nozzles, and the instrumented rockets were then flown, resulting in the first known supersonic flights of aerospike rockets.
Author
Aerospike Engines; Flight Tests; Rocket Nozzles; Solid Propellant Rocket Engines; Test Stands

20060056097 NASA Dryden Flight Research Center, Edwards, CA, USA
Autonomous Soaring for Small Unmanned Aerial Vehicles (UAVs)
Allen, Michael J.; 2004 Research Engineering Annual Report; June 2006, pp. 35-36; In English; See also 20060056071; Original contains color illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056097; Avail.: CASI: A01, Hardcopy

One relatively unexplored way to improve the performance of an autonomous aircraft is to use buoyant plumes of air found in the lower atmosphere called thermals or updrafts. Updrafts are commonly used by glider pilots and birds to improve range, endurance, and cross-country speed. A small electric-powered UAV can extend its maximum duration 7 times longer using updrafts (ref. 1). Average endurance was found to be 4 times longer in simulation. The objective of this effort is to flight test autonomous soaring algorithms on a small UAV.
Author
Flight Tests; Pilotless Aircraft; Autonomy; Soaring; Buoyancy

20060056098 NASA Dryden Flight Research Center, Edwards, CA, USA
The X-43A (Hyper-X) Flies Into the Record Books
Grindle, Laurie; Bahm, Catherine; 2004 Research Engineering Annual Report; June 2006, pp. 1-3; In English; See also 20060056071; Original contains color and black and white illustrations; No Copyright; ONLINE:
http://hdl.handle.net/2060/20060056098; Avail.: CASI: A01, Hardcopy

The goal of the Hyper-X research program, conducted jointly by the NASA Dryden Flight Research Center and the NASA Langley Research Center, was to demonstrate and validate the technology, experimental techniques, and computation methods and tools for design and performance predictions of a hypersonic aircraft with an airframe-integrated, scramjet propulsion system. Three X-43A airframe-integrated, scramjet research vehicles were designed and fabricated to achieve that goal by flight test: two test flights at Mach 7 and one test flight at Mach 10. The first flight, conducted on June 2, 2001, experienced a launch vehicle failure and resulted in a 9-month mishap investigation. A two-year return-to-flight effort ensued and concluded when the second Mach 7 flight was successful on March 27, 2004. Just eight months later, on November 16, the X-43A successfully completed the third and final flight. These two flights were the first flight demonstrations, at Mach 7 and Mach 10 respectively, of an airframe-integrated, scramjet-powered, hypersonic vehicle.
Author
Hypersonic Aircraft; Flight Tests; Supersonic Combustion Ramjet Engines; Performance Prediction; Aircraft Design

20060056099 NASA Dryden Flight Research Center, Edwards, CA, USA
The X-37 Hot Structure Control Surface Testing
Hudson, Larry D.; Stephens, Craig A.; 2004 Research Engineering Annual Report; June 2006, pp. 87-89; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE:
http://hdl.handle.net/2060/20060056099; Avail.: CASI: A01, Hardcopy

Thermal-structural testing of three hot structure control surface subcomponent test articles (STA) designed for the X-37 (Boeing Phantom Works, Huntington Beach, California) Orbital Vehicle (OV) has been completed. The test articles were subcomponents of the X-37 OV bodyflap and flaperon control surfaces.
Author
Hot Surfaces; X-37 Vehicle; Fabrication; Flaps (Control Surfaces)

20060056100 NASA Dryden Flight Research Center, Edwards, CA, USA
Verification of the Active Aeroelastic Wing Aerodynamic Model with Flight Test Results
Cumming, Stephen; 2004 Research Engineering Annual Report; June 2006, pp. 20; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056100; Avail.: CASI: A01, Hardcopy

During phase II of the Active Aeroelastic Wing (AAW) project, test flights were conducted using control laws designed using an aerodynamic model developed at the NASA Dryden Flight Research Center. These flights allowed a unique opportunity to evaluate the accuracy and adequacy of the aerodynamic model. Aerodynamic responses from flight were compared with responses from the F-18 airplane simulation using the aerodynamic model. Overall, the aerodynamic model was found to be adequate for control law design and as a predictive tool for aircraft behavior.
Author
Aerodynamic Characteristics; Proving; Control Theory; Flight Tests; Aeroelasticity; Accuracy

20060056101 NASA Dryden Flight Research Center, Edwards, CA, USA
Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm
Brenner, Martin J.; 2004 Research Engineering Annual Report; June 2006, pp. 66-67; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056101; Avail.: CASI: A01, Hardcopy

This research investigates the utility of the Hilbert Huang Transform (HHT) for the analysis of aeroelastic flight data. It is well known that the classical Hilbert transform can be used for time-frequency analysis of functions or signals. Unfortunately, the Hilbert transform can only be effectively applied to an extremely small class of signals, namely those that are characterized by a single frequency component at any instant in time. The recently developed Hilbert Huang algorithm addresses the limitations of the classical Hilbert transform through a process known as empirical mode decomposition. Using this approach, the data is filtered into a series of intrinsic mode functions, each of which admits a well-behaved Hilbert transform. In this manner, the Hilbert Huang algorithm affords time-frequency analysis of a large class of signals. This powerful tool has been applied in the analysis of scientific data, structural system identification, mechanical system fault detection, and even image processing. The purpose of this research is to demonstrate the potential applications of the Hilbert Huang algorithm for the analysis of aeroelastic systems, with improvements such as localized online processing. Applications for correlations between system input and output, and among output sensors, characterize the time-varying amplitude and frequency correlations present in the various components of multiple data channels. Online stability analyses and modal identification are new applications for the algorithm, particularly in the area of aeroelastic and aeroservoelastic systems analysis.
Author
Algorithms; Hilbert Transformation; Data Processing; Flight Tests

20060056102 NASA Dryden Flight Research Center, Edwards, CA, USA
The X-43A Force and Moment Analysis
Davis, Mark; 2004 Research Engineering Annual Report; June 2006, pp. 9-10; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056102; Avail.: CASI: A01, Hardcopy

Airframe accelerations and rotational rates measured during force and moment analysis maneuvers provided a continuous record of the vehicle body axis aerodynamic forces and moments. These maneuvers were conducted in a Mach range of 9.60 to 0.76, at an altitude range of 110,000 ft to sea level, with a dynamic pressure range of 1100 to 550 psf, and an observed angle of attack range of 3 to 9 deg. These flight measurements were then compared with preflight predictions based on wind tunnel test data. The comparisons covered topics such as stability and control characteristics, static margins, longitudinal and lateral-directional characteristics, and aerodynamic characteristics in this flight regime.
Author
Method of Moments; X-43 Vehicle; Aerodynamic Forces; Wind Tunnel Tests

20060056103 NASA Dryden Flight Research Center, Edwards, CA, USA
Hyper-X Research Vehicle Mach 7 and Mach 10 Mission Guidance, Navigation, and Control Performance
Baumann, Ethan; Bahm, Cathy; Strpvers. Brian; 2004 Research Engineering Annual Report; June 2006, pp. 7-8; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056103; Avail.: CASI: A01, Hardcopy

The Hyper-X program culminated in two successful flights in 2004 of the X-43A, also known as the Hyper-X Research Vehicle (HXRV). The first flight of 2004 occurred on March 27 and reached a top speed of Mach 6.9. During this mission, the HXRV demonstrated the first inflight operation of an airframe-integrated scramjet engine. All of the objectives for the Mach 7 mission were accomplished including separation from the HXLV, vehicle acceleration during the scramjet test, and controlled flight to an impact in the Pacific Ocean. The second mission, to Mach 10, occurred on November 16, 2004. The

HXRV achieved a maximum Mach number of 9.7. All of the mission objectives for the Mach 10 mission were accomplished.
Author
Hypersonic Speed; Research Vehicles; Supersonic Speed; Navigation; Flight Control

20060056104 NASA Dryden Flight Research Center, Edwards, CA, USA
Predictions of Aerostructures Operational Flight Life Using the Half-Cycle Crack Growth Program
Ko, William L.; Tran, Van T.; 2004 Research Engineering Annual Report; June 2006, pp. 68-69; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056104; Avail.: CASI: A01, Hardcopy

The half-cycle crack growth theory was incorporated into the Ko closed-form aging theory for the predictions of operational flight life of failure-critical aerostructural components. A new crack growth computer program was written to determine the maximum and minimum loads of each half-cycle from the random loading spectra for crack growth calculations. The outputs from this program were used to generate crack growth curves. The unified theories were then applied to calculate the number of flights permitted for the B-52B (The Boeing Company, Chicago, Illinois) airplane pylon hooks and the Pegasus (Orbital Sciences Corporation, Dulles, Virginia) adapter pylon hooks to carry the Pegasus rocket X-43 for air launching. A crack growth curve for each hook was generated for visual observation of the crack growth behavior during the entire airlaunching flight. It was found that taxiing, takeoff run, and landing induced major portion of the total crack growth per flight.
Author
Computer Programs; Crack Propagation; X-43 Vehicle; Aircraft Structures

20060056105 NASA Dryden Flight Research Center, Edwards, CA, USA
The F-15B Embedded Global Positioning System/Inertial Navigation System Instrumentation System Upgrade
Franz, Russ; 2004 Research Engineering Annual Report; June 2006, pp. 44-45; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056105; Avail.: CASI: A01, Hardcopy

An embedded global positioning system/inertial navigation system (GPS/INS) has been incorporated into the existing instrumentation system of the NASA Dryden Flight Research Center F-15B (McDonnell Douglas Corporation, St. Louis, Missouri) airplane. This system provides aircraft state information as part of the aircraft pulse coded modulation (PCM) stream and is available in the control room in real time and through the flight data access system (FDAS) postflight.
Author
Global Positioning System; Inertial Navigation; Real Time Operation; Coding; Data Systems; Pulse Modulation; Ground Based Control

20060056106 NASA Dryden Flight Research Center, Edwards, CA, USA
Shaped Sonic Boom Experiment
Haering, Edward A.,Jr.; Coen, Peter G.; 2004 Research Engineering Annual Report; June 2006, pp. 42-43; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056106; Avail.: CASI: A01, Hardcopy

The most significant technology barrier for unrestricted supersonic flight is the loudness of the sonic boom. The validated ability to shape aircraft to lower the resulting ground disturbance caused by the sonic boom is a major breakthrough for potential future development of environmentally acceptable supersonic aircraft. The 2004 Shaped Sonic Boom Experiment (SSBE) was designed to build on the success of the Defense Advanced Research Projects Agency (DARPA), NASA, and Northrop Shaped Sonic Boom Demonstration (SSBD) in 2003.
Author
Sonic Booms; Loudness; Supersonic Aircraft; Supersonic Flight

20060056107 NASA Dryden Flight Research Center, Edwards, CA, USA
Two Serial Data to Pulse Code Modulation System Interfaces
Hamory, Phil; 2004 Research Engineering Annual Report; June 2006, pp. 57-59; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056107; Avail.: CASI: A01, Hardcopy

Two pulse code modulation (PCM) system interfaces for asynchronous serial data are described. One interface is for global positioning system (GPS) data on the NASA Dryden Flight Research Center (DFRC) F-15B (McDonnell Douglas

Corporation, St. Louis, Missouri) airplane, tail number 836 (F-15B/836). The other is for flight control computer data on the duPont Aerospace (La Jolla, California) DP-1, a 53-percent scale model of the duPont Aerospace DP-2.
Author
Pulse Code Modulation; Scale Models; F-15 Aircraft; Digital Data

20060056108 NASA Dryden Flight Research Center, Edwards, CA, USA
Study of the New Air-Launched Small Missile (ALSM) Phoenix Hypersonic Flight Research Test Bed
Bui, Trong; 2004 Research Engineering Annual Report; June 2006, pp. 60; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056108; Avail.: CASI: A01, Hardcopy

A new test bed for hypersonic flight research is proposed. Named the Air-Launched Small Missile (ALSM) Phoenix hypersonic flight research test bed, it was conceived to help address the current lack in hypersonic flight research capabilities. The Phoenix ALSM test bed results from the utilization of two unique and very capable flight assets: the U.S. Navy Phoenix AIM-54 guided air-to-air missile and the NASA Dryden Flight Research Center F-15B (McDonnell Douglas Corporation, St. Louis, Missouri) flight research airplane. Preliminary studies indicate that the Phoenix missile is a highly capable platform. When launched from a high-performance aircraft, the guided Phoenix missile can boost research payloads to low hypersonic Mach numbers, enabling cost-effective, quick-turnaround flight research in the supersonic-to-hypersonic transitional flight envelope. Experience gained from developing and operating the ALSM Phoenix test bed will be valuable for the development and operation of future higher-performance ALSM hypersonic flight test beds as well as responsive microsatellite and small-payload air-launched space boosters.
Author
Air Launching; Air to Air Missiles; Hypersonic Flight; Research Aircraft; Test Stands

20060056109 NASA Dryden Flight Research Center, Edwards, CA, USA
Damage Emulation in the Dryden C-17 Simulation Estimating Maximum Torque Tolerance
McWherter, Shaun; 2004 Research Engineering Annual Report; June 2006, pp. 23-24; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056109; Avail.: CASI: A01, Hardcopy

One of the goals of the Damage Adaptive Control Systems (DACS) project is to develop and integrate high-fidelity damage models into various commercial aircraft simulations. These damage models are to be representative of a wide variety of instances of shoulder-launched-missile-inflicted damage. The goal of this study was to explore a method of emulating damage not through exact modeling, but rather through determining maximum tolerable aerodynamic effect for a variety of system failure scenarios in a simulation environment. This phase of the study is considered a preliminary assessment and was performed in the NASA Dryden Flight Research Center (DFRC) C-17 simulator.
Author
System Failures; Adaptive Control; Commercial Aircraft; In-Flight Monitoring; Damage

20060056110 NASA Dryden Flight Research Center, Edwards, CA, USA
The X-43A Flight System Highlights and Challenges for the Second and Third Flights
Lin, Yohan; 2004 Research Engineering Annual Report; June 2006, pp. 4-6; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056110; Avail.: CASI: A01, Hardcopy

The following sections summarize tests that were performed on the X-43A Hyper-X Research Vehicle (HXRV) and Hyper-X Launch Vehicle (HXLV) in preparation for two flight tests in 2004. The first section covers the first flight at Mach 7 and the second section covers the flight at Mach 10. The challenges encountered during the verification and validation effort are presented, along with results and highlights.
Author
Flight Tests; Hypersonic Speed; Launch Vehicles; Research Vehicles

20060056111 NASA Dryden Flight Research Center, Edwards, CA, USA
The X-43 Parameter Identification Research
Smith, Mark; 2004 Research Engineering Annual Report; June 2006, pp. 12; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056111; Avail.: CASI: A01, Hardcopy

Initial analyses of flights 2 and 3 have been completed. Analysis covered longitudinal and lateral/directional analysis. The results of the flight 2 parameter identification (PID) led to the desire to make updates to the PID maneuvers used by the X-43A

Hyper-X Research Vehicle (HXRV). The data from flight 2 was used in conjunction with simulations to redefine and redesign the PID maneuvers used for flight 3. For both flight 2 and 3, the descent PID maneuvers were nominal.
Author
Research Vehicles; Hypersonic Aircraft; Parameter Identification

20060056112 NASA Dryden Flight Research Center, Edwards, CA, USA
The X-43A Flush Airdata Sensing Research
Davis, Mark; Baumann, Ethan; 2004 Research Engineering Annual Report; June 2006, pp. 13-14; In English; See also 20060056071; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056112; Avail.: CASI: A01, Hardcopy

A flush airdata sensing (FADS) system was flight tested on two X-43A Hyper-X Research Vehicle (HXRV) missions, providing a unique opportunity to validate the system in the hypersonic flight regime. The FADS system was used on three flight tests from Mach 0.8 to Mach 9.6, with an angle of attack ranging from 6 to 15 deg and an angle of sideslip ranging from 3. The FADS system provided estimation of angle of attack, angle of sideslip, and dynamic pressure.
Author
X-43 Vehicle; Air Data Systems; Detection; Flight Tests; Aircraft Configurations

20060056113 NASA Dryden Flight Research Center, Edwards, CA, USA
The X-43A and B-52B Tunnel Test
Davis, Mark; 2004 Research Engineering Annual Report; June 2006, pp. 11; In English; See also 20060056071; Original contains black and white illustrations; No Copyright; ONLINE: http://hdl.handle.net/2060/20060056113; Avail.: CASI: A01, Hardcopy

A low speed wind tunnel test was performed with a 3-percent-scale model of the Orbital Sciences Corporation (Dulles, Virginia) Pegasus(Registered TradeMark) booster rocket mated to the X-43A research vehicle and the B-52B (The Boeing Company, Chicago, Illinois) airplane. The test was conducted both in freestream [for the Hyper-X Launch Vehicle (HXLV)] and in the presence of a partial model of the B-52B launch vehicle. The objectives of the test were to obtain force and moment data to generate structural loads affecting the pylon of the B-52B and to determine the aerodynamic influence of the B-52B on the HXLV for evaluating launch separation characteristics. The data gathered was used to develop loads models and for use in engineering simulation
Author
Wind Tunnel Tests; Low Speed Wind Tunnels; Research Vehicles; Scale Models; Simulation

20060056184 Government Accountability Office, Washington, DC, USA
Coast Guard: Condition of Some Aids-to-Navigation and Domestic Icebreaking Vessels Has Declined; Effect on Mission Performance Appears Mixed
Sep. 2006; 61 pp.; In English
Report No.(s): PB2007-101009; GAO-06-979; No Copyright; Avail.: CASI: A04, Hardcopy

The marine transportation system is a critical part of the nation's infrastructure. To facilitate the safety and efficiency of this system, the Coast Guard maintains aids-to-navigation (ATON), such as buoys and beacons, and conducts domestic icebreaking in the Great Lakes, St. Lawrence Seaway, and northeast coast. To conduct these missions, the Coast Guard has a fleet of more than 200 vessels, ranging from 225-foot seagoing buoy tenders and 140-foot domestic icebreakers to 21-foot boats. After the terrorist attacks of September 11, 2001, many of these assets took on additional responsibilities for security patrols and other homeland security duties. Although some assets have been recently acquired, many others are reaching or have exceeded their design service lives, raising concerns about how well and for how much longer these older assets may be able to carry out their missions. In response, GAO examined (1) recent trends in the amount of time these assets have spent performing missions; (2) asset condition and its effect on mission performance; and (3) the actions taken by the Coast Guard to continue to achieve the missions of these assets. To conduct this work, GAO reviewed Coast Guard documents, interviewed Coast Guard officials, and made site visits to various locations around the country. In commenting on a draft of this report, the Coast Guard provided technical comments, which were incorporated as appropriate.
NTIS
Coasts; Marine Transportation; Navigation Aids; Security; Ships

Subject Term Index

ABDOMEN

Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

ABERRATION

Stability of Radiation Induced Chromosome Damage in Human Peripheral Blood Lymphocytes – 186

ABLATIVE MATERIALS

Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

ABORT TRAJECTORIES

Entry Abort Determination using Non-adaptive Neural Networks for Mars Precision Landers – 28

ABSORPTION SPECTRA

Astrochemistry: Recent Advances in the Study of Carbon Molecules in Space – 276

ABSTRACTS

Diagnosis and Treatment of Combat Related Post-Traumatic Stress Disorder. An Abstract Bibliography – 270

U.S. Geological Survey National Computer Technology Meeting (7th): Program and Abstracts, Held in New Orleans, Louisiana, April 10-15, 1994 – 193

AC GENERATORS

Alternator Electrical Feedthrough Insulator Materials for Project Prometheus(B-MT(AMSI)-44) – 256

Performance and Operational Characteristics for a Dual Brayton Space Power System With Common Gas Inventory – 31

ACCELERATION (PHYSICS)

Biological Parameters of Impact – 15

Hit-to-Kill Guidance Algorithm for the Interception of Ballistic Missiles During the Boost Phase – 207

ACCELERATION TOLERANCE

Association of Hormonal Responses and Performance of Student Pilots during Acceleration Training on the Human Centrifuge – 135

Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory – 142

ACCELERATORS

Helical Pulse Line Structures for Ion Acceleration – 244

ACCELEROMETERS

Monitor Activity, Temperature and Heart Rate with a Mouse Telemeter to be used for Animal Research on Board the International Space Station – 127

ACCESS CONTROL

Access Control to Information in Pervasive Computing Environments – 267

Analytical Modeling of Medium Access Control Protocols in Wireless Networks – 219

Software Defined Radio Prototype (I): System Design and Performance Evaluation – 191

ACCIDENTS

The Disposal of Spacecraft and Launch Vehicle Stages in Low Earth Orbit – 26

ACCURACY

Guided Standoff Weapons: A Threat to Expeditionary Air Power – 6

Verification of the Active Aeroelastic Wing Aerodynamic Model with Flight Test Results – 291

ACHONDRITES

Asteroidal Differentiation Processes Deduced from Ultramafic Achondrite Ureilite Meteorites – 280

ACOUSTIC ATTENUATION

Bouchon d'oreille a attenuation active adaptee aux bruits d'helicoptere (Ear Plugs for Active Attenuation Adapted for Helicopter Noises) (Gehoerschutzstopsel mit aktriver Daempfung, geeignet fuer Hubschrauberlaerm) – 13

ACOUSTIC DUCTS

On the Development of an Efficient Parallel Hybrid Solver with Application to Acoustically Treated Aero-Engine Nacelles – 17

ACOUSTIC SCATTERING

Three-Dimensional Analysis of Azimuthal Dependence of Sound Propagation through Shallow-Water Internal Solitary Waves – 44

ACOUSTICS

A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

Application of the Bootstrap Statistical Method in Deriving Vibroacoustic Specifications – 100

Experimental Measures of Blast and Acoustic Trauma in Marine Mammals – 167

Implementation of a Distributed Time Based Simulation of Underwater Acoustic Networking Using Java – 252

Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results – 269

ACTINIDE SERIES

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 46

ACTIVATION (BIOLOGY)

Inactivation of Bacillus Anthracis Spores Delivered as Liquid Suspension or Aerosol to Self-Decontaminating Fabric – 55

ACTIVATION ENERGY

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

ACTIVE CONTROL

Development of a Test Facility for Air Revitalization Technology Evaluation – 8

Evaluation of Active Aeroelastic Wing Flight Controls Technology – 290

Gain-Scheduled Fault Tolerance Control Under False Identification – 19

Rate-Based Model Predictive Control of Turbofan Engine Clearance – 19

ACTUATORS

Rate-Based Model Predictive Control of Turbofan Engine Clearance – 19

ADAPTATION

Adaptation of the Baroreflex Sensitivity to Microgravity: Data from the STS-107 Columbia Mission – 152

Angiotensinogen Expression in Vascular Tissues of Simulated Weightless Rats – 153

Centrifugation Effects on Estrous Cycling, Mating Success and Pregnancy Outcome in Rats – 156

Hardware Development for Electrophysiological Long-Term Studies in Space – 141

Heart Rate Variability in Evaluation of Functional State and Types of Autonomic Regulation under Conditions of Space Flight – 132

Improving the Performance of Perfectly Matched Layers by Means of hp-Adaptivity – 243

Neurovestibular Adaptation to Short Radius Centrifugation – 150

On-line Robot Adaptation to Environmental Change – 239

Optimizing CAT-ASVAB Item Selection Using Form Assembly Techniques – 241

Rapid Nitric Oxide Production by Bone Cells in Response to Mechanical Vibration – 148

SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

ADAPTERS
40‘x44’ Metal Pallet With Metal Adapters With PA125 Metal Boxes, MIL-STD-1660 First Article Tests – 58

ADAPTIVE CONTROL
Damage Emulation in the Dryden C-17 Simulation Estimating Maximum Torque Tolerance – 294

ADDING CIRCUITS
Adding Faster with Application Specific Early Termination – 213

ADDITIVES
Advanced Fuel Development and Fuel Combustion. Delivery Order 0005: Mitigation of Particulates Using Fuel Additives – 56

ADENOSINE TRIPHOSPHATE
Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent – 127

ADIPOSE TISSUES
Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

ADJUSTING
Recent Progress Designing Compact Superconducting Final Focus Magnets for the ILC – 244

ADRENAL GLAND
Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

ADRENOCORTICOTROPIN (ACTH)
Association of Hormonal Responses and Performance of Student Pilots during Acceleration Training on the Human Centrifuge – 135

ADSORBENTS
Decomposition of GD on CeO2/Alumina Adsorbents in a Gas Chromatograph On-Column Injector Tube Reactor – 42

ADSORPTION
Dual Control Cell Reaction Ensemble Molecular Dynamics: A Method for Simulations of Reactions and Adsorption in Porous Materials – 39

AEROACOUSTICS
On the Development of an Efficient Parallel Hybrid Solver with Application to Acoustically Treated Aero-Engine Nacelles – 17

AEROCAPTURE
Mars Aerocapture Systems Study – 29

AERODYNAMIC CHARACTERISTICS
Aerodynamic Characteristic of the A3 DRDC-ISL Reference Projectile: Missile with Lattice Fins – 2

Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results – 86

Verification of the Active Aeroelastic Wing Aerodynamic Model with Flight Test Results – 291

AERODYNAMIC COEFFICIENTS
Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results – 86

AERODYNAMIC FORCES
Orion Aerodynamics for Hypersonic Free Molecular to Continuum Conditions – 3

The X-43A Force and Moment Analysis – 292

AERODYNAMIC HEATING
Arc Jet Flow Properties Determined from Laser- Induced Fluorescence of Atomic Species – 85

Fabrication of 0.0075-Scale Orbiter Phosphor Thermography Test Models for Shuttle RTF Aeroheating Studies – 85

Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

AERODYNAMIC LOADS
Fiber Optic Sensor Attachment Development and Performance Evaluations – 285

AERODYNAMICS
2004 Research Engineering Annual Report – 284

Meteorological Support for the Pathfinder- Plus Aeroelastic Research Flights – 289

AEROELASTICITY
Evaluation of Active Aeroelastic Wing Flight Controls Technology – 290

Meteorological Support for the Pathfinder- Plus Aeroelastic Research Flights – 289

Nonlinear Aeroelastic System Identification with Application to Experimental Data – 286

Verification of the Active Aeroelastic Wing Aerodynamic Model with Flight Test Results – 291

AEROGELS
Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

AERONAUTICS
An Overview of the Role of Systems Analysis in NASA’s Hypersonics Project – 1

AEROSHELLS
Mars Aerocapture Systems Study – 29

AEROSOLS
Aerodynamic Aerosol Concentrators – 91

Characteristics and Sampling Efficiencies of OMNI 3000 Aerosol Samplers – 43

Characteristics and Sampling Efficiency of Eight-Unit Linear Slot Impactor (EULSI) – 43

Inactivation of Bacillus Anthracis Spores Delivered as Liquid Suspension or Aerosol to Self-Decontaminating Fabric – 54

Optical Properties of Biological Aerosols – 258

Respirator Filter Efficiency Testing Against Particulate and Biological Aerosols Under Moderate to High Flow Rates – 95

AEROSPACE ENGINEERING
A Study on Improving USA Air Force Space Systems Engineering and Acquisition – 24

Documentation of Naval Reactors Papers and Presentations for the Space Technology and Applications International Forum (STAIF) 2006 – 254

Hardware Development for Electrophysiological Long-Term Studies in Space – 141

AEROSPACE ENVIRONMENTS
ESA Ground Based Facilities – 154

Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

AEROSPACE MEDICINE
Astronauts Autonomic Regulation Reserves Evaluation during Pre- and Postflight Examinations – 153

Core Data Model Proposal for Physiology Research in Space – 125

Effect of Sampling Schedule on Pharmacokinetic Parameter Estimates of Promethazine in Astronauts – 129

Managing Space Radiation Risks on Lunar and Mars Missions: Risk Assessment and Mitigation – 186

Mitigation Strategies for Acute Radiation Exposure during Space Flight – 183

Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

The Role of Spatial Disorientation in Fatal General Aviation Accidents – 4

WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

AEROSPACE SAFETY
Status of the SOS-LUX-Toxicity-Test on the International Space Station – 120

AEROSPACE SYSTEMS
A Study on Improving USA Air Force Space Systems Engineering and Acquisition – 24

Biological Parameters of Impact – 15

Update on Extended Operation of Stirling Convertors in Thermal Vacuum at NASA Glenn Research Center – 32

AEROSPACE VEHICLES
Full Field Thermal Protection System Health Monitoring System for Crew Exploration Vehicles – 290

AEROSPIKE ENGINES
The Dryden Aerospike Rocket Test – 291

AFRICA
AIDS in Africa – 170

AFTERBURNING
Reactive Shear Layer Mixing and Growth Rate Effects on Afterburning Properties for Axisymetric Rocket Engine Plumes – 31

AGING (BIOLOGY)
A Role of Peroxidases in Acceleration of the Aging of Potato Minitubers under Influence of Microgravity – 151

Relations Between Prooxidant and Antioxidant Variables in Hypergravity and Aging – 133

AGRICULTURE
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

AIR BREATHING ENGINES
Approaches to Cycle Analysis and Performance Metrics – 89

AIR DATA SYSTEMS
The X-43A Flush Airdata Sensing Research – 295

AIR FILTERS
Evaluation of Low-Pressure Drop Antimicrobial and Hybrid Air Filters – 95

AIR FLOW
Air Flow Patterns Around Several Biological Point Detection System Configurations – 91

AIR INTAKES
Air Flow Patterns Around Several Biological Point Detection System Configurations – 91

AIR LAUNCHING
Study of the New Air-Launched Small Missile (ALSM) Phoenix Hypersonic Flight Research Test Bed – 294

AIR LOCKS
Rationale for Suit and Airlock Dust Mitigation – 271

AIR POLLUTION
Feasibility Study: A Swedish Integrated Assessment Model – 113

Toxecon Retrofit for Mercury and Multi Pollutant Control on Three 90-MW Coal Fired Boilers – 114

Winter Air Quality Study, 2004-2005. Results from Yellowstone National Park – 107

Workers' Exposures to n-Propyl Bromide at a Helicopter Transmission Factory – 110

AIR PURIFICATION
Development of a Test Facility for Air Revitalization Technology Evaluation – 8

Exploration Life Support Directions – 188

AIR QUALITY
Air Quality Criteria for Lead. Volume I of II (October 2006) – 110

Winter Air Quality Study, 2004-2005. Results from Yellowstone National Park – 107

AIR SAMPLING
Networked Unmanned Aerial Vehicle Teams (NUAVT) – 288

AIR TO AIR MISSILES
Study of the New Air-Launched Small Missile (ALSM) Phoenix Hypersonic Flight Research Test Bed – 294

AIR TRAFFIC CONTROL
Required Surveillance Performance Accuracy to Support 3-Mile and 5-Mile Separation in the National Airspace System – 7

The Outcome of ATC Message Complexity on Pilot Readback Performance – 9

AIR TRANSPORTATION
Comparative Evaluation of Air and Auto Travel Between Urban Regions (Quantifying Intercity Modal Accessibility) – 3

Data Collection and Analysis in the Air Travel Planning Domain – 73

Effect of Span Variation on the Performance of a Cross Flow Fan – 6

Evaluation of Cabin Crew Technical Knowledge – 3

Next Generation NASA GA Advanced Concept – 8

AIRCRAFT ACCIDENTS
Aircraft Accidents and Incidents Associated With Visual Disturbances From Bright Lights During Nighttime Flight Operations – 184

Developing A Methodology For Assessing Safety Programs Targeting Human Error In Aviation – 8

The Role of Spatial Disorientation in Fatal General Aviation Accidents – 4

AIRCRAFT CARRIERS
Metrics of METOC Forecast Performance and Operational Impacts on Carrier Strike Operations – 11

Steady-State and Transient Measurements Within a Compressor Rotor During Steam-Induced Stall at Transonic Operational Speeds – 13

AIRCRAFT COMMUNICATION
In-Flight Ratio Frequency Spectrum Measurements of Commercial Aircraft Cabins – 65

AIRCRAFT COMPARTMENTS
Space Cabin Landing Impact Vector Effects on Human Physiology – 15

AIRCRAFT CONFIGURATIONS
The X-43A Flush Airdata Sensing Research – 295

AIRCRAFT CONTROL
Rate-Based Model Predictive Control of Turbofan Engine Clearance – 19

AIRCRAFT DESIGN
Generic Guidance and Control Law Development for Six-Degree-of-Freedom (DOF) Simulation to Support Conceptual Aircraft Design – 286

The X-43A (Hyper-X) Flies Into the Record Books – 291

AIRCRAFT ENGINES
Flow Field Surveys in a Transonic Compressor Rig – 7

Steady-State and Transient Measurements Within a Compressor Rotor During Steam-Induced Stall at Transonic Operational Speeds – 13

Unsteady Casewall Pressure Measurements in a Transonic Compressor during Steam Induced Stall – 18

Updating the Finite Element Model to Match Ground Vibration Test Data – 285

AIRCRAFT GUIDANCE
Generic Guidance and Control Law Development for Six-Degree-of-Freedom (DOF) Simulation to Support Conceptual Aircraft Design – 286

AIRCRAFT INDUSTRY
Aviation Finance: Observations on Potential FAA Funding Options – 8

AIRCRAFT MAINTENANCE
Analyzing Requirements for and Designing a Collaborative Tool Based on Functional and User Input – 16

AIRCRAFT NOISE
Bouchon d'oreille a attenuation active adaptee aux bruits d'helicoptere (Ear Plugs for Active Attenuation Adapted for Helicopter Noises) (Gehoerschutzstopsel mit aktriver Daempfung, geeignet fuer Hubschrauberlaerm) – 13

AIRCRAFT PILOTS
U.S. Army Aviator Job Analysis – 4

AIRCRAFT RELIABILITY
Testing of 7050-T7451 Aluminum Strain-Life Coupons for a Probabilistic Strain-Life Curve – 14

AIRCRAFT SAFETY
Developing A Methodology For Assessing Safety Programs Targeting Human Error In Aviation – 8

Development of an Electrical Wire Interconnect System Risk Assessment Tool – 9

In-Flight Ratio Frequency Spectrum Measurements of Commercial Aircraft Cabins – 65

AIRCRAFT STRUCTURES

Displacement Theories for Inflight Deformed Shape Predictions of a Long Span Flying Wing – 287

Predictions of Aerostructures Operational Flight Life Using the Half-Cycle Crack Growth Program – 293

AIRCRAFT

Biological Parameters of Impact – 15

Transient fault Currents in Aircraft D-C Systems – 16

AIRFRAMES

Improved Seals for High Temperature Airframe Applications – 97

AIRPORTS

Aviation Finance: Observations on Potential FAA Funding Options – 8

Guided Standoff Weapons: A Threat to Expeditionary Air Power – 5

AIRSHIPS

Evaluation of Long Duration Flight on Venus – 282

ALCOHOLS

Effects of Head Down Tilt upon Cortisol and Sex Hormones – 121

ALGORITHMS

A Faster Strongly Polynomial Minimum Cost Flow Algorithm – 231

A New Application of the Channel Packet Method for Low Energy 1-D Elastic Scattering – 107

Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm – 292

Algorithmic and Domain Centralization in Distributed Constraint Optimization Problems – 230

Automated Thermal Camouflage Generation Program Status – 33

Exploring Fields with Shift Registers – 232

Genetic Algorithm Based Optimization of Advanced Solar Cell Designs Modeled in SILVACO ATLAS(Trademark) – 104

Hit-to-Kill Guidance Algorithm for the Interception of Ballistic Missiles During the Boost Phase – 207

LISA Framework for Enhancing Gravitational Wave Signal Extraction Techniques – 276

MPATH: A Loop-free Multipath Routing Algorithm – 219

Probabilistic Reuse of Past Policies – 235

Real Estate Site Selection: An Application of Artificial Intelligence for Military Retail Facilities – 241

Registration for Tactical Imagery: An Updated Taxonomy – 224

Search Algorithms for Software-Only Real-Time Recognition with Very Large Vocabularies – 234

Statement of Work for Studies in BlueGene/L Scalability and Reconfigurability – 189

Tree-Based Hierarchical Reinforcement Learning – 237

Using Dominating Sets to Improve the Performance of Mobile Ad Hoc Networks – 232

ALIGNMENT

Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Relay Telescope, High Power Laser Alignment System, and Laser Peening Method and System Using Same – 259

ALKANES

CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy – 45

ALLOYS

Optimizing Mechanical Properties and Thermal Stability of Age Hardenable Aluminum Alloys Through Theoretical Modeling, Alloy Modification and Thermal Mechanical Processing – 41

ALPHA PARTICLES

Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

ALTERNATING CURRENT

Surge Current Suppression in Power-Factor-Corrected AC-To-DC Converter with Capacitive Load – 84

ALTERNATIVES

Evaluating the Effectiveness of Waterside Security Alternatives for Force Protection of Navy Ships and Installations Using X3D Graphics and Agent-Based Simulation – 197

ALUMINUM ALLOYS

Mechanical and Thermal Properties of Ultra-High Carbon Steel Containing Aluminum – 51

Optimizing Mechanical Properties and Thermal Stability of Age Hardenable Aluminum Alloys Through Theoretical Modeling, Alloy Modification and Thermal Mechanical Processing – 40

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-4. Shipyard Aluminum/Steel Welded Transition Joints – 49

ALUMINUM OXIDES

Decomposition of GD on CeO2/Alumina Adsorbents in a Gas Chromatograph On-Column Injector Tube Reactor – 42

The Effects of Colloidal Processing on the Densification of Titanium Diboride (TiB2) - Alumina (Al2O3) Composites – 41

ALUMINUM

High-Speed Photographic Study of Wave Propagation and Impact Damage in Transparent Aluminum Oxynitride (AION) – 91

Mechanical and Thermal Properties of Ultra-High Carbon Steel Containing Aluminum – 50

Testing of 7050-T7451 Aluminum Strain-Life Coupons for a Probabilistic Strain-Life Curve – 14

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-4. Shipyard Aluminum/Steel Welded Transition Joints – 49

AMBIENCE

Air Quality Criteria for Lead. Volume I of II (October 2006) – 110

AMERICAN INDIANS

Assessing the Effect of Humic Acids on Germinating a Native American Plant – 43

AMINO ACIDS

Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

AMMONIA

An Evaluation of the Vapor Phase Catalytic Ammonia Removal Process for Use in a Mars Transit Vehicle – 278

AMMUNITION

Shallow Water UXO Technology Demonstration Site, Scoring Record Number 2 – 251

AMORPHOUS MATERIALS

New Optical Constants for Amorphous and Crystalline H2O-ice – 257

AMPLIFIERS

Envelope Switched Doherty Power Amplifier For RF Applications (Preprint) – 77

AMPLITUDE DISTRIBUTION ANALYSIS

Electromagnetic Disturbance Measurement by Using Amplitude Probability Distribution for Protecting Digital Wireless Communication Systems – 61

AMPLITUDE MODULATION

Reduction of Residual Amplitude Modulation Frequency-Modulated Signals – 84

ANALOG TO DIGITAL CONVERTERS

Higher Resolution Strain Gage Data Acquisition – 288

ANALOGS

Are You Talking to Me? Dialogue Systems Supporting Mixed Teams of Humans and Robots – 224

ANATOMY
Differentiation of Plant Graviperceiving and Graviresponding Cells in Altered Gravity – 124

ANGIOGENESIS
Angiogenic Signaling in Living Breast Tumor Models – 163

The Clinical Development of Thalidomide as an Angiogenesis Inhibitor Therapy for Prostate Cancer – 167

ANGIOGRAPHY
Detailed Structural Analysis on Retinal Vascular Bed by Automated Computer Processing of Fluorescein Angiography – 133

ANGIOTENSINS
Angiotensinogen Expression in Vascular Tissues of Simulated Weightless Rats – 154

ANGLE OF ATTACK
Hypersonic Laminar Instability on Round Cones Near Zero Angle of Attack – 86

Orion Aerodynamics for Hypersonic Free Molecular to Continuum Conditions – 2

ANGULAR DISTRIBUTION
Development of a Test Facility for Air Revitalization Technology Evaluation – 8

ANGULAR VELOCITY
Do Perception and Postrotatory Vestibulo-Ocular Reflex Share the Same Gravity Reference? – 153

ANIMALS
A Brief Overview of Animal Hypergravity Studies – 130

Experimental Measures of Blast and Acoustic Trauma in Marine Mammals – 167

MISS: Mice on International Space Station – 162

ANNOTATIONS
Interactive Electronic Technical Manuals (IETMs) Annotated Bibliography – 270

ANNUAL VARIATIONS
Rip Channel Migration in the Nearshore – 92

ANOMALIES
Detecting, Classifying, and Handling Contradictions in a Large, Dynamic Information Environment – 226

Sample Entropy and Random Forests: A Methodology for Anomaly-based Intrusion Detection and Classification of Low-bandwidth Malware Attacks – 218

Seasonal Prediction with the GEOS GCM – 118

ANTENNA ARRAYS
Driving Point Impedance for a Linear Array of Half-Width Leaky-Wave Antenna (Preprint) – 77

Space-based Telemetry and Range Safety (STARS) Phased Array Antenna Controller – 289

ANTENNA DESIGN
Uncertainty Estimation of Loop Antenna Calibration System in MF/HF Band – 62

ANTIBIOTICS
Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin – 34

Evaluation of Low-Pressure Drop Antimicrobial and Hybrid Air Filters – 95

Fast Detection of Ciprofloxacin Resistance - Part II – 166

Fast Detection of Ciprofloxacin Resistance, Part I – 165

ANTIBODIES
Altered Gravity Causes the Changes in the Protein NopA100 in Plant Cell Nucleoli – 139

An Activity-Dependent Assay for Ricin and Related RNA N-Glycosidases Based on Electrochemiluminescence – 162

Novel Protein Microarray Technology to Examine Men with Prostate Cancer – 169

ANTIGRAVITY
Pilots' Examination in a Rapid LBNP Exposure – 136

ANTIINFECTIVES AND ANTIBACTERIALS
Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity – 145

Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin – 34

Evaluation of Low-Pressure Drop Antimicrobial and Hybrid Air Filters – 95

ANTIMISSILE DEFENSE
Optimal Stationing of RADAR Pickets and Anti-Ballistic Missile Defenders for Long Range Surveillance and Tracking (LRS&T) and Ballistic Missile Defense (BMD) Operations – 92

ANTINEUTRINOS
Use of Antineutrino Detectors for Nuclear Reactor Safeguards Effectiveness Assessment – 247

ANTIOXIDANTS
Advantages of Simulated Microgravity in the Production of Compounds of Industrial Relevance – 161

Relations Between Prooxidant and Antioxidant Variables in Hypergravity and Aging – 133

APOPTOSIS
Regulation of MDM2 Activity by Nucleolin – 179

The Role of Semaphorin 3B (SEMA3B) in the Pathogenesis of Breast Cancer – 175

APPLICATIONS PROGRAMS (COMPUTERS)
On the Development of an Efficient Parallel Hybrid Solver with Application to Acoustically Treated Aero-Engine Nacelles – 17

APPROPRIATIONS
State Department and Related Agencies: FY2006 Appropriations and FY2007 Request – 70

APTITUDE
Optimizing CAT-ASVAB Item Selection Using Form Assembly Techniques – 242

ARC HEATING
Arc Jet Flow Properties Determined from Laser- Induced Fluorescence of Atomic Species – 85

ARCHITECTURE (COMPUTERS)
A Need for Systems Architecture Approach for Next Generation Mine Warfare Capability – 198

A Reusable Design for Precision Lunar Landing Systems – 281

An Upgradeable Agent-Based Model to Explore Non-Linearity and Intangibles in Peacekeeping Operations – 207

Design Considerations for Optically Connected Systems on Chip – 81

KOJAK Group Finder: Scalable Group Detecllon via Integrated Knowledge-Based and Statistical Reasoning – 236

Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Preliminary Security Requirements for SecureCore Hardware – 191

Simulation Development for Dynamic Situation Awareness and Prediction II – 201

The K9 On-Board Rover Architecture – 230

ARCTIC REGIONS
Refractivity in the Arctic Regions – 116

ARGON
CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy – 45

ARRHYTHMIA
Respiratory Sinus Arrhythmia: A Marker of Decreased Parasympathetic Modulation after Short Duration Spaceflight – 151

ARTERIES
Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats – 129

Angiotensinogen Expression in Vascular Tissues of Simulated Weightless Rats – 153

Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity – 157

Hemodynamic Changes in Post-Suspension Rats during Gradual Hemorrhage – 133

Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G – 126

The Effect of Simulated Microgravity on Nitrergic Innervation of the Middle Cerebral Artery – 124

ARTIFICIAL GRAVITY

Artificial Gravity: Physiological Perspectives for Long-Term Space Exploration – 159

Comparison of the Effects of DL-threo-Beta-Benzyloxyaspartate on the Glutamate Release from Synaptosomes before and after Exposure of Rats to Artificial Gravity – 148

Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

Neurovestibular Adaptation to Short Radius Centrifugation – 150

Vestibular Adaptation to Changing Gravity Levels and the Orientation of Listing's Plane – 149

ARTIFICIAL INTELLIGENCE

Design, Implementation and Testing of a Common Data Model Supporting Autonomous Vehicle Compatibility and Interoperability – 224

Evaluation of an Outer Loop Retrofit Architecture for Intelligent Turbofan Engine Thrust Control – 18

Exploration and Policy Reuse – 235

Intelligent Maintenance Aid (IMA) – 81

Probabilistic Reuse of Past Policies – 235

Real Estate Site Selection: An Application of Artificial Intelligence for Military Retail Facilities – 241

Social Structure Simulation and Inference Using Artificial Intelligence Techniques – 227

Survey of Available Artificial Intelligence Technologies for Addition Into Delta3D – 199

The Importance of Artificial Intelligence for Naval Intelligence Training Simulations – 225

ARTIFICIAL SATELLITES

A LEO Satellite Postmission Disposal Study using LEGEND – 279

A Study on Improving USA Air Force Space Systems Engineering and Acquisition – 23

Beam Control of Extremely Agile Relaying Laser Source for Bifocal Relay Mirror Spacecraft – 24

China's Space Program: An Overview – 20

The Extratropical Transition of Tropical Storm Banyan – 116

Thermo-mechanical Analysis of Ground-based Directed Energy Weapons on Satellites and Intercontinental Ballistic Missiles – 24

ASCENT

CFD Simulation of the Space Shuttle Launch Vehicle with Booster Separation Motor and Reaction Control Plumes – 27

ASIA

Amplitude Analysis and Modeling of Regional Phases in PNE Profiles in Northern Eurasia and Seismic Regionalization – 115

ASPERGILLUS

Effect of Simulated Microgravity on Aspergillus Niger – 140

ASSAYING

A Quantitative Electrochemiluminescence Assay for Clostridium perfringens alpha toxin – 163

An Activity-Dependent Assay for Ricin and Related RNA N-Glycosidases Based on Electrochemiluminescence – 162

TRIPLE LUX-B: Phagocytosis in Mussel Hemocytes – 144

ASSEMBLING

Rotary Shaft Sealing Assembly – 95

ASSEMBLY LANGUAGE

Certifying Compilation for Standard ML in a Type Analysis Framework – 195

ASSESSMENTS

Development of an Electrical Wire Interconnect System Risk Assessment Tool – 10

International Seminar on The Role of Dosimetry in High-Quality EMF Risk Assessment Held in Ljubljana, Slovenia and Zagreb, Croatia on 13-15 September 2006 – 246

ASTEROIDS

Asteroidal Differentiation Processes Deduced from Ultramafic Achondrite Ureilite Meteorites – 280

Metal-Silicate Segregation in Asteroidal Meteorites – 279

ASTRONAUT PERFORMANCE

Investigating Human Cognitive Performance during Spaceflight – 122

ASTRONAUTS

3-D Ballistocardiography, A Tool Revisited for Following Astronaut Cardiovascular Function? – 132

Artificial Gravity: Physiological Perspectives for Long-Term Space Exploration – 159

Astronauts Autonomic Regulation Reserves Evaluation during Pre- and Post-flight Examinations – 153

Biolab Crew Training – 155

Effects of Space-Flight Simulation on Human Cells – 140

Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study – 124

Personal Cooling for Extra-Vehicular Activities on Mars – 274

ASTRONOMICAL INTERFEROMETRY

Capella Corona Revisited: A Combined View from XMM-Newton RGS Chandra HETGS, and LETGS – 277

ASTROPHYSICS

Astrochemistry: Recent Advances in the Study of Carbon Molecules in Space – 276

Small Particle May Answer Large Physics Questions – 274

ASYMMETRY

Implementation of a Modular Fly away Kits (FLAK) for C4ISR in order to counter Asymmetric Threats in the Coalition Riverine and Maritime Theatres – 73

ATMOSPHERIC CORRECTION

Thermal Band Atmospheric Correction Using Atmospheric Profiles Derived from Global Positioning System Radio Occultation and the Atmospheric Infrared Sounder – 103

ATMOSPHERIC ENTRY

Entry Abort Determination using Non-adaptive Neural Networks for Mars Precision Landers – 28

Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

Public Risk Assessment of Off-Nominal Genesis Entries – 25

The Disposal of Spacecraft and Launch Vehicle Stages in Low Earth Orbit – 26

ATMOSPHERIC TEMPERATURE

On the Observed Changes in Upper Stratospheric and Mesospheric Temperatures from UARS HALOE – 118

ATMOSPHERIC TURBULENCE

Meteorological Support for the Pathfinder- Plus Aeroelastic Research Flights – 289

ATOM CONCENTRATION

Arc Jet Flow Properties Determined from Laser- Induced Fluorescence of Atomic Species – 85

ATOMS

On Optimizing the Configuration of Time-Transfer Links Used to Generate TAI – 24

ATROPHY

Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Depressed Tetanic Contractile Function Cannot be Compensated by Increasing Stimulating Frequency in Unloaded Soleus Muscle – 124

How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device – 126

ATTITUDE (INCLINATION)

Vestibular Adaptation to Changing Gravity Levels and the Orientation of Listing's Plane – 150

AUDIOLOGY

Audiological Findings in Antiorthostatic Position Modelling Microgravitation – 146

AUDITORY SIGNALS

Sensing Super-Position: Human Sensing Beyond the Visual Spectrum – 182

AUGMENTATION

DARPA Improving Warfighter Information Intake Under Stress -- Augmented Cognition. Volume 1. Phase 2: Concept Validation Experiment – 187

Enhancement of an Analytical Method for the Determination of Squalene in Anthrax Vaccine Absorbed Formulations – 40

Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems – 262

AURORAS

Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study – 125

AUTOMATIC CONTROL

Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Tree-Based Hierarchical Reinforcement Learning – 237

AUTOMOBILES

Automotive Replacement Glass Windshields from China. Investigation No. 731-TA-922 (Final). Determination and Views of the Commission – 53

AUTONOMIC NERVOUS SYSTEM

An Analysis of the Joint Strike Fighter Autonomic Logistics System – 12

Astronauts Autonomic Regulation Reserves Evaluation during Pre- and Postflight Examinations – 153

Design, Implementation and Testing of a Common Data Model Supporting Autonomous Vehicle Compatibility and Interoperability – 224

Effects of Water Temperature on Cardiac Autonomic Nervous System Modulation during Foot Immersion (Foot Bath) – 140

Heart Rate Variability in Evaluation of Functional State and Types of Autonomic Regulation under Conditions of Space Flight – 132

Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Results of Cardiorespiratory System Autonomic Regulation Investigations during Long Term International Space Station Missions: Experiment 'Pulse' – 161

AUTONOMY

Automated Classification of Thermal Infrared Spectra Using Self-organizing Maps – 272

Autonomous Soaring for Small Unmanned Aerial Vehicles (UAVs) – 291

Design, Implementation and Testing of a Common Data Model Supporting Autonomous Vehicle Compatibility and Interoperability – 224

Intelligent Rover Execution for Detecting Life in the Atacama Desert – 271

Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

Space Robotics: AWIMR an Overview – 223

Technical and Scientific Evaluation of EM-APEX in Hurricane Frances – 117

Verification and Validation of Neural Networks in Flight Control Systems – 288

AUTOREGRESSIVE MOVING AVERAGE

Nonlinear Aeroelastic System Identification with Application to Experimental Data – 286

AVIONICS

Human Exploration and Avionic Technology Challenges – 17

AVOIDANCE

Limited Investigation and Characterization of Boundary Avoidance Tracking (Project HAVE BAT) – 6

AXIAL STRESS

Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 50

AZIMUTH

Three-Dimensional Analysis of Azimuthal Dependence of Sound Propagation through Shallow-Water Internal Solitary Waves – 44

BACILLUS

Inactivation of Bacillus Anthracis Spores Delivered as Liquid Suspension or Aerosol to Self-Decontaminating Fabric – 55

BACKGROUND RADIATION

Comparison of Techniques to Reduce Bremsstrahlung Background Radiation from Monoenergetic Photon Beams – 248

BACKSCATTERING

Discrimination of Complex Synthetic Echoes by an Echolocating Bottlenose Dolphin – 253

Low-Frequency Electromagnetic Backscatter from Buries Tunnels – 247

BACTERIA

A Quantitative Electrochemiluminescence Assay for Clostridium perfringens alpha toxin – 163

Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity – 144

Biolab Experiment Development Status 2005 – 123

Diminished Performance of Bacterial Fuel Cells in Microgravity – 141

Fast Detection of Ciprofloxacin Resistance - Part II – 166

Fast Detection of Ciprofloxacin Resistance, Part I – 165

BACTERICIDES

Inactivation of Bacillus Anthracis Spores Delivered as Liquid Suspension or Aerosol to Self-Decontaminating Fabric – 55

BACTERIOPHAGES

Determination of MS2 Bacteriophage Stability at Low pH Using the Integrated Virus Detection System (IVDS) – 92

BALANCING

Person Tracking From a Dynamic Balancing Platform – 228

BALLISTIC MISSILES

Hit-to-Kill Guidance Algorithm for the Interception of Ballistic Missiles During the Boost Phase – 207

Optimal Stationing of RADAR Pickets and Anti-Ballistic Missile Defenders for Long Range Surveillance and Tracking (LRS&T) and Ballistic Missile Defense (BMD) Operations – 92

BALLISTICS

Dynamic Response of an Alternative Tissue Simulant, Physically Associating Gels (PAG) – 39

Efficient Calculation of Earth Penetrating Projectile Trajectories – 273

Multiscale Mechanical Characterization of Biomimetic Physically Associating Gels – 53

WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis-)Mounted Soldier – 196

BALLISTOCARDIOGRAPHY

3-D Ballistocardiography, A Tool Revisited for Following Astronaut Cardiovascular Function? – 132

BANDWIDTH
Effects of Spread Spectrum Clocking on Measured Noise Spectra – 64

Power Measurement Emitted by UWB System in Time Domain – 63

Sample Entropy and Random Forests: A Methodology for Anomaly-based Intrusion Detection and Classification of Low-bandwidth Malware Attacks – 218

WiNN: An Efficient Method for Routing Short-Lived Flows – 222

BAROREFLEXES
Adaptation of the Baroreflex Sensitivity to Microgravity: Data from the STS-107 Columbia Mission – 152

BATS
Limited Investigation and Characterization of Boundary Avoidance Tracking (Project HAVE BAT) – 6

BAYES THEOREM
A Computer-Aided Diagnosis System for Breast Cancer Combining Digital Mammography and Genomics – 178

BEAM CURRENTS
Combined Phase Space Characterization at the PEP-II IP Using Single-Beam and Luminous-Region Measurements – 251

BEAM INTERACTIONS
Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 32

Luminosity Improvement at PEP-II Based on Optics Model and Beam-Beam Simulation – 265

Observation of Long-Range Beam-Beam Effect in RHIC and Plans for Compensation – 263

BED REST
Artificial Gravity: Physiological Perspectives for Long-Term Space Exploration – 159

Calf Tissue Liquid Stowage and Muscular and Deep Vein Distension in Orthostatic Tests after a 90-Day Head Down Bed Rest – 125

Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 152

Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest – 148

MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest – 123

WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

BENZENE POISONING
Toxicological Profile for Dichlorobenzenes (2006 Update) – 108

BERYLLIUM OXIDES
Reflector and Shield Material Properties for Project Prometheus – 256

BERYLLIUM
Reflector and Shield Material Properties for Project Prometheus – 256

BETATRONS
Measurements and Modeling of Eddy Current Effects in BNL's AGS Booster – 250

Summary of Coupling and Tune Feedback Results During RHIC Run 6, and Possible Implications for LHC Commissioning – 263

BIAS
Cavity-Bias Sampling in Reaction Ensemble Monte Carlo Simulation – 40

BIBLIOGRAPHIES
Diagnosis and Treatment of Combat Related Post-Traumatic Stress Disorder. An Abstract Bibliography – 270

Interactive Electronic Technical Manuals (IETMs) Annotated Bibliography – 270

BINARY ALLOYS
Thermomechanical Cycling Investigation of Cu and Niti Reinforced Lead-Free Solder – 49

BINARY DATA
Absolute Position Measurement for Automated Guided Vehicles using the Greedy DeBruijn Sequence – 233

BIOASSAY
Respirator Filter Efficiency Testing Against Particulate and Biological Aerosols Under Moderate to High Flow Rates – 95

BIOCHEMISTRY
A Role of Peroxidases in Acceleration of the Aging of Potato Minitubers under Influence of Microgravity – 151

An Energetic Concept of Habitability for the Deep Subsurface – 187

Cell-Like Entities: On the Boundary Between Non-Living and Living – 178

Relations Between Prooxidant and Antioxidant Variables in Hypergravity and Aging – 133

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

BIODYNAMICS
System Specificity in Responsiveness to Intermittent -Gx Gravitation during Simulated Microgravity in Rats – 130

BIOENGINEERING
Moving from Bilateral to Multilateral Medical Operations – 22

New Technique for Simulation of Microgravity and Variable Gravity Conditions – 161

BIOINSTRUMENTATION
Status of the SOS-LUX-Toxicity-Test on the International Space Station – 120

BIOLOGICAL EFFECTS
Air Flow Patterns Around Several Biological Point Detection System Configurations – 91

Development of Exposure Systems and Exposure Assessment for Studies on Biological Effect of Electromagnetic Field – 64

Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

Mechanism of Action for Anti-Radiation Vaccine in Reducing the Biological Impact of High-Dose Irradiation – 184

The Pathogenesis and Therapy of Combined Radiation Injury – 174

BIOLOGICAL EVOLUTION
Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems – 145

BIOLOGICAL WEAPONS
Sensor Systems for Biological Agent Attacks: Protecting Buildings and Military Bases – 94

BIOMARKERS
Benign Breast Disease: Toward Molecular Prediction of Breast Cancer Risk – 164

Novel Protein Microarray Technology to Examine Men with Prostate Cancer – 169

Phagocytosis as a Biomarker for Stress Responses – 139

BIOMASS
Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 106

BIOMIMETICS
Multiscale Mechanical Characterization of Biomimetic Physically Associating Gels – 54

BIOREACTORS
Advantages of Simulated Microgravity in the Production of Compounds of Industrial Relevance – 161

BIOTECHNOLOGY
Nanobiotechnology: Report of the National Nanotechnology Initiative Workshop. Held in Arlington, Virginia on October 9-11, 2003 – 46

BIRTH
Centrifugation Effects on Estrous Cycling, Mating Success and Pregnancy Outcome in Rats – 156

BLACK HOLES (ASTRONOMY)
Gamma-Ray Bursts Shower the Universe with Metals – 276

BLADE TIPS
Rate-Based Model Predictive Control of Turbofan Engine Clearance – 19

BLINDNESS
Reproductive and Hormonal Risk Factors for Breast Cancer in Blind Women – 176

BLOCK COPOLYMERS
Multiscale Mechanical Characterization of Biomimetic Physically Associating Gels – 54

BLOOD CIRCULATION
Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G – 126

BLOOD FLOW
Environmental Challenge Impairs Prefrontal Brain Functions – 159

BLOOD PRESSURE
Adaptation of the Baroreflex Sensitivity to Microgravity: Data from the STS-107 Columbia Mission – 152

Effects of Water Temperature on Cardiac Autonomic Nervous System Modulation during Foot Immersion (Foot Bath) – 140

Influence of Weightlessness and Apnea on Heart Rate and Blood Pressure Regulation during Exercise – 121

BLOOD VOLUME
Restoration of Central Blood Volume: Application of a Simple Concept and Simple Device to Counteract Cardiovascular Instability in Syncope and Hemorrhage – 152

WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

BLOOD-BRAIN BARRIER
Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory – 142

BLOOD
Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Hemodynamic Changes in Post-Suspension Rats during Gradual Hemorrhage – 133

Novel Protein Microarray Technology to Examine Men with Prostate Cancer – 169

Stability of Radiation Induced Chromosome Damage in Human Peripheral Blood Lymphocytes – 185

BOATS
Deployable Command and Control System for Over the Horizon Small Boat Operations – 70

BODY FLUIDS
Fluid and Electrolyte Needs for Preparation and Recovery From Training and Competition – 41

BODY TEMPERATURE
Effect of Swimming Suits' Difference at Supine Position in Water on Heart Rate, Rectal Temperature and Sense of Subjective Temperature – 161

Monitor Activity, Temperature and Heart Rate with a Mouse Telemeter to be used for Animal Research on Board the International Space Station – 127

BODY WEIGHT
Prenatal Centrifugation: A Mode1 for Fetal Programming of Body Weight? – 139

BOEING 757 AIRCRAFT
The C-17 Throttles-Only Control Evaluation and Simulation Validation – 284

BONE DEMINERALIZATION
Measures of Complexity to Quantify Bone Loss and Estimate Strength of Human Lumbar Vertebrae: Comparison of pQCT Image Analysis with Bone Histomorphometry and Biomechanical Tests – 182

Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Quantitative MR Imaging for the in Vivo Assessment of Trabecular Bone Quality – 181

Rapid Nitric Oxide Production by Bone Cells in Response to Mechanical Vibration – 148

Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

BONE MINERAL CONTENT
An Innovative Approach for the Assessment of 3D Structures in Trabecular Bone – 122

European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Measures of Complexity to Quantify Bone Loss and Estimate Strength of Human Lumbar Vertebrae: Comparison of pQCT Image Analysis with Bone Histomorphometry and Biomechanical Tests – 181

Quantitative MR Imaging for the in Vivo Assessment of Trabecular Bone Quality – 181

BONES
Modulation of Gene Expression in Bone Cells during Strain-Adapted Bone Remodeling – 150

BOOLEAN ALGEBRA
Model Checking Discounted Temporal Properties – 243

BOOSTER ROCKET ENGINES
CFD Simulation of the Space Shuttle Launch Vehicle with Booster Separation Motor and Reaction Control Plumes – 27

BORIDES
The Effects of Colloidal Processing on the Densification of Titanium Diboride (TiB2) - Alumina (Al2O3) Composites – 41

BOSONS
Small Particle May Answer Large Physics Questions – 275

BOUNDARIES
Cell-Like Entities: On the Boundary Between Non-Living and Living – 178

Limited Investigation and Characterization of Boundary Avoidance Tracking (Project HAVE BAT) – 6

BOUNDARY CONDITIONS
An Energetic Concept of Habitability for the Deep Subsurface – 187

Seasonal Prediction with the GEOS GCM – 118

Total Radiated Power of Radio Transmitters Measured in a Reverberation Chamber – 60

BOUNDARY LAYER STABILITY
Hypersonic Laminar Instability on Round Cones Near Zero Angle of Attack – 86

BOUNDARY LAYER TRANSITION
Fabrication of 0.0075-Scale Orbiter Phosphor Thermography Test Models for Shuttle RTF Aeroheating Studies – 85

BOUNDARY LAYERS
Mach 4 Test Results of a Dual-Flowpath, Turbine Based Combined Cycle Inlet – 10

Quiet Tunnel Experiments of Shock/Boundary Layer Interactions – 1

BRAGG GRATINGS
Development of Portable Fiber Bragg Grating Interrogation System – 285

Fiber Optic Sensor Attachment Development and Performance Evaluations – 285

BRAIN CIRCULATION
Environmental Challenge Impairs Prefrontal Brain Functions – 159

Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G – 126

BRAIN DAMAGE
Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory – 142

BRAIN
Do Perception and Postrotatory Vestibulo-Ocular Reflex Share the Same Gravity Reference? – 153

BRAYTON CYCLE
Performance and Operational Characteristics for a Dual Brayton Space Power System With Common Gas Inventory – 31

BRAZIL
Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 47

BREAST
A Computer-Aided Diagnosis System for Breast Cancer Combining Digital Mammography and Genomics – 178

Angiogenic Signaling in Living Breast Tumor Models – 163

Benign Breast Disease: Toward Molecular Prediction of Breast Cancer Risk – 164

Breast Cancer Suppression by IDO Inhibitors – 173

Breast Cancer Therapy With Annexin 11 Nanoparticles – 164

Clinically Practical Magnetic Resonance Protocol for Improved Specifically in Breast Cancer Diagnosis – 176

Design and Testing of Bi-Functional, P-Loop-Targeted MDM2 Inhibitors – 173

Exploring Early Detection Methods: Using the Intraductal Approach to Predict Breast Cancer – 171

Hypoxia as a Driving Force for Genetic Instability During Breast Tumorigenesis – 175

Inhibition of Fatty Acid Synthase (FAS): A New Drug for Breast Cancer Chemoprevention – 165

Integrating Geographic Information Systems (GIS) Into Breast Cancer Epidemiologic Research – 172

Is Peripheral Benzodiazepine Receptor (PBR) Gene Expression Involved in Breast Cancer Suppression by Dietary Soybean Protein? – 171

Modifiers of the Efficacy of Risk-Reducing Salpingo-Oophorectomy for the Prevention of Breast and Ovarian Cancer in Carriers of BRCA1 and BRCA2 – 172

Quality of Life and Functional Status Across the Life Course – 177

Reproductive and Hormonal Risk Factors for Breast Cancer in Blind Women – 176

Role of Rac GTPases in Chemokine-Stimulated Breast Carcinoma – 172

The Nuclear Death Domain Protein p84N5; a Candidate Breast Cancer Susceptibility Gene – 171

The Role of Semaphorin 3B (SEMA3B) in the Pathogenesis of Breast Cancer – 175

Towards the Early Detection of Breast Cancer in Young Women – 175

Using the Internet to Collaborate with Consumers in Redefining a Psychosocial Agenda for Families with Hereditary Breast Cancer – 174

BREEDER REACTORS
Progress Report on Fast Breeder Reactor Safety Studies – 93

BREMSSTRAHLUNG
Comparison of Techniques to Reduce Bremsstrahlung Background Radiation from Monoenergetic Photon Beams – 248

BRIGHTNESS
Aircraft Accidents and Incidents Associated With Visual Disturbances From Bright Lights During Nighttime Flight Operations – 184

BRILLOUIN EFFECT
Stimulated Brillouin Scattering Mirror System, High Power Laser and Laser Peening Method and System Using Same – 259

BROADBAND
A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59

Light Reconnaissance Vehicle (LRV): Enhancing Command, Control, Communications, and Computers and Information Systems (C4I) to Tactically Employed Forces via a Mobile Platform – 216

Multi-User Performance Issues in Wireless Impulse Radio Networks – 70

Power Measurement Emitted by UWB System in Time Domain – 63

Total Radiated Power of Radio Transmitters Measured in a Reverberation Chamber – 60

BROADCASTING
Performance of Directional Collision Avoidance in Multihop Wireless Networks – 5

State Department and Related Agencies: FY2006 Appropriations and FY2007 Request – 70

BROMIDES
Workers' Exposures to n-Propyl Bromide at a Helicopter Transmission Factory – 110

BUFFER STORAGE
Study of Buffer Size in Internet Routers – 234

BUILDINGS
Sensor Systems for Biological Agent Attacks: Protecting Buildings and Military Bases – 94

The Effective Use of New Materials and Methodologies for Blast Mitigation in New and Renovated Facilities by the Armed Services – 100

BUOYANCY
Autonomous Soaring for Small Unmanned Aerial Vehicles (UAVs) – 291

BURST TESTS
Burst Testing and Analysis of Superalloy Disks With a Dual Grain Microstructure – 51

BY-PRODUCTS
Coherence and Coreference – 271

C (PROGRAMMING LANGUAGE)
Implementation of a Quadrature Mirror Filter Bank on an SRC Reconfigurable Computer for Real-Time Signal Processing – 199

C++ (PROGRAMMING LANGUAGE)
ORA 2006: User's Guide – 210

CABINS
Evaluation of Cabin Crew Technical Knowledge – 4

CADMIUM TELLURIDES
Electromagnetic Field Distribution Measurements using an Optically Scanning Probe System – 61

CADMIUM
Phagocytosis as a Biomarker for Stress Responses – 139

CALCIUM
Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity – 157

Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcromeric Cytoskeletal Proteins of Hindlimb Suspended Rats – 120

CALIBRATING
Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department – 61

Evaluation of Uncertainty of Horn Antenna Calibration with the Frequency range of 1 GHz to 18 GHz. – 62

Feasibility of a Spin Decoherence Measurement – 262

Spectral Irradiance Calibration in the Infrared. XVI. Improved Accuracy in the Infrared Spectra of the Secondary and Tertiary Standard Calibration Stars – 253

Uncertainty Estimation of Loop Antenna Calibration System in MF/HF Band – 62

CALORIC REQUIREMENTS
Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

CAMERAS
Progress Report on Fast Breeder Reactor Safety Studies – 93

CAMOUFLAGE
Automated Thermal Camouflage Generation Program Status – 33

Camouflaging Vehicles Using Field Expedient Materials, Commercial Hardware Store Materials, Camouflage Nets, and Rubber Conveyer Belt Material – 258

CANADA

Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 47

CANCER

A Computer-Aided Diagnosis System for Breast Cancer Combining Digital Mammography and Genomics – 178

Benign Breast Disease: Toward Molecular Prediction of Breast Cancer Risk – 164

Breast Cancer Suppression by IDO Inhibitors – 173

Breast Cancer Therapy With Annexin 11 Nanoparticles – 164

Clinically Practical Magnetic Resonance Protocol for Improved Specifically in Breast Cancer Diagnosis – 176

Design and Testing of Bi-Functional, P-Loop-Targeted MDM2 Inhibitors – 173

Exploring Early Detection Methods: Using the Intraductal Approach to Predict Breast Cancer – 171

Hypoxia as a Driving Force for Genetic Instability During Breast Tumorigenesis – 175

Inhibition of Fatty Acid Synthase (FAS): A New Drug for Breast Cancer Chemoprevention – 165

Integrating Geographic Information Systems (GIS) Into Breast Cancer Epidemiologic Research – 172

Is Peripheral Benzodiazepine Receptor (PBR) Gene Expression Involved in Breast Cancer Suppression by Dietary Soybean Protein? – 171

Modifiers of the Efficacy of Risk-Reducing Salpingo-Oophorectomy for the Prevention of Breast and Ovarian Cancer in Carriers of BRCA1 and BRCA2 – 172

Novel Protein Microarray Technology to Examine Men with Prostate Cancer – 169

Post-Transcriptional Regulation of MKK4-A Stress Signaling Kinase Implicated in the Regulation of Metastatic Growth – 169

Quality of Life and Functional Status Across the Life Course – 177

Reproductive and Hormonal Risk Factors for Breast Cancer in Blind Women – 176

Restoration of Transforming Growth Factor Beta Signaling by Histone Deacetylase Inhibitors in Human Prostate Carcinoma – 177

Role of Rac GTPases in Chemokine-Stimulated Breast Carcinoma – 172

Systemic Oncolytic Cytokine HSV Therapy of Prostate Cancer – 164

The Clinical Development of Thalidomide as an Angiogenesis Inhibitor Therapy for Prostate Cancer – 167

The Nuclear Death Domain Protein p84N5; a Candidate Breast Cancer Susceptibility Gene – 171

The Role of Semaphorin 3B (SEMA3B) in the Pathogenesis of Breast Cancer – 175

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor – 165

Towards the Early Detection of Breast Cancer in Young Women – 175

Using the Internet to Collaborate with Consumers in Redefining a Psychosocial Agenda for Families with Hereditary Breast Cancer – 174

CANTILEVER BEAMS

Natural Frequencies and Mode Shapes of a Nonlinear, Uniform Cantilevered Beam – 246

CAPACITANCE

Surge Current Suppression in Power-Factor-Corrected AC-To-DC Converter with Capacitive Load – 84

Top vs. Bottom Charging of the Dielectric in RF MEMS Capacitive Switches (Preprint) – 78

CAPACITORS

Low Voltage Electrolytic Capacitor Pulse Forming Inductive Network for Electric Weapons – 80

CARBON DIOXIDE

Carbon Nanotube Activities at NASA-Johnson Space Center – 245

CO2 Sequestration and Recycle by Photosynthesis. (Technical Report, September 24, 2004-September 23, 2005) – 113

CARBON NANOTUBES

Carbon Nanotube Activities at NASA-Johnson Space Center – 245

Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Higher Order Chemistry Models in the CFD Simulation of Laser-Ablated Carbon Plumes – 88

CARBON STEELS

Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 47

Corrosion-Resistant Carbon Steel Flat Products from France and Germany. Investigations Nos. 701-TA-348-349 and 731-TA-615 (Review) (Remand). Determination and Views of the Commission – 47

Mechanical and Thermal Properties of Ultra-High Carbon Steel Containing Aluminum – 50

CARBONATES

Statistical Review of Cesium Carbonate Fusion Measurements of Archived Glass Samples from the DWPF Process – 45

CARBON-PHENOLIC COMPOSITES

Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

CARBON

Astrochemistry: Recent Advances in the Study of Carbon Molecules in Space – 276

Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 46

Fullerenic Structures and Such Structures Tethered to Carbon Materials – 249

Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems – 262

CARDIOVASCULAR SYSTEM

3-D Ballistocardiography, A Tool Revisited for Following Astronaut Cardiovascular Function? – 132

A Brief Overview of Animal Hypergravity Studies – 130

Angiotensinogen Expression in Vascular Tissues of Simulated Weightless Rats – 153

Artificial Gravity: Physiological Perspectives for Long-Term Space Exploration – 159

Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity – 157

Effects of Space-Flight Simulation on Human Cells – 140

Evaluation of Spare Capacities of the Respiratory Muscles during Hypokinesia – 186

Influence of Weightlessness and Apnea on Heart Rate and Blood Pressure Regulation during Exercise – 121

Pilots' Examination in a Rapid LBNP Exposure – 136

Prenatal Centrifugation: A Mode1 for Fetal Programming of Body Weight? – 138

Restoration of Central Blood Volume: Application of a Simple Concept and Simple Device to Counteract Cardiovascular Instability in Syncope and Hemorrhage – 151

The Effect of Simulated Microgravity on Nitrergic Innervation of the Middle Cerebral Artery – 124

WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

CARGO

Internal Cargo Integration – 27

International Space Station: Introduction and ISS Familiarization – 27

ISS Commercial Cargo Service: Requirements and Constraints Summary – 25

ISS Payloads Office Utilization/Research Cargo Familiarization – 27

CASSINI MISSION

Recent Highlights in Ring Structure, Dynamics, and Composition – 275

CATALASE

Superoxide Dismutase, Catalase, Glutathione Peroxidase, and Glutothione Reductase in the Heart of Hypergravity-Treated and Aging Rats – 158

CATALOGS (PUBLICATIONS)

The Army Digital Terrain Catalog II (ADTC) – 210

CATALYSIS

Metal Cation Mediated Hydrolysis of Phosphono-Formate Diesters: Chemoselectivity and Catalysis – 34

CATALYSTS

Development of High Temperature Membranes and Improved Cathode Catalysts – 46

CATALYTIC ACTIVITY

An Evaluation of the Vapor Phase Catalytic Ammonia Removal Process for Use in a Mars Transit Vehicle – 278

CATECHOLAMINE

Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

CATHODES

Development of High Temperature Membranes and Improved Cathode Catalysts – 46

CATIONS

Metal Cation Mediated Hydrolysis of Phosphono-Formate Diesters: Chemoselectivity and Catalysis – 34

CAVITIES

A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

Cavity BPM with Dipole-Mode-Selective Coupler – 250

Cavity-Bias Sampling in Reaction Ensemble Monte Carlo Simulation – 40

CELL DIVISION

Differentiation of Plant Graviperceiving and Graviresponding Cells in Altered Gravity – 124

CELLS (BIOLOGY)

A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

A Role of Peroxidases in Acceleration of the Aging of Potato Minitubers under Influence of Microgravity – 151

Altered Gravity Causes the Changes in the Protein NopA100 in Plant Cell Nucleoli – 139

Biolab Experiment Development Status 2005 – 123

Effects of Space-Flight Simulation on Human Cells – 140

Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems – 145

European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Gene Expression of delta-1- and delta-3-Cyclins in Root Meristem Cells of Pisurn Sativurn L. under Clinorotation – 150

How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

MISS: Mice on International Space Station – 162

Modulation of Gene Expression in Bone Cells during Strain-Adapted Bone Remodeling – 150

Production of Cytokines by Human PBMCs in Simulated Microgravity – 149

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

The German ISS Experiment Cellular Responses to Radiation in Space (CERASP): The Effects of Single and Combined Space Flight Conditions on Mammalian Cells – 158

The Influence of Clinorotation on Root Cell Differentiation in Brassica Rapa Seedlings – 143

Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

CELLULOSE

Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin – 34

CENTRAL NERVOUS SYSTEM

Environmental Challenge Impairs Prefrontal Brain Functions – 159

Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by a Simulation Study – 158

CENTRAL PROCESSING UNITS

Absolute Position Measurement for Automated Guided Vehicles using the Greedy DeBruijn Sequence – 233

Software Defined Radio Prototype (I): System Design and Performance Evaluation – 191

CENTRIFUGAL FORCE

Artificial Gravity: Physiological Perspectives for Long-Term Space Exploration – 159

CENTRIFUGES

Comparison of the Effects of DL-threo-Beta-Benzyloxyaspartate on the Glutamate Release from Synaptosomes before and after Exposure of Rats to Artificial Gravity – 148

Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory – 142

International Space Station Centrifuge Rotor Models A Comparison of the Euler-Lagrange and the Bond Graph Modeling Approach – 96

Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G – 126

CENTRIFUGING

Centrifugation Effects on Estrous Cycling, Mating Success and Pregnancy Outcome in Rats – 156

Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

Neurovestibular Adaptation to Short Radius Centrifugation – 150

Prenatal Centrifugation: A Mode1 for Fetal Programming of Body Weight? – 138

System Specificity in Responsiveness to Intermittent -Gx Gravitation during Simulated Microgravity in Rats – 130

CERAMIC MATRIX COMPOSITES

Performance Evaluations of Ceramic Wafer Seals – 37

CERAMICS

2006 Gordon Research Conference on Ceramics, Solid Studies In – 54

Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems – 262

The Effects of Colloidal Processing on the Densification of Titanium Diboride (TiB2) - Alumina (Al2O3) Composites – 41

CEREBELLUM

Structural Reappraisal of Dendritic Tree of Cerebellar Purkinje Cell for Novel Functional Modeling of Elementary Sensorimotor Adaptive Processes – 147

CEREBRAL CORTEX

Structural Reappraisal of Dendritic Tree of Cerebellar Purkinje Cell for Novel Functional Modeling of Elementary Sensorimotor Adaptive Processes – 147

CEREBRUM

Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity – 157

The Effect of Simulated Microgravity on Nitrergic Innervation of the Middle Cerebral Artery – 124

CERIUM OXIDES

Decomposition of GD on CeO2/Alumina Adsorbents in a Gas Chromatograph On-Column Injector Tube Reactor – 42

CERTIFICATION

Certifying Compilation for Standard ML in a Type Analysis Framework – 195

CESIUM

Statistical Review of Cesium Carbonate Fusion Measurements of Archived Glass Samples from the DWPF Process – 45

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 46

CHANGE DETECTION

On-line Robot Adaptation to Environmental Change – 239

CHARACTERIZATION

Combined Phase Space Characterization at the PEP-II IP Using Single-Beam and Luminous-Region Measurements – 251

Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 31

Specifications, Pre-Experimental Predictions, and Test Plate Characterization Information for the Prometheus Critical Experiments – 51

CHARTS

2006 Navigation Charts. J. Bennett Johnston Waterway, Red River Shreveport, Louisiana to Mouth of Red River Mile 235 to Mile O P.P.R.M. 4th Edition – 101

CHEMICAL ANALYSIS

Novel Protein Microarray Technology to Examine Men with Prostate Cancer – 169

CHEMICAL COMPOSITION

Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

Improved Materials for High-Temperature Black Liquor Gasification – 35

CHEMICAL EXPLOSIONS

Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Consequences Management – 266

CHEMICAL REACTIONS

Breast Cancer Suppression by IDO Inhibitors – 173

Cavity-Bias Sampling in Reaction Ensemble Monte Carlo Simulation – 40

Dual Control Cell Reaction Ensemble Molecular Dynamics: A Method for Simulations of Reactions and Adsorption in Porous Materials – 39

Reaction Ensemble Molecular Dynamics: Direct Simulation of the Dynamic Equilibrium Properties of Chemically Reacting Mixtures – 39

Theoretical Chemical Dyamics Studies of Elementary Combustion Reactions – 38

CHEMICAL WARFARE

Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Consequences Management – 266

CHEMILUMINESCENCE

A Quantitative Electrochemiluminescence Assay for Clostridium perfringens alpha toxin – 163

An Activity-Dependent Assay for Ricin and Related RNA N-Glycosidases Based on Electrochemiluminescence – 162

Phagocytosis as a Biomarker for Stress Responses – 139

CHEMISTRY

Higher Order Chemistry Models in the CFD Simulation of Laser-Ablated Carbon Plumes – 89

CHEMORECEPTORS

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor – 165

CHEMOTHERAPY

Hypoxia as a Driving Force for Genetic Instability During Breast Tumorigenesis – 176

CHINA

Automotive Replacement Glass Windshields from China. Investigation No. 731-TA-922 (Final). Determination and Views of the Commission – 53

Cased Pencils from China. Investigation No. 731-TA-669 (Second Review) – 32

China's Space Program: An Overview – 20

Ferrovanadium from China and South Africa. Investigations Nos. 731-TA-986 and 987 (Final). Determinations and Views of the Commission – 47

CHINESE SPACE PROGRAM

China's Space Program: An Overview – 20

CHIPS (ELECTRONICS)

The Microchip Optera Project – 78

CHIPS

Design Considerations for Optically Connected Systems on Chip – 81

CHLORELLA

Ultrastructural Peculiarities and Galactolipid Contents in Chlorella Cells in Altered Gravity – 132

CHLORIDES

Toxicological Profile for Vinyl Chloride (2006 Update) – 109

CHLORINE

Inactivation of Bacillus Anthracis Spores Delivered as Liquid Suspension or Aerosol to Self-Decontaminating Fabric – 55

CHLOROPHYLLS

Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

CHLOROPLASTS

Ultrastructural Peculiarities and Galactolipid Contents in Chlorella Cells in Altered Gravity – 132

CHONDRITES

Early Planetary Differentiation: Comparative Planetology – 277

CHROMATOGRAPHY

Effect of Sampling Schedule on Pharmacokinetic Parameter Estimates of Promethazine in Astronauts – 129

CHROMOSOME ABERRATIONS

Stability of Radiation Induced Chromosome Damage in Human Peripheral Blood Lymphocytes – 186

CIRCADIAN RHYTHMS

Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight? – 142

Reproductive and Hormonal Risk Factors for Breast Cancer in Blind Women – 176

CIRCUIT BOARDS

Reconfigurable Instrumentation Signal Conditioning – 290

CIRCUITS

Software Defined Radio, its Programmable Signal-Processing Unit, and Central Control Signal-Processing Unit – 65

CITIES

Comparative Evaluation of Air and Auto Travel Between Urban Regions (Quantifying Intercity Modal Accessibility) – 3

CLADDING

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IIIB-2: Permanent Composite Cladding of Deteriorating Steel Hulls – 50

CLASSIFICATIONS

Automated Classification of Thermal Infrared Spectra Using Self-organizing Maps – 272

Developing A Methodology For Assessing Safety Programs Targeting Human Error In Aviation – 8

LISA Framework for Enhancing Gravitational Wave Signal Extraction Techniques – 276

Recognition Using Classification and Segmentation Scoring – 71

Sample Entropy and Random Forests: A Methodology for Anomaly-based Intrusion Detection and Classification of Low-bandwidth Malware Attacks – 218

CLEARANCES

Rate-Based Model Predictive Control of Turbofan Engine Clearance – 19

Transient Response of Rotor on Rolling-Element Bearings with Clearance – 96

CLIENT SERVER SYSTEMS

The Performance and Compatibility of Thin Client Computing with Fleet Operations – 220

CLIMATE CHANGE

Quantifying Uncertainty in Scenarios for Integrated Assessment of Climate Change – 114

CLIMATE MODELS

Fibonacci Grids – 235

CLINICAL MEDICINE

Clinically Practical Magnetic Resonance Protocol for Improved Specifically in Breast Cancer Diagnosis – 176

Improving Clinical Efficiency of Military Treatment Facilities – 179

Neurofibromatosis Type 2 (NF2) Natural History Consortium – 170

CLINOROTATION

Actin Organization and Gene Expression in Beta Vulgaris Seedlings under Clinorotation – 124

Altered Gravity Causes the Changes in the Protein NopA100 in Plant Cell Nucleoli – 139

Differentiation of Plant Graviperceiving and Graviresponding Cells in Altered Gravity – 124

Expression of Small Heat Shock Proteins in Pea Seedlings under Gravity-Altered Conditions – 132

Gene Expression of delta-1- and delta-3-Cyclins in Root Meristem Cells of Pisurn Sativurn L. under Clinorotation – 150

Growth of Cress Seedlings and Morphogenesis of Root Gravisensors under Clino-Rotation and in Unidirectional Red or Blue Light – 120

The Influence of Clinorotation on Root Cell Differentiation in Brassica Rapa Seedlings – 143

Ultrastructural Peculiarities and Galactolipid Contents in Chlorella Cells in Altered Gravity – 131

CLINOSTATS

A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

A Role of Peroxidases in Acceleration of the Aging of Potato Minitubers under Influence of Microgravity – 151

Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity – 144

Behavior of Gravisensitive Cells on 2D and 3D Clinostats – 144

Effects of Vector-Averaged Gravity on the Response to Different Stimulatory Signals in T-Cells – 146

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

CLOCKS

Effects of Spread Spectrum Clocking on Measured Noise Spectra – 64

CLOSED CYCLES

Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

Performance and Operational Characteristics for a Dual Brayton Space Power System With Common Gas Inventory – 31

CLOSED ECOLOGICAL SYSTEMS

Status of the SOS-LUX-Toxicity-Test on the International Space Station – 120

CLOUD COVER

NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

COAL

A System for Three-Dimensional Robotic Mapping of Underground Mines – 102

Toxecon Retrofit for Mercury and Multi Pollutant Control on Three 90-MW Coal Fired Boilers – 114

COASTS

Coast Guard: Condition of Some Aids-to-Navigation and Domestic Icebreaking Vessels Has Declined; Effect on Mission Performance Appears Mixed – 295

COATINGS

Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 50

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-2: Areal Coverage Using Friction Surfacing – 33

CODING

A General Framework for Analyzing, Characterizing, and Implementing Spectrally Modulated, Spectrally Encoded Signals – 190

Applications of the MuSES Infrared Signature Code – 91

Beyond MARC: New Trends for the Library of the Future – 267

Fracture of Grooved Kinetic Energy Rods Subject to Oblique Impact – 203

Low Spectral Efficiency Trellis Coded Modulation Systems – 203

Offline Forensic Analysis Of Microsoft Windows XP Physical Memory – 201

The F-15B Embedded Global Positioning System/Inertial Navigation System Instrumentation System Upgrade – 293

COGNITION

DARPA Improving Warfighter Information Intake Under Stress -- Augmented Cognition. Volume 1. Phase 2: Concept Validation Experiment – 187

COGNITIVE PSYCHOLOGY

Investigating Human Cognitive Performance during Spaceflight – 122

COHERENCE

Coherence and Coreference – 271

COHERENT LIGHT

Blind Deconvolution of Anisoplanatic Images Collected by a Partially Coherent Imaging System – 94

COHERENT RADAR

Potential of Remote Laser Vibration Sensing for Military Applications – 94

COLLAGENS

Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

COLLISION AVOIDANCE

A Hybrid Collision Avoidance Scheme for Ad Hoc Networks – 5

Performance of Directional Collision Avoidance in Multihop Wireless Networks – 5

COLLISIONS

Recent Progress Designing Compact Superconducting Final Focus Magnets for the ILC – 244

The Disposal of Spacecraft and Launch Vehicle Stages in Low Earth Orbit – 26

COLLOIDS

The Effects of Colloidal Processing on the Densification of Titanium Diboride (TiB2) - Alumina (Al2O3) Composites – 41

COLOR CODING

ChromaBlast - a Data Visualization Tool – 179

COLORADO

Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 1 of 2 – 112

Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 2 of 2 – 112

COLOR

Growth of Cress Seedlings and Morphogenesis of Root Gravisensors under Clino-Rotation and in Unidirectional Red or Blue Light – 120

COMBAT

A Network-Centric Operations Case Study: US/UK Coalition Combat Operations During Operation Iraqi Freedom – 69

Analysis of Operational Pace Versus Logistical Support Rate in the Ground Combat Element of a Marine Expeditionary Brigade – 203

Detailed Fuel Cell Demonstration Site Summary Report: Naval Hospital at Marine Corps Air Ground Combat Center - Twentynine Palms – 106

Diagnosis and Treatment of Combat Related Post-Traumatic Stress Disorder. An Abstract Bibliography – 270

The SAFIRE and an Initial Network-Centric Warfare Evaluation – 265

COMBUSTION

Metallized Gelled Propellants Combustion Experiments in a Pulse Detonation Engine – 57

Theoretical Chemical Dyamics Studies of Elementary Combustion Reactions – 38

COMET HEADS

Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus? – 277

COMET NUCLEI

Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus? – 277

COMET TAILS

Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus? – 277

COMETS

Spectroscopy of Kuiper Belt Objects and Centaurs – 275

COMMAND AND CONTROL

Are Service Oriented Architectures the Only Valid Architectural Approach for the Transformation to Network Centric Warfare? – 221

Campaigns of Experimentation: Pathways to Innovation and Transformation – 74

Deployable Command and Control System for Over the Horizon Small Boat Operations – 69

Extending the Tactical Wireless Internet in Support of USMC Distributed Operations – 72

Graph Theoretical Analysis of Network Centric Operations Using Multi-Layer Models – 65

HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 242

Implementation of a Modular Fly away Kits (FLAK) for C4ISR in order to counter Asymmetric Threats in the Coalition Riverine and Maritime Theatres – 73

Indian Nuclear Command and Control Dilemma – 67

Landpower and Network-Centric Operations: How Information in Today's Battlespace can be Exploited – 68

Light Reconnaissance Vehicle (LRV): Enhancing Command, Control, Communications, and Computers and Information Systems (C4I) to Tactically Employed Forces via a Mobile Platform – 216

Methodology for Evaluating the Effectiveness of Collaborative Tools for Coordinating MDA Emergency Response – 204

Network-Centric Railroading Utilizing Intelligent Railroad Systems – 72

Obstacle Marking and Vehicle Guidance Science and Technology Objective (OMVG-STO) Augmented Reality for Enhanced Command and Control and Mobility – 69

Simulation Development for Dynamic Situation Awareness and Prediction II – 201

The Agile Organization: From Informal Networks to Complex Effects and Agility – 75

The SAFIRE and an Initial Network-Centric Warfare Evaluation – 265

Understanding Command and Control – 74

Visually Based Timeline Debrief Toolset for Team Training AAR – 204

COMMERCE

Business Process Reengineering in the Inventory Management to Improve Aircraft Maintenance Operations in the Indonesian Air Force – 11

China's Space Program: An Overview – 20

From Metacomputing to Metabusiness Processing – 192

COMMERCIAL AIRCRAFT

Damage Emulation in the Dryden C-17 Simulation Estimating Maximum Torque Tolerance – 294

In-Flight Ratio Frequency Spectrum Measurements of Commercial Aircraft Cabins – 65

COMMERCIALIZATION

Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 106

International Space Station: Introduction and ISS Familiarization – 27

ISS Commercial Cargo Service: Requirements and Constraints Summary – 25

COMMUNICATION NETWORKS

A Hybrid Collision Avoidance Scheme for Ad Hoc Networks – 5

A Network-Centric Operations Case Study: US/UK Coalition Combat Operations During Operation Iraqi Freedom – 68

A Scalable Logical Coordinates Framework for Routing in Wireless Sensor Networks – 216

A Simple MPLS-based Flow Aggregation Scheme for Providing Scalable Quality of Service – 219

Are DoD Network Centric Policies, Processes and Edge Organizations Sufficiently Adaptable to Adequately Respond to the Impact of Globalization? – 71

Chapter 7. Node-Centric Hybrid Routing for Wireless Internetworking – 69

Coalition Interoperability: A Modeled Approach – 72

Deployable Command and Control System for Over the Horizon Small Boat Operations – 69

Development of Future Course Content Requirements Supporting the Department of Defense's Internet Protocol Version 6 Transition and Implementation – 191

Graph Theoretical Analysis of Network Centric Operations Using Multi-Layer Models – 65

Implementation of a Distributed Time Based Simulation of Underwater Acoustic Networking Using Java – 252

Light Reconnaissance Vehicle (LRV): Enhancing Command, Control, Communications, and Computers and Information Systems (C4I) to Tactically Employed Forces via a Mobile Platform – 216

Multi-User Performance Issues in Wireless Impulse Radio Networks – 70

NTT Technical Review, Volume 1, No. 4 – 58

Path Calculation and Packet Translation for UAV Surveillance in Support of Wireless Sensor Networks – 14

Performance Analysis of Wireless Networks – 218

Performance of Directional Collision Avoidance in Multihop Wireless Networks – 5

Rapidly Deployable, Self Forming, Wireless Networks for Maritime Interdiction Operations – 66

Robust Loop-Free On-Demand Routing in Ad Hoc Networks – 211

Shipboard Wireless Sensor Networks Utilizing Zigbee Technology – 67

Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

The Core Protocol Set for the Global Grid – 223

Using Dominating Sets to Improve the Performance of Mobile Ad Hoc Networks – 232

COMMUNICATION SATELLITES

On Optimizing the Configuration of Time-Transfer Links Used to Generate TAI – 24

COMMUNICATION

Light Reconnaissance Vehicle (LRV): Enhancing Command, Control, Communications, and Computers and Information Systems (C4I) to Tactically Employed Forces via a Mobile Platform – 217

Sociable Interfaces – 229

COMPATIBILITY

Design, Implementation and Testing of a Common Data Model Supporting Autonomous Vehicle Compatibility and Interoperability – 224

The Performance and Compatibility of Thin Client Computing with Fleet Operations – 220

COMPENSATORS

Observation of Long-Range Beam-Beam Effect in RHIC and Plans for Compensation – 263

COMPETITION

Fluid and Electrolyte Needs for Preparation and Recovery From Training and Competition – 41

COMPILERS

A Separate Compilation Extension to Standard ML (Revised and Expanded) – 195

COMPOSITE MATERIALS

Low-Velocity Impact Response of Sandwich Beams with Functionally Graded Core – 37

COMPOSTING

Laboratory Study to Investigate Gaseous Emissions and Solids Decomposition During Composting of Municipal Solid Wastes – 113

COMPRESSION TESTS

Measures of Complexity to Quantify Bone Loss and Estimate Strength of Human Lumbar Vertebrae: Comparison of pQCT Image Analysis with Bone Histomorphometry and Biomechanical Tests – 182

COMPRESSIVE STRENGTH

Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems – 262

COMPRESSOR ROTORS

Steady-State and Transient Measurements Within a Compressor Rotor During Steam-Induced Stall at Transonic Operational Speeds – 14

COMPRESSORS

Performance Comparison between Rough and Smooth-Cast Blades in a Low-Speed Multistage Compressor – 87

Unsteady Casewall Pressure Measurements in a Transonic Compressor during Steam Induced Stall – 18

COMPTON EFFECT

Nucleon Compton Scattering – 264

COMPUTATIONAL FLUID DYNAMICS

Approaches to Cycle Analysis and Performance Metrics – 89

CFD Simulation of the Space Shuttle Launch Vehicle with Booster Separation Motor and Reaction Control Plumes – 27

Conjugate Heat Transfer Analyses on the Manifold for Ramjet Fuel Injectors – 89

Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results – 86

Higher Order Chemistry Models in the CFD Simulation of Laser-Ablated Carbon Plumes – 88

Mars Aerocapture Systems Study – 29

PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD – 3

RTO WG 10: Test Cases for CFD Validation of Hypersonic Flight – 86

COMPUTATIONAL GRIDS

Data Structure and Parallel Decomposition Considerations on a Fibonacci Grid – 214

Fibonacci Grids – 234

PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD – 3

COMPUTATION

A Programming Language for Probabilistic Computation – 236

COMPUTER COMPONENTS

Sociable Interfaces – 229

COMPUTER GRAPHICS

A Computer Graphics-Based Target Detection Model – 198

Design of an Object Oriented and Modular Architecture for a Naval Tactical Simulator using Delta3D's Game Manager – 190

COMPUTER INFORMATION SECURITY

Development of Methodical Social Engineering Taxonomy Project – 221

Preliminary Security Requirements for SecureCore Hardware – 191

Provably Secure Passwork-Based Authentication in TLS – 189

Testing Template and Testing Concept of Operations for Speaker Authentication Technology – 58

COMPUTER NETWORKS

A Framework for the Management of Evolving Requirements in Software Systems Supporting Network-Centric Warfare – 208

A Measurement Study of BGP Blackhole Routing Performance – 211

Analytical Modeling of Medium Access Control Protocols in Wireless Networks – 219

Authoritative SSL Auditor – 222

Design of an Object Oriented and Modular Architecture for a Naval Tactical Simulator using Delta3D's Game Manager – 190

Dispelling Seven Myths about Grid Resource Management – 215

Electronic Warfare (EW) Historical Perspectives and Its Relationship to Information Operations (IO) - Considerations for Turkey – 202

Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

Identifying Supervisory Control and Data Acquisition (SCADA) Systems on a Network via Remote Reconnaissance – 218

Sample Entropy and Random Forests: A Methodology for Anomaly-based Intrusion Detection and Classification of Low-bandwidth Malware Attacks – 218

Statistical Analysis of Wireless Networks: Predicting Performance in Multiple Environments – 221

COMPUTER PROGRAMMING

A Computer Graphics-Based Target Detection Model – 198

A Framework for the Management of Evolving Requirements in Software Systems Supporting Network-Centric Warfare – 208

An Object-Oriented View of Backend Databases in a Mobile Environment for Navy and Marine Corps Applications – 198

Analyzing Divisia Rules Extracted from a Feedforward Neural Network – 208

Case Study: Accelerating Process Improvement by Integrating the TSP and CMMI – 11

Characterization and Application of Four-Layer Semiconductor Structures in Pulse Mode Operation – 79

Developing Software Requirements Supporting Open Architecture Performance Goals in Critical DoD System-of-Systems – 205

Evaluating the Effectiveness of Waterside Security Alternatives for Force Protection of Navy Ships and Installations Using X3D Graphics and Agent-Based Simulation – 197

Experimentation in a Collaborative Planning Environment – 207

Exploration and Policy Reuse – 235

Field Programmable Gate Array Hysteresis Control of Parallel Connected Inverters – 206

KOJAK Group Finder: Scalable Group Detecllon via Integrated Knowledge-Based and Statistical Reasoning – 236

Low-Power Fault Tolerance for Spacecraft FPGA-Based Numerical Computing – 20

Probabilistic Reuse of Past Policies – 235

Proceedings of the Second Software Architecture Technology User Network (SATURN) Workshop – 196

The Evaluation of Project Management Performance on Two Software Maintenance Projects Based on a CMMI Framework – 205

WEBTAS Software Life Cycle Development – 79

Workshop on Program Generation and Model-Driven Architecture – 200

COMPUTER PROGRAMS

A General Framework for Analyzing, Characterizing, and Implementing Spectrally Modulated, Spectrally Encoded Signals – 190

A Management Perspective of the Department of Defense (DoD) Internet Protocol Version 6 (IPv6) Transition Plan, Where it is Today, and Where it Needs to be by the Year 2008 – 197

A New Framework for Software Visualization: A Multi-Layer Approach – 212

Benchmarking and Validation of IR Signature Programs: SensorVision, CAMEO-ESA and RadThermIR – 195

Developing Software Requirements Supporting Open Architecture Performance Goals in Critical DoD System-of-Systems – 205

Game Models for Open Systems – 241

KOJAK Group Finder: Scalable Group Detecllon via Integrated Knowledge-Based and Statistical Reasoning – 236

Limited Investigation and Characterization of Boundary Avoidance Tracking (Project HAVE BAT) – 6

Performance Monitoring of Parallel Scientific Applications – 188

Predictions of Aerostructures Operational Flight Life Using the Half-Cycle Crack Growth Program – 293

Producibility Evaluation Criteria Cost Estimating Computer Programs - Manual – 194

Remote Sensing Time Series Product Tool – 103

Shipboard Wireless Sensor Networks Utilizing Zigbee Technology – 67

The K9 On-Board Rover Architecture – 230

The Range Managers Toolkit (RMTK) Noise Tool – 111

Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results – 269

WEBTAS Software Life Cycle Development – 79

WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis-)Mounted Soldier – 196

COMPUTER SECURITY

A Security Model for Space Based Communication – 28

COMPUTER STORAGE DEVICES

Atomically Smooth Epitaxial Ferroelectric Thin Films for the Development of a Nonvolatile, Ultrahigh Density, Fast, Low Voltage, Radiation-Hard Memory – 80

GEM: Graph EMbedding for Routing and Data-Centric Storage in Sensor Networks without Geographic Information – 221

Magnetic Random Access Memory Using Memory Cells with Rotated Magnetic Storage Elements – 83

Offline Forensic Analysis Of Microsoft Windows XP Physical Memory – 201

COMPUTER SYSTEMS DESIGN

U.S. Geological Survey National Computer Technology Meeting (7th): Program and Abstracts, Held in New Orleans, Louisiana, April 10-15, 1994 – 193

COMPUTER SYSTEMS PERFORMANCE

Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects – 147

COMPUTER SYSTEMS PROGRAMS

A Framework for the Management of Evolving Requirements in Software Systems Supporting Network-Centric Warfare – 208

The Evaluation of Project Management Performance on Two Software Maintenance Projects Based on a CMMI Framework – 205

COMPUTER TECHNIQUES

A Computer-Aided Diagnosis System for Breast Cancer Combining Digital Mammography and Genomics – 178

A Photo-Computer Technique for Design and Analysis of Personal Protective Equipment – 200

ChromaBlast - a Data Visualization Tool – 178

COMPUTER VIRUSES

Offline Forensic Analysis Of Microsoft Windows XP Physical Memory – 201

COMPUTER VISION

Detecting Instances of Shape Classes That Exhibit Variable Structure – 227

Drexel Object Occlusion Repository (DOOR) – 241

COMPUTERIZED SIMULATION

A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope – 60

A Simulation-Based Tool to Train Rapid Decision-Making Skills for the Digital Battlefield – 202

Analysis of the Assignment Scheduling Capability for Unmanned Aerial Vehicles (ASC-U) Simulation Tool – 14

Chapter 7. Node-Centric Hybrid Routing for Wireless Internetworking – 69

Design of an Object Oriented and Modular Architecture for a Naval Tactical Simulator using Delta3D's Game Manager – 190

Doubling the PEP-II Luminosity in Simulations – 264

Integrated Simulation Design Challenges to Support TPS Repair Operations – 272

International Space Station Centrifuge Rotor Models A Comparison of the Euler-Lagrange and the Bond Graph Modeling Approach – 96

Orion Aerodynamics for Hypersonic Free Molecular to Continuum Conditions – 2

Simulation of Cylinder Implosion Initiated by Underwater Explosion – 206

Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

Survey of Available Artificial Intelligence Technologies for Addition Into Delta3D – 199

The Army Digital Terrain Catalog II (ADTC) – 210

WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis-)Mounted Soldier – 196

COMPUTERS

Adding Faster with Application Specific Early Termination – 213

Implementation of a Quadrature Mirror Filter Bank on an SRC Reconfigurable Computer for Real-Time Signal Processing – 199

KOJAK Group Finder: Scalable Group Detecllon via Integrated Knowledge-Based and Statistical Reasoning – 236

Light Reconnaissance Vehicle (LRV): Enhancing Command, Control, Communications, and Computers and Information Systems (C4I) to Tactically Employed Forces via a Mobile Platform – 216

On System Scalability – 215

CONCENTRATORS
Aerodynamic Aerosol Concentrators – 91

CONCRETES
Prestressed Concrete Steel Wire Strand from Japan. Investigation No. AA1921-188 (Second Review) – 47

CONDENSING
Development of a Gravity-Insensitive Heat Pump for Lunar Applications – 96

CONDUCTORS
Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 50

CONFERENCES
2006 Gordon Research Conference on Ceramics, Solid Studies In – 54

Gordon Research Conference on Electrodeposition – 81

Proceedings of the Second Software Architecture Technology User Network (SATURN) Workshop – 196

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IIIB-2: Permanent Composite Cladding of Deteriorating Steel Hulls – 50

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-2: Areal Coverage Using Friction Surfacing – 33

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-3. Recent MIT Research on Residual Stresses and Distortion in Welded Structures – 49

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-4. Shipyard Aluminum/Steel Welded Transition Joints – 49

Workshop on Assessing and Managing Mercury from Historic and Current Mining Activities, Proceedings and Summary Report – 44

CONFIGURATIONS
Configurational Forces in Solid Nanostructures – 248

CONSCIOUSNESS
Cortical Regions Associated with Orthostatic Stress in Conscious Humans – 137

CONSTRAINTS
ISS Commercial Cargo Service: Requirements and Constraints Summary – 25

CONSTRUCTION
Final Environmental Impact Statement for the Outrigger Telescopes Project: Volume II – 109

The Effective Use of New Materials and Methodologies for Blast Mitigation in New and Renovated Facilities by the Armed Services – 100

CONSUMABLES (SPACECRAFT)
Personal Cooling for Extra-Vehicular Activities on Mars – 274

CONSUMERS
Using the Internet to Collaborate with Consumers in Redefining a Psychosocial Agenda for Families with Hereditary Breast Cancer – 175

CONTAMINANTS
Toxecon Retrofit for Mercury and Multi Pollutant Control on Three 90-MW Coal Fired Boilers – 115

Toxicological Profile for Dichlorobenzenes (2006 Update) – 108

CONTAMINATION
Effects of Techa River Radiation Contamination on the Reproductive Function of Residents – 174

CONTINGENCY
Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

CONTINUOUS WAVE RADAR
Time-Frequency, Bi-Frequency Detection Analysis of Noise Technology Radar – 252

CONTINUUMS
Orion Aerodynamics for Hypersonic Free Molecular to Continuum Conditions – 3

CONTRACTION
Depressed Tetanic Contractile Function Cannot be Compensated by Increasing Stimulating Frequency in Unloaded Soleus Muscle – 124

Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions – 122

Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcromeric Cytoskeletal Proteins of Hindlimb Suspended Rats – 120

CONTRACTS
Contracting out Governmental Web Services (Externalisation de l'hebergement de sites web gouvernementaux) – 223

CONTROL EQUIPMENT
Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

CONTROL SIMULATION
The C-17 Throttles-Only Control Evaluation and Simulation Validation – 284

CONTROL SURFACES
Further Investigations of High Temperature Knitted Spring Tubes for Advanced Control Surface Seal Applications – 97

CONTROL SYSTEMS DESIGN
Future Small Unmanned Aerial System (SUAS) Flight And Mission Control Support System (FMCSS) Design – 13

Gain-Scheduled Fault Tolerance Control Under False Identification – 19

High Temperature Evaluation of an Active Clearance Control System Concept – 98

The NASA F-15 Intelligent Flight Control Systems: Generation II – 285

CONTROL THEORY
Assessing the Potential Value of FORCEnet Technologies Within the JFMCC Planning Process Using the Knowledge Value Added Methodology – 212

Generic Guidance and Control Law Development for Six-Degree-of-Freedom (DOF) Simulation to Support Conceptual Aircraft Design – 286

Rate-Based Model Predictive Control of Turbofan Engine Clearance – 19

Verification of the Active Aeroelastic Wing Aerodynamic Model with Flight Test Results – 291

CONTROL UNITS (COMPUTERS)
The K9 On-Board Rover Architecture – 230

CONTROLLERS
Entry Abort Determination using Non-adaptive Neural Networks for Mars Precision Landers – 28

Materials for the Control Drive Mechanisms – 255

Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Rate-Based Model Predictive Control of Turbofan Engine Clearance – 19

Space-based Telemetry and Range Safety (STARS) Phased Array Antenna Controller – 289

CONTROL
Future Small Unmanned Aerial System (SUAS) Flight And Mission Control Support System (FMCSS) Design – 13

Identifying Supervisory Control and Data Acquisition (SCADA) Systems on a Network via Remote Reconnaissance – 218

Operator Control Units for the Dismounted Soldier – 226

Tree-Based Hierarchical Reinforcement Learning – 237

CONVECTION
Scrape-Off Layer Plasmas for ITER with 2nd X-Point and Convective Transport Effects – 260

CONVEYORS
Camouflaging Vehicles Using Field Expedient Materials, Commercial Hardware Store Materials, Camouflage Nets, and Rubber Conveyer Belt Material – 258

COOLERS
ERL High-Energy Cooler for RHIC – 264

COOLING
ERL High-Energy Cooler for RHIC – 264

Personal Cooling for Extra-Vehicular Activities on Mars – 274

Simulations of MANX, A Practical Six Dimensional Muon Beam Cooling Experiment – 249

Successful Bunched Beam Stochastic Cooling in RHIC – 262

COORDINATES

A Scalable Logical Coordinates Framework for Routing in Wireless Sensor Networks – 216

COORDINATION

Information Security: Coordination of Federal Cyber Security Research and Development – 74

Network Support for Group Coordination – 220

COPOLYMERS

Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

COPPER ALLOYS

Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 50

COPPER

Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 50

CORONAS

Capella Corona Revisited: A Combined View from XMM-Newton RGS Chandra HETGS, and LETGS – 277

CORROSION PREVENTION

Effect of Crevice Former on Corrosion Damage Propagation – 36

CORROSION RESISTANCE

Corrosion-Resistant Carbon Steel Flat Products from France and Germany. Investigations Nos. 701-TA-348-349 and 731-TA-615 (Review) (Remand). Determination and Views of the Commission – 47

CORROSION

Effect of Crevice Former on Corrosion Damage Propagation – 36

Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 36

COSMIC RAYS

Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study – 125

Managing Space Radiation Risks on Lunar and Mars Missions: Risk Assessment and Mitigation – 186

COST EFFECTIVENESS

A Faster Strongly Polynomial Minimum Cost Flow Algorithm – 231

Effectiveness of Introductory Flight Screening (IFS) for USA Navy and Marine Corps Student Pilots – 4

COST ESTIMATES

Producibility Evaluation Criteria Cost Estimating Computer Programs - Manual – 194

COUNTERMEASURES

Selecting Appropriate Counter-Measures in an Intrusion Detection Framework – 216

COUPLERS

Cavity BPM with Dipole-Mode-Selective Coupler – 250

CRACK CLOSURE

Influence of Finite Element Software on Energy Release Rates Computed Using the Virtual Crack Closure Technique – 37

CRACK PROPAGATION

Predictions of Aerostructures Operational Flight Life Using the Half-Cycle Crack Growth Program – 293

CRACKS

Effect of Crevice Former on Corrosion Damage Propagation – 36

CREATINE

How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

CREEP PROPERTIES

Comprehensive Creep and Thermophysical Performance of Refractory Materials – 55

CREW EXPLORATION VEHICLE

Exploration Life Support Directions – 188

Full Field Thermal Protection System Health Monitoring System for Crew Exploration Vehicles – 290

CRITICAL EXPERIMENTS

Specifications, Pre-Experimental Predictions, and Test Plate Characterization Information for the Prometheus Critical Experiments – 52

CRITICAL FREQUENCIES

In-Flight Ratio Frequency Spectrum Measurements of Commercial Aircraft Cabins – 65

CRITICAL POINT

Can We Discover the QCD Critical Point at RHIC – 248

CROATIA

International Seminar on The Role of Dosimetry in High-Quality EMF Risk Assessment Held in Ljubljana, Slovenia and Zagreb, Croatia on 13-15 September 2006 – 247

CROSS FLOW

Effect of Span Variation on the Performance of a Cross Flow Fan – 6

In-Plant Testing of High-Efficiency Hydraulic Separators. (Annual Report, July 21, 2004-July 20, 2005) – 87

CRUDE OIL

Toxicological Profile for Hydrogen Sulfide (2006 Update) – 109

CRYOGENIC EQUIPMENT

ISS Payloads Office Utilization/Research Cargo Familiarization – 27

CRYOGENICS

Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

CRYPTOGRAPHY

Access Control to Information in Pervasive Computing Environments – 267

CRYSTAL RECTIFIERS

Improvements in Regenerative Frequency Dividers – 78

CRYSTALLINITY

New Optical Constants for Amorphous and Crystalline H2O-ice – 257

CRYSTALS

Dynamic Plasticity and Fracture in High Density Polycrystals: Constitutive Modeling and Numerical Simulation – 261

CULTURE TECHNIQUES

Biolab Experiment Development Status 2005 – 123

European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Production of Cytokines by Human PBMCs in Simulated Microgravity – 149

Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

CURRENT DENSITY

Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity – 157

Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 31

CYANIDES

Toxicological Profile for Cyanide (2006 Update) – 108

CYCLES

Centrifugation Effects on Estrous Cycling, Mating Success and Pregnancy Outcome in Rats – 156

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

Thermomechanical Cycling Investigation of Cu and Niti Reinforced Lead-Free Solder – 49

CYCLONES

Evaluation of Causes of Large 96-H and 120-H Track Errors in the Western North Pacific – 117

Objective Identification of Environmental Patterns Related to Tropical Cyclone Track Forecast Errors – 116

The Extratropical Transition of Tropical Storm Banyan – 116

CYTOLOGY

Cytotoxic Activity of Natural Killer Cells in Vitro under Microgravity – 148

Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcromeric Cytoskeletal Proteins of Hindlimb Suspended Rats – 120

Exploring Early Detection Methods: Using the Intraductal Approach to Predict Breast Cancer – 171

Hypergravity Modulates Cyclic GMP Efflux in Nitric Oxide-Stimulated Human Melanocytic Cells – 143

Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP – 135

Production of Cytokines by Human PBMCs in Simulated Microgravity – 149

Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

CYTOPLASM

How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

DAMAGE ASSESSMENT

The Range Managers Toolkit (RMTK) Noise Tool – 111

DAMAGE

Damage Emulation in the Dryden C-17 Simulation Estimating Maximum Torque Tolerance – 294

Effect of Crevice Former on Corrosion Damage Propagation – 36

Influence of Rat Hindlimb Suspension on Sarcolemmal Dystrophin and its Sensitivity to Mechanical Damage – 122

Orbiter Repair Maneuver Contingency Separation Methods and Analysis – 26

The Effective Use of New Materials and Methodologies for Blast Mitigation in New and Renovated Facilities by the Armed Services – 100

DAMPING

Simulation of the Electron Cloud for Various Configurations of a Damping Ring for the ILC – 264

Single-Bunch Instability Driven by The Electron Cloud Effect in the Positron Damping Ring of the International Linear Collider – 244

DATA ACQUISITION

Data Collection and Analysis in the Air Travel Planning Domain – 73

Effect of Sampling Schedule on Pharmacokinetic Parameter Estimates of Promethazine in Astronauts – 129

Higher Resolution Strain Gage Data Acquisition – 288

Identifying Supervisory Control and Data Acquisition (SCADA) Systems on a Network via Remote Reconnaissance – 218

Usable Knowledge Gained or Refined for Personnel Serving in the Operating Forces Through Naval Postgraduate School's Distributed Learning Program – 205

DATA BASES

An Object-Oriented View of Backend Databases in a Mobile Environment for Navy and Marine Corps Applications – 199

Experimentation in a Collaborative Planning Environment – 207

Issues in Developing Object-Oriented Database Systems for Real-Time Applications – 192

Parameter-Free Spatial and Stream Mining – 268

The Army Digital Terrain Catalog II (ADTC) – 210

The ERASMUS Experiment Archive – 129

Visually Based Timeline Debrief Toolset for Team Training AAR – 204

WEBTAS Software Life Cycle Development – 79

DATA LINKS

Endpoint-Based Routing Strategies for Improving Internet Performance and Resilience – 238

Limited Evaluation of an 802.11b Air-to-Ground Wireless Datalink (Project 'HAVE HALO' – 22

DATA MANAGEMENT

An Object-Oriented View of Backend Databases in a Mobile Environment for Navy and Marine Corps Applications – 199

DATA MINING

Data Mining on an OLTP System (Nearly) for Free – 270

DATA PROCESSING

Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm – 292

Electronic Warfare (EW) Historical Perspectives and Its Relationship to Information Operations (IO) - Considerations for Turkey – 202

GPS Carrier Phase Analysis Noise on the USNO-PTB Baselines – 233

DATA REDUCTION

ChromaBlast - a Data Visualization Tool – 179

DATA STORAGE

GEM: Graph EMbedding for Routing and Data-Centric Storage in Sensor Networks without Geographic Information – 222

DATA STRUCTURES

Data Structure and Parallel Decomposition Considerations on a Fibonacci Grid – 214

DATA SYSTEMS

Core Data Model Proposal for Physiology Research in Space – 125

LISA Framework for Enhancing Gravitational Wave Signal Extraction Techniques – 276

Reconfigurable Instrumentation Signal Conditioning – 290

The F-15B Embedded Global Positioning System/Inertial Navigation System Instrumentation System Upgrade – 293

DATA TRANSMISSION

A Comparison of Known Classes of Reliable Multicast Protocols – 227

A Security Model for Space Based Communication – 27

On-demand Loop-Free Routing in Ad Hoc Networks Using Source Sequence Numbers – 222

Real-Time Application Traffic Monitoring System for Streaming Data Quality Evaluation – 213

DAYTIME

Optimizing Daytime Short Sleep Episodes to Maximize Performance in a Stressful Environment – 183

DEACTIVATION

Inactivation of Bacillus Anthracis Spores Delivered as Liquid Suspension or Aerosol to Self-Decontaminating Fabric – 55

Lunar Dust Activation and Related Studies – 274

DEATH

The Nuclear Death Domain Protein p84N5; a Candidate Breast Cancer Susceptibility Gene – 171

DECEPTION

Automated Thermal Camouflage Generation Program Status – 33

DECISION MAKING

A Simulation-Based Tool to Train Rapid Decision-Making Skills for the Digital Battlefield – 202

Agent-based Modeling of Dismounted Infantry Through Inclusion of Perceptions, Inferences and Associations Phase 1 – 269

Analysis of Layered Social Networks – 193

Exploration of Force Transition in Stability Operations Using Multi-Agent Simulation – 196

Iconic Representation and Dynamic Information Fidelity: Implications for Decision Support – 77

DECODING

Low Spectral Efficiency Trellis Coded Modulation Systems – 204

DECOMPOSITION

Data Structure and Parallel Decomposition Considerations on a Fibonacci Grid – 214

Decomposition of GD on CeO2/Alumina Adsorbents in a Gas Chromatograph On-Column Injector Tube Reactor – 42

Laboratory Study to Investigate Gaseous Emissions and Solids Decomposition During Composting of Municipal Solid Wastes – 113

DECONDITIONING

Evaluation of Spare Capacities of the Respiratory Muscles during Hypokinesia – 187

DECONTAMINATION

Catalytic Enzyme-Based Methods for Water Treatment and Water Distribution System Decontamination. 1. Literature Survey – 168

Inactivation of Bacillus Anthracis Spores Delivered as Liquid Suspension or Aerosol to Self-Decontaminating Fabric – 54

DEFENSE PROGRAM

A Management Perspective of the Department of Defense (DoD) Internet Protocol Version 6 (IPv6) Transition Plan, Where it is Today, and Where it Needs to be by the Year 2008 – 197

Reducing DoD Fossil-Fuel Dependence – 56

DEFLECTION

Simultaneous Flight Demonstration of Three Wing Deflection Measurement Approaches – 287

Transient Response of Rotor on Rolling-Element Bearings with Clearance – 96

DEFORMATION

Displacement Theories for Inflight Deformed Shape Predictions of a Long Span Flying Wing – 287

DEGRADATION

Development of a Test Facility for Air Revitalization Technology Evaluation – 8

Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor – 165

DEGREES OF FREEDOM

Generic Guidance and Control Law Development for Six-Degree-of-Freedom (DOF) Simulation to Support Conceptual Aircraft Design – 286

DELAMINATING

Influence of Finite Element Software on Energy Release Rates Computed Using the Virtual Crack Closure Technique – 37

DENSIFICATION

The Effects of Colloidal Processing on the Densification of Titanium Diboride (TiB2) - Alumina (Al2O3) Composites – 41

DEOXYRIBONUCLEIC ACID

DNA MIcroarray-Assisted Modeling of Metabolic and Regulatory Networks With Applications to Bio-Defense – 169

Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

DEPLOYMENT

Intelligent Rover Execution for Detecting Life in the Atacama Desert – 272

DEPOSITS

Workshop on Assessing and Managing Mercury from Historic and Current Mining Activities, Proceedings and Summary Report – 44

DEPTH

Rip Channel Migration in the Nearshore – 92

DESCENT TRAJECTORIES

Entry Abort Determination using Non-adaptive Neural Networks for Mars Precision Landers – 28

DESERTS

Protective Clothing and Life Support Equipment Applicable to a Desert Environment – 188

DESIGN ANALYSIS

A Photo-Computer Technique for Design and Analysis of Personal Protective Equipment – 200

Development of a Gravity-Insensitive Heat Pump for Lunar Applications – 95

DESIGN OPTIMIZATION

Optimization of the X-Band Structure for the JLC/NLC – 261

DESORPTION

Beam Pipe Desorption Rate in RHIC – 263

DETECTION

A Computer Graphics-Based Target Detection Model – 198

Air Flow Patterns Around Several Biological Point Detection System Configurations – 91

CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy – 45

Detecting, Classifying, and Handling Contradictions in a Large, Dynamic Information Environment – 226

Detecting Instances of Shape Classes That Exhibit Variable Structure – 227

Determination of MS2 Bacteriophage Stability at Low pH Using the Integrated Virus Detection System (IVDS) – 92

Electromagnetic Field Distribution Measurements using an Optically Scanning Probe System – 61

Exploring Early Detection Methods: Using the Intraductal Approach to Predict Breast Cancer – 171

Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

Eye-Safe Laser Radar 3-D Imaging – 228

Intelligent Rover Execution for Detecting Life in the Atacama Desert – 271

LISA Framework for Enhancing Gravitational Wave Signal Extraction Techniques – 276

Sample Entropy and Random Forests: A Methodology for Anomaly-based Intrusion Detection and Classification of Low-bandwidth Malware Attacks – 218

Selecting Appropriate Counter-Measures in an Intrusion Detection Framework – 216

Sensing Super-Position: Human Sensing Beyond the Visual Spectrum – 182

Statement of Work for Studies in BlueGene/L Scalability and Reconfigurability – 189

The X-43A Flush Airdata Sensing Research – 295

Time-Frequency, Bi-Frequency Detection Analysis of Noise Technology Radar – 252

Towards the Early Detection of Breast Cancer in Young Women – 175

DETERIORATION

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IIIB-2: Permanent Composite Cladding of Deteriorating Steel Hulls – 50

DIAGNOSIS

A Computer-Aided Diagnosis System for Breast Cancer Combining Digital Mammography and Genomics – 178

Clinically Practical Magnetic Resonance Protocol for Improved Specifically in Breast Cancer Diagnosis – 176

Diagnosis and Treatment of Combat Related Post-Traumatic Stress Disorder. An Abstract Bibliography – 270

Diagnosis and Treatment of Diseases of Tactical Importance to U.S. Central Command – 166

DICHLORIDES

Toxicological Profile for Dichlorobenzenes (2006 Update) – 108

DIELECTRIC PROPERTIES

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

DIELECTRICS
Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

Layer Incorporating Particles with a High Dielectric Constant – 81

Thin Dielectric Layers on Substrates, and Methods of Making the Same – 76

Top vs. Bottom Charging of the Dielectric in RF MEMS Capacitive Switches (Preprint) – 78

DIETS
Is Peripheral Benzodiazepine Receptor (PBR) Gene Expression Involved in Breast Cancer Suppression by Dietary Soybean Protein? – 171

DIGITAL DATA
Two Serial Data to Pulse Code Modulation System Interfaces – 294

DIGITAL SYSTEMS
A Simulation-Based Tool to Train Rapid Decision-Making Skills for the Digital Battlefield – 202

Contention-Conscious Transaction Ordering in Embedded Multiprocessors Systems – 234

Dataflow Interchange Format and a Framework for Processing Dataflow Graphs – 209

Deployable Command and Control System for Over the Horizon Small Boat Operations – 69

First Version of a Dataflow Interchange Format – 209

Visually Based Timeline Debrief Toolset for Team Training AAR – 204

DIMENSIONAL ANALYSIS
A System for Three-Dimensional Robotic Mapping of Underground Mines – 102

DIOXIDES
Haynes 230 Mini-Can Welding to Support Planned Irradiation Testing of Candidate Space Fuel Materials – 22

DIPOLES
Cavity BPM with Dipole-Mode-Selective Coupler – 250

DIRECT CURRENT
Transient fault Currents in Aircraft D-C Systems – 16

DISCRETE FUNCTIONS
A Review of Polyphase Filter Banks and Their Application – 232

DISCRIMINANT ANALYSIS (STATISTICS)
A Computer-Aided Diagnosis System for Breast Cancer Combining Digital Mammography and Genomics – 178

Discrimination of Complex Synthetic Echoes by an Echolocating Bottlenose Dolphin – 252

DISEASES
Diagnosis and Treatment of Diseases of Tactical Importance to U.S. Central Command – 166

DISKS (SHAPES)
Burst Testing and Analysis of Superalloy Disks With a Dual Grain Microstructure – 51

DISORIENTATION
The Role of Spatial Disorientation in Fatal General Aviation Accidents – 4

DISPLACEMENT
Displacement Theories for Inflight Deformed Shape Predictions of a Long Span Flying Wing – 287

DISPLAY DEVICES
A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope – 60

Iconic Representation and Dynamic Information Fidelity: Implications for Decision Support – 77

Obstacle Marking and Vehicle Guidance Science and Technology Objective (OMVG-STO) Augmented Reality for Enhanced Command and Control and Mobility – 69

WEBTAS Software Life Cycle Development – 79

DISTORTION
Langmuir Probe Distortions and Probe Compensation in an Inductively Coupled Plasma – 260

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-3. Recent MIT Research on Residual Stresses and Distortion in Welded Structures – 49

DISTRIBUTED PROCESSING
Usable Knowledge Gained or Refined for Personnel Serving in the Operating Forces Through Naval Postgraduate School's Distributed Learning Program – 206

DIVERGENCE
A Commemoration of Deschamps' and Sichak's 'Microstrip Microwave Antennas': 50 Years of Development, Divergence, and New Directions – 80

DOCUMENT MARKUP LANGUAGES
Beyond MARC: New Trends for the Library of the Future – 268

Semantic Web Services with Web Ontology Language (OWL-S) - Specification of Agent-Services for DARPA Agent Markup Language (DAML) – 219

DOCUMENTS
The ERASMUS Experiment Archive – 130

DOLPHINS
Discrimination of Complex Synthetic Echoes by an Echolocating Bottlenose Dolphin – 253

DOORS
Analysis of Adaptive Team Concept through Simulation Models: A Survey (toetsing van adaptieve teamconcepten door middel van simulatiemodellen: een verkenning) – 240

Drexel Object Occlusion Repository (DOOR) – 241

DOPED CRYSTALS
Optical and magnetic properties of Eu-doped GaN – 42

DOSAGE
Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects – 147

Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study – 124

DOSIMETERS
Advanced Beta Dosimetry Techniques – 283

International Seminar on The Role of Dosimetry in High-Quality EMF Risk Assessment Held in Ljubljana, Slovenia and Zagreb, Croatia on 13-15 September 2006 – 246

Studies on Dosimetry of Human-Body Exposure to Electromagnetic Field – 63

DOWNTIME
High Availability Server Platform for Operations Support System – 213

DRONE VEHICLES
Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

Future Small Unmanned Aerial System (SUAS) Flight And Mission Control Support System (FMCSS) Design – 13

Path Calculation and Packet Translation for UAV Surveillance in Support of Wireless Sensor Networks – 14

DROSOPHILA
Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 143

DRUGS
Breast Cancer Suppression by IDO Inhibitors – 173

Inhibition of Fatty Acid Synthase (FAS): A New Drug for Breast Cancer Chemoprevention – 165

DRYING
Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions – 123

Effect of 7-Days Dry Immersion in Combination with Mechanical Stimulation of Foot Support Zones upon Resistance to Fatigue of Knee Extensors and Flexors – 156

DUCTS
Refractivity in the Arctic Regions – 116

DUPLEXERS
A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59

DUST
Rationale for Suit and Airlock Dust Mitigation – 271

DYNAMIC CHARACTERISTICS
Reaction Ensemble Molecular Dynamics: Direct Simulation of the Dynamic Equilibrium Properties of Chemically Reacting Mixtures – 39

DYNAMIC MODELS
Computing the Observed Information Matrix for Dynamic Mixture Models – 236

Low-Velocity Impact Response of Sandwich Beams with Functionally Graded Core – 36

DYNAMIC RESPONSE
Dynamic Response of an Alternative Tissue Simulant, Physically Associating Gels (PAG) – 39

Dynamic Response of the Human Head to + Gx Impact – 184

DYNAMIC STRUCTURAL ANALYSIS
Producibility Evaluation Criteria Cost Estimating Computer Programs - Manual – 194

EAR PROTECTORS
Bouchon d'oreille a attenuation active adaptee aux bruits d'helicoptere (Ear Plugs for Active Attenuation Adapted for Helicopter Noises) (Gehoerschutzstopsel mit aktriver Daempfung, geeignet fuer Hubschrauberlaerm) – 13

EAR
Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

EARTH MAGNETOSPHERE
A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope – 60

EARTH ORBITAL ENVIRONMENTS
Ionizing Radiation Environment on the International Space Station: Performance vs. Expectations for Avionics and Material – 283

EARTH ORBITS
Efficient Calculation of Earth Penetrating Projectile Trajectories – 274

Spacecraft Instrumentation to Measure and Stimulate Space Particles and Plasma Waves in the Medium-Earth Orbit (MEO) Regime – 115

The International Space Station: A Pathway to the Future – 273

EARTH (PLANET)
Earth After the Moon Forming Impact – 278

EARTH SCIENCES
Internet Protocol Over Telemetry Testing for Earth Science Capability Demo Summary – 289

ECHOES
Discrimination of Complex Synthetic Echoes by an Echolocating Bottlenose Dolphin – 253

ECONOMICS
Solar Trough Organic Rankine Electricity System (STORES) Stage 1: Power Plant Optimization and Economics. November 2000-May 2005 – 104

EDDY CURRENTS
Measurements and Modeling of Eddy Current Effects in BNL's AGS Booster – 250

EDITING
Implementing OWL Defaults – 211

EDUCATION
Big Storm Named Katrina – 117

Biolab Crew Training – 155

Fluid and Electrolyte Needs for Preparation and Recovery From Training and Competition – 41

Measuring the Value of Graduate Manpower Systems Analysis Education for Naval Officers – 58

Seeds-In-Space Education Experiment during the Dutch Soyuz Mission, DELTA – 137

The Importance of Artificial Intelligence for Naval Intelligence Training Simulations – 225

Videogame-Based Training Success: The Impact of Trainee Characteristics - Year 2 – 202

Visually Based Timeline Debrief Toolset for Team Training AAR – 204

EFFICIENCY
Characteristics and Sampling Efficiencies of OMNI 3000 Aerosol Samplers – 43

EFFLUX
Hypergravity Modulates Cyclic GMP Efflux in Nitric Oxide-Stimulated Human Melanocytic Cells – 143

Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP – 135

EJECTION SEATS
Biological Parameters of Impact – 15

Development and Evaluation of a Device for the Prevention of Arm Flail Injuries – 16

ELASTIC SCATTERING
A New Application of the Channel Packet Method for Low Energy 1-D Elastic Scattering – 107

ELASTOMERS
Compressed Elastomer Method for Internal Pressure Testing – 54

ELECTRIC AUTOMOBILES
Plug-In Hybrid Electric Vehicle Energy Storage System Design. Preprint – 104

ELECTRIC BATTERIES
Microscopic Batteries for MEMS Systems – 82

ELECTRIC GENERATORS
Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 106

Toxecon Retrofit for Mercury and Multi Pollutant Control on Three 90-MW Coal Fired Boilers – 114

ELECTRIC POTENTIAL
Diminished Performance of Bacterial Fuel Cells in Microgravity – 141

ELECTRIC POWER PLANTS
Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 106

ELECTRIC PROPULSION
Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 32

ELECTRICAL RESISTANCE
Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 50

ELECTRICITY
Solar Trough Organic Rankine Electricity System (STORES) Stage 1: Power Plant Optimization and Economics. November 2000-May 2005 – 104

ELECTROCARDIOGRAPHY
Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 153

High-frequency ECG – 180

ELECTRODEPOSITION
Gordon Research Conference on Electrodeposition – 81

ELECTRODYNAMICS
High Performance Ion Mobility Spectrometry Using Hourglass Electrodynamic Funnel and Internal Ion Funnel – 90

ELECTROLUMINESCENCE
A Quantitative Electrochemiluminescence Assay for Clostridium perfringens alpha toxin – 163

An Activity-Dependent Assay for Ricin and Related RNA N-Glycosidases Based on Electrochemiluminescence – 162

ELECTROLYTES
Fluid and Electrolyte Needs for Preparation and Recovery From Training and Competition – 41

ELECTROMAGNETIC COMPATIBILITY
Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

Research Activities on EMC in NICT – 62

ELECTROMAGNETIC FIELDS
Bioelectromagnetics 2005 – 178

Development of Exposure Systems and Exposure Assessment for Studies on Biological Effect of Electromagnetic Field – 64

Electromagnetic Field Distribution Measurements using an Optically Scanning Probe System – 61

International Seminar on The Role of Dosimetry in High-Quality EMF Risk Assessment Held in Ljubljana, Slovenia and Zagreb, Croatia on 13-15 September 2006 – 246

Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

Naval Electromagnetic (EM) Gun Technology Assessment – 246

Studies on Dosimetry of Human-Body Exposure to Electromagnetic Field – 63

Total Radiated Power of Radio Transmitters Measured in a Reverberation Chamber – 60

ELECTROMAGNETIC INTERFERENCE

Use of Electromagnetic Energy and Resultant Noises – 63

ELECTROMAGNETIC MEASUREMENT

Electromagnetic Disturbance Measurement by Using Amplitude Probability Distribution for Protecting Digital Wireless Communication Systems – 61

Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

ELECTROMAGNETIC NOISE

Electromagnetic Disturbance Measurement by Using Amplitude Probability Distribution for Protecting Digital Wireless Communication Systems – 61

ELECTROMAGNETIC RADIATION

Physical Optics of Metal Plate Media Part 1, Theoretical Considerations – 258

ELECTROMAGNETIC SCATTERING

Low-Frequency Electromagnetic Backscatter from Buries Tunnels – 247

ELECTROMAGNETIC WAVE TRANSMISSION

Radio Propagation Prediction Software for Complex Mixed Path Physical Channels – 198

ELECTROMAGNETISM

Measurement of the Ratio GEP/GMP to Large Q(sub 2), Interesting Results form Jefferson Lab – 250

Refractivity in the Arctic Regions – 116

ELECTROMYOGRAPHY

Effect of 6-Days of Support Withdrawal on Characteristics of Balance Function – 129

Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device – 126

Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

ELECTRON ACCELERATION

ERL High-Energy Cooler for RHIC – 264

ELECTRON BEAMS

ERL High-Energy Cooler for RHIC – 264

ELECTRON CLOUDS

Simulation of the Electron Cloud for Various Configurations of a Damping Ring for the ILC – 264

Single-Bunch Instability Driven by The Electron Cloud Effect in the Positron Damping Ring of the International Linear Collider – 244

ELECTRON ENERGY

Langmuir Probe Distortions and Probe Compensation in an Inductively Coupled Plasma – 260

ELECTRON PARAMAGNETIC RESONANCE

Spin-Based Photonics via Electromagnetically Induced Transparency – 258

ELECTRONIC EQUIPMENT

Intelligent Maintenance Aid (IMA) – 81

Research Activities on EMC in NICT – 62

U.S. Navy Radar Systems Survey – 78

ELECTRONIC WARFARE

Electronic Warfare (EW) Historical Perspectives and Its Relationship to Information Operations (IO) - Considerations for Turkey – 202

ELECTRO-OPTICS

Applications of the MuSES Infrared Signature Code – 91

Electromagnetic Field Distribution Measurements using an Optically Scanning Probe System – 61

ELECTROPHYSIOLOGY

Hardware Development for Electrophysiological Long-Term Studies in Space – 142

ELECTROSTATIC PROBES

Langmuir Probe Distortions and Probe Compensation in an Inductively Coupled Plasma – 260

ELEMENTARY PARTICLE INTERACTIONS

Nucleon Compton Scattering – 264

ELLIPSOIDS

Changes in Ultrastructure of Mitochondria in Root Apex Cells of Soybean Seedlings in Microgravity – 147

EMBEDDING

GEM: Graph EMbedding for Routing and Data-Centric Storage in Sensor Networks without Geographic Information – 222

EMERGENCIES

Implementation of a Modular Fly away Kits (FLAK) for C4ISR in order to counter Asymmetric Threats in the Coalition Riverine and Maritime Theatres – 73

Methodology for Evaluating the Effectiveness of Collaborative Tools for Coordinating MDA Emergency Response – 204

EMISSION

Quantifying Uncertainty in Scenarios for Integrated Assessment of Climate Change – 114

EMISSIVITY

A Novel Method for Measurement of Total Hemispherical Emissivity – 21

EMITTANCE

Power Measurement Emitted by UWB System in Time Domain – 63

Spectral Irradiance Calibration in the Infrared. XVI. Improved Accuracy in the Infrared Spectra of the Secondary and Tertiary Standard Calibration Stars – 253

ENCAPSULATING

A Comprehensive Reasoning Framework for Information Survivability (User Intent Encapsulation and Reasoning About Intrusion: Implementation and Performance Assessment) – 215

ENDOCRINE SYSTEMS

Association of Hormonal Responses and Performance of Student Pilots during Acceleration Training on the Human Centrifuge – 135

ENDOCRINOLOGY

Prenatal Centrifugation: A Mode1 for Fetal Programming of Body Weight? – 139

ENDOPLASMIC RETICULUM

Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent – 127

ENDOTHELIUM

Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats – 129

Angiogenic Signaling in Living Breast Tumor Models – 163

ENERGY CONSERVATION

Detailed Fuel Cell Demonstration Site Summary Report: Naval Hospital at Marine Corps Air Ground Combat Center - Twentynine Palms – 106

Energy and Process Optimization and Benchmarking of Army Industrial Processes – 105

Voluntary Agreements for Energy Efficiency or GHG Emissions Reduction in Industry: An Assessment of Programs Around the World – 111

ENERGY CONVERSION EFFICIENCY

Update on Extended Operation of Stirling Convertors in Thermal Vacuum at NASA Glenn Research Center – 32

ENERGY CONVERSION

Update on Extended Operation of Stirling Convertors in Thermal Vacuum at NASA Glenn Research Center – 32

ENERGY LEVELS
An Energetic Concept of Habitability for the Deep Subsurface – 187

ENERGY POLICY
Voluntary Reporting of Greenhouse Gases, 2004 – 110

ENERGY STORAGE
Plug-In Hybrid Electric Vehicle Energy Storage System Design. Preprint – 104

ENGINE DESIGN
Burst Testing and Analysis of Superalloy Disks With a Dual Grain Microstructure – 51

The Nutating Engine-Prototype Engine Progress Report and Test Results – 16

ENGINE INLETS
Mach 4 Test Results of a Dual-Flowpath, Turbine Based Combined Cycle Inlet – 10

ENGINE TESTS
Evaluation of an Outer Loop Retrofit Architecture for Intelligent Turbofan Engine Thrust Control – 19

The Nutating Engine-Prototype Engine Progress Report and Test Results – 16

ENGINEERS
A New Framework for Software Visualization: A Multi-Layer Approach – 212

Science and Technology Review. Tomorrow's Scientists and Engineers, June 2006 – 250

ENGLISH LANGUAGE
CLIR Experiments at Maryland for TREC-2002: Evidence Combination for Arabic-English Retrieval – 269

ENTROPY
Sample Entropy and Random Forests: A Methodology for Anomaly-based Intrusion Detection and Classification of Low-bandwidth Malware Attacks – 218

ENVIRONMENT EFFECTS
Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity – 145

Estimating 'Concern Levels' for Concentrations of Chemical Substances in the Environment – 34

ENVIRONMENT MANAGEMENT
Quantifying Uncertainty in Scenarios for Integrated Assessment of Climate Change – 114

ENVIRONMENT MODELS
Feasibility Study: A Swedish Integrated Assessment Model – 113

ENVIRONMENTAL CLEANUP
Toxicological Profile for 1,1,1-Trichloroethane (2006 Update) – 108

Toxicological Profile for Cyanide (2006 Update) – 107

Toxicological Profile for Dichlorobenzenes (2006 Update) – 108

Toxicological Profile for Hydrogen Sulfide (2006 Update) – 108

Toxicological Profile for Vinyl Chloride (2006 Update) – 109

ENVIRONMENTAL MONITORING
Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 1 of 2 – 112

ENVIRONMENTAL SURVEYS
Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 2 of 2 – 112

Final Environmental Impact Statement for the Outrigger Telescopes Project: Volume II – 109

ENZYME ACTIVITY
Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent – 127

Superoxide Dismutase, Catalase, Glutathione Peroxidase, and Glutothione Reductase in the Heart of Hypergravity-Treated and Aging Rats – 157

ENZYMES
A Role of Peroxidases in Acceleration of the Aging of Potato Minitubers under Influence of Microgravity – 151

Catalytic Enzyme-Based Methods for Water Treatment and Water Distribution System Decontamination. 1. Literature Survey – 168

Immobilized Enzymes in Biocathodes – 82

EPIDEMIOLOGY
Integrating Geographic Information Systems (GIS) Into Breast Cancer Epidemiologic Research – 172

EPITAXY
Atomically Smooth Epitaxial Ferroelectric Thin Films for the Development of a Nonvolatile, Ultrahigh Density, Fast, Low Voltage, Radiation-Hard Memory – 80

EQUATORIAL ORBITS
Recent Highlights in Ring Structure, Dynamics, and Composition – 275

ERGOMETERS
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

ERROR CORRECTING CODES
Low Spectral Efficiency Trellis Coded Modulation Systems – 204

ERRORS
Evaluation of Causes of Large 96-H and 120-H Track Errors in the Western North Pacific – 117

Objective Identification of Environmental Patterns Related to Tropical Cyclone Track Forecast Errors – 116

ESTIMATES
Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised) – 101

ESTIMATING
Do Perception and Postrotatory Vestibulo-Ocular Reflex Share the Same Gravity Reference? – 153

Estimating 'Concern Levels' for Concentrations of Chemical Substances in the Environment – 34

Visual Through Infrared: Modeling Components and Methodologies for Estimating High Fidelity Ground Vehicle Signatures – 90

ESTROGENS
Regulation of MDM2 Activity by Nucleolin – 179

EULER-LAGRANGE EQUATION
International Space Station Centrifuge Rotor Models A Comparison of the Euler-Lagrange and the Bond Graph Modeling Approach – 96

EUROPEAN AIRBUS
The C-17 Throttles-Only Control Evaluation and Simulation Validation – 284

EUROPEAN SPACE AGENCY
ESA Ground Based Facilities – 154

The Biolab Facility Responsible Center at the German Aerospace Center DLR – 155

The ERASMUS Experiment Archive – 129

EUROPE
Amplitude Analysis and Modeling of Regional Phases in PNE Profiles in Northern Eurasia and Seismic Regionalization – 115

EUTROPHICATION
The Characteristics of Spanish Reservoirs – 106

EVALUATION
40'x44' Metal Pallet With Metal Adapters With PA125 Metal Boxes, MIL-STD-1660 First Article Tests – 58

Respirator Filter Efficiency Testing Against Particulate and Biological Aerosols Under Moderate to High Flow Rates – 95

Testing Template and Testing Concept of Operations for Speaker Authentication Technology – 58

EVAPORATION
Development of a Gravity-Insensitive Heat Pump for Lunar Applications – 96

EXHAUST EMISSION
Guidance for Quantifying and Using Long Duration Switch Yard Locomotive Idling Emission Reductions in State Implementation Plans – 112

Guidance for Quantifying and Using Long Duration Truck Idling Emission Reductions in State Implementation Plans and Transportation Conformity – 111

Laboratory Study to Investigate Gaseous Emissions and Solids Decomposition During Composting of Municipal Solid Wastes – 113

EXHAUST GASES

Laboratory Study to Investigate Gaseous Emissions and Solids Decomposition During Composting of Municipal Solid Wastes – 113

Reactive Shear Layer Mixing and Growth Rate Effects on Afterburning Properties for Axisymetric Rocket Engine Plumes – 30

Toxecon Retrofit for Mercury and Multi Pollutant Control on Three 90-MW Coal Fired Boilers – 114

EXOBIOLOGY

Last Call for Biorack: Results of 82 Experiments in Orbit – 154

EXPERIMENT DESIGN

Biolab Experiment Development Status 2005 – 123

Campaigns of Experimentation: Pathways to Innovation and Transformation – 74

EXPLOSIONS

Experimental Measures of Blast and Acoustic Trauma in Marine Mammals – 167

EXPLOSIVES

The Effective Use of New Materials and Methodologies for Blast Mitigation in New and Renovated Facilities by the Armed Services – 100

EXPONENTIAL FUNCTIONS

Exploring Fields with Shift Registers – 232

EXPOSURE

Development of Exposure Systems and Exposure Assessment for Studies on Biological Effect of Electromagnetic Field – 64

Effect of 6-Days of Support Withdrawal on Characteristics of Balance Function – 128

Hypergravity Modulates Cyclic GMP Efflux in Nitric Oxide-Stimulated Human Melanocytic Cells – 143

Mitigation Strategies for Acute Radiation Exposure during Space Flight – 183

Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device – 126

Studies on Dosimetry of Human-Body Exposure to Electromagnetic Field – 63

Workers' Exposures to n-Propyl Bromide at a Helicopter Transmission Factory – 110

EXTERNAL TANKS

Simulation and Analyses of Multi-Body Separation in Launch Vehicle Staging Environment – 23

EXTRACTION

LISA Framework for Enhancing Gravitational Wave Signal Extraction Techniques – 276

EXTRAVEHICULAR ACTIVITY

Personal Cooling for Extra-Vehicular Activities on Mars – 274

Rationale for Suit and Airlock Dust Mitigation – 271

Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

EXTREMELY LOW FREQUENCIES

Building Self-configuring Services Using Service-specific Knowledge – 195

EXTRUDING

Pressure Sensitive Plastic Tape from Italy. Investigation No. AA1921-167 (Second Review) – 52

EYE (ANATOMY)

Eye-Safe Laser Radar 3-D Imaging – 228

EYE MOVEMENTS

Vestibular Adaptation to Changing Gravity Levels and the Orientation of Listing's Plane – 150

F-15 AIRCRAFT

Flutter Analysis for the Centerline Instrumented Pylon (CLIP) with Airdata Boom Attachment – 287

The F-15B Baseline Ground Vibration Testing – 288

The NASA F-15 Intelligent Flight Control Systems: Generation II – 285

Two Serial Data to Pulse Code Modulation System Interfaces – 293

FABRICATION

Development of a Gravity-Insensitive Heat Pump for Lunar Applications – 96

Development of Portable Fiber Bragg Grating Interrogation System – 285

Flutter Analysis for the Centerline Instrumented Pylon (CLIP) with Airdata Boom Attachment – 287

Improved Seals for High Temperature Airframe Applications – 96

JOYO-1 Irradiation Test Campaign Technical Close-out – 254

Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

The X-37 Hot Structure Control Surface Testing – 291

FABRICS

Inactivation of Bacillus Anthracis Spores Delivered as Liquid Suspension or Aerosol to Self-Decontaminating Fabric – 55

FAILURE

Orbiter Repair Maneuver Contingency Separation Methods and Analysis – 26

FARM CROPS

Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

FAST NUCLEAR REACTORS

Progress Report on Fast Breeder Reactor Safety Studies – 93

FATIGUE LIFE

Testing of 7050-T7451 Aluminum Strain-Life Coupons for a Probabilistic Strain-Life Curve – 14

FATTY ACIDS

Inhibition of Fatty Acid Synthase (FAS): A New Drug for Breast Cancer Chemoprevention – 165

FAULT TOLERANCE

Development of a Test Facility for Air Revitalization Technology Evaluation – 8

Gain-Scheduled Fault Tolerance Control Under False Identification – 19

Low-Power Fault Tolerance for Spacecraft FPGA-Based Numerical Computing – 20

FEASIBILITY

Feasibility Study: A Swedish Integrated Assessment Model – 113

Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results – 269

FEDERAL BUDGETS

State Department and Related Agencies: FY2006 Appropriations and FY2007 Request – 70

FEEDBACK CONTROL

DARPA Improving Warfighter Information Intake Under Stress -- Augmented Cognition. Volume 1. Phase 2: Concept Validation Experiment – 187

Development of a Test Facility for Air Revitalization Technology Evaluation – 8

Gain-Scheduled Fault Tolerance Control Under False Identification – 19

Simulation Development for Dynamic Situation Awareness and Prediction II – 201

FEEDBACK

Analyzing Requirements for and Designing a Collaborative Tool Based on Functional and User Input – 16

Summary of Coupling and Tune Feedback Results During RHIC Run 6, and Possible Implications for LHC Commissioning – 263

The Role of Possible Feedback Mechanisms in the Effects of Altered Gravity on Formation and Function of Gravireceptors of Mollusks and Fish – 151

FEEDFORWARD CONTROL

Analyzing Divisia Rules Extracted from a Feedforward Neural Network – 208

FEET (ANATOMY)

Effect of 7-Days Dry Immersion in Combination with Mechanical Stimulation of Foot Support Zones upon Resistance to Fatigue of Knee Extensors and Flexors – 156

FEMALES

Reproductive and Hormonal Risk Factors for Breast Cancer in Blind Women – 176

Towards the Early Detection of Breast Cancer in Young Women – 175

WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

FERROELECTRIC MATERIALS

Atomically Smooth Epitaxial Ferroelectric Thin Films for the Development of a Nonvolatile, Ultrahigh Density, Fast, Low Voltage, Radiation-Hard Memory – 80

FERROELECTRICITY

Atomically Smooth Epitaxial Ferroelectric Thin Films for the Development of a Nonvolatile, Ultrahigh Density, Fast, Low Voltage, Radiation-Hard Memory – 80

FERTILITY

Effects of Techa River Radiation Contamination on the Reproductive Function of Residents – 174

FIBER LASERS

CThC7 25 nJ Passively Mode-Locked Fiber Laser at 1080 nm – 259

FIBER OPTICS

CThC7 25 nJ Passively Mode-Locked Fiber Laser at 1080 nm – 259

Development of Portable Fiber Bragg Grating Interrogation System – 285

Fiber Optic Sensor Attachment Development and Performance Evaluations – 285

FIBERS

Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcomeric Cytoskeletal Proteins of Hindlimb Suspended Rats – 120

FIBONACCI NUMBERS

Data Structure and Parallel Decomposition Considerations on a Fibonacci Grid – 214

FIBROBLASTS

Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

FIELD EFFECT TRANSISTORS

A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59

Envelope Switched Doherty Power Amplifier For RF Applications (Preprint) – 77

FIELD STRENGTH

Total Radiated Power of Radio Transmitters Measured in a Reverberation Chamber – 61

Use of Electromagnetic Energy and Resultant Noises – 63

FIELD-PROGRAMMABLE GATE ARRAYS

Field Programmable Gate Array Hysteresis Control of Parallel Connected Inverters – 207

List Mode Multichannel Analyzer – 83

Low-Power Fault Tolerance for Spacecraft FPGA-Based Numerical Computing – 20

Software Defined Radio, its Programmable Signal-Processing Unit, and Central Control Signal-Processing Unit – 64

Software Defined Radio Prototype (I): System Design and Performance Evaluation – 191

FIGHTER AIRCRAFT

An Analysis of the Joint Strike Fighter Autonomic Logistics System – 12

Flow Field Surveys in a Transonic Compressor Rig – 6

FINITE DIFFERENCE THEORY

Fibonacci Grids – 235

FINITE ELEMENT METHOD

Conjugate Heat Transfer Analyses on the Manifold for Ramjet Fuel Injectors – 89

Hanford Double-Shell Tank Thermal and Seismic Project Dytran Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank – 99

Influence of Finite Element Software on Energy Release Rates Computed Using the Virtual Crack Closure Technique – 37

On the Development of an Efficient Parallel Hybrid Solver with Application to Acoustically Treated Aero-Engine Nacelles – 17

Updating the Finite Element Model to Match Ground Vibration Test Data – 285

FINS

Aerodynamic Characteristic of the A3 DRDC-ISL Reference Projectile: Missile with Lattice Fins – 2

FIRE FIGHTING

Networked Unmanned Aerial Vehicle Teams (NUAVT) – 288

FIRING (IGNITING)

Coupling Between CTH and LS-DYNA for Thermal Postprocessing: Application to Propellant Cookoff From a Residual Penetrator – 262

FISHES

European Network using Fish as Osteoporosis Research Models (ENFORM) – 128

FLAPPING

Wind Tunnel Renovation, Flow Verification and Flapping Wing Analysis – 2

FLAPS (CONTROL SURFACES)

The X-37 Hot Structure Control Surface Testing – 291

FLAT PLATES

Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

FLAVOR (PARTICLE PHYSICS)

Study of Inclusive B- and overbar B (sup o) Decays to Flavor-Tagged D, D(sub s) and lambda (sup +)(sub c) – 248

FLEXIBILITY

Service Management System for IP Services – 213

FLEXORS

Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions – 123

Effect of 7-Days Dry Immersion in Combination with Mechanical Stimulation of Foot Support Zones upon Resistance to Fatigue of Knee Extensors and Flexors – 156

Mechanical Stimulation of the Foot Support Zones as a Way to Maintain Activity of the Tonic Muscular System during Functional Support Deprivation – 154

MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

FLIGHT CONDITIONS

The German ISS Experiment Cellular Responses to Radiation in Space (CERASP): The Effects of Single and Combined Space Flight Conditions on Mammalian Cells – 158

FLIGHT CONTROL

2004 Research Engineering Annual Report – 284

Evaluation of Active Aeroelastic Wing Flight Controls Technology – 290

Flight Test of the Engine Fuel Schedules of the X-43A Hyper-X Research Vehicles – 290

Future Small Unmanned Aerial System (SUAS) Flight And Mission Control Support System (FMCSS) Design – 13

Gain-Scheduled Fault Tolerance Control Under False Identification – 19

Hyper-X Research Vehicle Mach 7 and Mach 10 Mission Guidance, Navigation, and Control Performance – 292

The NASA F-15 Intelligent Flight Control Systems: Generation II – 285

Verification and Validation of Neural Networks in Flight Control Systems – 288

FLIGHT CREWS

3-D Ballistocardiography, A Tool Revisited for Following Astronaut Cardiovascular Function? – 132

Adaptation of the Baroreflex Sensitivity to Microgravity: Data from the STS-107 Columbia Mission – 152

Evaluation of Cabin Crew Technical Knowledge – 3

The SAFIRE and an Initial Network-Centric Warfare Evaluation – 265

FLIGHT OPERATIONS

Aircraft Accidents and Incidents Associated With Visual Disturbances From Bright Lights During Nighttime Flight Operations – 184

FLIGHT SAFETY

Developing A Methodology For Assessing Safety Programs Targeting Human Error In Aviation – 8

Evaluation of Cabin Crew Technical Knowledge – 3

FLIGHT SIMULATION

Effects of Space-Flight Simulation on Human Cells – 141

Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results – 86

The C-17 Throttles-Only Control Evaluation and Simulation Validation – 284

FLIGHT TESTS

2004 Research Engineering Annual Report – 284

Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm – 292

Autonomous Soaring for Small Unmanned Aerial Vehicles (UAVs) – 291

Evaluation of Active Aeroelastic Wing Flight Controls Technology – 290

Flight Test of the Engine Fuel Schedules of the X-43A Hyper-X Research Vehicles – 290

Flutter Analysis for the Centerline Instrumented Pylon (CLIP) with Airdata Boom Attachment – 287

Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

In-Flight Skin Friction Measurements Using Oil Film Interferometry – 10

Limited Evaluation of an 802.11b Air-to-Ground Wireless Datalink (Project 'HAVE HALO' – 22

Limited Investigation and Characterization of Boundary Avoidance Tracking (Project HAVE BAT) – 6

Parachute Testing for the NASA X-38 Crew Return Vehicle – 29

Simultaneous Flight Demonstration of Three Wing Deflection Measurement Approaches – 287

The C-17 Throttles-Only Control Evaluation and Simulation Validation – 284

The Dryden Aerospike Rocket Test – 290

The X-43A Flight System Highlights and Challenges for the Second and Third Flights – 294

The X-43A Flush Airdata Sensing Research – 295

The X-43A (Hyper-X) Flies Into the Record Books – 291

Verification of the Active Aeroelastic Wing Aerodynamic Model with Flight Test Results – 291

FLIGHT TRAINING

Effectiveness of Introductory Flight Screening (IFS) for USA Navy and Marine Corps Student Pilots – 5

Evaluation of Cabin Crew Technical Knowledge – 3

U.S. Army Aviator Job Analysis – 4

FLIGHT

Biological Parameters of Impact – 15

FLOORS

Floor Acquisition Multiple Access (FAMA) for Packet-Radio Networks – 227

FLOW CHARACTERISTICS

Wind Tunnel Renovation, Flow Verification and Flapping Wing Analysis – 2

FLOW DISTRIBUTION

Air Flow Patterns Around Several Biological Point Detection System Configurations – 91

CFD Simulation of the Space Shuttle Launch Vehicle with Booster Separation Motor and Reaction Control Plumes – 27

Conjugate Heat Transfer Analyses on the Manifold for Ramjet Fuel Injectors – 89

Flow Field Surveys in a Transonic Compressor Rig – 6

FLOW VELOCITY

Carbon Nanotube Activities at NASA-Johnson Space Center – 245

Performance Comparison between Rough and Smooth-Cast Blades in a Low-Speed Multistage Compressor – 86

Respirator Filter Efficiency Testing Against Particulate and Biological Aerosols Under Moderate to High Flow Rates – 95

FLOW VISUALIZATION

Wind Tunnel Renovation, Flow Verification and Flapping Wing Analysis – 2

FLUE GASES

Toxecon Retrofit for Mercury and Multi Pollutant Control on Three 90-MW Coal Fired Boilers – 115

FLUID FLOW

In-Plant Testing of High-Efficiency Hydraulic Separators. (Annual Report, July 21, 2004-July 20, 2005) – 87

Rapid Nitric Oxide Production by Bone Cells in Response to Mechanical Vibration – 148

FLUID SHIFTS (BIOLOGY)

Intracranial Pressure Increases during Weightlessness. A Parabolic Flights Study – 151

FLUORO COMPOUNDS

CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy – 45

FLUTTER ANALYSIS

Flutter Analysis for the Centerline Instrumented Pylon (CLIP) with Airdata Boom Attachment – 287

FLYING PERSONNEL

Sleep Patterns of Naval Aviation Personnel Conducting Mine Hunting Operations – 184

FOAMS

Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems – 262

FOOD INTAKE

Food and Nutrition for the Moon Base: What we have Learned in 45 Years of Space Flight – 180

FOOTPRINTS

Performance Monitoring of Parallel Scientific Applications – 189

FORECASTING

Metrics of METOC Forecast Performance and Operational Impacts on Carrier Strike Operations – 11

Objective Identification of Environmental Patterns Related to Tropical Cyclone Track Forecast Errors – 116

Studies in Forecasting Upper-Level Turbulence – 13

FOREST FIRES

Networked Unmanned Aerial Vehicle Teams (NUAVT) – 288

FORMATES

Metal Cation Mediated Hydrolysis of Phosphono-Formate Diesters: Chemoselectivity and Catalysis – 34

FOSSIL FUELS

Reducing DoD Fossil-Fuel Dependence – 56

FOURIER TRANSFORMATION

A Review of Polyphase Filter Banks and Their Application – 232

CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy – 45

FRACTURE STRENGTH
Effect of 7-Days Dry Immersion in Combination with Mechanical Stimulation of Foot Support Zones upon Resistance to Fatigue of Knee Extensors and Flexors – 156

Effect of Tritium and Decay Helium On Weldment Fracture Toughness – 52

FRACTURING
Dynamic Plasticity and Fracture in High Density Polycrystals: Constitutive Modeling and Numerical Simulation – 261

Fracture of Grooved Kinetic Energy Rods Subject to Oblique Impact – 203

FRANCE
Corrosion-Resistant Carbon Steel Flat Products from France and Germany. Investigations Nos. 701-TA-348-349 and 731-TA-615 (Review) (Remand). Determination and Views of the Commission – 47

FREE FLOW
Mach 4 Test Results of a Dual-Flowpath, Turbine Based Combined Cycle Inlet – 10

Quiet Tunnel Experiments of Shock/Boundary Layer Interactions – 1

FREQUENCIES
Depressed Tetanic Contractile Function Cannot be Compensated by Increasing Stimulating Frequency in Unloaded Soleus Muscle – 124

GPS Carrier Phase Analysis Noise on the USNO-PTB Baselines – 233

Portable Precision Frequency Meter – 57

Radio Propagation Prediction Software for Complex Mixed Path Physical Channels – 198

Time-Frequency, Bi-Frequency Detection Analysis of Noise Technology Radar – 252

FREQUENCY DISTRIBUTION
Development of the Measurement Technology of the Spurious Emission from Primary Radar – 62

In-Flight Ratio Frequency Spectrum Measurements of Commercial Aircraft Cabins – 65

FREQUENCY DIVIDERS
A Regenerative Frequency Divider of Improved Stability – 78

Improvements in Regenerative Frequency Dividers – 78

FREQUENCY DIVISION MULTIPLEXING
A General Framework for Analyzing, Characterizing, and Implementing Spectrally Modulated, Spectrally Encoded Signals – 190

FREQUENCY MEASUREMENT
Portable Precision Frequency Meter – 57

Time-Frequency, Bi-Frequency Detection Analysis of Noise Technology Radar – 252

FREQUENCY MODULATION
Reduction of Residual Amplitude Modulation Frequency-Modulated Signals – 84

FREQUENCY RANGES
High-frequency ECG – 180

Rapid Nitric Oxide Production by Bone Cells in Response to Mechanical Vibration – 148

FRICTION
The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-2: Areal Coverage Using Friction Surfacing – 33

FUEL CELLS
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 105

Detailed Fuel Cell Demonstration Site Summary Report: Naval Hospital at Marine Corps Air Ground Combat Center - Twentynine Palms – 106

Diminished Performance of Bacterial Fuel Cells in Microgravity – 141

FUEL COMBUSTION
Advanced Fuel Development and Fuel Combustion. Delivery Order 0005: Mitigation of Particulates Using Fuel Additives – 56

FUEL INJECTION
Conjugate Heat Transfer Analyses on the Manifold for Ramjet Fuel Injectors – 89

Fuel Injection Strategy for a Next Generation Pulse Detonation Engine – 56

FUNNELS
High Performance Ion Mobility Spectrometry Using Hourglass Electrodynamic Funnel and Internal Ion Funnel – 90

FURNACES
Comprehensive Creep and Thermophysical Performance of Refractory Materials – 55

FUSION REACTORS
Scrape-Off Layer Plasmas for ITER with 2nd X-Point and Convective Transport Effects – 260

GALLIUM NITRIDES
Optical and magnetic properties of Eu-doped GaN – 42

GAME THEORY
A Game-Theoretic Model for Repeated Helicopter Allocation Between Two Squads – 237

Design of an Object Oriented and Modular Architecture for a Naval Tactical Simulator using Delta3D's Game Manager – 190

Game Models for Open Systems – 241

Videogame-Based Training Success: The Impact of Trainee Characteristics - Year 2 – 202

GAMMA RAY BURSTS
Gamma-Ray Bursts Shower the Universe with Metals – 276

GAS CHROMATOGRAPHY
Decomposition of GD on CeO2/Alumina Adsorbents in a Gas Chromatograph On-Column Injector Tube Reactor – 42

GAS GIANT PLANETS
Spectroscopy of Kuiper Belt Objects and Centaurs – 275

GAS MIXTURES
A Method for Calculating Viscosity and Thermal Conductivity of a Helium-Xenon Gas Mixture – 31

GAS VISCOSITY
A Method for Calculating Viscosity and Thermal Conductivity of a Helium-Xenon Gas Mixture – 31

GASIFICATION
Improved Materials for High-Temperature Black Liquor Gasification – 36

GAS-ION INTERACTIONS
Astrochemistry: Recent Advances in the Study of Carbon Molecules in Space – 276

GEARS
Operational Influence on Thermal Behavior of High-Speed Helical Gear Trains – 98

GELATINS
Dynamic Response of an Alternative Tissue Simulant, Physically Associating Gels (PAG) – 39

GELLED PROPELLANTS
Metallized Gelled Propellants Combustion Experiments in a Pulse Detonation Engine – 57

GELS
Dynamic Response of an Alternative Tissue Simulant, Physically Associating Gels (PAG) – 39

Multiscale Mechanical Characterization of Biomimetic Physically Associating Gels – 53

GENE EXPRESSION
Actin Organization and Gene Expression in Beta Vulgaris Seedlings under Clinorotation – 124

ChromaBlast - a Data Visualization Tool – 178

DNA MIcroarray-Assisted Modeling of Metabolic and Regulatory Networks With Applications to Bio-Defense – 169

Expression of Small Heat Shock Proteins in Pea Seedlings under Gravity-Altered Conditions – 132

Gene Expression of delta-1- and delta-3-Cyclins in Root Meristem Cells of Pisurn Sativurn L. under Clinorotation – 150

Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 142

Is Peripheral Benzodiazepine Receptor (PBR) Gene Expression Involved in Breast Cancer Suppression by Dietary Soybean Protein? – 171

Modulation of Gene Expression in Bone Cells during Strain-Adapted Bone Remodeling – 150

Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Short-Term Exposure of Arabidopsis Cell Cultures to Hyper-G: Short-Term Changes in Transcription Regulator Expression – 140

The German ISS Experiment Cellular Responses to Radiation in Space (CERASP): The Effects of Single and Combined Space Flight Conditions on Mammalian Cells – 158

GENERAL AVIATION AIRCRAFT

Next Generation NASA GA Advanced Concept – 9

The Role of Spatial Disorientation in Fatal General Aviation Accidents – 4

GENERAL OVERVIEWS

An Overview of the Role of Systems Analysis in NASA's Hypersonics Project – 1

Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

GENESIS MISSION

Public Risk Assessment of Off-Nominal Genesis Entries – 26

GENES

Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity – 145

Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight? – 142

Expression of Small Heat Shock Proteins in Pea Seedlings under Gravity-Altered Conditions – 132

Modifiers of the Efficacy of Risk-Reducing Salpingo-Oophorectomy for the Prevention of Breast and Ovarian Cancer in Carriers of BRCA1 and BRCA2 – 172

Short-Term Exposure of Arabidopsis Cell Cultures to Hyper-G: Short-Term Changes in Transcription Regulator Expression – 140

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor – 165

GENETIC ALGORITHMS

Genetic Algorithm Based Optimization of Advanced Solar Cell Designs Modeled in SILVACO ATLAS(Trademark) – 105

GENETICS

A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

Human Adaptation Genetic Response Suites: Toward New Interventions and Countermeasures for Spaceflight – 157

Hypoxia as a Driving Force for Genetic Instability During Breast Tumorigenesis – 175

Interactions of Light and Gravity in Chara Internodal Cells – 155

The Nuclear Death Domain Protein p84N5; a Candidate Breast Cancer Susceptibility Gene – 171

Using the Internet to Collaborate with Consumers in Redefining a Psychosocial Agenda for Families with Hereditary Breast Cancer – 174

GENOME

ChromaBlast - a Data Visualization Tool – 179

Proteomics in Malaria – 166

GEOGRAPHIC INFORMATION SYSTEMS

Integrating Geographic Information Systems (GIS) Into Breast Cancer Epidemiologic Research – 172

Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results – 269

GEOLOGICAL SURVEYS

U.S. Geological Survey National Computer Technology Meeting (7th): Program and Abstracts, Held in New Orleans, Louisiana, April 10-15, 1994 – 193

User's Manual for the National Water Information System of the U.S. Geological Survey – 271

GEOMAGNETISM

Spacecraft Instrumentation to Measure and Stimulate Space Particles and Plasma Waves in the Medium-Earth Orbit (MEO) Regime – 115

GERMANY

Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 47

Corrosion-Resistant Carbon Steel Flat Products from France and Germany. Investigations Nos. 701-TA-348-349 and 731-TA-615 (Review) (Remand). Determination and Views of the Commission – 47

GERMINATION

Assessing the Effect of Humic Acids on Germinating a Native American Plant – 43

GIMBALS

Space Cabin Landing Impact Vector Effects on Human Physiology – 15

GLASS

Automotive Replacement Glass Windshields from China. Investigation No. 731-TA-922 (Final). Determination and Views of the Commission – 53

Comprehensive Creep and Thermophysical Performance of Refractory Materials – 55

Statistical Review of Cesium Carbonate Fusion Measurements of Archived Glass Samples from the DWPF Process – 45

GLOBAL POSITIONING SYSTEM

Deployable Command and Control System for Over the Horizon Small Boat Operations – 70

GPS Carrier Phase Analysis Noise on the USNO-PTB Baselines – 233

Integrating Stakeholder Requirements Across Generations of Technology – 199

The F-15B Embedded Global Positioning System/Inertial Navigation System Instrumentation System Upgrade – 293

GLOW DISCHARGES

Micro-Discharge Optical Source Apparatus and Method and System for Analyzing a Sample – 82

GLUCOSE

Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

GLUTAMATES

Comparison of the Effects of DL-threo-Beta-Benzyloxyaspartate on the Glutamate Release from Synaptosomes before and after Exposure of Rats to Artificial Gravity – 148

GLUTATHIONE

Advantages of Simulated Microgravity in the Production of Compounds of Industrial Relevance – 161

Superoxide Dismutase, Catalase, Glutathione Peroxidase, and Glutothione Reductase in the Heart of Hypergravity-Treated and Aging Rats – 157

GOALS

Developing Software Requirements Supporting Open Architecture Performance Goals in Critical DoD System-of-Systems – 205

GOES SATELLITES
NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

GRAINS
Burst Testing and Analysis of Superalloy Disks With a Dual Grain Microstructure – 51

GRAMMARS
Are You Talking to Me? Dialogue Systems Supporting Mixed Teams of Humans and Robots – 224

Development and Evaluation of a Korean Treebank and its Application to NLP – 266

GRAPH THEORY
Graph Theoretical Analysis of Network Centric Operations Using Multi-Layer Models – 65

On-demand Loop-Free Routing in Ad Hoc Networks Using Source Sequence Numbers – 222

GRAVIRECEPTORS
The Role of Possible Feedback Mechanisms in the Effects of Altered Gravity on Formation and Function of Gravireceptors of Mollusks and Fish – 151

GRAVITATIONAL EFFECTS
Behavior of Gravisensitive Cells on 2D and 3D Clinostats – 144

Characteristics of the Eyes Pursuit Function during Readaptation to Terrestrial Gravity after Prolonged Flights Aboard the International Space Station – 182

Diminished Performance of Bacterial Fuel Cells in Microgravity – 141

Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

Evaluation of Spare Capacities of the Respiratory Muscles during Hypokinesia – 186

Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

Measures of Complexity to Quantify Bone Loss and Estimate Strength of Human Lumbar Vertebrae: Comparison of pQCT Image Analysis with Bone Histomorphometry and Biomechanical Tests – 181

Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP – 135

Quantitative MR Imaging for the in Vivo Assessment of Trabecular Bone Quality – 181

The Effect of Simulated Microgravity on Nitrergic Innervation of the Middle Cerebral Artery – 124

The Role of Possible Feedback Mechanisms in the Effects of Altered Gravity on Formation and Function of Gravireceptors of Mollusks and Fish – 151

GRAVITATIONAL FIELDS
Short-Term Exposure of Arabidopsis Cell Cultures to Hyper-G: Short-Term Changes in Transcription Regulator Expression – 140

GRAVITATIONAL PHYSIOLOGY
A Brief Overview of Animal Hypergravity Studies – 130

A New Space Greenhouse Concept Development for Optimal Plant Growth – 144

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

GRAVITATIONAL WAVES
LISA Framework for Enhancing Gravitational Wave Signal Extraction Techniques – 276

GRAVITATION
Actin Organization and Gene Expression in Beta Vulgaris Seedlings under Clinorotation – 124

Do Perception and Postrotatory Vestibulo-Ocular Reflex Share the Same Gravity Reference? – 153

Effects of Vector-Averaged Gravity on the Response to Different Stimulatory Signals in T-Cells – 146

Expression of Small Heat Shock Proteins in Pea Seedlings under Gravity-Altered Conditions – 132

Growth of Cress Seedlings and Morphogenesis of Root Gravisensors under Clino-Rotation and in Unidirectional Red or Blue Light – 120

Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G – 126

Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

Perception of Body Vertical in Microgravity during Parabolic Flight – 145

System Specificity in Responsiveness to Intermittent -Gx Gravitation during Simulated Microgravity in Rats – 130

GRAVITROPISM
Changes in the Topography of Cellular Components in Pea Root Statocytes Exposed to High Gradient Magnetic Field – 134

Interactions of Light and Gravity in Chara Internodal Cells – 155

Investigation of Cress Root Gravisensing under Low Magnitute Acceleration – 136

GRAVITY PERCEPTION
Understanding Visual Perception in the Perspective of Gravity – 137

GREENHOUSE EFFECT
Feasibility Study: A Swedish Integrated Assessment Model – 113

Voluntary Agreements for Energy Efficiency or GHG Emissions Reduction in Industry: An Assessment of Programs Around the World – 111

Voluntary Reporting of Greenhouse Gases, 2004 – 110

GREENHOUSES
A New Space Greenhouse Concept Development for Optimal Plant Growth – 144

GRID COMPUTING (COMPUTER NETWORKS)
From Metacomputing to Metabusiness Processing – 193

GRID GENERATION (MATHEMATICS)
PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD – 3

GRID REFINEMENT (MATHEMATICS)
PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD – 3

GRIDS
The Core Protocol Set for the Global Grid – 223

GROUND BASED CONTROL
The F-15B Embedded Global Positioning System/Inertial Navigation System Instrumentation System Upgrade – 293

The Outcome of ATC Message Complexity on Pilot Readback Performance – 9

GROUND STATIONS
Limited Evaluation of an 802.11b Air-to-Ground Wireless Datalink (Project 'HAVE HALO' – 22

GROUND TESTS
Experimental Results of Thin-Film Photovoltaic Cells in a Low Density LEO Plasma Environment: Ground Tests – 30

Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

The F-15B Baseline Ground Vibration Testing – 288

Updating the Finite Element Model to Match Ground Vibration Test Data – 285

GUIDANCE (MOTION)
Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Consequences Management – 266

HABITABILITY
A Historical Search for the Occurrence of Habitable Ground Ice at the Phoenix Landing Site – 278

An Energetic Concept of Habitability for the Deep Subsurface – 187

HABITS

Optimizing Daytime Short Sleep Episodes to Maximize Performance in a Stressful Environment – 183

HABITUATION (LEARNING)

Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest – 123

HALOGEN OCCULTATION EXPERIMENT

On the Observed Changes in Upper Stratospheric and Mesospheric Temperatures from UARS HALOE – 118

HALOGENS

CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy – 45

HARDWARE

Hardware Development for Electrophysiological Long-Term Studies in Space – 142

Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

HARMONICS

Effects of Spread Spectrum Clocking on Measured Noise Spectra – 64

HAWAII

Final Environmental Impact Statement for the Outrigger Telescopes Project: Volume II – 109

HAZARDOUS WASTES

Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 36

HAZARDS

Research Activities on EMC in NICT – 63

HEAD DOWN TILT

Effects of Head Down Tilt upon Cortisol and Sex Hormones – 121

HEALING

Bioelectromagnetics 2005 – 178

HEALTH

Benign Breast Disease: Toward Molecular Prediction of Breast Cancer Risk – 164

Development and Evaluation of a Device for the Prevention of Arm Flail Injuries – 16

Diagnosis and Treatment of Diseases of Tactical Importance to U.S. Central Command – 166

Hurricane Katrina: Utilization of Private, Non-Governmental Health Professionals Time for New Strategies – 168

Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

Radio Frequency Identification (RFID) for Naval Medical Treatment Facilities (MTF) – 168

Toxicological Profile for Hydrogen Sulfide (2006 Update) – 108

HEART FUNCTION

Influence of Weightlessness and Apnea on Heart Rate and Blood Pressure Regulation during Exercise – 121

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Pilots' Examination in a Rapid LBNP Exposure – 136

Results of Cardiorespiratory System Autonomic Regulation Investigations during Long Term International Space Station Missions: Experiment 'Pulse' – 161

WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

HEART RATE

Adaptation of the Baroreflex Sensitivity to Microgravity: Data from the STS-107 Columbia Mission – 152

Effect of Swimming Suits' Difference at Supine Position in Water on Heart Rate, Rectal Temperature and Sense of Subjective Temperature – 161

Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 152

Heart Rate Variability in Evaluation of Functional State and Types of Autonomic Regulation under Conditions of Space Flight – 132

Hemodynamic Changes in Post-Suspension Rats during Gradual Hemorrhage – 133

Influence of Weightlessness and Apnea on Heart Rate and Blood Pressure Regulation during Exercise – 121

Monitor Activity, Temperature and Heart Rate with a Mouse Telemeter to be used for Animal Research on Board the International Space Station – 127

Respiratory Sinus Arrhythmia: A Marker of Decreased Parasympathetic Modulation after Short Duration Spaceflight – 151

WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

HEART

Hemodynamic Changes in Post-Suspension Rats during Gradual Hemorrhage – 133

High-frequency ECG – 180

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

HEAT EXCHANGERS

Performance of a Liquid Flow Ultra-Compact Heat Exchanger – 44

HEAT FLUX

A Novel Method for Measurement of Total Hemispherical Emissivity – 21

HEAT PUMPS

Development of a Gravity-Insensitive Heat Pump for Lunar Applications – 96

HEAT RESISTANT ALLOYS

Burst Testing and Analysis of Superalloy Disks With a Dual Grain Microstructure – 51

JOYO-1 Irradiation Test Campaign Technical Close-out – 254

HEAT SHIELDING

Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

HEAT SOURCES

Performance and Operational Characteristics for a Dual Brayton Space Power System With Common Gas Inventory – 31

HEAT TRANSFER

Conjugate Heat Transfer Analyses on the Manifold for Ramjet Fuel Injectors – 89

Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

HEATING EQUIPMENT

Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

HELICOPTER PROPELLER DRIVE

Workers' Exposures to n-Propyl Bromide at a Helicopter Transmission Factory – 110

HELICOPTERS

A Game-Theoretic Model for Repeated Helicopter Allocation Between Two Squads – 237

Bouchon d'oreille a attenuation active adaptee aux bruits d'helicoptere (Ear Plugs for Active Attenuation Adapted for Helicopter Noises) (Gehoerschutzstopsel mit aktriver Daempfung, geeignet fuer Hubschrauberlaerm) – 12

Business Process Reengineering in the Inventory Management to Improve Aircraft Maintenance Operations in the Indonesian Air Force – 11

HELIUM

A Method for Calculating Viscosity and Thermal Conductivity of a Helium-Xenon Gas Mixture – 31

Effect of Tritium and Decay Helium On Weldment Fracture Toughness – 52

HEMISPHERICAL SHELLS

A Novel Method for Measurement of Total Hemispherical Emissivity – 21

HEMOCYTES

TRIPLE LUX-B: Phagocytosis in Mussel Hemocytes – 144

HEMODYNAMIC RESPONSES

Hemodynamic Changes in Post-Suspension Rats during Gradual Hemorrhage – 133

HEMORRHAGES

Hemodynamic Changes in Post-Suspension Rats during Gradual Hemorrhage – 133

HEURISTIC METHODS

Algorithmic and Domain Centralization in Distributed Constraint Optimization Problems – 231

Web Page Clustering using Heuristic Search in the Web Graph – 267

WiNN: An Efficient Method for Routing Short-Lived Flows – 222

HIGH FLUX ISOTOPE REACTORS

Space Reflector Materials for a Prometheus Application – 254

HIGH FREQUENCIES

Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 153

Effects of Water Temperature on Cardiac Autonomic Nervous System Modulation during Foot Immersion (Foot Bath) – 140

High-frequency ECG – 180

Rapid Nitric Oxide Production by Bone Cells in Response to Mechanical Vibration – 148

HIGH GRAVITY ENVIRONMENTS

A Brief Overview of Animal Hypergravity Studies – 130

Comparison of the Effects of DL-threo-Beta-Benzyloxyaspartate on the Glutamate Release from Synaptosomes before and after Exposure of Rats to Artificial Gravity – 148

Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Effects of Space-Flight Simulation on Human Cells – 140

Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 142

Hypergravity Modulates Cyclic GMP Efflux in Nitric Oxide-Stimulated Human Melanocytic Cells – 143

Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP – 135

Relations Between Prooxidant and Antioxidant Variables in Hypergravity and Aging – 133

Superoxide Dismutase, Catalase, Glutathione Peroxidase, and Glutothione Reductase in the Heart of Hypergravity-Treated and Aging Rats – 157

Virtual Environment a Behavioral and Countermeasure Tool for Assisted Gesture in Weightlessness: Experiments during Parabolic Flight – 125

HIGH LEVEL LANGUAGES

A Programming Language for Probabilistic Computation – 236

Survey of Available Artificial Intelligence Technologies for Addition Into Delta3D – 199

HIGH POWER LASERS

Relay Telescope, High Power Laser Alignment System, and Laser Peening Method and System Using Same – 259

Stimulated Brillouin Scattering Mirror System, High Power Laser and Laser Peening Method and System Using Same – 259

HIGH RESOLUTION

Higher Resolution Strain Gage Data Acquisition – 288

HIGH SPEED PHOTOGRAPHY

High-Speed Photographic Study of Wave Propagation and Impact Damage in Transparent Aluminum Oxynitride (AION) – 91

HIGH SPEED

High-Speed Photographic Study of Wave Propagation and Impact Damage in Transparent Aluminum Oxynitride (AION) – 91

Improved Modeling Tools For High Speed Reacting Flows – 237

Operational Influence on Thermal Behavior of High-Speed Helical Gear Trains – 98

HIGH TEMPERATURE

Fiber Optic Sensor Attachment Development and Performance Evaluations – 285

Further Investigations of High Temperature Knitted Spring Tubes for Advanced Control Surface Seal Applications – 97

High Temperature Evaluation of an Active Clearance Control System Concept – 98

Improved Materials for High-Temperature Black Liquor Gasification – 35

Improved Seals for High Temperature Airframe Applications – 96

HILBERT TRANSFORMATION

Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm – 292

HINDLIMB SUSPENSION

Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading – 160

Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcromeric Cytoskeletal Proteins of Hindlimb Suspended Rats – 120

Influence of Rat Hindlimb Suspension on Sarcolemmal Dystrophin and its Sensitivity to Mechanical Damage – 122

Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats – 134

HIPPOCAMPUS

Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

HISTORIES

Electronic Warfare (EW) Historical Perspectives and Its Relationship to Information Operations (IO) - Considerations for Turkey – 202

Evaluation of Lithium Hydride for Use in a Space Nuclear Reactor Shield, Including a Historical Perspective, for NR Information – 255

Experiments on the Biological Action of Neutrons Performed in the Former Soviet Union: A Historical Review – 255

HOMEOSTASIS

Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory – 142

European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

HORIZONTAL ORIENTATION

Understanding Visual Perception in the Perspective of Gravity – 137

HORIZON

Deployable Command and Control System for Over the Horizon Small Boat Operations – 70

HORMONE METABOLISMS

Association of Hormonal Responses and Performance of Student Pilots during Acceleration Training on the Human Centrifuge – 135

HORMONES

Effects of Head Down Tilt upon Cortisol and Sex Hormones – 121

Reproductive and Hormonal Risk Factors for Breast Cancer in Blind Women – 176

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor – 165

Using the Internet to Collaborate with Consumers in Redefining a Psychosocial Agenda for Families with Hereditary Breast Cancer – 174

HORN ANTENNAS
Evaluation of Uncertainty of Horn Antenna Calibration with the Frequency range of 1 GHz to 18 GHz. – 62

HOSPITALS
Detailed Fuel Cell Demonstration Site Summary Report: Naval Hospital at Marine Corps Air Ground Combat Center - Twentynine Palms – 106

Improving Clinical Efficiency of Military Treatment Facilities – 179

HOT SURFACES
The X-37 Hot Structure Control Surface Testing – 291

HUBBLE SPACE TELESCOPE
Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation – 282

HULLS (STRUCTURES)
Apollo Seals: A Basis for the Crew Exploration Vehicle Seals – 97

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IIIB-2: Permanent Composite Cladding of Deteriorating Steel Hulls – 50

HUMAN BEHAVIOR
Agent-based Modeling of Dismounted Infantry Through Inclusion of Perceptions, Inferences and Associations Phase 1 – 269

HUMAN BEINGS
Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects – 147

Cortical Regions Associated with Orthostatic Stress in Conscious Humans – 137

Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

Effect of Swimming Suits' Difference at Supine Position in Water on Heart Rate, Rectal Temperature and Sense of Subjective Temperature – 161

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Novel Protein Microarray Technology to Examine Men with Prostate Cancer – 169

Perception of Body Vertical in Microgravity during Parabolic Flight – 145

Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest – 123

HUMAN BODY
Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Development of Exposure Systems and Exposure Assessment for Studies on Biological Effect of Electromagnetic Field – 64

Studies on Dosimetry of Human-Body Exposure to Electromagnetic Field – 63

HUMAN CENTRIFUGES
Association of Hormonal Responses and Performance of Student Pilots during Acceleration Training on the Human Centrifuge – 135

Pilots' Examination in a Rapid LBNP Exposure – 136

HUMAN FACTORS ENGINEERING
Developing A Methodology For Assessing Safety Programs Targeting Human Error In Aviation – 8

HUMAN IMMUNODEFICIENCY VIRUS
Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

HUMAN PERFORMANCE
Developing A Methodology For Assessing Safety Programs Targeting Human Error In Aviation – 8

Integrated Human-Robotic Missions to the Moon and Mars: Mission Operations Design Implications – 230

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Performance and Psychophysiological Measures of Fatigue Effects on Aviation Related Tasks of Varying Difficulty – 7

HUMAN RELATIONS
An Analytic Framework for the War of Ideas – 232

Online and Unsupervised Face Recognition for Humanoid Robot: Toward Relationship with People – 225

HUMAN RESOURCES
Measuring the Value of Graduate Manpower Systems Analysis Education for Naval Officers – 58

HUMAN TOLERANCES
Human Adaptation Genetic Response Suites: Toward New Interventions and Countermeasures for Spaceflight – 157

HUMAN-COMPUTER INTERFACE
HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 242

HURRICANES
Big Storm Named Katrina – 117

Hurricane Katrina: Utilization of Private, Non-Governmental Health Professionals Time for New Strategies – 168

Technical and Scientific Evaluation of EM-APEX in Hurricane Frances – 117

HYDRATION
Fluid and Electrolyte Needs for Preparation and Recovery From Training and Competition – 41

HYDROELECTRICITY
The Characteristics of Spanish Reservoirs – 106

HYDROGEN SULFIDE
Toxicological Profile for Hydrogen Sulfide (2006 Update) – 109

HYDROGEN
An Energetic Concept of Habitability for the Deep Subsurface – 187

HYDROLOGY
U.S. Geological Survey National Computer Technology Meeting (7th): Program and Abstracts, Held in New Orleans, Louisiana, April 10-15, 1994 – 193

HYDROLYSIS
Metal Cation Mediated Hydrolysis of Phosphono-Formate Diesters: Chemoselectivity and Catalysis – 34

HYDROXYCORTICOSTEROID
Phagocytosis as a Biomarker for Stress Responses – 139

HYPERCAPNIA
Influence of Weightlessness and Apnea on Heart Rate and Blood Pressure Regulation during Exercise – 121

HYPERSONIC AIRCRAFT
The X-43 Parameter Identification Research – 295

The X-43A (Hyper-X) Flies Into the Record Books – 291

HYPERSONIC FLIGHT
RTO WG 10: Test Cases for CFD Validation of Hypersonic Flight – 86

Study of the New Air-Launched Small Missile (ALSM) Phoenix Hypersonic Flight Research Test Bed – 294

HYPERSONIC FLOW
Hypersonic Laminar Instability on Round Cones Near Zero Angle of Attack – 86

HYPERSONIC REENTRY
Fiber Optic Sensor Attachment Development and Performance Evaluations – 285

HYPERSONIC SPEED
An Overview of the Role of Systems Analysis in NASA's Hypersonics Project – 1

Flight Test of the Engine Fuel Schedules of the X-43A Hyper-X Research Vehicles – 290

Hyper-X Research Vehicle Mach 7 and Mach 10 Mission Guidance, Navigation, and Control Performance – 292

The X-43A Flight System Highlights and Challenges for the Second and Third Flights – 294

HYPERSONIC VEHICLES
Performance Evaluations of Ceramic Wafer Seals – 37

HYPERSONIC WIND TUNNELS
Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

HYPERSONICS
Hypersonic Laminar Instability on Round Cones Near Zero Angle of Attack – 86

Orion Aerodynamics for Hypersonic Free Molecular to Continuum Conditions – 2

HYPOKINESIA
Evaluation of Spare Capacities of the Respiratory Muscles during Hypokinesia – 187

HYPOTENSION
Restoration of Central Blood Volume: Application of a Simple Concept and Simple Device to Counteract Cardiovascular Instability in Syncope and Hemorrhage – 152

HYPOTHALAMUS
Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

HYPOTHESES
Hypoxia as a Driving Force for Genetic Instability During Breast Tumorigenesis – 176

Prenatal Centrifugation: A Mode1 for Fetal Programming of Body Weight? – 138

HYPOXIA
Hypoxia as a Driving Force for Genetic Instability During Breast Tumorigenesis – 176

HYSTERESIS
Field Programmable Gate Array Hysteresis Control of Parallel Connected Inverters – 207

Hysteretic Loss Reduction in Striated YBCO – 42

ICE
A Historical Search for the Occurrence of Habitable Ground Ice at the Phoenix Landing Site – 278

New Optical Constants for Amorphous and Crystalline H2O-ice – 257

IDENTIFYING
Identifying Supervisory Control and Data Acquisition (SCADA) Systems on a Network via Remote Reconnaissance – 218

IDENTITIES
Access Control to Information in Pervasive Computing Environments – 267

Coherence and Coreference – 270

ILLUMINATING
Aircraft Accidents and Incidents Associated With Visual Disturbances From Bright Lights During Nighttime Flight Operations – 184

Growth of Cress Seedlings and Morphogenesis of Root Gravisensors under Clino-Rotation and in Unidirectional Red or Blue Light – 120

Interactions of Light and Gravity in Chara Internodal Cells – 155

IMAGE ANALYSIS
Measures of Complexity to Quantify Bone Loss and Estimate Strength of Human Lumbar Vertebrae: Comparison of pQCT Image Analysis with Bone Histomorphometry and Biomechanical Tests – 182

IMAGE PROCESSING
Fast Scene Based Nonuniformity Correction with Minimal Temporal Latency – 239

ISAR Motion Compensation using the Registration-Restoration-Fusion Method – 93

Registration for Tactical Imagery: An Updated Taxonomy – 224

IMAGERY
Potential of Remote Laser Vibration Sensing for Military Applications – 94

IMAGES
Blind Deconvolution of Anisoplanatic Images Collected by a Partially Coherent Imaging System – 94

IMAGING TECHNIQUES
Blind Deconvolution of Anisoplanatic Images Collected by a Partially Coherent Imaging System – 94

Clinically Practical Magnetic Resonance Protocol for Improved Specifically in Breast Cancer Diagnosis – 176

Eye-Safe Laser Radar 3-D Imaging – 228

High Performance Laser Scanning Confocal Microscope for Microgravity Research – 134

MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Quantitative MR Imaging for the in Vivo Assessment of Trabecular Bone Quality – 181

Rip Channel Migration in the Nearshore – 92

IMMUNE SYSTEMS
Effects of Vector-Averaged Gravity on the Response to Different Stimulatory Signals in T-Cells – 147

IMMUNITY
Breast Cancer Suppression by IDO Inhibitors – 173

TRIPLE LUX-B: Phagocytosis in Mussel Hemocytes – 144

IMMUNOLOGY
Efficacy of rSEB Vaccine and CpG ODN Administered by Inhalation in Monkeys – 167

IMPACT DAMAGE
High-Speed Photographic Study of Wave Propagation and Impact Damage in Transparent Aluminum Oxynitride (AION) – 91

Low-Velocity Impact Response of Sandwich Beams with Functionally Graded Core – 36

IMPACT LOADS
Space Cabin Landing Impact Vector Effects on Human Physiology – 15

IMPACT PREDICTION
The Range Managers Toolkit (RMTK) Noise Tool – 111

IMPACT STRENGTH
Dynamic Response of the Human Head to + Gx Impact – 184

IMPACTORS
Characteristics and Sampling Efficiency of Eight-Unit Linear Slot Impactor (EULSI) – 43

IMPACT
The Range Managers Toolkit (RMTK) Noise Tool – 111

IMPEDANCE
Driving Point Impedance for a Linear Array of Half-Width Leaky-Wave Antenna (Preprint) – 77

Inversion of Elastic Impedance for Unconsolidated Sediments – 87

IMPLOSIONS
Simulation of Cylinder Implosion Initiated by Underwater Explosion – 206

IMPULSES
Multi-User Performance Issues in Wireless Impulse Radio Networks – 70

IN VITRO METHODS AND TESTS
Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats – 129

Cytotoxic Activity of Natural Killer Cells in Vitro under Microgravity – 147

European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

Phagocytosis as a Biomarker for Stress Responses – 139

IN VIVO METHODS AND TESTS
Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

Monitor Activity, Temperature and Heart Rate with a Mouse Telemeter to be used for Animal Research on Board the International Space Station – 127

Rapid Nitric Oxide Production by Bone Cells in Response to Mechanical Vibration – 148

INCONEL (TRADEMARK)
Further Investigations of High Temperature Knitted Spring Tubes for Advanced Control Surface Seal Applications – 97

INDIA
Indian Nuclear Command and Control Dilemma – 67

INDONESIA
Business Process Reengineering in the Inventory Management to Improve Aircraft Maintenance Operations in the Indonesian Air Force – 11

Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 46

INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY
Langmuir Probe Distortions and Probe Compensation in an Inductively Coupled Plasma – 260

INDUSTRIAL PLANTS
Energy and Process Optimization and Benchmarking of Army Industrial Processes – 105

Search for B(sup +) Yields phi pi(sup +) and B(sup o) Decays – 245

The Characteristics of Spanish Reservoirs – 106

Workers' Exposures to n-Propyl Bromide at a Helicopter Transmission Factory – 110

INERTIAL CONFINEMENT FUSION
X-Ray Digital Radiography and Computed Tomography of High Energy Density Physics (HEDP) Material, Subassemblies and Targets – 248

X-Ray Digital Radiography and Computed Tomography of ICF and HEDP Materials, Subassemblies and Targets – 247

INERTIAL NAVIGATION
Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised) – 101

The F-15B Embedded Global Positioning System/Inertial Navigation System Instrumentation System Upgrade – 293

INFECTIOUS DISEASES
Enhancement of an Analytical Method for the Determination of Squalene in Anthrax Vaccine Absorbed Formulations – 40

Systemic Oncolytic Cytokine HSV Therapy of Prostate Cancer – 164

INFERENCE
Agent-based Modeling of Dismounted Infantry Through Inclusion of Perceptions, Inferences and Associations Phase 1 – 269

Coherence and Coreference – 270

Social Structure Simulation and Inference Using Artificial Intelligence Techniques – 227

IN-FLIGHT MONITORING
Damage Emulation in the Dryden C-17 Simulation Estimating Maximum Torque Tolerance – 294

INFORMATION MANAGEMENT
100X Joint Battlespace Infosphere (JBI) – 216

Assessing the Potential Value of FORCEnet Technologies Within the JFMCC Planning Process Using the Knowledge Value Added Methodology – 211

Collaboration Technology in Military Operations: Lessons Learned from the Corporate Domain – 208

Experimentation in a Collaborative Planning Environment – 207

Usable Knowledge Gained or Refined for Personnel Serving in the Operating Forces Through Naval Postgraduate School's Distributed Learning Program – 205

INFORMATION RETRIEVAL
CLIR Experiments at Maryland for TREC-2002: Evidence Combination for Arabic-English Retrieval – 269

Content Locality in Distributed Digital Libraries – 266

Data Mining on an OLTP System (Nearly) for Free – 270

GEM: Graph EMbedding for Routing and Data-Centric Storage in Sensor Networks without Geographic Information – 221

NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Parameter-Free Spatial and Stream Mining – 268

INFORMATION SYSTEMS
100X Joint Battlespace Infosphere (JBI) – 216

A Concept of Operations for the Use of Emergent Open Internet Technologies as the Basis for a Network-Centric Environment – 268

Business Process Reengineering in the Inventory Management to Improve Aircraft Maintenance Operations in the Indonesian Air Force – 11

Identifying Supervisory Control and Data Acquisition (SCADA) Systems on a Network via Remote Reconnaissance – 218

Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

U.S. Geological Survey National Computer Technology Meeting (7th): Program and Abstracts, Held in New Orleans, Louisiana, April 10-15, 1994 – 193

User's Manual for the National Water Information System of the U.S. Geological Survey – 271

INFORMATION THEORY
Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised) – 101

INFORMATION
A Comprehensive Reasoning Framework for Information Survivability (User Intent Encapsulation and Reasoning About Intrusion: Implementation and Performance Assessment) – 215

Light Reconnaissance Vehicle (LRV): Enhancing Command, Control, Communications, and Computers and Information Systems (C4I) to Tactically Employed Forces via a Mobile Platform – 216

INFRARED RADIATION
Astrochemistry: Recent Advances in the Study of Carbon Molecules in Space – 276

Spectral Irradiance Calibration in the Infrared. XVI. Improved Accuracy in the Infrared Spectra of the Secondary and Tertiary Standard Calibration Stars – 253

INFRARED SIGNATURES
Applications of the MuSES Infrared Signature Code – 91

Benchmarking and Validation of IR Signature Programs: SensorVision, CAMEO-ESA and RadThermIR – 195

Visual Through Infrared: Modeling Components and Methodologies for Estimating High Fidelity Ground Vehicle Signatures – 90

INFRARED SPECTRA
Automated Classification of Thermal Infrared Spectra Using Self-organizing Maps – 272

Spectral Irradiance Calibration in the Infrared. XVI. Improved Accuracy in the Infrared Spectra of the Secondary and Tertiary Standard Calibration Stars – 253

INFRARED SPECTROSCOPY
CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy – 45

INHIBITORS
Breast Cancer Suppression by IDO Inhibitors – 173

Comparison of the Effects of DL-threo-Beta-Benzyloxyaspartate on the Glutamate Release from Synaptosomes before and after Exposure of Rats to Artificial Gravity – 148

Design and Testing of Bi-Functional, P-Loop-Targeted MDM2 Inhibitors – 173

Inhibition of Fatty Acid Synthase (FAS): A New Drug for Breast Cancer Chemoprevention – 165

Restoration of Transforming Growth Factor Beta Signaling by Histone Deacetylase Inhibitors in Human Prostate Carcinoma – 177

The Clinical Development of Thalidomide as an Angiogenesis Inhibitor Therapy for Prostate Cancer – 167

INJECTION

Effects of Heat Stress on the Regeneration of Injured Skeletal Muscle in Rats – 126

INJECTORS

Decomposition of GD on CeO2/Alumina Adsorbents in a Gas Chromatograph On-Column Injector Tube Reactor – 42

INJURIES

Development and Evaluation of a Device for the Prevention of Arm Flail Injuries – 16

Diagnosis and Treatment of Combat Related Post-Traumatic Stress Disorder. An Abstract Bibliography – 270

Dynamic Response of the Human Head to + Gx Impact – 184

Experimental Measures of Blast and Acoustic Trauma in Marine Mammals – 167

The Pathogenesis and Therapy of Combined Radiation Injury – 174

INLET TEMPERATURE

Performance and Operational Characteristics for a Dual Brayton Space Power System With Common Gas Inventory – 31

INORGANIC PEROXIDES

Superoxide Dismutase, Catalase, Glutathione Peroxidase, and Glutothione Reductase in the Heart of Hypergravity-Treated and Aging Rats – 158

INSTRUMENTS

Reconfigurable Instrumentation Signal Conditioning – 290

INSULATION

Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

INSULATORS

Alternator Electrical Feedthrough Insulator Materials for Project Prometheus(B-MT(AMSI)-44) – 256

INTELLIGENCE

The Importance of Artificial Intelligence for Naval Intelligence Training Simulations – 225

INTERACTIONS

Authoritative SSL Auditor – 222

INTERCEPTION

Hit-to-Kill Guidance Algorithm for the Interception of Ballistic Missiles During the Boost Phase – 207

INTERCONTINENTAL BALLISTIC MISSILES

Thermo-mechanical Analysis of Ground-based Directed Energy Weapons on Satellites and Intercontinental Ballistic Missiles – 24

INTERFEROMETRY

In-Flight Skin Friction Measurements Using Oil Film Interferometry – 10

INTERLEUKINS

Effects of Vector-Averaged Gravity on the Response to Different Stimulatory Signals in T-Cells – 147

Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

INTERNAL COMBUSTION ENGINES

The Nutating Engine-Prototype Engine Progress Report and Test Results – 17

INTERNAL PRESSURE

Compressed Elastomer Method for Internal Pressure Testing – 54

INTERNAL WAVES

Three-Dimensional Analysis of Azimuthal Dependence of Sound Propagation through Shallow-Water Internal Solitary Waves – 44

INTERNATIONAL COOPERATION

Moving from Bilateral to Multilateral Medical Operations – 22

INTERNATIONAL RELATIONS

State Department and Related Agencies: FY2006 Appropriations and FY2007 Request – 70

INTERNATIONAL SPACE STATION

Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 143

Internal Cargo Integration – 26

International Space Station Centrifuge Rotor Models A Comparison of the Euler-Lagrange and the Bond Graph Modeling Approach – 96

International Space Station: Introduction and ISS Familiarization – 27

Ionizing Radiation Environment on the International Space Station: Performance vs. Expectations for Avionics and Material – 283

ISS Commercial Cargo Service: Requirements and Constraints Summary – 25

MISS: Mice on International Space Station – 162

Moving from Bilateral to Multilateral Medical Operations – 22

Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

Orbiter Repair Maneuver Contingency Separation Methods and Analysis – 26

Parachute Testing for the NASA X-38 Crew Return Vehicle – 29

Reference Guide to the International Space Station – 30

The German ISS Experiment Cellular Responses to Radiation in Space (CERASP): The Effects of Single and Combined Space Flight Conditions on Mammalian Cells – 158

The International Space Station: A Pathway to the Future – 273

The Logistic Path from the International Space Station to the Moon and Beyond – 25

INTERNATIONAL SYSTEM OF UNITS

Metrication of U.S. Shipbuilding - The Challenges and the Opportunities – 246

Metrics of METOC Forecast Performance and Operational Impacts on Carrier Strike Operations – 11

INTERNATIONAL TRADE

Automotive Replacement Glass Windshields from China. Investigation No. 731-TA-922 (Final). Determination and Views of the Commission – 53

Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 46

Cased Pencils from China. Investigation No. 731-TA-669 (Second Review) – 32

Corrosion-Resistant Carbon Steel Flat Products from France and Germany. Investigations Nos. 701-TA-348-349 and 731-TA-615 (Review) (Remand). Determination and Views of the Commission – 47

Ferrovanadium from China and South Africa. Investigations Nos. 731-TA-986 and 987 (Final). Determinations and Views of the Commission – 47

Polyethylene Terephthalate (PET) Film from Korea. Investigation No. 731-TA-459 (Second Review) – 52

Pressure Sensitive Plastic Tape from Italy. Investigation No. AA1921-167 (Second Review) – 52

Prestressed Concrete Steel Wire Strand from Japan. Investigation No. AA1921-188 (Second Review) – 47

INTERNET RESOURCES

Real-Time Application Traffic Monitoring System for Streaming Data Quality Evaluation – 213

Service Management System for IP Services – 213

INTERNETS

A Concept of Operations for the Use of Emergent Open Internet Technologies as the Basis for a Network-Centric Environment – 268

A Management Perspective of the Department of Defense (DoD) Internet Protocol Version 6 (IPv6) Transition Plan, Where it is Today, and Where it Needs to be by the Year 2008 – 197

Development of Future Course Content Requirements Supporting the Department of Defense's Internet Protocol Version 6 Transition and Implementation – 191

Endpoint-Based Routing Strategies for Improving Internet Performance and Resilience – 238

Extending the Tactical Wireless Internet in Support of USMC Distributed Operations – 72

High Availability Server Platform for Operations Support System – 213

Implementing OWL Defaults – 210

Internet Protocol Over Telemetry Testing for Earth Science Capability Demo Summary – 289

IP Network Technologies for the Ubiquitous Era – 59

National Strategy to Secure Cyberspace – 217

NTT Technical Review, Volume 1, No. 4 – 58

Service Management System for IP Services – 213

Standardization Activities on Optical Networking – 59

Study of Buffer Size in Internet Routers – 233

The Design and Implementation of a Prototype Web-Portal for the Integrated Mobile Alerting System (IMAS) – 206

Using the Internet to Collaborate with Consumers in Redefining a Psychosocial Agenda for Families with Hereditary Breast Cancer – 174

Web Page Clustering using Heuristic Search in the Web Graph – 267

'GMPLS Signaling Protocol Interoperability Test in Multilayer Network': Toward a Global Standard for the Next-Generation Photonic Network – 257

INTEROPERABILITY

Coalition Interoperability: A Modeled Approach – 72

Design, Implementation and Testing of a Common Data Model Supporting Autonomous Vehicle Compatibility and Interoperability – 224

Developing Software Requirements Supporting Open Architecture Performance Goals in Critical DoD System-of-Systems – 205

'GMPLS Signaling Protocol Interoperability Test in Multilayer Network': Toward a Global Standard for the Next-Generation Photonic Network – 257

INTERPOLATION

Symplectic Interpolation – 256

INTERPROCESSOR COMMUNICATION

Provably Secure Passwork-Based Authentication in TLS – 189

INTERROGATION

Development of Portable Fiber Bragg Grating Interrogation System – 285

INTERSTELLAR CHEMISTRY

Astrochemistry: Recent Advances in the Study of Carbon Molecules in Space – 276

INTRACRANIAL PRESSURE

Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory – 142

Intracranial Pressure Increases during Weightlessness. A Parabolic Flights Study – 151

INVARIANCE

An Invariant Representation for Matching Trajectories Across Uncalibrated Video Streams – 233

B-Meson Semileptonic Decays at BABAR – 245

INVENTORIES

Inventory of Simulation and Modeling for the Analysis of Ground Manoeuvre Performance (inventarisatie van vragen en modellen voor de analyse van het grondgebonden optreden) – 240

U.S. Army Aviator Job Analysis – 4

INVENTORY CONTROLS

Business Process Reengineering in the Inventory Management to Improve Aircraft Maintenance Operations in the Indonesian Air Force – 11

INVENTORY MANAGEMENT

Business Process Reengineering in the Inventory Management to Improve Aircraft Maintenance Operations in the Indonesian Air Force – 11

INVERSIONS

Inversion of Elastic Impedance for Unconsolidated Sediments – 88

INVERTEBRATES

Biolab Experiment Development Status 2005 – 123

INVERTERS

Field Programmable Gate Array Hysteresis Control of Parallel Connected Inverters – 207

ION ACCELERATORS

Helical Pulse Line Structures for Ion Acceleration – 244

ION BEAMS

Beam Pipe Desorption Rate in RHIC – 263

ION CURRENTS

Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 32

ION ENGINES

Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 32

ION EXCHANGING

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 46

IONIZING RADIATION

Ionizing Radiation Environment on the International Space Station: Performance vs. Expectations for Avionics and Material – 283

Mechanism of Action for Anti-Radiation Vaccine in Reducing the Biological Impact of High-Dose Irradiation – 184

The German ISS Experiment Cellular Responses to Radiation in Space (CERASP): The Effects of Single and Combined Space Flight Conditions on Mammalian Cells – 158

IONS

High Performance Ion Mobility Spectrometry Using Hourglass Electrodynamic Funnel and Internal Ion Funnel – 90

Method and System for Mass Spectroscopy – 257

IRON ALLOYS

Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 50

IRON METEORITES

Metal-Silicate Segregation in Asteroidal Meteorites – 280

IRRADIATION

JOYO-1 Irradiation Test Campaign Technical Close-out – 254

Multiple Irradiation Capsule Experiment (MICE)-3B Irradiation Test of Space Fuel Specimens in the Advanced Test Reactor(ATR) -Closeout Documentation for Naval Reactors(NR) Information – 255

ISCHEMIA

Mechanical Stimulation of the Foot Support Zones as a Way to Maintain Activity of the Tonic Muscular System during Functional Support Deprivation – 154

ITALY

Pressure Sensitive Plastic Tape from Italy. Investigation No. AA1921-167 (Second Review) – 52

JANUS

Portability in the Janus Natural Language Interface – 205

JAPAN

Prestressed Concrete Steel Wire Strand from Japan. Investigation No. AA1921-188 (Second Review) – 47

JAVA (PROGRAMMING LANGUAGE)

Characterization and Application of Four-Layer Semiconductor Structures in Pulse Mode Operation – 79

Evaluating the Effectiveness of Waterside Security Alternatives for Force Protection of Navy Ships and Installations Using X3D Graphics and Agent-Based Simulation – 197

ORA 2006: User's Guide – 210

JET AIRCRAFT
Flow Field Surveys in a Transonic Compressor Rig – 7

JET ENGINE FUELS
Performance of a Liquid Flow Ultra-Compact Heat Exchanger – 44

JET FLOW
Arc Jet Flow Properties Determined from Laser- Induced Fluorescence of Atomic Species – 85

JOINTS (ANATOMY)
Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

JP-7 JET FUEL
Conjugate Heat Transfer Analyses on the Manifold for Ramjet Fuel Injectors – 89

JP-8 JET FUEL
Metallized Gelled Propellants Combustion Experiments in a Pulse Detonation Engine – 57

KINEMATICS
Virtual Environment a Behavioral and Countermeasure Tool for Assisted Gesture in Weightlessness: Experiments during Parabolic Flight – 125

KINETIC ENERGY
Fracture of Grooved Kinetic Energy Rods Subject to Oblique Impact – 203

KITS
Implementation of a Modular Fly away Kits (FLAK) for C4ISR in order to counter Asymmetric Threats in the Coalition Riverine and Maritime Theatres – 73

KLYSTRONS
Marx Modulator Development Program for the International Linear Collider – 249

KNEE (ANATOMY)
Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions – 123

KNOWLEDGE BASED SYSTEMS
KOJAK Group Finder: Scalable Group Detecllon via Integrated Knowledge-Based and Statistical Reasoning – 236

Portability in the Janus Natural Language Interface – 204

KNOWLEDGE REPRESENTATION
Implementing OWL Defaults – 211

KOREA
Polyethylene Terephthalate (PET) Film from Korea. Investigation No. 731-TA-459 (Second Review) – 53

KUIPER BELT
Spectroscopy of Kuiper Belt Objects and Centaurs – 275

LABORATORIES
Performance and Capabilities of the NASA Space Radiation Laboratory at BNL – 283

LABORATORY EQUIPMENT
Improved Materials for High-Temperature Black Liquor Gasification – 36

LAGRANGIAN FUNCTION
Fibonacci Grids – 235

LAMINAR BOUNDARY LAYER
Hypersonic Laminar Instability on Round Cones Near Zero Angle of Attack – 86

LAMINAR FLOW
Hypersonic Laminar Instability on Round Cones Near Zero Angle of Attack – 86

LAMINATES
Report on Laminations in Plates - An Acoustical Method for Determination of – 252

LANDING LOADS
Space Cabin Landing Impact Vector Effects on Human Physiology – 15

LANGUAGES
Development and Evaluation of a Korean Treebank and its Application to NLP – 266

Evaluating the Effectiveness of Waterside Security Alternatives for Force Protection of Navy Ships and Installations Using X3D Graphics and Agent-Based Simulation – 197

Survey of Available Artificial Intelligence Technologies for Addition Into Delta3D – 199

LARGE EDDY SIMULATION
Implicit Large Eddy Simulation for Unsteady Turbulent Flows – 86

LASER ABLATION
Higher Order Chemistry Models in the CFD Simulation of Laser-Ablated Carbon Plumes – 89

LASER APPLICATIONS
High Performance Laser Scanning Confocal Microscope for Microgravity Research – 134

LASER BEAMS
Thermo-mechanical Analysis of Ground-based Directed Energy Weapons on Satellites and Intercontinental Ballistic Missiles – 24

LASER INDUCED FLUORESCENCE
Arc Jet Flow Properties Determined from Laser- Induced Fluorescence of Atomic Species – 85

LASER OUTPUTS
Beam Control of Extremely Agile Relaying Laser Source for Bifocal Relay Mirror Spacecraft – 25

LASER RANGE FINDERS
Eye-Safe Laser Radar 3-D Imaging – 228

LASERS
CThC7 25 nJ Passively Mode-Locked Fiber Laser at 1080 nm – 259

High Performance Laser Scanning Confocal Microscope for Microgravity Research – 134

Potential of Remote Laser Vibration Sensing for Military Applications – 94

Relay Telescope, High Power Laser Alignment System, and Laser Peening Method and System Using Same – 259

Stimulated Brillouin Scattering Mirror System, High Power Laser and Laser Peening Method and System Using Same – 259

Titan Laser at LLNL – 259

LATTICE VIBRATIONS
Aerodynamic Characteristic of the A3 DRDC-ISL Reference Projectile: Missile with Lattice Fins – 2

LAUNCH VEHICLES
CFD Simulation of the Space Shuttle Launch Vehicle with Booster Separation Motor and Reaction Control Plumes – 27

Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

Simulation and Analyses of Multi-Body Separation in Launch Vehicle Staging Environment – 23

The Disposal of Spacecraft and Launch Vehicle Stages in Low Earth Orbit – 26

The X-43A Flight System Highlights and Challenges for the Second and Third Flights – 294

LAUNCHING
Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

LAW (JURISPRUDENCE)
State Department and Related Agencies: FY2006 Appropriations and FY2007 Request – 70

LAWS
Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 74

LEARNING
Usable Knowledge Gained or Refined for Personnel Serving in the Operating Forces Through Naval Postgraduate School's Distributed Learning Program – 206

LEG (ANATOMY)
Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest – 148

LENNARD-JONES POTENTIAL
Molecular Simulation of the Vapor-Liquid Phase Behavior of Lennard-Jones Mixtures in Porous Solids – 40

LETHALITY
WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis-)Mounted Soldier – 196

LEUKOCYTES
Phagocytosis as a Biomarker for Stress Responses – 139

LEVITATION
Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

LIBRARIES
Beyond MARC: New Trends for the Library of the Future – 268

Content Locality in Distributed Digital Libraries – 266

HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 242

LIFE (DURABILITY)
WEBTAS Software Life Cycle Development – 79

LIFE SCIENCES
Core Data Model Proposal for Physiology Research in Space – 125

ESA Ground Based Facilities – 154

Last Call for Biorack: Results of 82 Experiments in Orbit – 154

Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

LIFE SUPPORT SYSTEMS
Biolab Experiment Development Status 2005 – 123

Exploration Life Support Directions – 188

Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

Protective Clothing and Life Support Equipment Applicable to a Desert Environment – 188

LIGANDS
Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

LIGHT AIRCRAFT
In-Flight Skin Friction Measurements Using Oil Film Interferometry – 10

LIGHT EMITTING DIODES
Dual Mode Display with a Backlight Filter for an Unactivated Light Emitting Diode – 83

LIGHT SOURCES
Dual Mode Display with a Backlight Filter for an Unactivated Light Emitting Diode – 83

LIGHT (VISIBLE RADIATION)
Spectral Irradiance Calibration in the Infrared. XVI. Improved Accuracy in the Infrared Spectra of the Secondary and Tertiary Standard Calibration Stars – 253

LINE OF SIGHT
Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

LINEAR ACCELERATORS
Method and System for Mass Spectroscopy – 257

LINEAR ARRAYS
Driving Point Impedance for a Linear Array of Half-Width Leaky-Wave Antenna (Preprint) – 77

LINEAR PARAMETER-VARYING CONTROL
Gain-Scheduled Fault Tolerance Control Under False Identification – 20

Rate-Based Model Predictive Control of Turbofan Engine Clearance – 19

LINEAR PROGRAMMING
Optimizing CAT-ASVAB Item Selection Using Form Assembly Techniques – 242

LINEARITY
An Upgradeable Agent-Based Model to Explore Non-Linearity and Intangibles in Peacekeeping Operations – 207

LINGUISTICS
Development and Evaluation of a Korean Treebank and its Application to NLP – 266

LIPIDS
Ultrastructural Peculiarities and Galactolipid Contents in Chlorella Cells in Altered Gravity – 132

LIQUID CHROMATOGRAPHY
Enhancement of an Analytical Method for the Determination of Squalene in Anthrax Vaccine Absorbed Formulations – 40

LIQUID CRYSTALS
Dual Mode Display with a Backlight Filter for an Unactivated Light Emitting Diode – 83

LIQUID FLOW
Performance of a Liquid Flow Ultra-Compact Heat Exchanger – 44

LIQUID HYDROGEN
Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

LITHIUM HYDRIDES
Evaluation of Lithium Hydride for Use in a Space Nuclear Reactor Shield, Including a Historical Perspective, for NR Information – 256

Space Shielding Materials for Prometheus Application – 51

LITHIUM NIOBATES
Electromagnetic Field Distribution Measurements using an Optically Scanning Probe System – 61

LIVER
Role of Rac GTPases in Chemokine-Stimulated Breast Carcinoma – 172

LOAD TESTS
Support Motion Effects in a Timber Trestle Bridge: Physical and Analytical Modeling – 98

LOADS (FORCES)
A Perspective for Ultrasonic Assessment of Osteoporotic Changes of Bone Structure in Proximal Tibia – 143

Hanford Double-Shell Tank Thermal and Seismic Project Summary of Combined Thermal and Operating Loads – 85

Operational Influence on Thermal Behavior of High-Speed Helical Gear Trains – 98

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

Surge Current Suppression in Power-Factor-Corrected AC-To-DC Converter with Capacitive Load – 84

Transient Response of Rotor on Rolling-Element Bearings with Clearance – 96

LOCAL AREA NETWORKS
Development of Future Course Content Requirements Supporting the Department of Defense's Internet Protocol Version 6 Transition and Implementation – 191

Light Reconnaissance Vehicle (LRV): Enhancing Command, Control, Communications, and Computers and Information Systems (C4I) to Tactically Employed Forces via a Mobile Platform – 216

Software Defined Radio Prototype (I): System Design and Performance Evaluation – 191

Software Defined Radio Prototype (II): Implementation and Evaluation of IEEE 802.11 Wireless LAN – 214

LOCOMOTION
Mechanical Stimulation of the Foot Support Zones as a Way to Maintain Activity of the Tonic Muscular System during Functional Support Deprivation – 154

LOCOMOTIVES
Guidance for Quantifying and Using Long Duration Switch Yard Locomotive Idling Emission Reductions in State Implementation Plans – 112

LOGIC PROGRAMMING
Knowledge-Intensive, Interactive and Efficient Relational Pattern Learning – 229

LOGISTICS MANAGEMENT
Analysis of Operational Pace Versus Logistical Support Rate in the Ground Combat Element of a Marine Expeditionary Brigade – 203

Business Process Reengineering in the Inventory Management to Improve Aircraft Maintenance Operations in the Indonesian Air Force – 11

Logistics Maturity Evaluator – 217

LOGISTICS
An Analysis of the Joint Strike Fighter Autonomic Logistics System – 12

Internal Cargo Integration – 26

Logistics Maturity Evaluator – 217

The Logistic Path from the International Space Station to the Moon and Beyond – 25

LONGITUDINAL CONTROL

Gain-Scheduled Fault Tolerance Control Under False Identification – 20

LOOP ANTENNAS

Uncertainty Estimation of Loop Antenna Calibration System in MF/HF Band – 62

LOSSES

Hysteretic Loss Reduction in Striated YBCO – 42

LOUDNESS

Shaped Sonic Boom Experiment – 293

LOW COST

Low Cost Ku-Band Satellite Transmitter System – 289

LOW EARTH ORBITS

A LEO Satellite Postmission Disposal Study using LEGEND – 279

Experimental Results of Thin-Film Photovoltaic Cells in a Low Density LEO Plasma Environment: Ground Tests – 29

The Disposal of Spacecraft and Launch Vehicle Stages in Low Earth Orbit – 26

The International Space Station: A Pathway to the Future – 273

LOW FREQUENCIES

Effects of Water Temperature on Cardiac Autonomic Nervous System Modulation during Foot Immersion (Foot Bath) – 140

Low-Frequency Electromagnetic Backscatter from Buries Tunnels – 247

LOW PRESSURE

Evaluation of Low-Pressure Drop Antimicrobial and Hybrid Air Filters – 95

LOW SPEED WIND TUNNELS

The X-43A and B-52B Tunnel Test – 295

LOW SPEED

Performance Comparison between Rough and Smooth-Cast Blades in a Low-Speed Multistage Compressor – 87

LOW VOLTAGE

Atomically Smooth Epitaxial Ferroelectric Thin Films for the Development of a Nonvolatile, Ultrahigh Density, Fast, Low Voltage, Radiation-Hard Memory – 80

Low Voltage Electrolytic Capacitor Pulse Forming Inductive Network for Electric Weapons – 80

LOWER BODY NEGATIVE PRESSURE

Pilots' Examination in a Rapid LBNP Exposure – 136

WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

LUMBAR REGION

An Innovative Approach for the Assessment of 3D Structures in Trabecular Bone – 122

LUMENS

Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest – 148

LUMINESCENCE

TRIPLE LUX-B: Phagocytosis in Mussel Hemocytes – 144

LUMINOSITY

Combined Phase Space Characterization at the PEP-II IP Using Single-Beam and Luminous-Region Measurements – 251

Doubling the PEP-II Luminosity in Simulations – 264

Luminosity Improvement at PEP-II Based on Optics Model and Beam-Beam Simulation – 265

LUNAR BASES

Exploration Life Support Directions – 188

Food and Nutrition for the Moon Base: What we have Learned in 45 Years of Space Flight – 179

LUNAR DUST

Lunar Dust Activation and Related Studies – 274

LUNAR ENVIRONMENT

Development of a Gravity-Insensitive Heat Pump for Lunar Applications – 96

LUNAR EXPLORATION

Human Exploration and Avionic Technology Challenges – 17

LUNAR LANDING

A Reusable Design for Precision Lunar Landing Systems – 281

LUNAR SURFACE VEHICLES

Exploration Life Support Directions – 188

LUNAR SURFACE

Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

LUNGS

Role of Rac GTPases in Chemokine-Stimulated Breast Carcinoma – 172

LYMPHATIC SYSTEM

Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

LYMPHOCYTES

A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

Effects of Vector-Averaged Gravity on the Response to Different Stimulatory Signals in T-Cells – 146

Human Adaptation Genetic Response Suites: Toward New Interventions and Countermeasures for Spaceflight – 157

Stability of Radiation Induced Chromosome Damage in Human Peripheral Blood Lymphocytes – 185

MACH NUMBER

Entry Abort Determination using Non-adaptive Neural Networks for Mars Precision Landers – 28

MACHINE LEARNING

Exploration and Policy Reuse – 235

Knowledge-Intensive, Interactive and Efficient Relational Pattern Learning – 229

Probabilistic Reuse of Past Policies – 235

The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

Tree-Based Hierarchical Reinforcement Learning – 237

MACHINE TRANSLATION

Limited-Domain Speech-to-Speech Translation between English and Pashto – 228

MAGMA

Early Planetary Differentiation: Comparative Planetology – 277

MAGNESIUM

Estimating 'Concern Levels' for Concentrations of Chemical Substances in the Environment – 34

MAGNETIC EFFECTS

Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

MAGNETIC FIELDS

Changes in the Topography of Cellular Components in Pea Root Statocytes Exposed to High Gradient Magnetic Field – 134

Electromagnetic Field Distribution Measurements using an Optically Scanning Probe System – 61

MAGNETIC INDUCTION

Spin-Based Photonics via Electromagnetically Induced Transparency – 258

MAGNETIC PROPERTIES

Optical and magnetic properties of Eu-doped GaN – 42

MAGNETIC RESONANCE

Clinically Practical Magnetic Resonance Protocol for Improved Specifically in Breast Cancer Diagnosis – 176

MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Quantitative MR Imaging for the in Vivo Assessment of Trabecular Bone Quality – 181

MAGNETIC STORAGE

Magnetic Random Access Memory Using Memory Cells with Rotated Magnetic Storage Elements – 83

MAGNETIC SUSPENSION
Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

MAGNETOMETERS
Spacecraft Instrumentation to Measure and Stimulate Space Particles and Plasma Waves in the Medium-Earth Orbit (MEO) Regime – 115

MAGNETO-OPTICS
Electromagnetic Field Distribution Measurements using an Optically Scanning Probe System – 61

MAGNETOSPHERE-IONOSPHERE COUPLING
A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope – 60

MAGNETS
Changes in the Topography of Cellular Components in Pea Root Statocytes Exposed to High Gradient Magnetic Field – 134

MAGNITUDE
Investigation of Cress Root Gravisensing under Low Magnitute Acceleration – 137

MAINTAINABILITY
Analysis Methods and Models for Small Unit Operations – 240

MAINTENANCE
An Analysis of the Joint Strike Fighter Autonomic Logistics System – 12

Analyzing Requirements for and Designing a Collaborative Tool Based on Functional and User Input – 16

Business Process Reengineering in the Inventory Management to Improve Aircraft Maintenance Operations in the Indonesian Air Force – 11

Intelligent Maintenance Aid (IMA) – 81

Orbiter Repair Maneuver Contingency Separation Methods and Analysis – 26

The Evaluation of Project Management Performance on Two Software Maintenance Projects Based on a CMMI Framework – 205

MALES
Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

Novel Protein Microarray Technology to Examine Men with Prostate Cancer – 169

Relations Between Prooxidant and Antioxidant Variables in Hypergravity and Aging – 133

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor – 165

MAMMALS
European Network using Fish as Osteoporosis Research Models (ENFORM) – 128

The German ISS Experiment Cellular Responses to Radiation in Space (CERASP): The Effects of Single and Combined Space Flight Conditions on Mammalian Cells – 158

MAMMARY GLANDS
A Computer-Aided Diagnosis System for Breast Cancer Combining Digital Mammography and Genomics – 178

Benign Breast Disease: Toward Molecular Prediction of Breast Cancer Risk – 164

Breast Cancer Therapy With Annexin 11 Nanoparticles – 164

Clinically Practical Magnetic Resonance Protocol for Improved Specifically in Breast Cancer Diagnosis – 176

Design and Testing of Bi-Functional, P-Loop-Targeted MDM2 Inhibitors – 173

Exploring Early Detection Methods: Using the Intraductal Approach to Predict Breast Cancer – 171

Hypoxia as a Driving Force for Genetic Instability During Breast Tumorigenesis – 175

Inhibition of Fatty Acid Synthase (FAS): A New Drug for Breast Cancer Chemoprevention – 165

Integrating Geographic Information Systems (GIS) Into Breast Cancer Epidemiologic Research – 172

Is Peripheral Benzodiazepine Receptor (PBR) Gene Expression Involved in Breast Cancer Suppression by Dietary Soybean Protein? – 171

Modifiers of the Efficacy of Risk-Reducing Salpingo-Oophorectomy for the Prevention of Breast and Ovarian Cancer in Carriers of BRCA1 and BRCA2 – 172

Quality of Life and Functional Status Across the Life Course – 177

Reproductive and Hormonal Risk Factors for Breast Cancer in Blind Women – 176

Role of Rac GTPases in Chemokine-Stimulated Breast Carcinoma – 172

The Nuclear Death Domain Protein p84N5; a Candidate Breast Cancer Susceptibility Gene – 171

The Role of Semaphorin 3B (SEMA3B) in the Pathogenesis of Breast Cancer – 175

Towards the Early Detection of Breast Cancer in Young Women – 175

Using the Internet to Collaborate with Consumers in Redefining a Psychosocial Agenda for Families with Hereditary Breast Cancer – 174

MANAGEMENT METHODS
Implementation of a Modular Fly away Kits (FLAK) for C4ISR in order to counter Asymmetric Threats in the Coalition Riverine and Maritime Theatres – 73

MANAGEMENT PLANNING
Case Study: Accelerating Process Improvement by Integrating the TSP and CMMI – 11

The Agile Organization: From Informal Networks to Complex Effects and Agility – 75

MANAGEMENT SYSTEMS
100X Joint Battlespace Infosphere (JBI) – 216

Service Management System for IP Services – 213

Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems – 262

MANEUVERS
Inventory of Simulation and Modeling for the Analysis of Ground Manoeuvre Performance (inventarisatie van vragen en modellen voor de analyse van het grondgebonden optreden) – 240

MANNED SPACE FLIGHT
Apollo Seals: A Basis for the Crew Exploration Vehicle Seals – 97

Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight? – 142

Food and Nutrition for the Moon Base: What we have Learned in 45 Years of Space Flight – 179

Human Adaptation Genetic Response Suites: Toward New Interventions and Countermeasures for Spaceflight – 157

Human Exploration and Avionic Technology Challenges – 17

Investigating Human Cognitive Performance during Spaceflight – 121

Managing Space Radiation Risks on Lunar and Mars Missions: Risk Assessment and Mitigation – 186

Mitigation Strategies for Acute Radiation Exposure during Space Flight – 183

MANNED SPACECRAFT
China's Space Program: An Overview – 20

MANPOWER
Exploration of Force Transition in Stability Operations Using Multi-Agent Simulation – 197

Measuring the Value of Graduate Manpower Systems Analysis Education for Naval Officers – 58

MANUALS
Interactive Electronic Technical Manuals (IETMs) Annotated Bibliography – 270

User's Manual for the National Water Information System of the U.S. Geological Survey – 271

MAPPING
A System for Three-Dimensional Robotic Mapping of Underground Mines – 102

Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised) – 101

MARINE BIOLOGY

Experimental Measures of Blast and Acoustic Trauma in Marine Mammals – 167

MARINE MAMMALS

Experimental Measures of Blast and Acoustic Trauma in Marine Mammals – 167

MARINE TECHNOLOGY

Metrication of U.S. Shipbuilding - The Challenges and the Opportunities – 246

Producibility Evaluation Criteria Cost Estimating Computer Programs - Manual – 194

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IIIB-2: Permanent Composite Cladding of Deteriorating Steel Hulls – 50

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-2: Areal Coverage Using Friction Surfacing – 33

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-3. Recent MIT Research on Residual Stresses and Distortion in Welded Structures – 49

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-4. Shipyard Aluminum/Steel Welded Transition Joints – 49

MARINE TRANSPORTATION

Coast Guard: Condition of Some Aids-to-Navigation and Domestic Icebreaking Vessels Has Declined; Effect on Mission Performance Appears Mixed – 295

MARKERS

Benign Breast Disease: Toward Molecular Prediction of Breast Cancer Risk – 164

Novel Protein Microarray Technology to Examine Men with Prostate Cancer – 169

MARKOV PROCESSES

A Game-Theoretic Model for Repeated Helicopter Allocation Between Two Squads – 237

Exploration and Policy Reuse – 235

Probabilistic Reuse of Past Policies – 235

Tree-Based Hierarchical Reinforcement Learning – 237

MARS ATMOSPHERE

Mars Aerocapture Systems Study – 29

MARS CRATERS

Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

MARS ENVIRONMENT

Personal Cooling for Extra-Vehicular Activities on Mars – 274

MARS EXPLORATION

A Reusable Design for Precision Lunar Landing Systems – 281

Are You Talking to Me? Dialogue Systems Supporting Mixed Teams of Humans and Robots – 223

Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

Human Exploration and Avionic Technology Challenges – 17

Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

MARS LANDING SITES

A Historical Search for the Occurrence of Habitable Ground Ice at the Phoenix Landing Site – 278

MARS LANDING

Entry Abort Determination using Non-adaptive Neural Networks for Mars Precision Landers – 28

MARS MISSIONS

Integrated Human-Robotic Missions to the Moon and Mars: Mission Operations Design Implications – 230

MARS ROVING VEHICLES

An Evaluation of the Vapor Phase Catalytic Ammonia Removal Process for Use in a Mars Transit Vehicle – 278

Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

MARS SAMPLE RETURN MISSIONS

Mars Aerocapture Systems Study – 29

MARS SURFACE

Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

MASS SPECTROSCOPY

Method and System for Mass Spectroscopy – 257

MASSIVELY PARALLEL PROCESSORS

Fibonacci Grids – 235

MATERIALS HANDLING

International Space Station: Introduction and ISS Familiarization – 27

MATERIALS SELECTION

Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 36

MATHEMATICAL LOGIC

Model Checking Discounted Temporal Properties – 243

MATHEMATICAL MODELS

A Discrete-Event Simulation Model for Evaluating Air Force Reusable Military Launch Vehicle Post-Landing Operations – 23

An Analytic Framework for the War of Ideas – 231

Analytic Models for a Spherical Satellite Charging in Sunlight at any Spin Rate – 21

Analytical Modeling of Medium Access Control Protocols in Wireless Networks – 219

Computing the Observed Information Matrix for Dynamic Mixture Models – 236

DNA MIcroarray-Assisted Modeling of Metabolic and Regulatory Networks With Applications to Bio-Defense – 169

Dynamic Plasticity and Fracture in High Density Polycrystals: Constitutive Modeling and Numerical Simulation – 261

Flutter Analysis for the Centerline Instrumented Pylon (CLIP) with Airdata Boom Attachment – 287

Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results – 86

Heart Rate Variability in Evaluation of Functional State and Types of Autonomic Regulation under Conditions of Space Flight – 132

International Space Station Centrifuge Rotor Models A Comparison of the Euler-Lagrange and the Bond Graph Modeling Approach – 96

Mathematical Modeling of Rail Gun – 50

Model Checking Discounted Temporal Properties – 242

Objective Identification of Environmental Patterns Related to Tropical Cyclone Track Forecast Errors – 116

Optimizing Mechanical Properties and Thermal Stability of Age Hardenable Aluminum Alloys Through Theoretical Modeling, Alloy Modification and Thermal Mechanical Processing – 40

Speaker Adaptation Using Multiple Reference Speakers – 73

Support Motion Effects in a Timber Trestle Bridge: Physical and Analytical Modeling – 98

Symplectic Interpolation – 256

Updating the Finite Element Model to Match Ground Vibration Test Data – 285

Visual Through Infrared: Modeling Components and Methodologies for Estimating High Fidelity Ground Vehicle Signatures – 90

MEASUREMENT

A Novel Method for Measurement of Total Hemispherical Emissivity – 21

Absolute Position Measurement for Automated Guided Vehicles using the Greedy DeBruijn Sequence – 233

MEASURING INSTRUMENTS

Instrumentation and Metrology for Nanotechnology: Report of the National Nanotechnology Initiative Workshop. Held in Gaithersburg, Maryland on January 27-29, 2004 – 84

MECHANICAL DRIVES

Materials for the Control Drive Mechanisms – 255

MECHANICAL ENGINEERING

Performance Evaluations of Ceramic Wafer Seals – 37

MECHANICAL PROPERTIES

Development and Evaluation of a Device for the Prevention of Arm Flail Injuries – 16

Mechanical and Thermal Properties of Ultra-High Carbon Steel Containing Aluminum – 50

Multiscale Mechanical Characterization of Biomimetic Physically Associating Gels – 53

Optimizing Mechanical Properties and Thermal Stability of Age Hardenable Aluminum Alloys Through Theoretical Modeling, Alloy Modification and Thermal Mechanical Processing – 40

Studies in Forecasting Upper-Level Turbulence – 13

MEDICAL SCIENCE

Integrating Geographic Information Systems (GIS) Into Breast Cancer Epidemiologic Research – 172

Naval Submarine Medical Research Laboratory Command History, OPNAV 5750-1 Fiscal Year 2005 – 165

MEDICAL SERVICES

Diagnosis and Treatment of Combat Related Post-Traumatic Stress Disorder. An Abstract Bibliography – 270

Diagnosis and Treatment of Diseases of Tactical Importance to U.S. Central Command – 166

Hurricane Katrina: Utilization of Private, Non-Governmental Health Professionals Time for New Strategies – 168

Improving Clinical Efficiency of Military Treatment Facilities – 179

Radio Frequency Identification (RFID) for Naval Medical Treatment Facilities (MTF) – 168

Using the Internet to Collaborate with Consumers in Redefining a Psychosocial Agenda for Families with Hereditary Breast Cancer – 174

MELATONIN

Reproductive and Hormonal Risk Factors for Breast Cancer in Blind Women – 176

MEMBRANES

Behavior of Gravisensitive Cells on 2D and 3D Clinostats – 144

Comparison of the Effects of DL-threo-Beta-Benzyloxyaspartate on the Glutamate Release from Synaptosomes before and after Exposure of Rats to Artificial Gravity – 148

Development of High Temperature Membranes and Improved Cathode Catalysts – 46

Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

MEMORY (COMPUTERS)

Magnetic Random Access Memory Using Memory Cells with Rotated Magnetic Storage Elements – 83

Software Defined Radio, its Programmable Signal-Processing Unit, and Central Control Signal-Processing Unit – 64

MENTAL PERFORMANCE

Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects – 147

Environmental Challenge Impairs Prefrontal Brain Functions – 158

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Performance and Psychophysiological Measures of Fatigue Effects on Aviation Related Tasks of Varying Difficulty – 7

MERCURY (METAL)

Toxecon Retrofit for Mercury and Multi Pollutant Control on Three 90-MW Coal Fired Boilers – 115

MESONS

B-Meson Semileptonic Decays at BABAR – 245

Observation of B(sup o) Meson Decay to A (sup plus or minus)(sub 1) (1260) pi (sup plus or minus) – 244

Search for B(sup +) Yields phi pi(sup +) and B(sup o) Decays – 245

MESOSPHERE

On the Observed Changes in Upper Stratospheric and Mesospheric Temperatures from UARS HALOE – 118

METABOLISM

Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory – 142

DNA MIcroarray-Assisted Modeling of Metabolic and Regulatory Networks With Applications to Bio-Defense – 169

Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

Personal Cooling for Extra-Vehicular Activities on Mars – 274

METADATA

Beyond MARC: New Trends for the Library of the Future – 268

METAL JOINTS

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-4. Shipyard Aluminum/Steel Welded Transition Joints – 49

METAL PLATES

Coupling Between CTH and LS-DYNA for Thermal Postprocessing: Application to Propellant Cookoff From a Residual Penetrator – 262

Physical Optics of Metal Plate Media Part 1, Theoretical Considerations – 258

Report on Laminations in Plates - An Acoustical Method for Determination of – 252

METALLICITY

Metal-Silicate Segregation in Asteroidal Meteorites – 280

METALLIZING

Metallized Gelled Propellants Combustion Experiments in a Pulse Detonation Engine – 57

METALS

Further Investigations of High Temperature Knitted Spring Tubes for Advanced Control Surface Seal Applications – 97

Gamma-Ray Bursts Shower the Universe with Metals – 276

METASTASIS

Hypergravity Modulates Cyclic GMP Efflux in Nitric Oxide-Stimulated Human Melanocytic Cells – 143

Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP – 135

Post-Transcriptional Regulation of MKK4-A Stress Signaling Kinase Implicated in the Regulation of Metastatic Growth – 169

Role of Rac GTPases in Chemokine-Stimulated Breast Carcinoma – 172

METEORITIC COMPOSITION

Early Planetary Differentiation: Comparative Planetology – 277

METEOROLOGICAL PARAMETERS

Evaluation of Causes of Large 96-H and 120-H Track Errors in the Western North Pacific – 117

METEOROLOGICAL SERVICES

Meteorological Support for the Pathfinder- Plus Aeroelastic Research Flights – 289

METEOROLOGY
Metrics of METOC Forecast Performance and Operational Impacts on Carrier Strike Operations – 11

METHOD OF MOMENTS
The X-43A Force and Moment Analysis – 292

METHYL COMPOUNDS
Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin – 34

METHYL POLYSILOXANES
Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

METRICATION
Metrication of U.S. Shipbuilding - The Challenges and the Opportunities – 246

METROLOGY
Instrumentation and Metrology for Nanotechnology: Report of the National Nanotechnology Initiative Workshop. Held in Gaithersburg, Maryland on January 27-29, 2004 – 84

MICE
Mechanical and/or Neural Activity-Dependent Regulation of Soleus Muscle Fibers of MDX Mice – 160

MISS: Mice on International Space Station – 162

Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

MICROELECTROMECHANICAL SYSTEMS
Microscopic Batteries for MEMS Systems – 82

Top vs. Bottom Charging of the Dielectric in RF MEMS Capacitive Switches (Preprint) – 78

MICROFIBERS
Actin Organization and Gene Expression in Beta Vulgaris Seedlings under Clinorotation – 124

MICROGRAVITY
A New Space Greenhouse Concept Development for Optimal Plant Growth – 144

A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

A Role of Peroxidases in Acceleration of the Aging of Potato Minitubers under Influence of Microgravity – 151

Adaptation of the Baroreflex Sensitivity to Microgravity: Data from the STS-107 Columbia Mission – 152

Advantages of Simulated Microgravity in the Production of Compounds of Industrial Relevance – 160

Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight? – 142

Audiological Findings in Antiorthostatic Position Modelling Microgravitation – 146

Behavior of Gravisensitive Cells on 2D and 3D Clinostats – 144

Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity – 157

Cytotoxic Activity of Natural Killer Cells in Vitro under Microgravity – 147

Development of a Gravity-Insensitive Heat Pump for Lunar Applications – 95

Diminished Performance of Bacterial Fuel Cells in Microgravity – 141

Effect of 6-Days of Support Withdrawal on Characteristics of Balance Function – 128

Effect of Simulated Microgravity on Aspergillus Niger – 140

Effects of Space-Flight Simulation on Human Cells – 140

Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 142

Hardware Development for Electrophysiological Long-Term Studies in Space – 141

High Performance Laser Scanning Confocal Microscope for Microgravity Research – 134

Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Monitor Activity, Temperature and Heart Rate with a Mouse Telemeter to be used for Animal Research on Board the International Space Station – 127

Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device – 126

Neurovestibular Adaptation to Short Radius Centrifugation – 150

New Technique for Simulation of Microgravity and Variable Gravity Conditions – 161

Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

Production of Cytokines by Human PBMCs in Simulated Microgravity – 149

Results of Cardiorespiratory System Autonomic Regulation Investigations during Long Term International Space Station Missions: Experiment 'Pulse' – 161

Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Short-Term Exposure of Arabidopsis Cell Cultures to Hyper-G: Short-Term Changes in Transcription Regulator Expression – 140

Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

System Specificity in Responsiveness to Intermittent -Gx Gravitation during Simulated Microgravity in Rats – 130

The Effect of Simulated Microgravity on Nitrergic Innervation of the Middle Cerebral Artery – 124

The ERASMUS Experiment Archive – 129

The German ISS Experiment Cellular Responses to Radiation in Space (CERASP): The Effects of Single and Combined Space Flight Conditions on Mammalian Cells – 158

The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by a Simulation Study – 158

Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

TRIPLE LUX-B: Phagocytosis in Mussel Hemocytes – 144

Ultrastructural Peculiarities and Galactolipid Contents in Chlorella Cells in Altered Gravity – 131

Understanding Visual Perception in the Perspective of Gravity – 137

WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

MICROORGANISMS

A Historical Search for the Occurrence of Habitable Ground Ice at the Phoenix Landing Site – 278

Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity – 144

Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin – 34

Evaluation of Low-Pressure Drop Antimicrobial and Hybrid Air Filters – 95

SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

MICROPROCESSORS

Software Defined Radio Prototype (I): System Design and Performance Evaluation – 192

The K9 On-Board Rover Architecture – 230

MICROSCOPES

High Performance Laser Scanning Confocal Microscope for Microgravity Research – 134

MICROSCOPY

Angiogenic Signaling in Living Breast Tumor Models – 163

MICROSTRUCTURE

2006 Gordon Research Conference on Ceramics, Solid Studies In – 54

Burst Testing and Analysis of Superalloy Disks With a Dual Grain Microstructure – 51

Modeling Dynamic Plasticity and Spall Fracture in High Density Polycrystalline Alloys – 48

MICROWAVE ANTENNAS

A Commemoration of Deschamps' and Sichak's 'Microstrip Microwave Antennas': 50 Years of Development, Divergence, and New Directions – 80

MICROWAVE FREQUENCIES

Evaluation of Uncertainty of Horn Antenna Calibration with the Frequency range of 1 GHz to 18 GHz. – 62

Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

MICROWAVES

A Commemoration of Deschamps' and Sichak's 'Microstrip Microwave Antennas': 50 Years of Development, Divergence, and New Directions – 80

MIDDLE EAR

Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

MIGRATION

Rip Channel Migration in the Nearshore – 92

MILITARY AIR FACILITIES

Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 1 of 2 – 112

Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 2 of 2 – 112

MILITARY AVIATION

Sleep Patterns of Naval Aviation Personnel Conducting Mine Hunting Operations – 184

MILITARY OPERATIONS

A Network-Centric Operations Case Study: US/UK Coalition Combat Operations During Operation Iraqi Freedom – 69

Analytic Methods for Tactical Air Warfare - 2006. Air Campaign and Mathematical Analysis – 243

Diagnosis and Treatment of Diseases of Tactical Importance to U.S. Central Command – 166

Effectiveness of Non-Lethal Capabilities in a Maritime Environment – 200

Radio Frequency Identification (RFID) for Naval Medical Treatment Facilities (MTF) – 168

Rapidly Deployable, Self Forming, Wireless Networks for Maritime Interdiction Operations – 66

Studies in Forecasting Upper-Level Turbulence – 13

The Performance and Compatibility of Thin Client Computing with Fleet Operations – 220

Understanding Command and Control – 74

MILITARY PERSONNEL

Analysis Methods and Models for Small Unit Operations – 240

Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

Quantifying the Probabilities of Selection of Surface Warfare Officers to Executive Officer – 236

Sleep Patterns of Naval Aviation Personnel Conducting Mine Hunting Operations – 183

U.S. Army Aviator Job Analysis – 4

MILITARY TECHNOLOGY

China's Space Program: An Overview – 20

Potential of Remote Laser Vibration Sensing for Military Applications – 94

U.S. Navy Radar Systems Survey – 78

MINERALOGY

Asteroidal Differentiation Processes Deduced from Ultramafic Achondrite Ureilite Meteorites – 280

MINES (EXCAVATIONS)

A System for Three-Dimensional Robotic Mapping of Underground Mines – 102

MINING

Data Mining on an OLTP System (Nearly) for Free – 270

Parameter-Free Spatial and Stream Mining – 268

Workshop on Assessing and Managing Mercury from Historic and Current Mining Activities, Proceedings and Summary Report – 44

MIR SPACE STATION

Heart Rate Variability in Evaluation of Functional State and Types of Autonomic Regulation under Conditions of Space Flight – 132

MIRRORS

Beam Control of Extremely Agile Relaying Laser Source for Bifocal Relay Mirror Spacecraft – 25

Implementation of a Quadrature Mirror Filter Bank on an SRC Reconfigurable Computer for Real-Time Signal Processing – 199

Stimulated Brillouin Scattering Mirror System, High Power Laser and Laser Peening Method and System Using Same – 259

MISSILE DEFENSE

Optimal Stationing of RADAR Pickets and Anti-Ballistic Missile Defenders for Long Range Surveillance and Tracking (LRS&T) and Ballistic Missile Defense (BMD) Operations – 92

MISSILE RANGES

Optimal Stationing of RADAR Pickets and Anti-Ballistic Missile Defenders for Long Range Surveillance and Tracking (LRS&T) and Ballistic Missile Defense (BMD) Operations – 92

MISSILES

Aerodynamic Characteristic of the A3 DRDC-ISL Reference Projectile: Missile with Lattice Fins – 2

Hit-to-Kill Guidance Algorithm for the Interception of Ballistic Missiles During the Boost Phase – 207

MISSION PLANNING

Apollo Seals: A Basis for the Crew Exploration Vehicle Seals – 97

Integrated Human-Robotic Missions to the Moon and Mars: Mission Operations Design Implications – 230

Internal Cargo Integration – 26

Moving from Bilateral to Multilateral Medical Operations – 22

MITOCHONDRIA
Changes in Ultrastructure of Mitochondria in Root Apex Cells of Soybean Seedlings in Microgravity – 147

MIXERS
A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59

MOBILITY
High Performance Ion Mobility Spectrometry Using Hourglass Electrodynamic Funnel and Internal Ion Funnel – 90

Obstacle Marking and Vehicle Guidance Science and Technology Objective (OMVG-STO) Augmented Reality for Enhanced Command and Control and Mobility – 69

MODELS
A LEO Satellite Postmission Disposal Study using LEGEND – 279

An Upgradeable Agent-Based Model to Explore Non-Linearity and Intangibles in Peacekeeping Operations – 207

Analytic Methods for Tactical Air Warfare - 2006. Air Campaign and Mathematical Analysis – 243

Audiological Findings in Antiorthostatic Position Modelling Microgravitation – 146

Coalition Interoperability: A Modeled Approach – 72

Feasibility Study: A Swedish Integrated Assessment Model – 113

Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results – 86

Higher Order Chemistry Models in the CFD Simulation of Laser-Ablated Carbon Plumes – 88

Inventory of Simulation and Modeling for the Analysis of Ground Manoeuvre Performance (inventarisatie van vragen en modellen voor de analyse van het grondgebonden optreden) – 240

Natural Frequencies and Mode Shapes of a Nonlinear, Uniform Cantilevered Beam – 245

Radio Propagation Prediction Software for Complex Mixed Path Physical Channels – 198

Support Motion Effects in a Timber Trestle Bridge: Physical and Analytical Modeling – 98

Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results – 269

Understanding Command and Control – 74

MODULATION TRANSFER FUNCTION
Radio Frequency Identification (RFID) for Naval Medical Treatment Facilities (MTF) – 168

MODULATION
Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 153

Low Spectral Efficiency Trellis Coded Modulation Systems – 203

Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Modulation of Gene Expression in Bone Cells during Strain-Adapted Bone Remodeling – 150

Respiratory Sinus Arrhythmia: A Marker of Decreased Parasympathetic Modulation after Short Duration Spaceflight – 151

MODULATORS
Comparison of the Effects of DL-threo-Beta-Benzyloxyaspartate on the Glutamate Release from Synaptosomes before and after Exposure of Rats to Artificial Gravity – 148

Marx Modulator Development Program for the International Linear Collider – 249

MODULES
Understanding and Evolving the ML Module System – 212

MOLDOVA
Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 47

MOLECULAR BEAM EPITAXY
Optical and magnetic properties of Eu-doped GaN – 42

MOLECULAR BIOLOGY
Benign Breast Disease: Toward Molecular Prediction of Breast Cancer Risk – 164

MOLECULAR DYNAMICS
Dual Control Cell Reaction Ensemble Molecular Dynamics: A Method for Simulations of Reactions and Adsorption in Porous Materials – 39

Reaction Ensemble Molecular Dynamics: Direct Simulation of the Dynamic Equilibrium Properties of Chemically Reacting Mixtures – 39

MOLECULAR RELAXATION
Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

MOLECULES
An Energetic Concept of Habitability for the Deep Subsurface – 187

Astrochemistry: Recent Advances in the Study of Carbon Molecules in Space – 275

Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

Ultrastructural Peculiarities and Galactolipid Contents in Chlorella Cells in Altered Gravity – 131

MONKEYS
Efficacy of rSEB Vaccine and CpG ODN Administered by Inhalation in Monkeys – 167

MONOCYTES
A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

MONTE CARLO METHOD
Cavity-Bias Sampling in Reaction Ensemble Monte Carlo Simulation – 40

Orion Aerodynamics for Hypersonic Free Molecular to Continuum Conditions – 2

MOON
Earth After the Moon Forming Impact – 278

Food and Nutrition for the Moon Base: What we have Learned in 45 Years of Space Flight – 179

Integrated Human-Robotic Missions to the Moon and Mars: Mission Operations Design Implications – 230

The Logistic Path from the International Space Station to the Moon and Beyond – 25

MORPHOLOGY
Changes in Ultrastructure of Mitochondria in Root Apex Cells of Soybean Seedlings in Microgravity – 147

Development and Evaluation of a Korean Treebank and its Application to NLP – 266

Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G – 126

MOSSBAUER EFFECT
Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

MOTION SICKNESS
Vestibular Adaptation to Changing Gravity Levels and the Orientation of Listing's Plane – 150

MOTION
Motion-Based Visualization – 76

MULTILAYER INSULATION
Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation – 282

MULTIPATH TRANSMISSION

A Simple MPLS-based Flow Aggregation Scheme for Providing Scalable Quality of Service – 219

MPATH: A Loop-free Multipath Routing Algorithm – 219

MULTIPLE ACCESS

Floor Acquisition Multiple Access (FAMA) for Packet-Radio Networks – 227

MULTIPROCESSING (COMPUTERS)

Contention-Conscious Transaction Ordering in Embedded Multiprocessors Systems – 234

MUONS

Simulations of MANX, A Practical Six Dimensional Muon Beam Cooling Experiment – 249

MUSCLE FIBERS

Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading – 160

How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

Mechanical and/or Neural Activity-Dependent Regulation of Soleus Muscle Fibers of MDX Mice – 159

Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats – 134

MUSCLES

Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions – 123

Effect of 6-Days of Support Withdrawal on Characteristics of Balance Function – 128

How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent – 127

Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest – 123

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

MUSCULAR FATIGUE

Evaluation of Spare Capacities of the Respiratory Muscles during Hypokinesia – 187

MUSCULAR FUNCTION

Depressed Tetanic Contractile Function Cannot be Compensated by Increasing Stimulating Frequency in Unloaded Soleus Muscle – 124

Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device – 126

MUSCULAR STRENGTH

Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

MUSCULAR TONUS

Mechanical Stimulation of the Foot Support Zones as a Way to Maintain Activity of the Tonic Muscular System during Functional Support Deprivation – 154

MUSCULOSKELETAL SYSTEM

A Brief Overview of Animal Hypergravity Studies – 130

Depressed Tetanic Contractile Function Cannot be Compensated by Increasing Stimulating Frequency in Unloaded Soleus Muscle – 124

Effects of Heat Stress on the Regeneration of Injured Skeletal Muscle in Rats – 126

Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

Mechanical and/or Neural Activity-Dependent Regulation of Soleus Muscle Fibers of MDX Mice – 159

Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device – 126

System Specificity in Responsiveness to Intermittent -Gx Gravitation during Simulated Microgravity in Rats – 130

MYOSINS

Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent – 127

NACELLES

On the Development of an Efficient Parallel Hybrid Solver with Application to Acoustically Treated Aero-Engine Nacelles – 17

NANOPARTICLES

Breast Cancer Therapy With Annexin 11 Nanoparticles – 164

WTEC Panel Report on Nanostructure Science and Technology: R and D Status and Trends in Nanoparticles, Nanostructured Materials, and Nanodevices – 35

NANOSTRUCTURE (CHARACTERISTICS)

WTEC Panel Report on Nanostructure Science and Technology: R and D Status and Trends in Nanoparticles, Nanostructured Materials, and Nanodevices – 35

NANOSTRUCTURE GROWTH

Carbon Nanotube Activities at NASA-Johnson Space Center – 245

NANOSTRUCTURES (DEVICES)

Configurational Forces in Solid Nanostructures – 248

WTEC Panel Report on Nanostructure Science and Technology: R and D Status and Trends in Nanoparticles, Nanostructured Materials, and Nanodevices – 35

NANOTECHNOLOGY

Instrumentation and Metrology for Nanotechnology: Report of the National Nanotechnology Initiative Workshop. Held in Gaithersburg, Maryland on January 27-29, 2004 – 84

Nanobiotechnology: Report of the National Nanotechnology Initiative Workshop. Held in Arlington, Virginia on October 9-11, 2003 – 46

WTEC Panel Report on Nanostructure Science and Technology: R and D Status and Trends in Nanoparticles, Nanostructured Materials, and Nanodevices – 35

NASA PROGRAMS

An Overview of the Role of Systems Analysis in NASA's Hypersonics Project – 1

NASA SPACE PROGRAMS

A Reusable Design for Precision Lunar Landing Systems – 281

Food and Nutrition for the Moon Base: What we have Learned in 45 Years of Space Flight – 179

Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

Parachute Testing for the NASA X-38 Crew Return Vehicle – 29

NATIONAL AIRSPACE SYSTEM

Aviation Finance: Observations on Potential FAA Funding Options – 8

Required Surveillance Performance Accuracy to Support 3-Mile and 5-Mile Separation in the National Airspace System – 7

NATURAL LANGUAGE (COMPUTERS)

Interactive Electronic Technical Manuals (IETMs) Annotated Bibliography – 270

Portability in the Janus Natural Language Interface – 204

The BBN Spoken Language System – 71

Toward a Real-Time Spoken Language System Using Commercial Hardware – 191

NATURAL LANGUAGE PROCESSING
Development and Evaluation of a Korean Treebank and its Application to NLP – 266

NAVIER-STOKES EQUATION
Orion Aerodynamics for Hypersonic Free Molecular to Continuum Conditions – 3

NAVIGATION AIDS
2006 Navigation Charts. J. Bennett Johnston Waterway, Red River Shreveport, Louisiana to Mouth of Red River Mile 235 to Mile O P.P.R.M. 4th Edition – 101

Coast Guard: Condition of Some Aids-to-Navigation and Domestic Icebreaking Vessels Has Declined; Effect on Mission Performance Appears Mixed – 295

NAVIGATION
Hyper-X Research Vehicle Mach 7 and Mach 10 Mission Guidance, Navigation, and Control Performance – 293

Iconic Representation and Dynamic Information Fidelity: Implications for Decision Support – 77

NAVY
An Object-Oriented View of Backend Databases in a Mobile Environment for Navy and Marine Corps Applications – 199

Assessing the Potential Value of FORCEnet Technologies Within the JFMCC Planning Process Using the Knowledge Value Added Methodology – 211

Effectiveness of Introductory Flight Screening (IFS) for USA Navy and Marine Corps Student Pilots – 4

Evaluating the Effectiveness of Waterside Security Alternatives for Force Protection of Navy Ships and Installations Using X3D Graphics and Agent-Based Simulation – 197

U.S. Navy Radar Systems Survey – 78

NEAR FIELDS
Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

NEAR INFRARED RADIATION
Spectroscopy of Kuiper Belt Objects and Centaurs – 275

NECK (ANATOMY)
Angiotensinogen Expression in Vascular Tissues of Simulated Weightless Rats – 154

NERVES
Mechanical and/or Neural Activity-Dependent Regulation of Soleus Muscle Fibers of MDX Mice – 160

The Effect of Simulated Microgravity on Nitrergic Innervation of the Middle Cerebral Artery – 124

NERVOUS SYSTEM
Neurofibromatosis Type 2 (NF2) Natural History Consortium – 170

NETS
Camouflaging Vehicles Using Field Expedient Materials, Commercial Hardware Store Materials, Camouflage Nets, and Rubber Conveyer Belt Material – 258

NETWORK ANALYSIS
A Simple MPLS-based Flow Aggregation Scheme for Providing Scalable Quality of Service – 219

Analysis of Layered Social Networks – 193

DNA MIcroarray-Assisted Modeling of Metabolic and Regulatory Networks With Applications to Bio-Defense – 169

ORA 2006: User's Guide – 210

Social Structure Simulation and Inference Using Artificial Intelligence Techniques – 227

WiNN: An Efficient Method for Routing Short-Lived Flows – 222

NETWORKS
A Concept of Operations for the Use of Emergent Open Internet Technologies as the Basis for a Network-Centric Environment – 268

Analysis of Layered Social Networks – 193

GPS Carrier Phase Analysis Noise on the USNO-PTB Baselines – 233

Preliminary Security Requirements for SecureCore Hardware – 191

Signal-to-Noise Ratio Gains and Synchronization Requirements of a Distributed Radar Network – 80

The Agile Organization: From Informal Networks to Complex Effects and Agility – 75

NEURAL NETS
Analyzing Divisia Rules Extracted from a Feedforward Neural Network – 208

Entry Abort Determination using Non-adaptive Neural Networks for Mars Precision Landers – 28

The NASA F-15 Intelligent Flight Control Systems: Generation II – 285

Verification and Validation of Neural Networks in Flight Control Systems – 288

NEUROLOGY
Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects – 147

Virtual Environment a Behavioral and Countermeasure Tool for Assisted Gesture in Weightlessness: Experiments during Parabolic Flight – 125

NEUROMUSCULAR TRANSMISSION
New Technique for Simulation of Microgravity and Variable Gravity Conditions – 162

NEURONS
Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

Structural Reappraisal of Dendritic Tree of Cerebellar Purkinje Cell for Novel Functional Modeling of Elementary Sensorimotor Adaptive Processes – 147

NEUROPHYSIOLOGY
Association of Hormonal Responses and Performance of Student Pilots during Acceleration Training on the Human Centrifuge – 135

Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

NEUROTRANSMITTERS
Results of Cardiorespiratory System Autonomic Regulation Investigations during Long Term International Space Station Missions: Experiment 'Pulse' – 161

NEUTRINOS
Choice of Proton Driver Parameters For a Neutrino Factory – 263

Use of Antineutrino Detectors for Nuclear Reactor Safeguards Effectiveness Assessment – 247

NEUTRONS
Compact Neutron Generators for Medical, Home Land Security and Planetary Exploration – 254

Experiments on the Biological Action of Neutrons Performed in the Former Soviet Union: A Historical Review – 255

NICKEL ALLOYS
Thermomechanical Cycling Investigation of Cu and Niti Reinforced Lead-Free Solder – 49

NIGHT VISION
Aircraft Accidents and Incidents Associated With Visual Disturbances From Bright Lights During Nighttime Flight Operations – 184

NIOBATES
Estimating 'Concern Levels' for Concentrations of Chemical Substances in the Environment – 34

NITRIC OXIDE
Hypergravity Modulates Cyclic GMP Efflux in Nitric Oxide-Stimulated Human Melanocytic Cells – 143

Rapid Nitric Oxide Production by Bone Cells in Response to Mechanical Vibration – 148

NOISE PREDICTION
The Range Managers Toolkit (RMTK) Noise Tool – 111

NOISE SPECTRA
Effects of Spread Spectrum Clocking on Measured Noise Spectra – 64

NONDESTRUCTIVE TESTS
A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

NONLINEAR EQUATIONS
Nonlinear Aeroelastic System Identification with Application to Experimental Data – 286

NONLINEAR SYSTEMS
A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 287

NONLINEARITY
Natural Frequencies and Mode Shapes of a Nonlinear, Uniform Cantilevered Beam – 246

Nonlinear Aeroelastic System Identification with Application to Experimental Data – 286

NONUNIFORM MAGNETIC FIELDS
Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

NONUNIFORMITY
Fast Scene Based Nonuniformity Correction with Minimal Temporal Latency – 239

Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent – 127

NOTCHES
A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

NOZZLE DESIGN
Methods and Apparatus to Reduce Turbine Engine Nozzle Basesheet Stresses – 19

NOZZLE FLOW
CFD Simulation of the Space Shuttle Launch Vehicle with Booster Separation Motor and Reaction Control Plumes – 27

NUCLEAR EXPLOSIONS
Amplitude Analysis and Modeling of Regional Phases in PNE Profiles in Northern Eurasia and Seismic Regionalization – 115

NUCLEAR FUELS
Interim Storage and Long Term Disposal of Research Reactor Spent Fuel – 114

NUCLEAR MAGNETIC RESONANCE
Test of a Filter Pack Combined with a PM10 Inlet. Final Report from NMR Project – 113

NUCLEAR POWER PLANTS
Initial Assessment of Environmental Barrier Coatings for the Prometheus Project – 53

Prometheus Hot Leg Piping Concept – 32

NUCLEAR REACTORS
Evaluation of Lithium Hydride for Use in a Space Nuclear Reactor Shield, Including a Historical Perspective, for NR Information – 256

Use of Antineutrino Detectors for Nuclear Reactor Safeguards Effectiveness Assessment – 247

NUCLEAR WARFARE
Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Consequences Management – 266

NUCLEAR WEAPONS
Indian Nuclear Command and Control Dilemma – 67

NUCLEI (CYTOLOGY)
Altered Gravity Causes the Changes in the Protein NopA100 in Plant Cell Nucleoli – 139

NUCLEONS
Nucleon Compton Scattering – 264

NUMERICAL ANALYSIS
Improved Modeling Tools For High Speed Reacting Flows – 237

Studies on Dosimetry of Human-Body Exposure to Electromagnetic Field – 63

NUMERICAL CONTROL
Access Control to Information in Pervasive Computing Environments – 267

Analytical Modeling of Medium Access Control Protocols in Wireless Networks – 219

NUMERICAL WEATHER FORECASTING
Fibonacci Grids – 235

NUTATION
The Nutating Engine-Prototype Engine Progress Report and Test Results – 17

NUTRITION
Food and Nutrition for the Moon Base: What we have Learned in 45 Years of Space Flight – 180

OBJECT-ORIENTED PROGRAMMING
An Object-Oriented View of Backend Databases in a Mobile Environment for Navy and Marine Corps Applications – 199

From Metacomputing to Metabusiness Processing – 192

Integrating Stakeholder Requirements Across Generations of Technology – 199

Issues in Developing Object-Oriented Database Systems for Real-Time Applications – 192

OCCLUSION
Drexel Object Occlusion Repository (DOOR) – 241

OCEANOGRAPHY
Rip Channel Migration in the Nearshore – 92

OCEANS
Technical and Scientific Evaluation of EM-APEX in Hurricane Frances – 117

OILS
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 105

In-Flight Skin Friction Measurements Using Oil Film Interferometry – 10

ONCOGENES
The Nuclear Death Domain Protein p84N5; a Candidate Breast Cancer Susceptibility Gene – 171

ON-LINE SYSTEMS
On-line Robot Adaptation to Environmental Change – 239

OPERATIONS RESEARCH
Optimizing CAT-ASVAB Item Selection Using Form Assembly Techniques – 242

OPERATORS (MATHEMATICS)
A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 287

OPHTHALMOLOGY
Neurofibromatosis Type 2 (NF2) Natural History Consortium – 170

OPTICAL COMMUNICATION
Standardization Activities on Optical Networking – 59

OPTICAL DATA PROCESSING
'GMPLS Signaling Protocol Interoperability Test in Multilayer Network': Toward a Global Standard for the Next-Generation Photonic Network – 257

OPTICAL INTERCONNECTS
Standardization Activities on Optical Networking – 59

OPTICAL PATHS
Micro-Discharge Optical Source Apparatus and Method and System for Analyzing a Sample – 82

OPTICAL PROPERTIES
Optical and magnetic properties of Eu-doped GaN – 42

Optical Properties of Biological Aerosols – 258

Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation – 282

OPTICAL RADAR
Eye-Safe Laser Radar 3-D Imaging – 228

Fast Scene Based Nonuniformity Correction with Minimal Temporal Latency – 239

Potential of Remote Laser Vibration Sensing for Military Applications – 94

OPTICAL SWITCHING
Optical Multistage Networks – 260

OPTICAL TRACKING
Chasing the Sun - The In-Flight Evaluation of an Optical Head Tracker – 93

OPTIMIZATION
A New Space Greenhouse Concept Development for Optimal Plant Growth – 144

Algorithmic and Domain Centralization in Distributed Constraint Optimization Problems – 230

Case Study: Accelerating Process Improvement by Integrating the TSP and CMMI – 11

Energy and Process Optimization and Benchmarking of Army Industrial Processes – 105

First Version of a Dataflow Interchange Format – 209

On Optimizing the Configuration of Time-Transfer Links Used to Generate TAI – 24

Optimizing CAT-ASVAB Item Selection Using Form Assembly Techniques – 241

Real Estate Site Selection: An Application of Artificial Intelligence for Military Retail Facilities – 241

ORDNANCE
Shallow Water UXO Technology Demonstration Site, Scoring Record Number 2 – 251

ORGANELLES
Changes in Ultrastructure of Mitochondria in Root Apex Cells of Soybean Seedlings in Microgravity – 147

Differentiation of Plant Graviperceiving and Graviresponding Cells in Altered Gravity – 124

Ultrastructural Peculiarities and Galactolipid Contents in Chlorella Cells in Altered Gravity – 131

ORGANIC COMPOUNDS
Optical Properties of Biological Aerosols – 258

ORGANIC SEMICONDUCTORS
Devices Having Large Organic Semiconductor Crystals and Methods of Making the Same – 76

ORGANISMS
Behavior of Gravisensitive Cells on 2D and 3D Clinostats – 144

Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 142

The Role of Possible Feedback Mechanisms in the Effects of Altered Gravity on Formation and Function of Gravireceptors of Mollusks and Fish – 151

ORGANIZATIONS
A Concept of Operations for the Use of Emergent Open Internet Technologies as the Basis for a Network-Centric Environment – 268

A Measurement Study of BGP Blackhole Routing Performance – 211

Are DoD Network Centric Policies, Processes and Edge Organizations Sufficiently Adaptable to Adequately Respond to the Impact of Globalization? – 71

Collaboration Technology in Military Operations: Lessons Learned from the Corporate Domain – 208

Neurofibromatosis Type 2 (NF2) Natural History Consortium – 170

The Agile Organization: From Informal Networks to Complex Effects and Agility – 75

ORTHOSTATIC TOLERANCE
Cortical Regions Associated with Orthostatic Stress in Conscious Humans – 137

OSCILLOSCOPES
Real-Time Application Traffic Monitoring System for Streaming Data Quality Evaluation – 213

OSTEOBLASTS
Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Rapid Nitric Oxide Production by Bone Cells in Response to Mechanical Vibration – 148

Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

OSTEOPOROSIS
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

OTOLITH ORGANS
Understanding Visual Perception in the Perspective of Gravity – 137

OVARIES
Modifiers of the Efficacy of Risk-Reducing Salpingo-Oophorectomy for the Prevention of Breast and Ovarian Cancer in Carriers of BRCA1 and BRCA2 – 173

Post-Transcriptional Regulation of MKK4-A Stress Signaling Kinase Implicated in the Regulation of Metastatic Growth – 169

OVER-THE-HORIZON RADAR
Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

OXYGEN
An Energetic Concept of Habitability for the Deep Subsurface – 187

OXYNITRIDES
High-Speed Photographic Study of Wave Propagation and Impact Damage in Transparent Aluminum Oxynitride (AION) – 91

PACIFIC OCEAN
The Extratropical Transition of Tropical Storm Banyan – 116

PACKET SWITCHING
Floor Acquisition Multiple Access (FAMA) for Packet-Radio Networks – 227

PAINTS
Automated Thermal Camouflage Generation Program Status – 33

PARABOLIC FLIGHT
Perception of Body Vertical in Microgravity during Parabolic Flight – 146

Virtual Environment a Behavioral and Countermeasure Tool for Assisted Gesture in Weightlessness: Experiments during Parabolic Flight – 125

PARABOLIC REFLECTORS
Solar Trough Organic Rankine Electricity System (STORES) Stage 1: Power Plant Optimization and Economics. November 2000-May 2005 – 104

PARACHUTES
Parachute Testing for the NASA X-38 Crew Return Vehicle – 29

PARALLEL PROCESSING (COMPUTERS)
Data Structure and Parallel Decomposition Considerations on a Fibonacci Grid – 214

Fibonacci Grids – 234

Field Programmable Gate Array Hysteresis Control of Parallel Connected Inverters – 206

On the Development of an Efficient Parallel Hybrid Solver with Application to Acoustically Treated Aero-Engine Nacelles – 17

Performance Monitoring of Parallel Scientific Applications – 188

PARAMETER IDENTIFICATION
Effect of Sampling Schedule on Pharmacokinetic Parameter Estimates of Promethazine in Astronauts – 129

The X-43 Parameter Identification Research – 294

PARASITIC DISEASES
Proteomics in Malaria – 166

PARTICLE ACCELERATION
Acceleration of Polarized Protons in the AGS with Two Helical Partial Snakes – 261

PARTICLE ACCELERATORS
Doubling the PEP-II Luminosity in Simulations – 265

Luminosity Improvement at PEP-II Based on Optics Model and Beam-Beam Simulation – 265

Observation of Long-Range Beam-Beam Effect in RHIC and Plans for Compensation – 263

Optimization of the X-Band Structure for the JLC/NLC – 261

Simulation of the Electron Cloud for Various Configurations of a Damping Ring for the ILC – 264

PARTICLE BEAMS

Observation of Long-Range Beam-Beam Effect in RHIC and Plans for Compensation – 263

PARTICLE COLLISIONS

Observation of Long-Range Beam-Beam Effect in RHIC and Plans for Compensation – 263

PARTICLE DECAY

B-Meson Semileptonic Decays at BABAR – 245

Observation of B(sup o) Meson Decay to A (sup plus or minus)(sub 1) (1260) pi (sup plus or minus) – 244

Study of Inclusive B- and overbar B (sup o) Decays to Flavor-Tagged D, D(sub s) and lambda (sup +)(sub c) – 248

PARTICLE MASS

Method and System for Mass Spectroscopy – 257

PARTICLE SPIN

Feasibility of a Spin Decoherence Measurement – 262

PARTICLE TRAJECTORIES

Symplectic Interpolation – 256

PARTICULATES

Advanced Fuel Development and Fuel Combustion. Delivery Order 0005: Mitigation of Particulates Using Fuel Additives – 56

Respirator Filter Efficiency Testing Against Particulate and Biological Aerosols Under Moderate to High Flow Rates – 95

Toxecon Retrofit for Mercury and Multi Pollutant Control on Three 90-MW Coal Fired Boilers – 114

PATENT APPLICATIONS

Distributed Oscillator Architectures – 75

Dual Mode Display with a Backlight Filter for an Unactivated Light Emitting Diode – 82

Fullerenic Structures and Such Structures Tethered to Carbon Materials – 249

Immobilized Enzymes in Biocathodes – 82

Integrated Interface Electronics for Reconfigurable Sensor Array – 83

Layer Incorporating Particles with a High Dielectric Constant – 81

List Mode Multichannel Analyzer – 83

Magnetic Random Access Memory Using Memory Cells with Rotated Magnetic Storage Elements – 83

Method of Processing a Substrate – 34

Microscopic Batteries for MEMS Systems – 82

Motion-Based Visualization – 76

Optical Multistage Networks – 260

Reduction of Residual Amplitude Modulation Frequency-Modulated Signals – 84

Relay Telescope, High Power Laser Alignment System, and Laser Peening Method and System Using Same – 259

Stimulated Brillouin Scattering Mirror System, High Power Laser and Laser Peening Method and System Using Same – 259

Surge Current Suppression in Power-Factor-Corrected AC-To-DC Converter with Capacitive Load – 84

PATHOGENESIS

Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

The Pathogenesis and Therapy of Combined Radiation Injury – 174

The Role of Semaphorin 3B (SEMA3B) in the Pathogenesis of Breast Cancer – 175

PATHOLOGY

Astronauts Autonomic Regulation Reserves Evaluation during Pre- and Post-flight Examinations – 153

PATIENTS

Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

PATTERN RECOGNITION

The BBN Spoken Language System – 71

PATTERN REGISTRATION

Registration for Tactical Imagery: An Updated Taxonomy – 224

PAYLOADS

The Biolab Facility Responsible Center at the German Aerospace Center DLR – 155

PEENING

Relay Telescope, High Power Laser Alignment System, and Laser Peening Method and System Using Same – 259

Stimulated Brillouin Scattering Mirror System, High Power Laser and Laser Peening Method and System Using Same – 259

PENETRATION

Coupling Between CTH and LS-DYNA for Thermal Postprocessing: Application to Propellant Cookoff From a Residual Penetrator – 262

Efficient Calculation of Earth Penetrating Projectile Trajectories – 273

PERCEPTION

Agent-based Modeling of Dismounted Infantry Through Inclusion of Perceptions, Inferences and Associations Phase 1 – 269

PERFECTLY MATCHED LAYERS

Improving the Performance of Perfectly Matched Layers by Means of hp-Adaptivity – 243

PERFORMANCE PREDICTION

Inventory of Simulation and Modeling for the Analysis of Ground Manoeuvre Performance (inventarisatie van vragen en modellen voor de analyse van het grondgebonden optreden) – 240

Statistical Analysis of Wireless Networks: Predicting Performance in Multiple Environments – 221

The X-43A (Hyper-X) Flies Into the Record Books – 291

PERFORMANCE TESTS

Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects – 147

Effectiveness of Introductory Flight Screening (IFS) for USA Navy and Marine Corps Student Pilots – 4

Performance Analysis of Wireless Networks – 218

Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

PERIODIC VARIATIONS

On the Observed Changes in Upper Stratospheric and Mesospheric Temperatures from UARS HALOE – 118

PERMITTIVITY

Layer Incorporating Particles with a High Dielectric Constant – 82

PERSONNEL SELECTION

Quantifying the Probabilities of Selection of Surface Warfare Officers to Executive Officer – 237

U.S. Army Aviator Job Analysis – 4

PERSONNEL

Logistics Maturity Evaluator – 217

Quantifying the Probabilities of Selection of Surface Warfare Officers to Executive Officer – 236

Usable Knowledge Gained or Refined for Personnel Serving in the Operating Forces Through Naval Postgraduate School's Distributed Learning Program – 205

Workers' Exposures to n-Propyl Bromide at a Helicopter Transmission Factory – 110

PERTURBATION

Detecting, Classifying, and Handling Contradictions in a Large, Dynamic Information Environment – 226

Effect of 6-Days of Support Withdrawal on Characteristics of Balance Function – 128

PESTICIDES

Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin – 34

PETROGENESIS

Asteroidal Differentiation Processes Deduced from Ultramafic Achondrite Ureilite Meteorites – 280

PHARMACOLOGY

Effect of Sampling Schedule on Pharmacokinetic Parameter Estimates of Promethazine in Astronauts – 129

PHASED ARRAYS

Space-based Telemetry and Range Safety (STARS) Phased Array Antenna Controller – 289

PHENOLIC RESINS

Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

PHENOTYPE

Prenatal Centrifugation: A Mode1 for Fetal Programming of Body Weight? – 139

PHONEMES

Multilingual Phoneme Models for Rapid Speech Processing System Development – 66

PHOSPHORS

Fabrication of 0.0075-Scale Orbiter Phosphor Thermography Test Models for Shuttle RTF Aeroheating Studies – 85

Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

PHOTOGRAPHS

High-Speed Photographic Study of Wave Propagation and Impact Damage in Transparent Aluminum Oxynitride (AION) – 91

PHOTON BEAMS

Comparison of Techniques to Reduce Bremsstrahlung Background Radiation from Monoenergetic Photon Beams – 248

PHOTONICS

Spin-Based Photonics via Electromagnetically Induced Transparency – 258

'GMPLS Signaling Protocol Interoperability Test in Multilayer Network': Toward a Global Standard for the Next-Generation Photonic Network – 257

PHOTONS

Comparison of Techniques to Reduce Bremsstrahlung Background Radiation from Monoenergetic Photon Beams – 248

Experiments on the Biological Action of Neutrons Performed in the Former Soviet Union: A Historical Review – 255

PHOTOSYNTHESIS

CO2 Sequestration and Recycle by Photosynthesis. (Technical Report, September 24, 2004-September 23, 2005) – 114

PHOTOTROPISM

Interactions of Light and Gravity in Chara Internodal Cells – 155

PHOTOVOLTAIC CELLS

Evaluation of Long Duration Flight on Venus – 282

Experimental Results of Thin-Film Photovoltaic Cells in a Low Density LEO Plasma Environment: Ground Tests – 29

PH

Determination of MS2 Bacteriophage Stability at Low pH Using the Integrated Virus Detection System (IVDS) – 92

PHYSICAL CHEMISTRY

Molecular Simulation of the Vapor-Liquid Phase Behavior of Lennard-Jones Mixtures in Porous Solids – 40

PHYSICAL EXAMINATIONS

Pilots' Examination in a Rapid LBNP Exposure – 136

PHYSICAL EXERCISE

Adaptation of the Baroreflex Sensitivity to Microgravity: Data from the STS-107 Columbia Mission – 152

Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Calf Tissue Liquid Stowage and Muscular and Deep Vein Distension in Orthostatic Tests after a 90-Day Head Down Bed Rest – 125

Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 152

Influence of Weightlessness and Apnea on Heart Rate and Blood Pressure Regulation during Exercise – 121

Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest – 148

MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest – 123

WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

PHYSICAL OPTICS

Physical Optics of Metal Plate Media Part 1, Theoretical Considerations – 258

PHYSICAL SCIENCES

ESA Ground Based Facilities – 154

PHYSICIANS

Diagnosis and Treatment of Diseases of Tactical Importance to U.S. Central Command – 166

PHYSIOLOGICAL EFFECTS

Evaluation of Spare Capacities of the Respiratory Muscles during Hypokinesia – 187

Virtual Environment a Behavioral and Countermeasure Tool for Assisted Gesture in Weightlessness: Experiments during Parabolic Flight – 125

PHYSIOLOGICAL RESPONSES

Association of Hormonal Responses and Performance of Student Pilots during Acceleration Training on the Human Centrifuge – 135

Hardware Development for Electrophysiological Long-Term Studies in Space – 141

Human Adaptation Genetic Response Suites: Toward New Interventions and Countermeasures for Spaceflight – 157

Influence of Weightlessness and Apnea on Heart Rate and Blood Pressure Regulation during Exercise – 121

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

The Pathogenesis and Therapy of Combined Radiation Injury – 174

TRIPLE LUX-B: Phagocytosis in Mussel Hemocytes – 144

WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

PHYSIOLOGY

Artificial Gravity: Physiological Perspectives for Long-Term Space Exploration – 159

Astronauts Autonomic Regulation Reserves Evaluation during Pre- and Post-flight Examinations – 153

Core Data Model Proposal for Physiology Research in Space – 125

Human Adaptation Genetic Response Suites: Toward New Interventions and Countermeasures for Spaceflight – 157

Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

MISS: Mice on International Space Station – 162

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Relations Between Prooxidant and Antioxidant Variables in Hypergravity and Aging – 133

PILOT ERROR

Developing A Methodology For Assessing Safety Programs Targeting Human Error In Aviation – 8

The Outcome of ATC Message Complexity on Pilot Readback Performance – 9

PILOT PERFORMANCE

The Outcome of ATC Message Complexity on Pilot Readback Performance – 9

PILOT TRAINING

Effectiveness of Introductory Flight Screening (IFS) for USA Navy and Marine Corps Student Pilots – 5

PILOTLESS AIRCRAFT

Analysis of the Assignment Scheduling Capability for Unmanned Aerial Vehicles (ASC-U) Simulation Tool – 15

Autonomous Soaring for Small Unmanned Aerial Vehicles (UAVs) – 291

Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

Meteorological Support for the Pathfinder- Plus Aeroelastic Research Flights – 289

Networked Unmanned Aerial Vehicle Teams (NUAVT) – 288

SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

PILOTS

Effectiveness of Introductory Flight Screening (IFS) for USA Navy and Marine Corps Student Pilots – 5

PIPES (TUBES)

Prometheus Hot Leg Piping Concept – 33

PITCH

Audiological Findings in Antiorthostatic Position Modelling Microgravitation – 146

PITUITARY HORMONES

Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight? – 142

PLANETARY COMPOSITION

Recent Highlights in Ring Structure, Dynamics, and Composition – 275

PLANETARY GEOLOGY

Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

New Optical Constants for Amorphous and Crystalline H2O-ice – 257

PLANETARY RINGS

Recent Highlights in Ring Structure, Dynamics, and Composition – 275

PLANETARY STRUCTURE

Recent Highlights in Ring Structure, Dynamics, and Composition – 275

PLANETOLOGY

Early Planetary Differentiation: Comparative Planetology – 277

PLANNING

Analytic Methods for Tactical Air Warfare - 2006. Air Campaign and Mathematical Analysis – 243

PLANT GROWTH REGULATORS

SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

PLANT PHYSIOLOGY

A New Space Greenhouse Concept Development for Optimal Plant Growth – 144

PLANT ROOTS

Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems – 145

Gene Expression of delta-1- and delta-3-Cyclins in Root Meristem Cells of Pisurn Sativurn L. under Clinorotation – 150

Investigation of Cress Root Gravisensing under Low Magnitute Acceleration – 136

The Influence of Clinorotation on Root Cell Differentiation in Brassica Rapa Seedlings – 143

PLASMA DIAGNOSTICS

Scrape-Off Layer Plasmas for ITER with 2nd X-Point and Convective Transport Effects – 260

PLASMA WAVES

Spacecraft Instrumentation to Measure and Stimulate Space Particles and Plasma Waves in the Medium-Earth Orbit (MEO) Regime – 115

PLASMAS (PHYSICS)

Experimental Results of Thin-Film Photovoltaic Cells in a Low Density LEO Plasma Environment: Ground Tests – 30

Scrape-Off Layer Plasmas for ITER with 2nd X-Point and Convective Transport Effects – 260

PLASTIC PROPERTIES

Dynamic Plasticity and Fracture in High Density Polycrystals: Constitutive Modeling and Numerical Simulation – 261

Modeling Dynamic Plasticity and Spall Fracture in High Density Polycrystalline Alloys – 48

PLASTIC TAPES

Pressure Sensitive Plastic Tape from Italy. Investigation No. AA1921-167 (Second Review) – 52

PLATINUM

Development of High Temperature Membranes and Improved Cathode Catalysts – 46

PLAYBACKS

Visually Based Timeline Debrief Toolset for Team Training AAR – 204

PLUMES

CFD Simulation of the Space Shuttle Launch Vehicle with Booster Separation Motor and Reaction Control Plumes – 27

Higher Order Chemistry Models in the CFD Simulation of Laser-Ablated Carbon Plumes – 88

Reactive Shear Layer Mixing and Growth Rate Effects on Afterburning Properties for Axisymetric Rocket Engine Plumes – 30

POLARIZATION (CHARGE SEPARATION)

Feasibility of a Spin Decoherence Measurement – 262

POLICIES

Are DoD Network Centric Policies, Processes and Edge Organizations Sufficiently Adaptable to Adequately Respond to the Impact of Globalization? – 72

Critical Infrastructure Protection: How to Assess and Provide Remedy to Vulnerabilities in Telecom Hotels – 67

Exploration and Policy Reuse – 235

Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 74

Probabilistic Reuse of Past Policies – 235

POLLUTION CONTROL

Toxecon Retrofit for Mercury and Multi Pollutant Control on Three 90-MW Coal Fired Boilers – 115

POLLUTION MONITORING

Winter Air Quality Study, 2004-2005. Results from Yellowstone National Park – 107

POLLUTION

Feasibility Study: A Swedish Integrated Assessment Model – 113

POLYACRYLONITRILE

Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

POLYCRYSTALS

Modeling Dynamic Plasticity and Spall Fracture in High Density Polycrystalline Alloys – 48

POLYCYCLIC AROMATIC HYDROCARBONS
Astrochemistry: Recent Advances in the Study of Carbon Molecules in Space – 276

POLYETHYLENE TEREPHTHALATE
Polyethylene Terephthalate (PET) Film from Korea. Investigation No. 731-TA-459 (Second Review) – 53

POLYMER MATRIX COMPOSITES
Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

POLYMERIC FILMS
In-Flight Skin Friction Measurements Using Oil Film Interferometry – 10

POLYMERIZATION
Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

POLYMORPHISM
System Synthesis for Polymorphous Computing Architectures – 210

POLYNOMIALS
A Faster Strongly Polynomial Minimum Cost Flow Algorithm – 231

POLYVINYL CHLORIDE
Toxicological Profile for Vinyl Chloride (2006 Update) – 109

POPULATIONS
An Analytic Framework for the War of Ideas – 232

POROSITY
Molecular Simulation of the Vapor-Liquid Phase Behavior of Lennard-Jones Mixtures in Porous Solids – 40

POROUS MATERIALS
Dual Control Cell Reaction Ensemble Molecular Dynamics: A Method for Simulations of Reactions and Adsorption in Porous Materials – 39

POROUS SILICON
Novel Protein Microarray Technology to Examine Men with Prostate Cancer – 169

PORTABLE EQUIPMENT
Development of Portable Fiber Bragg Grating Interrogation System – 285

Device-Enabled Authorization in the Grey System – 194

POSITION (LOCATION)
A System for Three-Dimensional Robotic Mapping of Underground Mines – 102

Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Localization of Tactile Signals as a Function of Tactor Operating Characteristics – 90

Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised) – 101

POSITRONS
Single-Bunch Instability Driven by The Electron Cloud Effect in the Positron Damping Ring of the International Linear Collider – 244

POSTURE
Effect of 6-Days of Support Withdrawal on Characteristics of Balance Function – 129

POTABLE WATER
Catalytic Enzyme-Based Methods for Water Treatment and Water Distribution System Decontamination. 1. Literature Survey – 168

POTASSIUM CHLORIDES
Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats – 129

POTATOES
A Role of Peroxidases in Acceleration of the Aging of Potato Minitubers under Influence of Microgravity – 151

POTENTIAL ENERGY
Theoretical Chemical Dyamics Studies of Elementary Combustion Reactions – 38

POWER AMPLIFIERS
Envelope Switched Doherty Power Amplifier For RF Applications (Preprint) – 77

POWER SPECTRA
Power Measurement Emitted by UWB System in Time Domain – 63

PRECAMBRIAN PERIOD
Earth After the Moon Forming Impact – 278

PRECIPITATION HARDENING
Optimizing Mechanical Properties and Thermal Stability of Age Hardenable Aluminum Alloys Through Theoretical Modeling, Alloy Modification and Thermal Mechanical Processing – 41

PRECISION
A Reusable Design for Precision Lunar Landing Systems – 281

PREGNANCY
Centrifugation Effects on Estrous Cycling, Mating Success and Pregnancy Outcome in Rats – 156

Prenatal Centrifugation: A Mode1 for Fetal Programming of Body Weight? – 138

PRESSURE EFFECTS
Perception of Body Vertical in Microgravity during Parabolic Flight – 146

PRESSURE MEASUREMENT
Unsteady Casewall Pressure Measurements in a Transonic Compressor during Steam Induced Stall – 18

PRESSURE SENSORS
Steady-State and Transient Measurements Within a Compressor Rotor During Steam-Induced Stall at Transonic Operational Speeds – 14

PRESSURE VESSELS
Effect of Tritium and Decay Helium On Weldment Fracture Toughness – 52

PRESTRESSING
Prestressed Concrete Steel Wire Strand from Japan. Investigation No. AA1921-188 (Second Review) – 47

PREVENTION
Development and Evaluation of a Device for the Prevention of Arm Flail Injuries – 16

HIV/AIDS Prevention in Zambia: A Preliminary Study of Obstacles to Behavior Change in the Copperbelt – 176

Modifiers of the Efficacy of Risk-Reducing Salpingo-Oophorectomy for the Prevention of Breast and Ovarian Cancer in Carriers of BRCA1 and BRCA2 – 172

PRIVACY
Privacy-Preserving Set Operations – 239

PROBABILITY THEORY
A Programming Language for Probabilistic Computation – 236

Application of the Bootstrap Statistical Method in Deriving Vibroacoustic Specifications – 100

Guided Standoff Weapons: A Threat to Expeditionary Air Power – 5

Quantifying the Probabilities of Selection of Surface Warfare Officers to Executive Officer – 236

The Effective Use of New Materials and Methodologies for Blast Mitigation in New and Renovated Facilities by the Armed Services – 100

PROBLEM SOLVING
Tree-Based Hierarchical Reinforcement Learning – 238

PROCUREMENT
A Study on Improving USA Air Force Space Systems Engineering and Acquisition – 24

PRODUCTION ENGINEERING
Case Study: Accelerating Process Improvement by Integrating the TSP and CMMI – 11

PROGRAM VERIFICATION (COMPUTERS)
Simulation Validation for Societal Systems – 201

Verification and Validation of Neural Networks in Flight Control Systems – 288

PROGRAMMING LANGUAGES
A Programming Language for Probabilistic Computation – 236

A Separate Compilation Extension to Standard ML (Revised and Expanded) – 195

Offline Forensic Analysis Of Microsoft Windows XP Physical Memory – 201

Understanding and Evolving the ML Module System – 212

PROJECT MANAGEMENT

A Study on Improving USA Air Force Space Systems Engineering and Acquisition – 24

The Biolab Facility Responsible Center at the German Aerospace Center DLR – 155

The Evaluation of Project Management Performance on Two Software Maintenance Projects Based on a CMMI Framework – 205

PROJECTILES

Aerodynamic Characteristic of the A3 DRDC-ISL Reference Projectile: Missile with Lattice Fins – 2

Efficient Calculation of Earth Penetrating Projectile Trajectories – 273

Fracture of Grooved Kinetic Energy Rods Subject to Oblique Impact – 203

Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results – 86

PROMETHAZINE

Effect of Sampling Schedule on Pharmacokinetic Parameter Estimates of Promethazine in Astronauts – 129

PROMETHEUS

Initial Assessment of Environmental Barrier Coatings for the Prometheus Project – 53

Prometheus Hot Leg Piping Concept – 32

Reflector and Shield Material Properties for Project Prometheus – 256

Space Reflector Materials for a Prometheus Application – 254

Space Shielding Materials for Prometheus Application – 51

Specifications, Pre-Experimental Predictions, and Test Plate Characterization Information for the Prometheus Critical Experiments – 51

PROPELLANTS

Coupling Between CTH and LS-DYNA for Thermal Postprocessing: Application to Propellant Cookoff From a Residual Penetrator – 262

PROPULSION SYSTEM CONFIGURATIONS

Effect of Span Variation on the Performance of a Cross Flow Fan – 6

PROPULSION SYSTEM PERFORMANCE

Effect of Span Variation on the Performance of a Cross Flow Fan – 6

Performance Evaluations of Ceramic Wafer Seals – 37

PROPULSION

Documentation of Naval Reactors Papers and Presentations for the Space Technology and Applications International Forum (STAIF) 2006 – 254

Multiple Irradiation Capsule Experiment (MICE)-3B Irradiation Test of Space Fuel Specimens in the Advanced Test Reactor(ATR) -Closeout Documentation for Naval Reactors(NR) Information – 255

PROSTATE GLAND

Novel Protein Microarray Technology to Examine Men with Prostate Cancer – 169

Post-Transcriptional Regulation of MKK4-A Stress Signaling Kinase Implicated in the Regulation of Metastatic Growth – 169

Restoration of Transforming Growth Factor Beta Signaling by Histone Deacetylase Inhibitors in Human Prostate Carcinoma – 177

Systemic Oncolytic Cytokine HSV Therapy of Prostate Cancer – 164

The Clinical Development of Thalidomide as an Angiogenesis Inhibitor Therapy for Prostate Cancer – 167

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor – 165

PROTECTION

Critical Infrastructure Protection: How to Assess and Provide Remedy to Vulnerabilities in Telecom Hotels – 67

Effectiveness of Non-Lethal Capabilities in a Maritime Environment – 200

Evaluating the Effectiveness of Waterside Security Alternatives for Force Protection of Navy Ships and Installations Using X3D Graphics and Agent-Based Simulation – 197

PROTECTIVE CLOTHING

Protective Clothing and Life Support Equipment Applicable to a Desert Environment – 188

PROTECTIVE COATINGS

Initial Assessment of Environmental Barrier Coatings for the Prometheus Project – 53

PROTECTORS

A Photo-Computer Technique for Design and Analysis of Personal Protective Equipment – 200

PROTEIN SYNTHESIS

Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

PROTEINS

Advantages of Simulated Microgravity in the Production of Compounds of Industrial Relevance – 161

Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats – 129

Altered Gravity Causes the Changes in the Protein NopA100 in Plant Cell Nucleoli – 139

Angiotensinogen Expression in Vascular Tissues of Simulated Weightless Rats – 153

Design and Testing of Bi-Functional, P-Loop-Targeted MDM2 Inhibitors – 173

Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcromeric Cytoskeletal Proteins of Hindlimb Suspended Rats – 120

Effects of Heat Stress on the Regeneration of Injured Skeletal Muscle in Rats – 126

Expression of Small Heat Shock Proteins in Pea Seedlings under Gravity-Altered Conditions – 132

Hypergravity Modulates Cyclic GMP Efflux in Nitric Oxide-Stimulated Human Melanocytic Cells – 143

Is Peripheral Benzodiazepine Receptor (PBR) Gene Expression Involved in Breast Cancer Suppression by Dietary Soybean Protein? – 171

Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP – 135

Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent – 127

Novel Protein Microarray Technology to Examine Men with Prostate Cancer – 169

Post-Transcriptional Regulation of MKK4-A Stress Signaling Kinase Implicated in the Regulation of Metastatic Growth – 169

Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Short-Term Exposure of Arabidopsis Cell Cultures to Hyper-G: Short-Term Changes in Transcription Regulator Expression – 140

Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats – 134

The Nuclear Death Domain Protein p84N5; a Candidate Breast Cancer Susceptibility Gene – 171

WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

PROTEOME
Proteomics in Malaria – 166

PROTOCOL (COMPUTERS)
A Comparison of Known Classes of Reliable Multicast Protocols – 227

A Management Perspective of the Department of Defense (DoD) Internet Protocol Version 6 (IPv6) Transition Plan, Where it is Today, and Where it Needs to be by the Year 2008 – 197

A Measurement Study of BGP Blackhole Routing Performance – 211

A Security Model for Space Based Communication – 27

A Simple MPLS-based Flow Aggregation Scheme for Providing Scalable Quality of Service – 219

Analytical Modeling of Medium Access Control Protocols in Wireless Networks – 219

Clinically Practical Magnetic Resonance Protocol for Improved Specifically in Breast Cancer Diagnosis – 176

Development of Future Course Content Requirements Supporting the Department of Defense's Internet Protocol Version 6 Transition and Implementation – 191

Floor Acquisition Multiple Access (FAMA) for Packet-Radio Networks – 226

Internet Protocol Over Telemetry Testing for Earth Science Capability Demo Summary – 289

IP Network Technologies for the Ubiquitous Era – 59

On-demand Loop-Free Routing in Ad Hoc Networks Using Source Sequence Numbers – 222

Privacy-Preserving Set Operations – 239

Software Defined Radio Prototype (I): System Design and Performance Evaluation – 191

The Core Protocol Set for the Global Grid – 223

'GMPLS Signaling Protocol Interoperability Test in Multilayer Network': Toward a Global Standard for the Next-Generation Photonic Network – 257

PROTON BEAMS
Choice of Proton Driver Parameters For a Neutrino Factory – 263

PROTONS
Acceleration of Polarized Protons in the AGS with Two Helical Partial Snakes – 261

Choice of Proton Driver Parameters For a Neutrino Factory – 263

Measurement of the Ratio GEP/GMP to Large Q(sub 2), Interesting Results form Jefferson Lab – 250

Successful Bunched Beam Stochastic Cooling in RHIC – 262

PROTOTYPES
The Design and Implementation of a Prototype Web-Portal for the Integrated Mobile Alerting System (IMAS) – 206

The Nutating Engine-Prototype Engine Progress Report and Test Results – 16

PROVING
Verification of the Active Aeroelastic Wing Aerodynamic Model with Flight Test Results – 292

Wind Tunnel Renovation, Flow Verification and Flapping Wing Analysis – 2

PSEUDOMONAS
Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity – 145

PSYCHOLOGICAL TESTS
Optimizing CAT-ASVAB Item Selection Using Form Assembly Techniques – 242

PSYCHOPHYSIOLOGY
Performance and Psychophysiological Measures of Fatigue Effects on Aviation Related Tasks of Varying Difficulty – 7

PUBLIC HEALTH
Hurricane Katrina: Utilization of Private, Non-Governmental Health Professionals Time for New Strategies – 168

Toxicological Profile for 1,1,1-Trichloroethane (2006 Update) – 108

Toxicological Profile for Cyanide (2006 Update) – 107

Toxicological Profile for Dichlorobenzenes (2006 Update) – 108

Toxicological Profile for Hydrogen Sulfide (2006 Update) – 108

Toxicological Profile for Vinyl Chloride (2006 Update) – 109

PULSE CODE MODULATION
Higher Resolution Strain Gage Data Acquisition – 288

Internet Protocol Over Telemetry Testing for Earth Science Capability Demo Summary – 289

Two Serial Data to Pulse Code Modulation System Interfaces – 293

PULSE DETONATION ENGINES
Approaches to Cycle Analysis and Performance Metrics – 89

Fuel Injection Strategy for a Next Generation Pulse Detonation Engine – 56

Metallized Gelled Propellants Combustion Experiments in a Pulse Detonation Engine – 56

PULSE GENERATORS
Characterization and Application of Four-Layer Semiconductor Structures in Pulse Mode Operation – 79

PULSE MODULATION
The F-15B Embedded Global Positioning System/Inertial Navigation System Instrumentation System Upgrade – 293

PYLONS
Flutter Analysis for the Centerline Instrumented Pylon (CLIP) with Airdata Boom Attachment – 287

QUADRATURES
A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59

Implementation of a Quadrature Mirror Filter Bank on an SRC Reconfigurable Computer for Real-Time Signal Processing – 199

QUANTITATIVE ANALYSIS
A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

Short-Term Exposure of Arabidopsis Cell Cultures to Hyper-G: Short-Term Changes in Transcription Regulator Expression – 140

QUANTUM CHROMODYNAMICS
Can We Discover the QCD Critical Point at RHIC – 248

Nucleon Compton Scattering – 264

RADAR ANTENNAS
Development of the Measurement Technology of the Spurious Emission from Primary Radar – 62

RADAR APPROACH CONTROL
The Outcome of ATC Message Complexity on Pilot Readback Performance – 9

RADAR EQUIPMENT
U.S. Navy Radar Systems Survey – 79

RADAR IMAGERY
ISAR Motion Compensation using the Registration-Restoration-Fusion Method – 93

RADAR MEASUREMENT
Development of the Measurement Technology of the Spurious Emission from Primary Radar – 62

The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

RADAR NETWORKS
Signal-to-Noise Ratio Gains and Synchronization Requirements of a Distributed Radar Network – 80

RADAR TRACKING
Optimal Stationing of RADAR Pickets and Anti-Ballistic Missile Defenders for Long Range Surveillance and Tracking (LRS&T) and Ballistic Missile Defense (BMD) Operations – 92

RADIANCE
Benchmarking and Validation of IR Signature Programs: SensorVision, CAMEO-ESA and RadThermIR – 195

Spectral Irradiance Calibration in the Infrared. XVI. Improved Accuracy in the Infrared Spectra of the Secondary and Tertiary Standard Calibration Stars – 253

Thermal Band Atmospheric Correction Using Atmospheric Profiles Derived from Global Positioning System Radio Occultation and the Atmospheric Infrared Sounder – 103

RADIATION CHEMISTRY

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 46

RADIATION DAMAGE

Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study – 125

Stability of Radiation Induced Chromosome Damage in Human Peripheral Blood Lymphocytes – 185

RADIATION DOSAGE

Carbon Nanotube Activities at NASA-Johnson Space Center – 245

Ionizing Radiation Environment on the International Space Station: Performance vs. Expectations for Avionics and Material – 283

Mitigation Strategies for Acute Radiation Exposure during Space Flight – 183

Stability of Radiation Induced Chromosome Damage in Human Peripheral Blood Lymphocytes – 185

Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

RADIATION EFFECTS

Effects of Techa River Radiation Contamination on the Reproductive Function of Residents – 174

Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study – 124

Mechanism of Action for Anti-Radiation Vaccine in Reducing the Biological Impact of High-Dose Irradiation – 184

Performance and Capabilities of the NASA Space Radiation Laboratory at BNL – 283

Radiation Effects in Nuclear Waste Materials – 33

Stability of Radiation Induced Chromosome Damage in Human Peripheral Blood Lymphocytes – 185

Thermo-mechanical Analysis of Ground-based Directed Energy Weapons on Satellites and Intercontinental Ballistic Missiles – 24

RADIATION HARDENING

Atomically Smooth Epitaxial Ferroelectric Thin Films for the Development of a Nonvolatile, Ultrahigh Density, Fast, Low Voltage, Radiation-Hard Memory – 80

RADIATION HAZARDS

Managing Space Radiation Risks on Lunar and Mars Missions: Risk Assessment and Mitigation – 186

RADIATION INJURIES

The Pathogenesis and Therapy of Combined Radiation Injury – 174

RADIATION MEASUREMENT

Ionizing Radiation Environment on the International Space Station: Performance vs. Expectations for Avionics and Material – 283

RADIATION PROTECTION

Mechanism of Action for Anti-Radiation Vaccine in Reducing the Biological Impact of High-Dose Irradiation – 185

Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

RADIATION SHIELDING

Carbon Nanotube Activities at NASA-Johnson Space Center – 245

Ionizing Radiation Environment on the International Space Station: Performance vs. Expectations for Avionics and Material – 283

RADIATION SICKNESS

Effects of Techa River Radiation Contamination on the Reproductive Function of Residents – 174

Mechanism of Action for Anti-Radiation Vaccine in Reducing the Biological Impact of High-Dose Irradiation – 184

RADIATION SOURCES

Advanced Beta Dosimetry Techniques – 283

RADIO COMMUNICATION

Software Defined Radio Prototype (II): Implementation and Evaluation of IEEE 802.11 Wireless LAN – 214

Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

RADIO FREQUENCIES

A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59

CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy – 45

Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department – 61

Envelope Switched Doherty Power Amplifier For RF Applications (Preprint) – 77

In-Flight Ratio Frequency Spectrum Measurements of Commercial Aircraft Cabins – 65

Radio Frequency Identification (RFID) for Naval Medical Treatment Facilities (MTF) – 168

Research Activities on EMC in NICT – 62

Software Defined Radio, its Programmable Signal-Processing Unit, and Central Control Signal-Processing Unit – 64

Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

The Outcome of ATC Message Complexity on Pilot Readback Performance – 9

Top vs. Bottom Charging of the Dielectric in RF MEMS Capacitive Switches (Preprint) – 78

Use of Electromagnetic Energy and Resultant Noises – 63

RADIO SIGNALS

A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59

RADIO TRANSMISSION

Chapter 7. Node-Centric Hybrid Routing for Wireless Internetworking – 69

Propagation Modeling of Wireless Systems on Shipboard External Decks – 68

Radio Propagation Prediction Software for Complex Mixed Path Physical Channels – 198

Trends in Research and Development of Software Defined Radio – 59

RADIO TRANSMITTERS

Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

Low Cost Ku-Band Satellite Transmitter System – 289

RADIOACTIVE ISOTOPES

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 46

RADIOACTIVE MATERIALS

Closure Welding Radioactive Materials Containers at the Department of Energy (DOE) Hanford Site – 57

Radiation Effects in Nuclear Waste Materials – 33

RADIOACTIVE WASTES

Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 36

Hanford Double-Shell Tank Thermal and Seismic Project ANSYS Benchmark Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank – 99

Hanford Double-Shell Tank Thermal and Seismic Project Buckling Evaluation Methods and Results for the Primary Tanks – 99

Hanford Double-Shell Tank Thermal and Seismic Project Dytran Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank – 99

Hanford Double-Shell Tank Thermal and Seismic Project Establishment of Methodology for Time Domain-Structure Interaction Analysis of a Hanford Double-Shell Tank – 99

Hanford Double-Shell Tank Thermal and Seismic Project Seismic Analysis of Hanford Double-Shell Tanks – 111

Hanford Double-Shell Tank Thermal and Seismic Project Summary of Combined Thermal and Operating Loads – 85

Interim Storage and Long Term Disposal of Research Reactor Spent Fuel – 114

Performance Assessment Monitoring Plan for the Hanford Site Low-Level Burial Grounds. Revision 1 – 110

Radiation Effects in Nuclear Waste Materials – 33

Statistical Review of Cesium Carbonate Fusion Measurements of Archived Glass Samples from the DWPF Process – 45

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 46

RADIOGRAPHY

X-Ray Digital Radiography and Computed Tomography of High Energy Density Physics (HEDP) Material, Subassemblies and Targets – 248

X-Ray Digital Radiography and Computed Tomography of ICF and HEDP Materials, Subassemblies and Targets – 247

RADIOISOTOPE HEAT SOURCES

Evaluation of Long Duration Flight on Venus – 282

RADIOLOGY

Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Consequences Management – 266

RADIOTELEPHONES

A General Framework for Analyzing, Characterizing, and Implementing Spectrally Modulated, Spectrally Encoded Signals – 190

Extending the Tactical Wireless Internet in Support of USMC Distributed Operations – 72

Multi-User Performance Issues in Wireless Impulse Radio Networks – 70

Propagation Modeling of Wireless Systems on Shipboard External Decks – 68

RAIL TRANSPORTATION

Guidance for Quantifying and Using Long Duration Switch Yard Locomotive Idling Emission Reductions in State Implementation Plans – 112

Network-Centric Railroading Utilizing Intelligent Railroad Systems – 72

RAILS

Mathematical Modeling of Rail Gun – 50

RAMJET ENGINES

Conjugate Heat Transfer Analyses on the Manifold for Ramjet Fuel Injectors – 89

RANDOM ACCESS

Magnetic Random Access Memory Using Memory Cells with Rotated Magnetic Storage Elements – 83

RANDOM VIBRATION

Application of the Bootstrap Statistical Method in Deriving Vibroacoustic Specifications – 100

RANGE SAFETY

Low Cost Ku-Band Satellite Transmitter System – 289

Space-based Telemetry and Range Safety (STARS) Phased Array Antenna Controller – 289

RANGEFINDING

Discrimination of Complex Synthetic Echoes by an Echolocating Bottlenose Dolphin – 253

The Microchip Optera Project – 77

RANKINE CYCLE

Solar Trough Organic Rankine Electricity System (STORES) Stage 1: Power Plant Optimization and Economics. November 2000-May 2005 – 104

RARE EARTH COMPOUNDS

Optical and magnetic properties of Eu-doped GaN – 42

RATS

Centrifugation Effects on Estrous Cycling, Mating Success and Pregnancy Outcome in Rats – 156

Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading – 160

Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcromeric Cytoskeletal Proteins of Hindlimb Suspended Rats – 120

Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

Influence of Rat Hindlimb Suspension on Sarcolemmal Dystrophin and its Sensitivity to Mechanical Damage – 122

Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent – 127

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats – 134

REACTING FLOW

Improved Modeling Tools For High Speed Reacting Flows – 237

REACTION CONTROL

A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

REACTION TIME

Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects – 147

REACTIVITY

Reactive Shear Layer Mixing and Growth Rate Effects on Afterburning Properties for Axisymetric Rocket Engine Plumes – 31

REACTOR MATERIALS

Haynes 230 Mini-Can Welding to Support Planned Irradiation Testing of Candidate Space Fuel Materials – 22

Materials for the Control Drive Mechanisms – 255

REACTOR SAFETY

Progress Report on Fast Breeder Reactor Safety Studies – 93

REAL TIME OPERATION

A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope – 60

Implementation of a Quadrature Mirror Filter Bank on an SRC Reconfigurable Computer for Real-Time Signal Processing – 199

Issues in Developing Object-Oriented Database Systems for Real-Time Applications – 192

Obstacle Marking and Vehicle Guidance Science and Technology Objective (OMVG-STO) Augmented Reality for Enhanced Command and Control and Mobility – 69

Real-Time Application Traffic Monitoring System for Streaming Data Quality Evaluation – 213

Search Algorithms for Software-Only Real-Time Recognition with Very Large Vocabularies – 234

The F-15B Embedded Global Positioning System/Inertial Navigation System Instrumentation System Upgrade – 293

Toward a Real-Time Spoken Language System Using Commercial Hardware – 191

WiNN: An Efficient Method for Routing Short-Lived Flows – 222

RECONFIGURABLE HARDWARE

Implementation of a Quadrature Mirror Filter Bank on an SRC Reconfigurable Computer for Real-Time Signal Processing – 199

Reconfigurable Instrumentation Signal Conditioning – 290

RECONNAISSANCE

Identifying Supervisory Control and Data Acquisition (SCADA) Systems on a Network via Remote Reconnaissance – 218

Light Reconnaissance Vehicle (LRV): Enhancing Command, Control, Communications, and Computers and Information Systems (C4I) to Tactically Employed Forces via a Mobile Platform – 216

REENTRY SHIELDING

Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

REENTRY VEHICLES

Apollo Seals: A Basis for the Crew Exploration Vehicle Seals – 97

Fiber Optic Sensor Attachment Development and Performance Evaluations – 285

REENTRY

Further Investigations of High Temperature Knitted Spring Tubes for Advanced Control Surface Seal Applications – 97

REFINING

Usable Knowledge Gained or Refined for Personnel Serving in the Operating Forces Through Naval Postgraduate School's Distributed Learning Program – 206

REFLECTORS

Reflector and Shield Material Properties for Project Prometheus – 256

Space Reflector Materials for a Prometheus Application – 254

REFLEXES

Do Perception and Postrotatory Vestibulo-Ocular Reflex Share the Same Gravity Reference? – 153

Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions – 122

REFRACTION

New Optical Constants for Amorphous and Crystalline H2O-ice – 257

REFRACTIVITY

Refractivity in the Arctic Regions – 116

REFRACTORIES

Comprehensive Creep and Thermophysical Performance of Refractory Materials – 55

REFRACTORY MATERIALS

Comprehensive Creep and Thermophysical Performance of Refractory Materials – 55

REFRIGERATING MACHINERY

ISS Payloads Office Utilization/Research Cargo Familiarization – 27

REFUELING

Flight Test of the Engine Fuel Schedules of the X-43A Hyper-X Research Vehicles – 290

REGENERATION (PHYSIOLOGY)

Regulation of MDM2 Activity by Nucleolin – 179

Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

REGULATORS

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor – 165

REINFORCING MATERIALS

Thermomechanical Cycling Investigation of Cu and Niti Reinforced Lead-Free Solder – 49

RELIABILITY ANALYSIS

Performance Analysis of Wireless Networks – 218

RELIABILITY

Endpoint-Based Routing Strategies for Improving Internet Performance and Resilience – 238

Risk and Reliability of Infrastructure Asset Management Workshop – 238

REMOTE SENSING

Potential of Remote Laser Vibration Sensing for Military Applications – 94

Remote Sensing Time Series Product Tool – 103

REMOTE SENSORS

Potential of Remote Laser Vibration Sensing for Military Applications – 94

REMOTELY PILOTED VEHICLES

Analysis of the Assignment Scheduling Capability for Unmanned Aerial Vehicles (ASC-U) Simulation Tool – 15

REPLACING

Automotive Replacement Glass Windshields from China. Investigation No. 731-TA-922 (Final). Determination and Views of the Commission – 53

Beyond MARC: New Trends for the Library of the Future – 267

REPUBLIC OF SOUTH AFRICA

Ferrovanadium from China and South Africa. Investigations Nos. 731-TA-986 and 987 (Final). Determinations and Views of the Commission – 48

REQUIREMENTS

Integrating Stakeholder Requirements Across Generations of Technology – 199

ISS Commercial Cargo Service: Requirements and Constraints Summary – 25

RESEARCH AIRCRAFT

Simultaneous Flight Demonstration of Three Wing Deflection Measurement Approaches – 287

Study of the New Air-Launched Small Missile (ALSM) Phoenix Hypersonic Flight Research Test Bed – 294

RESEARCH AND DEVELOPMENT

2004 Research Engineering Annual Report – 284

Experimental Results of Thin-Film Photovoltaic Cells in a Low Density LEO Plasma Environment: Ground Tests – 29

Obstacle Marking and Vehicle Guidance Science and Technology Objective (OMVG-STO) Augmented Reality for Enhanced Command and Control and Mobility – 69

Science and Technology Review. Tomorrow's Scientists and Engineers, June 2006 – 250

WTEC Panel Report on International Assessment of Research and Development in Robotics – 189

RESEARCH FACILITIES

Biolab Crew Training – 155

Performance and Capabilities of the NASA Space Radiation Laboratory at BNL – 283

RESEARCH VEHICLES

Flight Test of the Engine Fuel Schedules of the X-43A Hyper-X Research Vehicles – 290

Hyper-X Research Vehicle Mach 7 and Mach 10 Mission Guidance, Navigation, and Control Performance – 292

The X-43 Parameter Identification Research – 294

The X-43A and B-52B Tunnel Test – 295

The X-43A Flight System Highlights and Challenges for the Second and Third Flights – 294

RESEARCH

Core Data Model Proposal for Physiology Research in Space – 125

Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

RESERVES

Astronauts Autonomic Regulation Reserves Evaluation during Pre- and Postflight Examinations – 153

RESERVOIRS

The Characteristics of Spanish Reservoirs – 106

RESIDUAL STRESS

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-3. Recent MIT Research on Residual Stresses and Distortion in Welded Structures – 49

RESILIENCE

Endpoint-Based Routing Strategies for Improving Internet Performance and Resilience – 238

RESISTANCE

WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

RESONANT FREQUENCIES

Natural Frequencies and Mode Shapes of a Nonlinear, Uniform Cantilevered Beam – 246

RESONANT VIBRATION
Application of the Bootstrap Statistical Method in Deriving Vibroacoustic Specifications – 100

RESOURCES MANAGEMENT
Dispelling Seven Myths about Grid Resource Management – 215

RESPIRATION
Efficacy of rSEB Vaccine and CpG ODN Administered by Inhalation in Monkeys – 167

RESPIRATORS
Respirator Filter Efficiency Testing Against Particulate and Biological Aerosols Under Moderate to High Flow Rates – 95

RESPIRATORY RATE
Respiratory Sinus Arrhythmia: A Marker of Decreased Parasympathetic Modulation after Short Duration Spaceflight – 151

RESPONSES
Methodology for Evaluating the Effectiveness of Collaborative Tools for Coordinating MDA Emergency Response – 204

RESTORATION
ISAR Motion Compensation using the Registration-Restoration-Fusion Method – 93

Restoration of Central Blood Volume: Application of a Simple Concept and Simple Device to Counteract Cardiovascular Instability in Syncope and Hemorrhage – 151

Restoration of Transforming Growth Factor Beta Signaling by Histone Deacetylase Inhibitors in Human Prostate Carcinoma – 177

RETINA
Detailed Structural Analysis on Retinal Vascular Bed by Automated Computer Processing of Fluorescein Angiography – 133

RETROFITTING
Evaluation of an Outer Loop Retrofit Architecture for Intelligent Turbofan Engine Thrust Control – 19

REUSABLE HEAT SHIELDING
Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

REUSABLE LAUNCH VEHICLES
A Discrete-Event Simulation Model for Evaluating Air Force Reusable Military Launch Vehicle Post-Landing Operations – 23

REUSABLE SPACECRAFT
Further Investigations of High Temperature Knitted Spring Tubes for Advanced Control Surface Seal Applications – 97

REVERBERATION CHAMBERS
Total Radiated Power of Radio Transmitters Measured in a Reverberation Chamber – 61

RIBONUCLEIC ACIDS
An Activity-Dependent Assay for Ricin and Related RNA N-Glycosidases Based on Electrochemiluminescence – 163

Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 142

Post-Transcriptional Regulation of MKK4-A Stress Signaling Kinase Implicated in the Regulation of Metastatic Growth – 169

RIBOSOMES
Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems – 145

RIGID STRUCTURES
Low-Velocity Impact Response of Sandwich Beams with Functionally Graded Core – 37

RISK
Are Service Oriented Architectures the Only Valid Architectural Approach for the Transformation to Network Centric Warfare? – 221

Benign Breast Disease: Toward Molecular Prediction of Breast Cancer Risk – 164

Critical Infrastructure Protection: How to Assess and Provide Remedy to Vulnerabilities in Telecom Hotels – 67

Development of an Electrical Wire Interconnect System Risk Assessment Tool – 9

Exploration of Force Transition in Stability Operations Using Multi-Agent Simulation – 196

International Seminar on The Role of Dosimetry in High-Quality EMF Risk Assessment Held in Ljubljana, Slovenia and Zagreb, Croatia on 13-15 September 2006 – 246

Managing Space Radiation Risks on Lunar and Mars Missions: Risk Assessment and Mitigation – 186

Modifiers of the Efficacy of Risk-Reducing Salpingo-Oophorectomy for the Prevention of Breast and Ovarian Cancer in Carriers of BRCA1 and BRCA2 – 172

Public Risk Assessment of Off-Nominal Genesis Entries – 25

Reproductive and Hormonal Risk Factors for Breast Cancer in Blind Women – 176

Risk and Reliability of Infrastructure Asset Management Workshop – 238

RIVERS
2006 Navigation Charts. J. Bennett Johnston Waterway, Red River Shreveport, Louisiana to Mouth of Red River Mile 235 to Mile O P.P.R.M. 4th Edition – 101

Effects of Techa River Radiation Contamination on the Reproductive Function of Residents – 174

ROBOT CONTROL
Exploiting Natural Dynamics in Robot Control – 224

Space Robotics: AWIMR an Overview – 223

ROBOTICS
A System for Three-Dimensional Robotic Mapping of Underground Mines – 102

Are You Talking to Me? Dialogue Systems Supporting Mixed Teams of Humans and Robots – 223

Design, Implementation and Testing of a Common Data Model Supporting Autonomous Vehicle Compatibility and Interoperability – 224

Exploiting Natural Dynamics in Robot Control – 224

Integrated Human-Robotic Missions to the Moon and Mars: Mission Operations Design Implications – 230

Integrated Mission Specification and Task Allocation for Robot Teams - Part 1: Design and Implementation – 225

Integrated Mission Specification and Task Allocation for Robot Teams - Part 2: Testing and Evaluation – 225

Intelligent Rover Execution for Detecting Life in the Atacama Desert – 271

On-line Robot Adaptation to Environmental Change – 239

Operator Control Units for the Dismounted Soldier – 226

Space Robotics: AWIMR an Overview – 223

Tree-Based Hierarchical Reinforcement Learning – 237

WTEC Panel Report on International Assessment of Research and Development in Robotics – 189

ROBOTS
A System for Three-Dimensional Robotic Mapping of Underground Mines – 102

Are You Talking to Me? Dialogue Systems Supporting Mixed Teams of Humans and Robots – 223

Characterizing and Processing Robot-Directed Speech – 66

Exploration and Policy Reuse – 235

Integrated Human-Robotic Missions to the Moon and Mars: Mission Operations Design Implications – 230

Integrated Mission Specification and Task Allocation for Robot Teams - Part 1: Design and Implementation – 225

Integrated Mission Specification and Task Allocation for Robot Teams - Part 2: Testing and Evaluation – 225

Online and Unsupervised Face Recognition for Humanoid Robot: Toward Relationship with People – 225

On-line Robot Adaptation to Environmental Change – 239

Person Tracking From a Dynamic Balancing Platform – 228

Probabilistic Reuse of Past Policies – 235

Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised) – 101

Sociable Interfaces – 229

Space Robotics: AWIMR an Overview – 223

ROBUSTNESS (MATHEMATICS)

Robust Loop-Free On-Demand Routing in Ad Hoc Networks – 211

ROCKET ENGINES

Reactive Shear Layer Mixing and Growth Rate Effects on Afterburning Properties for Axisymetric Rocket Engine Plumes – 31

ROCKET NOZZLES

The Dryden Aerospike Rocket Test – 291

RODS

Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 47

Fracture of Grooved Kinetic Energy Rods Subject to Oblique Impact – 203

ROTATION

Advantages of Simulated Microgravity in the Production of Compounds of Industrial Relevance – 161

Do Perception and Postrotatory Vestibulo-Ocular Reflex Share the Same Gravity Reference? – 153

Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G – 126

ROTOR DYNAMICS

Transient Response of Rotor on Rolling-Element Bearings with Clearance – 96

ROUTES

Robust Loop-Free On-Demand Routing in Ad Hoc Networks – 211

ROVING VEHICLES

Intelligent Rover Execution for Detecting Life in the Atacama Desert – 272

The K9 On-Board Rover Architecture – 230

RUBBER

Camouflaging Vehicles Using Field Expedient Materials, Commercial Hardware Store Materials, Camouflage Nets, and Rubber Conveyer Belt Material – 258

SACCADIC EYE MOVEMENTS

Characteristics of the Eyes Pursuit Function during Readaptation to Terrestrial Gravity after Prolonged Flights Aboard the International Space Station – 182

SAFETY

Criticality Safety Evaluation of a LLNL Training Assembly for Criticality Safety (TACS) – 255

SALIVA

Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

SALMONELLA

Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity – 145

SAMPLE RETURN MISSIONS

Public Risk Assessment of Off-Nominal Genesis Entries – 26

SAMPLERS

Characteristics and Sampling Efficiencies of OMNI 3000 Aerosol Samplers – 43

Characteristics and Sampling Efficiency of Eight-Unit Linear Slot Impactor (EULSI) – 43

SAMPLING

Cavity-Bias Sampling in Reaction Ensemble Monte Carlo Simulation – 40

Characteristics and Sampling Efficiencies of OMNI 3000 Aerosol Samplers – 43

Characteristics and Sampling Efficiency of Eight-Unit Linear Slot Impactor (EULSI) – 43

SANDWICH STRUCTURES

Low-Velocity Impact Response of Sandwich Beams with Functionally Graded Core – 37

Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

SATELLITE IMAGERY

NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Thermal Band Atmospheric Correction Using Atmospheric Profiles Derived from Global Positioning System Radio Occultation and the Atmospheric Infrared Sounder – 103

SATELLITE OBSERVATION

NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

SATURN WORKSHOPS

Proceedings of the Second Software Architecture Technology User Network (SATURN) Workshop – 196

SCALE MODELS

Mach 4 Test Results of a Dual-Flowpath, Turbine Based Combined Cycle Inlet – 10

The X-43A and B-52B Tunnel Test – 295

Two Serial Data to Pulse Code Modulation System Interfaces – 293

SCANNING

High Performance Laser Scanning Confocal Microscope for Microgravity Research – 134

SCATTERING CROSS SECTIONS

Efficient Calculation of Earth Penetrating Projectile Trajectories – 274

SCHEDULES

Assessing the Potential Value of FORCEnet Technologies Within the JFMCC Planning Process Using the Knowledge Value Added Methodology – 212

Effect of Sampling Schedule on Pharmacokinetic Parameter Estimates of Promethazine in Astronauts – 129

SCHEDULING

Analysis of the Assignment Scheduling Capability for Unmanned Aerial Vehicles (ASC-U) Simulation Tool – 15

Dispelling Seven Myths about Grid Resource Management – 215

Learning Dynamic Time Preferences in Multi-Agent Meeting Scheduling – 192

SCHOOLS

Usable Knowledge Gained or Refined for Personnel Serving in the Operating Forces Through Naval Postgraduate School's Distributed Learning Program – 206

SCHWASSMANN-WACHMANN COMET

Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus? – 277

SCIENTIFIC VISUALIZATION

ChromaBlast - a Data Visualization Tool – 179

Motion-Based Visualization – 76

SCIENTISTS

Science and Technology Review. Tomorrow's Scientists and Engineers, June 2006 – 250

SCORING

Recognition Using Classification and Segmentation Scoring – 71

Shallow Water UXO Technology Demonstration Site, Scoring Record Number 2 – 251

SEALING

Improved Seals for High Temperature Airframe Applications – 97

Rotary Shaft Sealing Assembly – 94

SEALS (STOPPERS)

Apollo Seals: A Basis for the Crew Exploration Vehicle Seals – 97

High Temperature Evaluation of an Active Clearance Control System Concept – 98

Performance Evaluations of Ceramic Wafer Seals – 37

Rotary Shaft Sealing Assembly – 94

SEARCH RADAR

Optimal Stationing of RADAR Pickets and Anti-Ballistic Missile Defenders for Long Range Surveillance and Tracking (LRS&T) and Ballistic Missile Defense (BMD) Operations – 92

SECRETIONS

Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight? – 142

SECURITY

A Comprehensive Reasoning Framework for Information Survivability (User Intent Encapsulation and Reasoning About Intrusion: Implementation and Performance Assessment) – 215

Access Control to Information in Pervasive Computing Environments – 267

Analysis of Layered Social Networks – 193

Coast Guard: Condition of Some Aids-to-Navigation and Domestic Icebreaking Vessels Has Declined; Effect on Mission Performance Appears Mixed – 295

Compact Neutron Generators for Medical, Home Land Security and Planetary Exploration – 253

Contracting out Governmental Web Services (Externalisation de l'hebergement de sites web gouvernementaux) – 223

Evaluating the Effectiveness of Waterside Security Alternatives for Force Protection of Navy Ships and Installations Using X3D Graphics and Agent-Based Simulation – 197

Identifying Supervisory Control and Data Acquisition (SCADA) Systems on a Network via Remote Reconnaissance – 218

Information Security: Coordination of Federal Cyber Security Research and Development – 74

Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 74

National Strategy to Secure Cyberspace – 217

Preliminary Security Requirements for SecureCore Hardware – 191

Testing Template and Testing Concept of Operations for Speaker Authentication Technology – 58

SEDIMENT TRANSPORT

Rip Channel Migration in the Nearshore – 92

SEDIMENTS

Inversion of Elastic Impedance for Unconsolidated Sediments – 88

SEEDLINGS (BOTANY)

Actin Organization and Gene Expression in Beta Vulgaris Seedlings under Clinorotation – 124

Altered Gravity Causes the Changes in the Protein NopA100 in Plant Cell Nucleoli – 139

Changes in Ultrastructure of Mitochondria in Root Apex Cells of Soybean Seedlings in Microgravity – 147

Differentiation of Plant Graviperceiving and Graviresponding Cells in Altered Gravity – 124

Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems – 145

Growth of Cress Seedlings and Morphogenesis of Root Gravisensors under Clino-Rotation and in Unidirectional Red or Blue Light – 120

SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

The Influence of Clinorotation on Root Cell Differentiation in Brassica Rapa Seedlings – 143

SEEDS

Assessing the Effect of Humic Acids on Germinating a Native American Plant – 43

Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

Seeds-In-Space Education Experiment during the Dutch Soyuz Mission, DELTA – 137

SEGMENTS

Recognition Using Classification and Segmentation Scoring – 71

SEISMIC WAVES

Amplitude Analysis and Modeling of Regional Phases in PNE Profiles in Northern Eurasia and Seismic Regionalization – 115

SEISMOLOGY

Hanford Double-Shell Tank Thermal and Seismic Project ANSYS Benchmark Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank – 99

Hanford Double-Shell Tank Thermal and Seismic Project Seismic Analysis of Hanford Double-Shell Tanks – 111

SELF ORGANIZING SYSTEMS

Building Self-configuring Services Using Service-specific Knowledge – 195

SEMANTICS

Model Checking Discounted Temporal Properties – 243

SEMICONDUCTOR DEVICES

Characterization and Application of Four-Layer Semiconductor Structures in Pulse Mode Operation – 79

SEMICONDUCTORS (MATERIALS)

Characterization and Application of Four-Layer Semiconductor Structures in Pulse Mode Operation – 79

Devices Having Large Organic Semiconductor Crystals and Methods of Making the Same – 76

SENSITIVITY

Development of a Test Facility for Air Revitalization Technology Evaluation – 8

Influence of Rat Hindlimb Suspension on Sarcolemmal Dystrophin and its Sensitivity to Mechanical Damage – 122

Investigation of Cress Root Gravisensing under Low Magnitute Acceleration – 136

Pressure Sensitive Plastic Tape from Italy. Investigation No. AA1921-167 (Second Review) – 52

SENSORS

Growth of Cress Seedlings and Morphogenesis of Root Gravisensors under Clino-Rotation and in Unidirectional Red or Blue Light – 120

Integrated Interface Electronics for Reconfigurable Sensor Array – 83

Sensor Systems for Biological Agent Attacks: Protecting Buildings and Military Bases – 93

SENSORY PERCEPTION

Understanding Visual Perception in the Perspective of Gravity – 137

SEPARATION

Metal-Silicate Segregation in Asteroidal Meteorites – 280

SEPARATORS

In-Plant Testing of High-Efficiency Hydraulic Separators. (Annual Report, July 21, 2004-July 20, 2005) – 87

SEQUENCING

An Invariant Representation for Matching Trajectories Across Uncalibrated Video Streams – 233

SEX GLANDS

Effects of Head Down Tilt upon Cortisol and Sex Hormones – 121

SHAFTS (MACHINE ELEMENTS)

Rotary Shaft Sealing Assembly – 95

SHALLOW WATER

Rip Channel Migration in the Nearshore – 92

Shallow Water UXO Technology Demonstration Site, Scoring Record Number 2 – 251

Three-Dimensional Analysis of Azimuthal Dependence of Sound Propagation through Shallow-Water Internal Solitary Waves – 44

SHAPE CONTROL

Changes in Ultrastructure of Mitochondria in Root Apex Cells of Soybean Seedlings in Microgravity – 147

SHAPE OPTIMIZATION
Displacement Theories for Inflight Deformed Shape Predictions of a Long Span Flying Wing – 287

SHAPES
Detecting Instances of Shape Classes That Exhibit Variable Structure – 227

SHEAR LAYERS
Reactive Shear Layer Mixing and Growth Rate Effects on Afterburning Properties for Axisymetric Rocket Engine Plumes – 31

SHEAR STRESS
Rapid Nitric Oxide Production by Bone Cells in Response to Mechanical Vibration – 149

SHELLS (STRUCTURAL FORMS)
Hanford Double-Shell Tank Thermal and Seismic Project Buckling Evaluation Methods and Results for the Primary Tanks – 99

SHIELDING
Evaluation of Lithium Hydride for Use in a Space Nuclear Reactor Shield, Including a Historical Perspective, for NR Information – 256

Space Shielding Materials for Prometheus Application – 51

SHIFT REGISTERS
Exploring Fields with Shift Registers – 232

SHIP HULLS
The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IIIB-2: Permanent Composite Cladding of Deteriorating Steel Hulls – 50

Weld Shrinkage Study – 48

SHIPS
Coast Guard: Condition of Some Aids-to-Navigation and Domestic Icebreaking Vessels Has Declined; Effect on Mission Performance Appears Mixed – 295

Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 74

Metrication of U.S. Shipbuilding - The Challenges and the Opportunities – 246

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IIIB-2: Permanent Composite Cladding of Deteriorating Steel Hulls – 50

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-2: Areal Coverage Using Friction Surfacing – 33

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-3. Recent MIT Research on Residual Stresses and Distortion in Welded Structures – 49

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-4. Shipyard Aluminum/Steel Welded Transition Joints – 49

SHIPYARDS
The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-4. Shipyard Aluminum/Steel Welded Transition Joints – 49

SHOCK LAYERS
Quiet Tunnel Experiments of Shock/Boundary Layer Interactions – 2

SHOCK (PHYSIOLOGY)
Restoration of Central Blood Volume: Application of a Simple Concept and Simple Device to Counteract Cardiovascular Instability in Syncope and Hemorrhage – 152

SHOCK WAVES
Quiet Tunnel Experiments of Shock/Boundary Layer Interactions – 2

SHRINKAGE
A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 287

Weld Shrinkage Study – 48

SIGNAL ANALYZERS
Software Defined Radio Prototype (I): System Design and Performance Evaluation – 192

SIGNAL PROCESSING
Dataflow Interchange Format and a Framework for Processing Dataflow Graphs – 209

First Version of a Dataflow Interchange Format – 209

Higher Resolution Strain Gage Data Acquisition – 288

Implementation of a Quadrature Mirror Filter Bank on an SRC Reconfigurable Computer for Real-Time Signal Processing – 199

Reconfigurable Instrumentation Signal Conditioning – 290

Software Defined Radio, its Programmable Signal-Processing Unit, and Central Control Signal-Processing Unit – 64

Trends in Research and Development of Software Defined Radio – 59

SIGNAL TO NOISE RATIOS
Signal-to-Noise Ratio Gains and Synchronization Requirements of a Distributed Radar Network – 80

SIGNAL TRANSMISSION
Three-Dimensional Analysis of Azimuthal Dependence of Sound Propagation through Shallow-Water Internal Solitary Waves – 44

SIGNATURES
Applications of the MuSES Infrared Signature Code – 91

Visual Through Infrared: Modeling Components and Methodologies for Estimating High Fidelity Ground Vehicle Signatures – 90

SIGNS AND SYMPTOMS
AIDS in Africa – 170

Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

SILICATES
Metal-Silicate Segregation in Asteroidal Meteorites – 280

SILICONES
Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

SILVER
Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation – 282

SIM
Benchmarking and Validation of IR Signature Programs: SensorVision, CAMEO-ESA and RadThermIR – 195

SIMULATION
A Discrete-Event Simulation Model for Evaluating Air Force Reusable Military Launch Vehicle Post-Landing Operations – 23

A Simulation-Based Tool to Train Rapid Decision-Making Skills for the Digital Battlefield – 202

An Upgradeable Agent-Based Model to Explore Non-Linearity and Intangibles in Peacekeeping Operations – 207

Analysis of Adaptive Team Concept through Simulation Models: A Survey (toetsing van adaptieve teamconcepten door middel van simulatiemodellen: een verkenning) – 240

Analysis of Operational Pace Versus Logistical Support Rate in the Ground Combat Element of a Marine Expeditionary Brigade – 203

Analysis of the Assignment Scheduling Capability for Unmanned Aerial Vehicles (ASC-U) Simulation Tool – 14

Dual Control Cell Reaction Ensemble Molecular Dynamics: A Method for Simulations of Reactions and Adsorption in Porous Materials – 39

Effect of Simulated Microgravity on Aspergillus Niger – 140

Evaluating the Effectiveness of Waterside Security Alternatives for Force Protection of Navy Ships and Installations Using X3D Graphics and Agent-Based Simulation – 197

Exploration of Force Transition in Stability Operations Using Multi-Agent Simulation – 196

Feasibility Study: A Swedish Integrated Assessment Model – 113

Generic Guidance and Control Law Development for Six-Degree-of-Freedom (DOF) Simulation to Support Conceptual Aircraft Design – 286

Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

Higher Order Chemistry Models in the CFD Simulation of Laser-Ablated Carbon Plumes – 88

Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Implementation of a Distributed Time Based Simulation of Underwater Acoustic Networking Using Java – 252

Implicit Large Eddy Simulation for Unsteady Turbulent Flows – 86

Inventory of Simulation and Modeling for the Analysis of Ground Manoeuvre Performance (inventarisatie van vragen en modellen voor de analyse van het grondgebonden optreden) – 240

Luminosity Improvement at PEP-II Based on Optics Model and Beam-Beam Simulation – 265

Molecular Simulation of the Vapor-Liquid Phase Behavior of Lennard-Jones Mixtures in Porous Solids – 39

New Technique for Simulation of Microgravity and Variable Gravity Conditions – 161

On-demand Loop-Free Routing in Ad Hoc Networks Using Source Sequence Numbers – 222

Reaction Ensemble Molecular Dynamics: Direct Simulation of the Dynamic Equilibrium Properties of Chemically Reacting Mixtures – 39

Simulation and Analyses of Multi-Body Separation in Launch Vehicle Staging Environment – 23

Simulation Development for Dynamic Situation Awareness and Prediction II – 201

Simulation of Cylinder Implosion Initiated by Underwater Explosion – 206

Simulation of the Electron Cloud for Various Configurations of a Damping Ring for the ILC – 264

Simulation Validation for Societal Systems – 200

Simulations of MANX, A Practical Six Dimensional Muon Beam Cooling Experiment – 249

Social Structure Simulation and Inference Using Artificial Intelligence Techniques – 227

Survey of Available Artificial Intelligence Technologies for Addition Into Delta3D – 199

The Importance of Artificial Intelligence for Naval Intelligence Training Simulations – 225

The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by a Simulation Study – 158

The X-43A and B-52B Tunnel Test – 295

WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

SIMULATORS

Advantages of Simulated Microgravity in the Production of Compounds of Industrial Relevance – 161

Beam Control of Extremely Agile Relaying Laser Source for Bifocal Relay Mirror Spacecraft – 24

Design of an Object Oriented and Modular Architecture for a Naval Tactical Simulator using Delta3D's Game Manager – 190

SINGLE ENGINE AIRCRAFT

In-Flight Skin Friction Measurements Using Oil Film Interferometry – 10

Next Generation NASA GA Advanced Concept – 8

SINGLE EVENT UPSETS

Ionizing Radiation Environment on the International Space Station: Performance vs. Expectations for Avionics and Material – 283

SINUSES

Respiratory Sinus Arrhythmia: A Marker of Decreased Parasympathetic Modulation after Short Duration Spaceflight – 151

SITE SELECTION

A Historical Search for the Occurrence of Habitable Ground Ice at the Phoenix Landing Site – 278

Development of the Measurement Technology of the Spurious Emission from Primary Radar – 62

Real Estate Site Selection: An Application of Artificial Intelligence for Military Retail Facilities – 241

SITUATIONAL AWARENESS

Landpower and Network-Centric Operations: How Information in Today's Battlespace can be Exploited – 68

The SAFIRE and an Initial Network-Centric Warfare Evaluation – 265

SKELETAL MUSCLE

Depressed Tetanic Contractile Function Cannot be Compensated by Increasing Stimulating Frequency in Unloaded Soleus Muscle – 124

Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcromeric Cytoskeletal Proteins of Hindlimb Suspended Rats – 120

Effects of Heat Stress on the Regeneration of Injured Skeletal Muscle in Rats – 126

Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device – 126

System Specificity in Responsiveness to Intermittent -Gx Gravitation during Simulated Microgravity in Rats – 130

SKIN (ANATOMY)

Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

SKIN FRICTION

In-Flight Skin Friction Measurements Using Oil Film Interferometry – 10

SLEEP DEPRIVATION

Sleep Patterns of Naval Aviation Personnel Conducting Mine Hunting Operations – 184

SLEEP

Optimizing Daytime Short Sleep Episodes to Maximize Performance in a Stressful Environment – 183

Sleep Patterns of Naval Aviation Personnel Conducting Mine Hunting Operations – 183

SLOTS

Characteristics and Sampling Efficiency of Eight-Unit Linear Slot Impactor (EULSI) – 43

SMOOTH MUSCLE

Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity – 157

SOARING

Autonomous Soaring for Small Unmanned Aerial Vehicles (UAVs) – 291

SOCIAL FACTORS

Online and Unsupervised Face Recognition for Humanoid Robot: Toward Relationship with People – 225

Using the Internet to Collaborate with Consumers in Redefining a Psychosocial Agenda for Families with Hereditary Breast Cancer – 174

SOFTWARE DEVELOPMENT TOOLS

Agent-based Modeling of Dismounted Infantry Through Inclusion of Perceptions, Inferences and Associations Phase 1 – 269

Device-Enabled Authorization in the Grey System – 194

DNA MIcroarray-Assisted Modeling of Metabolic and Regulatory Networks With Applications to Bio-Defense – 169

Learning Dynamic Time Preferences in Multi-Agent Meeting Scheduling – 192

The SAFIRE and an Initial Network-Centric Warfare Evaluation – 265

SOFTWARE ENGINEERING

A Computer Graphics-Based Target Detection Model – 198

A Framework for the Management of Evolving Requirements in Software Systems Supporting Network-Centric Warfare – 208

An Object-Oriented View of Backend Databases in a Mobile Environment for Navy and Marine Corps Applications – 198

Analyzing Divisia Rules Extracted from a Feedforward Neural Network – 208

Case Study: Accelerating Process Improvement by Integrating the TSP and CMMI – 11

Developing Software Requirements Supporting Open Architecture Performance Goals in Critical DoD System-of-Systems – 205

Experimentation in a Collaborative Planning Environment – 207

Exploration and Policy Reuse – 235

Probabilistic Reuse of Past Policies – 235

Proceedings of the Second Software Architecture Technology User Network (SATURN) Workshop – 196

The Evaluation of Project Management Performance on Two Software Maintenance Projects Based on a CMMI Framework – 205

The K9 On-Board Rover Architecture – 230

WEBTAS Software Life Cycle Development – 79

WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis-)Mounted Soldier – 196

Workshop on Program Generation and Model-Driven Architecture – 200

SOIL POLLUTION

Assessing the Effect of Humic Acids on Germinating a Native American Plant – 43

SOILS

Assessing the Effect of Humic Acids on Germinating a Native American Plant – 43

Effect of Simulated Microgravity on Aspergillus Niger – 140

Hanford Double-Shell Tank Thermal and Seismic Project Establishment of Methodology for Time Domain-Structure Interaction Analysis of a Hanford Double-Shell Tank – 99

Interactions of Light and Gravity in Chara Internodal Cells – 155

SOLAR ARRAYS

Evaluation of Long Duration Flight on Venus – 282

Experimental Results of Thin-Film Photovoltaic Cells in a Low Density LEO Plasma Environment: Ground Tests – 29

SOLAR CELLS

Genetic Algorithm Based Optimization of Advanced Solar Cell Designs Modeled in SILVACO ATLAS(Trademark) – 105

SOLAR CYCLES

On the Observed Changes in Upper Stratospheric and Mesospheric Temperatures from UARS HALOE – 118

SOLAR ENERGY

Evaluation of Long Duration Flight on Venus – 282

SOLAR GENERATORS

Performance and Operational Characteristics for a Dual Brayton Space Power System With Common Gas Inventory – 31

SOLAR POWERED AIRCRAFT

Meteorological Support for the Pathfinder- Plus Aeroelastic Research Flights – 289

SOLAR RADIATION

Managing Space Radiation Risks on Lunar and Mars Missions: Risk Assessment and Mitigation – 186

SOLAR THERMAL ELECTRIC POWER PLANTS

Solar Trough Organic Rankine Electricity System (STORES) Stage 1: Power Plant Optimization and Economics. November 2000-May 2005 – 104

SOLDERED JOINTS

Thermomechanical Cycling Investigation of Cu and Niti Reinforced Lead-Free Solder – 49

SOLDERS

Thermomechanical Cycling Investigation of Cu and Niti Reinforced Lead-Free Solder – 49

SOLID PROPELLANT ROCKET ENGINES

The Dryden Aerospike Rocket Test – 291

SOLID WASTES

Laboratory Study to Investigate Gaseous Emissions and Solids Decomposition During Composting of Municipal Solid Wastes – 113

SOLIDS

Laboratory Study to Investigate Gaseous Emissions and Solids Decomposition During Composting of Municipal Solid Wastes – 113

Molecular Simulation of the Vapor-Liquid Phase Behavior of Lennard-Jones Mixtures in Porous Solids – 39

SOLITARY WAVES

Three-Dimensional Analysis of Azimuthal Dependence of Sound Propagation through Shallow-Water Internal Solitary Waves – 44

SOLVENTS

An Energetic Concept of Habitability for the Deep Subsurface – 187

SONIC BOOMS

Shaped Sonic Boom Experiment – 293

SORBENTS

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 46

SOUND DETECTING AND RANGING

Report on Laminations in Plates - An Acoustical Method for Determination of – 252

Time-Frequency, Bi-Frequency Detection Analysis of Noise Technology Radar – 252

SOUND PROPAGATION

Three-Dimensional Analysis of Azimuthal Dependence of Sound Propagation through Shallow-Water Internal Solitary Waves – 44

SOUND TRANSMISSION

Three-Dimensional Analysis of Azimuthal Dependence of Sound Propagation through Shallow-Water Internal Solitary Waves – 44

Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results – 269

SOUND WAVES

Discrimination of Complex Synthetic Echoes by an Echolocating Bottlenose Dolphin – 253

Three-Dimensional Analysis of Azimuthal Dependence of Sound Propagation through Shallow-Water Internal Solitary Waves – 44

SOYBEANS

Changes in Ultrastructure of Mitochondria in Root Apex Cells of Soybean Seedlings in Microgravity – 147

Is Peripheral Benzodiazepine Receptor (PBR) Gene Expression Involved in Breast Cancer Suppression by Dietary Soybean Protein? – 171

SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

SOYUZ SPACECRAFT

Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 143

Seeds-In-Space Education Experiment during the Dutch Soyuz Mission, DELTA – 137

SPACE ADAPTATION SYNDROME

Intracranial Pressure Increases during Weightlessness. A Parabolic Flights Study – 151

SPACE COMMUNICATION

A Security Model for Space Based Communication – 28

SPACE DEBRIS

A LEO Satellite Postmission Disposal Study using LEGEND – 279

The Disposal of Spacecraft and Launch Vehicle Stages in Low Earth Orbit – 26

SPACE EXPLORATION

China's Space Program: An Overview – 20

Compact Neutron Generators for Medical, Home Land Security and Planetary Exploration – 253

Exploration Life Support Directions – 188

Integrated Human-Robotic Missions to the Moon and Mars: Mission Operations Design Implications – 230

The International Space Station: A Pathway to the Future – 273

SPACE FLIGHT TRAINING

Moving from Bilateral to Multilateral Medical Operations – 22

SPACE FLIGHT

Effect of Span Variation on the Performance of a Cross Flow Fan – 6

Effects of Space-Flight Simulation on Human Cells – 140

Investigating Human Cognitive Performance during Spaceflight – 121

Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

The ERASMUS Experiment Archive – 129

SPACE MISSIONS

A LEO Satellite Postmission Disposal Study using LEGEND – 279

Automated Classification of Thermal Infrared Spectra Using Self-organizing Maps – 272

China's Space Program: An Overview – 20

Seeds-In-Space Education Experiment during the Dutch Soyuz Mission, DELTA – 137

SPACE OBSERVATIONS (FROM EARTH)

Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus? – 277

SPACE PLASMAS

Capella Corona Revisited: A Combined View from XMM-Newton RGS Chandra HETGS, and LETGS – 277

SPACE PLATFORMS

SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

SPACE POWER REACTORS

Alternator Electrical Feedthrough Insulator Materials for Project Prometheus(B-MT(AMSI)-44) – 256

Evaluation of Lithium Hydride for Use in a Space Nuclear Reactor Shield, Including a Historical Perspective, for NR Information – 255

Haynes 230 Mini-Can Welding to Support Planned Irradiation Testing of Candidate Space Fuel Materials – 22

Materials for the Control Drive Mechanisms – 255

Reflector and Shield Material Properties for Project Prometheus – 256

SPACE SHUTTLE BOOSTERS

Simulation and Analyses of Multi-Body Separation in Launch Vehicle Staging Environment – 23

SPACE SHUTTLE MISSIONS

Adaptation of the Baroreflex Sensitivity to Microgravity: Data from the STS-107 Columbia Mission – 152

Apollo Seals: A Basis for the Crew Exploration Vehicle Seals – 97

SPACE SHUTTLE PAYLOADS

ISS Payloads Office Utilization/Research Cargo Familiarization – 27

SPACE SHUTTLES

A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

CFD Simulation of the Space Shuttle Launch Vehicle with Booster Separation Motor and Reaction Control Plumes – 27

Last Call for Biorack: Results of 82 Experiments in Orbit – 154

Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

The International Space Station: A Pathway to the Future – 273

SPACE STATION MODULES

Reference Guide to the International Space Station – 30

SPACE STATION STRUCTURES

Reference Guide to the International Space Station – 30

SPACE SUITS

Rationale for Suit and Airlock Dust Mitigation – 271

SPACE TECHNOLOGY EXPERIMENTS

Experimental Results of Thin-Film Photovoltaic Cells in a Low Density LEO Plasma Environment: Ground Tests – 30

SPACE TRANSPORTATION SYSTEM

Fabrication of 0.0075-Scale Orbiter Phosphor Thermography Test Models for Shuttle RTF Aeroheating Studies – 85

SPACEBORNE EXPERIMENTS

A New Space Greenhouse Concept Development for Optimal Plant Growth – 144

A Perspective for Ultrasonic Assessment of Osteoporotic Changes of Bone Structure in Proximal Tibia – 143

Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading – 160

SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

Seeds-In-Space Education Experiment during the Dutch Soyuz Mission, DELTA – 137

Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

The Biolab Facility Responsible Center at the German Aerospace Center DLR – 155

Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

SPACECRAFT CHARGING

Analytic Models for a Spherical Satellite Charging in Sunlight at any Spin Rate – 21

Aspects of Spacecraft Charging in Sunlight – 21

SPACECRAFT COMMUNICATION

A Security Model for Space Based Communication – 28

SPACECRAFT COMPONENTS

Reference Guide to the International Space Station – 30

SPACECRAFT CONSTRUCTION MATERIALS

Haynes 230 Mini-Can Welding to Support Planned Irradiation Testing of Candidate Space Fuel Materials – 22

Space Reflector Materials for a Prometheus Application – 254

Space Shielding Materials for Prometheus Application – 51

SPACECRAFT ENVIRONMENTS

Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

SPACECRAFT INSTRUMENTS

Spacecraft Instrumentation to Measure and Stimulate Space Particles and Plasma Waves in the Medium-Earth Orbit (MEO) Regime – 115

SPACECRAFT LAUNCHING

CFD Simulation of the Space Shuttle Launch Vehicle with Booster Separation Motor and Reaction Control Plumes – 27

Further Investigations of High Temperature Knitted Spring Tubes for Advanced Control Surface Seal Applications – 97

The Disposal of Spacecraft and Launch Vehicle Stages in Low Earth Orbit – 26

SPACECRAFT MAINTENANCE

Integrated Simulation Design Challenges to Support TPS Repair Operations – 273

The Logistic Path from the International Space Station to the Moon and Beyond – 25

SPACECRAFT MODULES
Orion Aerodynamics for Hypersonic Free Molecular to Continuum Conditions – 3

SPACECRAFT POWER SUPPLIES
Performance and Operational Characteristics for a Dual Brayton Space Power System With Common Gas Inventory – 31

SPACECREWS
Quantitative MR Imaging for the in Vivo Assessment of Trabecular Bone Quality – 181

SPACELAB PAYLOADS
Last Call for Biorack: Results of 82 Experiments in Orbit – 154

SPALLATION
Modeling Dynamic Plasticity and Spall Fracture in High Density Polycrystalline Alloys – 48

SPATIAL DISTRIBUTION
Total Radiated Power of Radio Transmitters Measured in a Reverberation Chamber – 61

SPECTRAL EMISSION
Spectral Irradiance Calibration in the Infrared. XVI. Improved Accuracy in the Infrared Spectra of the Secondary and Tertiary Standard Calibration Stars – 253

SPECTRA
Low Spectral Efficiency Trellis Coded Modulation Systems – 204

Sensing Super-Position: Human Sensing Beyond the Visual Spectrum – 182

Spectral Irradiance Calibration in the Infrared. XVI. Improved Accuracy in the Infrared Spectra of the Secondary and Tertiary Standard Calibration Stars – 253

SPECTROMETERS
High Performance Ion Mobility Spectrometry Using Hourglass Electrodynamic Funnel and Internal Ion Funnel – 90

Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

SPECTROSCOPY
Spectroscopy of Kuiper Belt Objects and Centaurs – 275

SPECTRUM ANALYSIS
Effects of Water Temperature on Cardiac Autonomic Nervous System Modulation during Foot Immersion (Foot Bath) – 140

SPEECH RECOGNITION
Audiological Findings in Antiorthostatic Position Modelling Microgravitation – 146

Characterizing and Processing Robot-Directed Speech – 66

Evaluation Results for the Talk'n'Travel System – 71

Interactive Electronic Technical Manuals (IETMs) Annotated Bibliography – 270

Limited-Domain Speech-to-Speech Translation between English and Pashto – 228

Multilingual Phoneme Models for Rapid Speech Processing System Development – 65

Recognition Using Classification and Segmentation Scoring – 71

Search Algorithms for Software-Only Real-Time Recognition with Very Large Vocabularies – 234

Speaker Adaptation Using Multiple Reference Speakers – 73

Testing Template and Testing Concept of Operations for Speaker Authentication Technology – 58

The BBN Spoken Language System – 71

SPEECH
Are You Talking to Me? Dialogue Systems Supporting Mixed Teams of Humans and Robots – 224

Data Collection and Analysis in the Air Travel Planning Domain – 73

The BBN Spoken Language System – 71

Toward a Real-Time Spoken Language System Using Commercial Hardware – 191

SPENT FUELS
Interim Storage and Long Term Disposal of Research Reactor Spent Fuel – 114

SPORES
Inactivation of Bacillus Anthracis Spores Delivered as Liquid Suspension or Aerosol to Self-Decontaminating Fabric – 55

Optical Properties of Biological Aerosols – 258

SPREAD SPECTRUM TRANSMISSION
Effects of Spread Spectrum Clocking on Measured Noise Spectra – 64

Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

SPREADSHEETS
ChromaBlast - a Data Visualization Tool – 179

STABILITY
A Regenerative Frequency Divider of Improved Stability – 78

Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Determination of MS2 Bacteriophage Stability at Low pH Using the Integrated Virus Detection System (IVDS) – 92

Exploration of Force Transition in Stability Operations Using Multi-Agent Simulation – 196

Hypersonic Laminar Instability on Round Cones Near Zero Angle of Attack – 86

Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

STABILIZATION
The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by a Simulation Study – 158

STAINLESS STEELS
The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-2: Areal Coverage Using Friction Surfacing – 33

STANDARDIZATION
HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 242

Standardization Activities on Optical Networking – 59

STAPHYLOCOCCUS
Fast Detection of Ciprofloxacin Resistance - Part II – 166

STATISTICAL ANALYSIS
Application of the Bootstrap Statistical Method in Deriving Vibroacoustic Specifications – 100

Computing the Observed Information Matrix for Dynamic Mixture Models – 236

Evaluating the Effectiveness of Waterside Security Alternatives for Force Protection of Navy Ships and Installations Using X3D Graphics and Agent-Based Simulation – 197

Statistical Analysis of Wireless Networks: Predicting Performance in Multiple Environments – 221

STEADY STATE
Steady-State and Transient Measurements Within a Compressor Rotor During Steam-Induced Stall at Transonic Operational Speeds – 14

STEAM
Steady-State and Transient Measurements Within a Compressor Rotor During Steam-Induced Stall at Transonic Operational Speeds – 14

Unsteady Casewall Pressure Measurements in a Transonic Compressor during Steam Induced Stall – 18

STEELS
Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 47

Prestressed Concrete Steel Wire Strand from Japan. Investigation No. AA1921-188 (Second Review) – 47

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IIIB-2: Permanent Composite Cladding of Deteriorating Steel Hulls – 50

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-4. Shipyard Aluminum/Steel Welded Transition Joints – 49

STEM CELLS

Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

STIFFNESS

Low-Velocity Impact Response of Sandwich Beams with Functionally Graded Core – 37

Transient Response of Rotor on Rolling-Element Bearings with Clearance – 96

STIMULANTS

Lunar Dust Activation and Related Studies – 274

STIMULATION

Effect of 7-Days Dry Immersion in Combination with Mechanical Stimulation of Foot Support Zones upon Resistance to Fatigue of Knee Extensors and Flexors – 156

Effects of Vector-Averaged Gravity on the Response to Different Stimulatory Signals in T-Cells – 146

Investigation of Cress Root Gravisensing under Low Magnitute Acceleration – 136

Mechanical Stimulation of the Foot Support Zones as a Way to Maintain Activity of the Tonic Muscular System during Functional Support Deprivation – 154

Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest – 123

STIRLING CYCLE

Update on Extended Operation of Stirling Convertors in Thermal Vacuum at NASA Glenn Research Center – 32

STIRLING ENGINES

Evaluation of Long Duration Flight on Venus – 282

STOCHASTIC PROCESSES

Model Checking Discounted Temporal Properties – 243

Successful Bunched Beam Stochastic Cooling in RHIC – 262

STORAGE TANKS

Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 36

Hanford Double-Shell Tank Thermal and Seismic Project ANSYS Benchmark Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank – 99

Hanford Double-Shell Tank Thermal and Seismic Project Buckling Evaluation Methods and Results for the Primary Tanks – 99

Hanford Double-Shell Tank Thermal and Seismic Project Dytran Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank – 99

Hanford Double-Shell Tank Thermal and Seismic Project Establishment of Methodology for Time Domain-Structure Interaction Analysis of a Hanford Double-Shell Tank – 99

Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

STORMS

Big Storm Named Katrina – 117

The Extratropical Transition of Tropical Storm Banyan – 116

STRAIN DISTRIBUTION

Modulation of Gene Expression in Bone Cells during Strain-Adapted Bone Remodeling – 150

STRAIN ENERGY RELEASE RATE

Influence of Finite Element Software on Energy Release Rates Computed Using the Virtual Crack Closure Technique – 37

STRAIN GAGES

Higher Resolution Strain Gage Data Acquisition – 288

STRAIN RATE

Modeling Dynamic Plasticity and Spall Fracture in High Density Polycrystalline Alloys – 48

STRANDS

Prestressed Concrete Steel Wire Strand from Japan. Investigation No. AA1921-188 (Second Review) – 47

STRATOSPHERE

On the Observed Changes in Upper Stratospheric and Mesospheric Temperatures from UARS HALOE – 118

STREAMS

An Invariant Representation for Matching Trajectories Across Uncalibrated Video Streams – 233

STRESS (BIOLOGY)

Cortical Regions Associated with Orthostatic Stress in Conscious Humans – 137

Phagocytosis as a Biomarker for Stress Responses – 139

STRESS CORROSION CRACKING

A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

STRIATION

Hysteretic Loss Reduction in Striated YBCO – 42

STRONTIUM

Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 46

STRUCTURAL ANALYSIS

2004 Research Engineering Annual Report – 284

Application of the Bootstrap Statistical Method in Deriving Vibroacoustic Specifications – 100

Detailed Structural Analysis on Retinal Vascular Bed by Automated Computer Processing of Fluorescein Angiography – 133

Hanford Double-Shell Tank Thermal and Seismic Project ANSYS Benchmark Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank – 99

Hanford Double-Shell Tank Thermal and Seismic Project Dytran Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank – 99

Investigation of Cress Root Gravisensing under Low Magnitute Acceleration – 136

Structural Reappraisal of Dendritic Tree of Cerebellar Purkinje Cell for Novel Functional Modeling of Elementary Sensorimotor Adaptive Processes – 147

STRUCTURAL DESIGN

Detailed Structural Analysis on Retinal Vascular Bed by Automated Computer Processing of Fluorescein Angiography – 133

Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

STUDENTS

Effectiveness of Introductory Flight Screening (IFS) for USA Navy and Marine Corps Student Pilots – 5

Videogame-Based Training Success: The Impact of Trainee Characteristics - Year 2 – 202

SUBASSEMBLIES

X-Ray Digital Radiography and Computed Tomography of High Energy Density Physics (HEDP) Material, Subassemblies and Targets – 248

X-Ray Digital Radiography and Computed Tomography of ICF and HEDP Materials, Subassemblies and Targets – 247

SUBMERGING

Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions – 123

Effect of 7-Days Dry Immersion in Combination with Mechanical Stimulation of Foot Support Zones upon Resistance to Fatigue of Knee Extensors and Flexors – 156

SUBSTRATES

Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 50

Method of Processing a Substrate – 34

Thin Dielectric Layers on Substrates, and Methods of Making the Same – 76

SUNLIGHT

Analytic Models for a Spherical Satellite Charging in Sunlight at any Spin Rate – 21

Aspects of Spacecraft Charging in Sunlight – 21

SUN

Chasing the Sun - The In-Flight Evaluation of an Optical Head Tracker – 93

SUPERCONDUCTING MAGNETS

Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

Recent Progress Designing Compact Superconducting Final Focus Magnets for the ILC – 244

SUPERCONDUCTIVITY

Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

SUPERCONDUCTORS (MATERIALS)

Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 50

SUPERHIGH FREQUENCIES

Low Cost Ku-Band Satellite Transmitter System – 289

Optimization of the X-Band Structure for the JLC/NLC – 261

SUPERSONIC AIRCRAFT

Shaped Sonic Boom Experiment – 293

SUPERSONIC COMBUSTION RAMJET ENGINES

The X-43A (Hyper-X) Flies Into the Record Books – 291

SUPERSONIC FLIGHT

Shaped Sonic Boom Experiment – 293

SUPERSONIC FLOW

Quiet Tunnel Experiments of Shock/Boundary Layer Interactions – 2

SUPERSONIC LOW ALTITUDE MISSILE

A System for Three-Dimensional Robotic Mapping of Underground Mines – 102

Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised) – 101

SUPERSONIC SPEED

Hyper-X Research Vehicle Mach 7 and Mach 10 Mission Guidance, Navigation, and Control Performance – 293

SUPERSONIC WIND TUNNELS

Quiet Tunnel Experiments of Shock/Boundary Layer Interactions – 2

SUPERSYMMETRY

Is Naturalness Unnatural – 265

SUPINE POSITION

Effect of Swimming Suits' Difference at Supine Position in Water on Heart Rate, Rectal Temperature and Sense of Subjective Temperature – 161

Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

SUPPLYING

The Characteristics of Spanish Reservoirs – 106

SUPPORT SYSTEMS

Analysis of Operational Pace Versus Logistical Support Rate in the Ground Combat Element of a Marine Expeditionary Brigade – 203

Future Small Unmanned Aerial System (SUAS) Flight And Mission Control Support System (FMCSS) Design – 13

High Availability Server Platform for Operations Support System – 213

High Performance Laser Scanning Confocal Microscope for Microgravity Research – 134

SUPPORTS

Effect of 7-Days Dry Immersion in Combination with Mechanical Stimulation of Foot Support Zones upon Resistance to Fatigue of Knee Extensors and Flexors – 156

SUPPRESSORS

Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats – 134

The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor – 165

SURFACE ROUGHNESS

Performance Comparison between Rough and Smooth-Cast Blades in a Low-Speed Multistage Compressor – 87

SURFACE TEMPERATURE

Benchmarking and Validation of IR Signature Programs: SensorVision, CAMEO-ESA and RadThermIR – 195

Thermal Band Atmospheric Correction Using Atmospheric Profiles Derived from Global Positioning System Radio Occultation and the Atmospheric Infrared Sounder – 103

SURFACE TO SURFACE MISSILES

Hit-to-Kill Guidance Algorithm for the Interception of Ballistic Missiles During the Boost Phase – 207

SURFACE VEHICLES

Comparative Evaluation of Air and Auto Travel Between Urban Regions (Quantifying Intercity Modal Accessibility) – 3

SURGES

Surge Current Suppression in Power-Factor-Corrected AC-To-DC Converter with Capacitive Load – 84

SURVEILLANCE

Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

Future Small Unmanned Aerial System (SUAS) Flight And Mission Control Support System (FMCSS) Design – 13

Optimal Stationing of RADAR Pickets and Anti-Ballistic Missile Defenders for Long Range Surveillance and Tracking (LRS&T) and Ballistic Missile Defense (BMD) Operations – 92

Path Calculation and Packet Translation for UAV Surveillance in Support of Wireless Sensor Networks – 14

Remote Sensing Time Series Product Tool – 103

Required Surveillance Performance Accuracy to Support 3-Mile and 5-Mile Separation in the National Airspace System – 7

SURVEYS

Analysis of Adaptive Team Concept through Simulation Models: A Survey (toetsing van adaptieve teamconcepten door middel van simulatiemodellen: een verkenning) – 240

Catalytic Enzyme-Based Methods for Water Treatment and Water Distribution System Decontamination. 1. Literature Survey – 168

Flow Field Surveys in a Transonic Compressor Rig – 6

Measuring the Value of Graduate Manpower Systems Analysis Education for Naval Officers – 58

Survey of Available Artificial Intelligence Technologies for Addition Into Delta3D – 199

U.S. Navy Radar Systems Survey – 78

SWEDEN

Feasibility Study: A Swedish Integrated Assessment Model – 113

Test of a Filter Pack Combined with a PM10 Inlet. Final Report from NMR Project – 113

SWIMMING

Effect of Swimming Suits' Difference at Supine Position in Water on Heart Rate, Rectal Temperature and Sense of Subjective Temperature – 161

SWITCHES

Guidance for Quantifying and Using Long Duration Switch Yard Locomotive Idling Emission Reductions in State Implementation Plans – 112

Top vs. Bottom Charging of the Dielectric in RF MEMS Capacitive Switches (Preprint) – 78

SWITCHING

A Simple MPLS-based Flow Aggregation Scheme for Providing Scalable Quality of Service – 219

Envelope Switched Doherty Power Amplifier For RF Applications (Preprint) – 77

SYMPATHETIC NERVOUS SYSTEM

Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

SYNCHRONISM

Signal-to-Noise Ratio Gains and Synchronization Requirements of a Distributed Radar Network – 80

SYNTAX

Development and Evaluation of a Korean Treebank and its Application to NLP – 266

SYSTEM EFFECTIVENESS

40'x44' Metal Pallet With Metal Adapters With PA125 Metal Boxes, MIL-STD-1660 First Article Tests – 58

Analysis Methods and Models for Small Unit Operations – 240

Development and Evaluation of a Device for the Prevention of Arm Flail Injuries – 16

Respirator Filter Efficiency Testing Against Particulate and Biological Aerosols Under Moderate to High Flow Rates – 95

Testing Template and Testing Concept of Operations for Speaker Authentication Technology – 58

SYSTEM FAILURES

Damage Emulation in the Dryden C-17 Simulation Estimating Maximum Torque Tolerance – 294

SYSTEM IDENTIFICATION

A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 287

Nonlinear Aeroelastic System Identification with Application to Experimental Data – 286

SYSTEMS ANALYSIS

An Overview of the Role of Systems Analysis in NASA's Hypersonics Project – 1

Measuring the Value of Graduate Manpower Systems Analysis Education for Naval Officers – 58

SYSTEMS ENGINEERING

A Study on Improving USA Air Force Space Systems Engineering and Acquisition – 24

Air Flow Patterns Around Several Biological Point Detection System Configurations – 91

Integrated Simulation Design Challenges to Support TPS Repair Operations – 272

Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 31

KOJAK Group Finder: Scalable Group Detecllon via Integrated Knowledge-Based and Statistical Reasoning – 236

Multilingual Phoneme Models for Rapid Speech Processing System Development – 65

NTT Technical Review, Volume 1, No. 4 – 58

Plug-In Hybrid Electric Vehicle Energy Storage System Design. Preprint – 104

SYSTEMS HEALTH MONITORING

Full Field Thermal Protection System Health Monitoring System for Crew Exploration Vehicles – 290

SYSTEMS INTEGRATION

Agent-based Modeling of Dismounted Infantry Through Inclusion of Perceptions, Inferences and Associations Phase 1 – 269

Determination of MS2 Bacteriophage Stability at Low pH Using the Integrated Virus Detection System (IVDS) – 92

Integrated Simulation Design Challenges to Support TPS Repair Operations – 272

Internal Cargo Integration – 26

International Space Station Centrifuge Rotor Models A Comparison of the Euler-Lagrange and the Bond Graph Modeling Approach – 96

Logistics Maturity Evaluator – 217

Studies in Forecasting Upper-Level Turbulence – 13

The Design and Implementation of a Prototype Web-Portal for the Integrated Mobile Alerting System (IMAS) – 206

TACTICS

An Upgradeable Agent-Based Model to Explore Non-Linearity and Intangibles in Peacekeeping Operations – 207

Effectiveness of Non-Lethal Capabilities in a Maritime Environment – 200

TACTILE DISCRIMINATION

Localization of Tactile Signals as a Function of Tactor Operating Characteristics – 90

TARGET ACQUISITION

A Computer Graphics-Based Target Detection Model – 198

Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

Eye-Safe Laser Radar 3-D Imaging – 228

TARGET RECOGNITION

Effectiveness of Non-Lethal Capabilities in a Maritime Environment – 200

TARGETS

Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

Hit-to-Kill Guidance Algorithm for the Interception of Ballistic Missiles During the Boost Phase – 207

Speaker Adaptation Using Multiple Reference Speakers – 73

X-Ray Digital Radiography and Computed Tomography of High Energy Density Physics (HEDP) Material, Subassemblies and Targets – 248

X-Ray Digital Radiography and Computed Tomography of ICF and HEDP Materials, Subassemblies and Targets – 247

TASKS

U.S. Army Aviator Job Analysis – 4

TAXONOMY

A New Framework for Software Visualization: A Multi-Layer Approach – 212

Development of Methodical Social Engineering Taxonomy Project – 220

Registration for Tactical Imagery: An Updated Taxonomy – 224

TECHNOLOGICAL FORECASTING

IP Network Technologies for the Ubiquitous Era – 59

Trends in Research and Development of Software Defined Radio – 59

TECHNOLOGIES

Obstacle Marking and Vehicle Guidance Science and Technology Objective (OMVG-STO) Augmented Reality for Enhanced Command and Control and Mobility – 69

Science and Technology Review. Tomorrow's Scientists and Engineers, June 2006 – 250

TECHNOLOGY ASSESSMENT

Naval Electromagnetic (EM) Gun Technology Assessment – 246

Trends in Research and Development of Software Defined Radio – 59

TECHNOLOGY UTILIZATION

An Evaluation of the Vapor Phase Catalytic Ammonia Removal Process for Use in a Mars Transit Vehicle – 278

Approaches to Cycle Analysis and Performance Metrics – 89

Documentation of Naval Reactors Papers and Presentations for the Space Technology and Applications International Forum (STAIF) 2006 – 254

Human Exploration and Avionic Technology Challenges – 17

Rationale for Suit and Airlock Dust Mitigation – 271

TECTONICS

Amplitude Analysis and Modeling of Regional Phases in PNE Profiles in Northern Eurasia and Seismic Regionalization – 115

TEFLON (TRADEMARK)
Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation – 282

TELECOMMUNICATION
A Concept of Operations for the Use of Emergent Open Internet Technologies as the Basis for a Network-Centric Environment – 268

A Security Model for Space Based Communication – 27

Chapter 7. Node-Centric Hybrid Routing for Wireless Internetworking – 69

Critical Infrastructure Protection: How to Assess and Provide Remedy to Vulnerabilities in Telecom Hotels – 67

Device-Enabled Authorization in the Grey System – 194

High Availability Server Platform for Operations Support System – 213

Implementation of a Modular Fly away Kits (FLAK) for C4ISR in order to counter Asymmetric Threats in the Coalition Riverine and Maritime Theatres – 73

Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

Multi-User Performance Issues in Wireless Impulse Radio Networks – 70

Performance Analysis of Wireless Networks – 218

Performance of Directional Collision Avoidance in Multihop Wireless Networks – 5

Propagation Modeling of Wireless Systems on Shipboard External Decks – 68

Research Activities on EMC in NICT – 62

Visually Based Timeline Debrief Toolset for Team Training AAR – 204

TELEGRAPH SYSTEMS
NTT Technical Review, Volume 1, No. 4 – 59

TELEMETRY
Internet Protocol Over Telemetry Testing for Earth Science Capability Demo Summary – 289

Space-based Telemetry and Range Safety (STARS) Phased Array Antenna Controller – 289

TELEPHONES
Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

TELESCOPES
Final Environmental Impact Statement for the Outrigger Telescopes Project: Volume II – 109

Relay Telescope, High Power Laser Alignment System, and Laser Peening Method and System Using Same – 259

TELEVISION CAMERAS
Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

TEMPERATURE CONTROL
Personal Cooling for Extra-Vehicular Activities on Mars – 274

Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems – 262

TEMPERATURE EFFECTS
A Method for Calculating Viscosity and Thermal Conductivity of a Helium-Xenon Gas Mixture – 31

Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory – 142

Effects of Heat Stress on the Regeneration of Injured Skeletal Muscle in Rats – 126

Effects of Water Temperature on Cardiac Autonomic Nervous System Modulation during Foot Immersion (Foot Bath) – 140

Operational Influence on Thermal Behavior of High-Speed Helical Gear Trains – 98

TEMPLATES
HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 242

Testing Template and Testing Concept of Operations for Speaker Authentication Technology – 58

TEMPORAL LOGIC
Model Checking Discounted Temporal Properties – 243

TERMINAL GUIDANCE
The Outcome of ATC Message Complexity on Pilot Readback Performance – 9

TERRAIN ANALYSIS
Fort A.P. Hill, Virginia, Terrain Analysis – 102

Fort Benning, Georgia, Terrain Analysis – 102

Fort Bragg, North Carolina, Terrain Analysis – 102

Fort Campbell, Kentucky, Terrain Analysis – 102

Fort Carson, Colorado, Terrain Analysis – 103

TERRAIN
Fort A.P. Hill, Virginia, Terrain Analysis – 102

Fort Benning, Georgia, Terrain Analysis – 102

Fort Bragg, North Carolina, Terrain Analysis – 102

Fort Campbell, Kentucky, Terrain Analysis – 102

Fort Carson, Colorado, Terrain Analysis – 103

The Army Digital Terrain Catalog II (ADTC) – 210

TERRESTRIAL PLANETS
Early Planetary Differentiation: Comparative Planetology – 277

TEST FACILITIES
Arc Jet Flow Properties Determined from Laser- Induced Fluorescence of Atomic Species – 85

TEST STANDS
Study of the New Air-Launched Small Missile (ALSM) Phoenix Hypersonic Flight Research Test Bed – 294

The Dryden Aerospike Rocket Test – 290

The F-15B Baseline Ground Vibration Testing – 288

TETHERING
Fullerenic Structures and Such Structures Tethered to Carbon Materials – 249

Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

TEXTS
Coherence and Coreference – 271

TEXTURES
Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 50

Mathematical Modeling of Rail Gun – 50

THERAPY
Bioelectromagnetics 2005 – 178

Breast Cancer Therapy With Annexin 11 Nanoparticles – 164

Systemic Oncolytic Cytokine HSV Therapy of Prostate Cancer – 164

The Clinical Development of Thalidomide as an Angiogenesis Inhibitor Therapy for Prostate Cancer – 167

The Pathogenesis and Therapy of Combined Radiation Injury – 174

THERMAL ANALYSIS
Applications of the MuSES Infrared Signature Code – 91

Development of a Gravity-Insensitive Heat Pump for Lunar Applications – 95

Personal Cooling for Extra-Vehicular Activities on Mars – 274

Thermo-mechanical Analysis of Ground-based Directed Energy Weapons on Satellites and Intercontinental Ballistic Missiles – 24

THERMAL BARRIERS (PLASMA CONTROL)
Improved Seals for High Temperature Airframe Applications – 97

THERMAL BUCKLING
Hanford Double-Shell Tank Thermal and Seismic Project Buckling Evaluation Methods and Results for the Primary Tanks – 99

THERMAL CONDUCTIVITY

A Method for Calculating Viscosity and Thermal Conductivity of a Helium-Xenon Gas Mixture – 31

Carbon Nanotube Activities at NASA-Johnson Space Center – 245

THERMAL CYCLING TESTS

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

THERMAL ENVIRONMENTS

Exploration Life Support Directions – 188

Update on Extended Operation of Stirling Convertors in Thermal Vacuum at NASA Glenn Research Center – 32

THERMAL PROTECTION

Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Full Field Thermal Protection System Health Monitoring System for Crew Exploration Vehicles – 290

Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

Integrated Simulation Design Challenges to Support TPS Repair Operations – 272

Mars Aerocapture Systems Study – 29

Orbiter Repair Maneuver Contingency Separation Methods and Analysis – 26

THERMAL REACTORS

Progress Report on Fast Breeder Reactor Safety Studies – 93

THERMAL SHOCK

Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading – 160

Expression of Small Heat Shock Proteins in Pea Seedlings under Gravity-Altered Conditions – 132

THERMAL STABILITY

Optimizing Mechanical Properties and Thermal Stability of Age Hardenable Aluminum Alloys Through Theoretical Modeling, Alloy Modification and Thermal Mechanical Processing – 41

THERMODYNAMIC PROPERTIES

Automated Thermal Camouflage Generation Program Status – 33

Coupling Between CTH and LS-DYNA for Thermal Postprocessing: Application to Propellant Cookoff From a Residual Penetrator – 261

Mechanical and Thermal Properties of Ultra-High Carbon Steel Containing Aluminum – 50

Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems – 262

THERMODYNAMICS

Thermo-mechanical Analysis of Ground-based Directed Energy Weapons on Satellites and Intercontinental Ballistic Missiles – 24

Thermomechanical Cycling Investigation of Cu and Niti Reinforced Lead-Free Solder – 49

THERMOGRAPHY

Fabrication of 0.0075-Scale Orbiter Phosphor Thermography Test Models for Shuttle RTF Aeroheating Studies – 85

Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

THERMONUCLEAR REACTIONS

Scrape-Off Layer Plasmas for ITER with 2nd X-Point and Convective Transport Effects – 260

THERMOPHYSICAL PROPERTIES

Comprehensive Creep and Thermophysical Performance of Refractory Materials – 55

THICKNESS

A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

THIGH

Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions – 123

THIN FILMS

Atomically Smooth Epitaxial Ferroelectric Thin Films for the Development of a Nonvolatile, Ultrahigh Density, Fast, Low Voltage, Radiation-Hard Memory – 80

Experimental Results of Thin-Film Photovoltaic Cells in a Low Density LEO Plasma Environment: Ground Tests – 29

THROMBOSIS

Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest – 148

THRUST CONTROL

Evaluation of an Outer Loop Retrofit Architecture for Intelligent Turbofan Engine Thrust Control – 19

THRUSTORS

A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

THRUST

The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

THYRISTORS

Characterization and Application of Four-Layer Semiconductor Structures in Pulse Mode Operation – 79

TIBIA

A Perspective for Ultrasonic Assessment of Osteoporotic Changes of Bone Structure in Proximal Tibia – 143

An Innovative Approach for the Assessment of 3D Structures in Trabecular Bone – 122

Calf Tissue Liquid Stowage and Muscular and Deep Vein Distension in Orthostatic Tests after a 90-Day Head Down Bed Rest – 125

Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest – 148

TILES

Orbiter Repair Maneuver Contingency Separation Methods and Analysis – 26

TIME SERIES ANALYSIS

On the Observed Changes in Upper Stratospheric and Mesospheric Temperatures from UARS HALOE – 118

Remote Sensing Time Series Product Tool – 103

TISSUES (BIOLOGY)

Calf Tissue Liquid Stowage and Muscular and Deep Vein Distension in Orthostatic Tests after a 90-Day Head Down Bed Rest – 126

Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

TITANIUM ALLOYS

Thermomechanical Cycling Investigation of Cu and Niti Reinforced Lead-Free Solder – 49

TITANIUM BORIDES

The Effects of Colloidal Processing on the Densification of Titanium Diboride (TiB2) - Alumina (Al2O3) Composites – 41

TITANIUM

The Effects of Colloidal Processing on the Densification of Titanium Diboride (TiB2) - Alumina (Al2O3) Composites – 41

TITAN

Titan Laser at LLNL – 259

TOMOGRAPHY

X-Ray Digital Radiography and Computed Tomography of High Energy Density Physics (HEDP) Material, Subassemblies and Targets – 248

X-Ray Digital Radiography and Computed Tomography of ICF and HEDP Materials, Subassemblies and Targets – 247

TOPOGRAPHY

Changes in the Topography of Cellular Components in Pea Root Statocytes Exposed to High Gradient Magnetic Field – 134

Studies in Forecasting Upper-Level Turbulence – 13

TOPOLOGY
Design Considerations for Optically Connected Systems on Chip – 81
GEM: Graph EMbedding for Routing and Data-Centric Storage in Sensor Networks without Geographic Information – 221

TORQUE
The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by a Simulation Study – 158

TOUCH
Localization of Tactile Signals as a Function of Tactor Operating Characteristics – 90

TOXIC HAZARDS
Toxicological Profile for Cyanide (2006 Update) – 108
Toxicological Profile for Dichlorobenzenes (2006 Update) – 108

TOXICITY
Estimating 'Concern Levels' for Concentrations of Chemical Substances in the Environment – 34
Mechanism of Action for Anti-Radiation Vaccine in Reducing the Biological Impact of High-Dose Irradiation – 184
Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119
Toxicological Profile for 1,1,1-Trichloroethane (2006 Update) – 108
Toxicological Profile for Cyanide (2006 Update) – 107
Toxicological Profile for Dichlorobenzenes (2006 Update) – 108
Toxicological Profile for Hydrogen Sulfide (2006 Update) – 108
Toxicological Profile for Vinyl Chloride (2006 Update) – 109

TOXICOLOGY
Toxicological Profile for Dichlorobenzenes (2006 Update) – 108

TOXINS AND ANTITOXINS
A Quantitative Electrochemiluminescence Assay for Clostridium perfringens alpha toxin – 163
An Activity-Dependent Assay for Ricin and Related RNA N-Glycosidases Based on Electrochemiluminescence – 162
Cytotoxic Activity of Natural Killer Cells in Vitro under Microgravity – 147

TRAINING DEVICES
A Simulation-Based Tool to Train Rapid Decision-Making Skills for the Digital Battlefield – 202

TRAINING EVALUATION
Criticality Safety Evaluation of a LLNL Training Assembly for Criticality Safety (TACS) – 255

TRAJECTORIES
An Invariant Representation for Matching Trajectories Across Uncalibrated Video Streams – 233
Efficient Calculation of Earth Penetrating Projectile Trajectories – 273
Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results – 86

TRANSIENT RESPONSE
Transient Response of Rotor on Rolling-Element Bearings with Clearance – 96

TRANSLATING
CLIR Experiments at Maryland for TREC-2002: Evidence Combination for Arabic-English Retrieval – 269
Limited-Domain Speech-to-Speech Translation between English and Pashto – 228
Path Calculation and Packet Translation for UAV Surveillance in Support of Wireless Sensor Networks – 14

TRANSMISSIONS (MACHINE ELEMENTS)
Operational Influence on Thermal Behavior of High-Speed Helical Gear Trains – 98
Workers' Exposures to n-Propyl Bromide at a Helicopter Transmission Factory – 110

TRANSMITTER RECEIVERS
A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59
Software Defined Radio Prototype (I): System Design and Performance Evaluation – 191

TRANSONIC COMPRESSORS
Flow Field Surveys in a Transonic Compressor Rig – 7
Unsteady Casewall Pressure Measurements in a Transonic Compressor during Steam Induced Stall – 18

TRANSONIC SPEED
Steady-State and Transient Measurements Within a Compressor Rotor During Steam-Induced Stall at Transonic Operational Speeds – 14

TRANSONIC WIND TUNNELS
In-Flight Skin Friction Measurements Using Oil Film Interferometry – 10

TRANSPARENCE
High-Speed Photographic Study of Wave Propagation and Impact Damage in Transparent Aluminum Oxynitride (AION) – 91
Spin-Based Photonics via Electromagnetically Induced Transparency – 258

TRANSPORTATION
Comparative Evaluation of Air and Auto Travel Between Urban Regions (Quantifying Intercity Modal Accessibility) – 3
Guidance for Quantifying and Using Long Duration Truck Idling Emission Reductions in State Implementation Plans and Transportation Conformity – 111

TRENDS
Beyond MARC: New Trends for the Library of the Future – 268
WTEC Panel Report on Nanostructure Science and Technology: R and D Status and Trends in Nanoparticles, Nanostructured Materials, and Nanodevices – 35

TRICHLOROETHYLENE
Toxicological Profile for 1,1,1-Trichloroethane (2006 Update) – 108

TRINIDAD AND TOBAGO
Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 47

TRITIUM
Effect of Tritium and Decay Helium On Weldment Fracture Toughness – 52

TROPICAL STORMS
Evaluation of Causes of Large 96-H and 120-H Track Errors in the Western North Pacific – 117
Objective Identification of Environmental Patterns Related to Tropical Cyclone Track Forecast Errors – 116
The Extratropical Transition of Tropical Storm Banyan – 116

TROUGHS
Solar Trough Organic Rankine Electricity System (STORES) Stage 1: Power Plant Optimization and Economics. November 2000-May 2005 – 104

TRUCKS
Guidance for Quantifying and Using Long Duration Truck Idling Emission Reductions in State Implementation Plans and Transportation Conformity – 112

TUMBLING MOTION
Neurovestibular Adaptation to Short Radius Centrifugation – 150

TUMORS
Angiogenic Signaling in Living Breast Tumor Models – 163
The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor – 165

TUNGSTEN ALLOYS
Modeling Dynamic Plasticity and Spall Fracture in High Density Polycrystalline Alloys – 48

TURBINE ENGINES
High Temperature Evaluation of an Active Clearance Control System Concept – 98
Methods and Apparatus to Reduce Turbine Engine Nozzle Basesheet Stresses – 19

TURBOCOMPRESSORS
Performance Comparison between Rough and Smooth-Cast Blades in a Low-Speed Multistage Compressor – 87

TURBOFAN ENGINES
Evaluation of an Outer Loop Retrofit Architecture for Intelligent Turbofan Engine Thrust Control – 19

TURBOGENERATORS
Performance and Operational Characteristics for a Dual Brayton Space Power System With Common Gas Inventory – 31

TURBOJET ENGINES
Mach 4 Test Results of a Dual-Flowpath, Turbine Based Combined Cycle Inlet – 10

TURBULENCE
Studies in Forecasting Upper-Level Turbulence – 13

TURBULENT BOUNDARY LAYER
Mach 4 Test Results of a Dual-Flowpath, Turbine Based Combined Cycle Inlet – 10

Quiet Tunnel Experiments of Shock/Boundary Layer Interactions – 1

TURBULENT FLOW
Implicit Large Eddy Simulation for Unsteady Turbulent Flows – 86

TYROSINE
Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

UKRAINE
Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 47

ULTRAHIGH FREQUENCIES
Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

ULTRASONICS
A Perspective for Ultrasonic Assessment of Osteoporotic Changes of Bone Structure in Proximal Tibia – 143

UNCERTAIN SYSTEMS
Uncertainty Estimation of Loop Antenna Calibration System in MF/HF Band – 62

UNDERGROUND STORAGE
Hanford Double-Shell Tank Thermal and Seismic Project ANSYS Benchmark Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank – 99

Hanford Double-Shell Tank Thermal and Seismic Project Buckling Evaluation Methods and Results for the Primary Tanks – 99

Hanford Double-Shell Tank Thermal and Seismic Project Dytran Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank – 99

Hanford Double-Shell Tank Thermal and Seismic Project Establishment of Methodology for Time Domain-Structure Interaction Analysis of a Hanford Double-Shell Tank – 99

UNDERWATER ACOUSTICS
Implementation of a Distributed Time Based Simulation of Underwater Acoustic Networking Using Java – 252

UNDERWATER EXPLOSIONS
Simulation of Cylinder Implosion Initiated by Underwater Explosion – 206

UNDERWATER VEHICLES
Design, Implementation and Testing of a Common Data Model Supporting Autonomous Vehicle Compatibility and Interoperability – 224

UNIFIED FIELD THEORY
Is Naturalness Unnatural – 265

UNITED KINGDOM
A Network-Centric Operations Case Study: US/UK Coalition Combat Operations During Operation Iraqi Freedom – 69

UNITED STATES
A Network-Centric Operations Case Study: US/UK Coalition Combat Operations During Operation Iraqi Freedom – 69

A Study on Improving USA Air Force Space Systems Engineering and Acquisition – 23

Effectiveness of Introductory Flight Screening (IFS) for USA Navy and Marine Corps Student Pilots – 4

Hurricane Katrina: Utilization of Private, Non-Governmental Health Professionals Time for New Strategies – 168

Indian Nuclear Command and Control Dilemma – 67

UNIVERSE
Gamma-Ray Bursts Shower the Universe with Metals – 276

UNLOADING
Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats – 134

UNSTEADY AERODYNAMICS
Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results – 86

UNSTEADY FLOW
Implicit Large Eddy Simulation for Unsteady Turbulent Flows – 86

UPPER ATMOSPHERE RESEARCH SATELLITE (UARS)
On the Observed Changes in Upper Stratospheric and Mesospheric Temperatures from UARS HALOE – 118

URANIUM
Haynes 230 Mini-Can Welding to Support Planned Irradiation Testing of Candidate Space Fuel Materials – 22

UREILITES
Asteroidal Differentiation Processes Deduced from Ultramafic Achondrite Ureilite Meteorites – 280

USER MANUALS (COMPUTER PROGRAMS)
User's Manual for the National Water Information System of the U.S. Geological Survey – 271

USER REQUIREMENTS
Endpoint-Based Routing Strategies for Improving Internet Performance and Resilience – 238

WEBTAS Software Life Cycle Development – 79

VACCINES
Efficacy of rSEB Vaccine and CpG ODN Administered by Inhalation in Monkeys – 167

Enhancement of an Analytical Method for the Determination of Squalene in Anthrax Vaccine Absorbed Formulations – 40

VAPOR PHASES
An Evaluation of the Vapor Phase Catalytic Ammonia Removal Process for Use in a Mars Transit Vehicle – 278

VASOPRESSINS
Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats – 129

VECTORCARDIOGRAPHY
Space Cabin Landing Impact Vector Effects on Human Physiology – 15

VEGETABLES
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 105

VEGETATION GROWTH
A New Space Greenhouse Concept Development for Optimal Plant Growth – 144

Assessing the Effect of Humic Acids on Germinating a Native American Plant – 43

VEINS
Calf Tissue Liquid Stowage and Muscular and Deep Vein Distension in Orthostatic Tests after a 90-Day Head Down Bed Rest – 126

Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest – 148

VENUS ATMOSPHERE

Evaluation of Long Duration Flight on Venus – 282

VERTEBRAE

An Innovative Approach for the Assessment of 3D Structures in Trabecular Bone – 122

VERTICAL ORIENTATION

Understanding Visual Perception in the Perspective of Gravity – 137

VERY LARGE SCALE INTEGRATION

The Microchip Optera Project – 78

VESTIBULAR TESTS

Characteristics of the Eyes Pursuit Function during Readaptation to Terrestrial Gravity after Prolonged Flights Aboard the International Space Station – 182

VESTIBULES

Neurofibromatosis Type 2 (NF2) Natural History Consortium – 170

Vestibular Adaptation to Changing Gravity Levels and the Orientation of Listing's Plane – 149

VIBRATION MEASUREMENT

Potential of Remote Laser Vibration Sensing for Military Applications – 94

VIBRATION MODE

Natural Frequencies and Mode Shapes of a Nonlinear, Uniform Cantilevered Beam – 246

VIBRATION TESTS

The F-15B Baseline Ground Vibration Testing – 288

Updating the Finite Element Model to Match Ground Vibration Test Data – 285

VIBRATIONAL STRESS

Application of the Bootstrap Statistical Method in Deriving Vibroacoustic Specifications – 100

VIBRATION

Potential of Remote Laser Vibration Sensing for Military Applications – 94

Transient Response of Rotor on Rolling-Element Bearings with Clearance – 96

VIDEO SIGNALS

An Invariant Representation for Matching Trajectories Across Uncalibrated Video Streams – 233

Rip Channel Migration in the Nearshore – 92

VIRAL DISEASES

Systemic Oncolytic Cytokine HSV Therapy of Prostate Cancer – 164

VIRTUAL REALITY

Analysis of the Assignment Scheduling Capability for Unmanned Aerial Vehicles (ASC-U) Simulation Tool – 15

Design of an Object Oriented and Modular Architecture for a Naval Tactical Simulator using Delta3D's Game Manager – 190

Virtual Environment a Behavioral and Countermeasure Tool for Assisted Gesture in Weightlessness: Experiments during Parabolic Flight – 125

VIRUSES

AIDS in Africa – 170

Determination of MS2 Bacteriophage Stability at Low pH Using the Integrated Virus Detection System (IVDS) – 92

Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

HIV/AIDS Prevention in Zambia: A Preliminary Study of Obstacles to Behavior Change in the Copperbelt – 176

VISIBLE SPECTRUM

Visual Through Infrared: Modeling Components and Methodologies for Estimating High Fidelity Ground Vehicle Signatures – 90

VISION

Sensing Super-Position: Human Sensing Beyond the Visual Spectrum – 182

VISUAL PERCEPTION

Sensing Super-Position: Human Sensing Beyond the Visual Spectrum – 182

Understanding Visual Perception in the Perspective of Gravity – 137

VISUAL TASKS

Characteristics of the Eyes Pursuit Function during Readaptation to Terrestrial Gravity after Prolonged Flights Aboard the International Space Station – 182

VOICE COMMUNICATION

Evaluation Results for the Talk'n'Travel System – 71

VOLCANOLOGY

Earth After the Moon Forming Impact – 278

VOLTAGE CONTROLLED OSCILLATORS

A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59

Distributed Oscillator Architectures – 75

VOLTAGE REGULATORS

Transient fault Currents in Aircraft D-C Systems – 16

VULNERABILITY

Critical Infrastructure Protection: How to Assess and Provide Remedy to Vulnerabilities in Telecom Hotels – 67

Indian Nuclear Command and Control Dilemma – 67

WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis-)Mounted Soldier – 196

WAFERS

Performance Evaluations of Ceramic Wafer Seals – 37

WALKING

Space Robotics: AWIMR an Overview – 223

WARFARE

A Framework for the Management of Evolving Requirements in Software Systems Supporting Network-Centric Warfare – 208

A Need for Systems Architecture Approach for Next Generation Mine Warfare Capability – 197

Agent-based Modeling of Dismounted Infantry Through Inclusion of Perceptions, Inferences and Associations Phase 1 – 269

An Analytic Framework for the War of Ideas – 231

Analytic Methods for Tactical Air Warfare - 2006. Air Campaign and Mathematical Analysis – 243

Are DoD Network Centric Policies, Processes and Edge Organizations Sufficiently Adaptable to Adequately Respond to the Impact of Globalization? – 71

Are Service Oriented Architectures the Only Valid Architectural Approach for the Transformation to Network Centric Warfare? – 221

Campaigns of Experimentation: Pathways to Innovation and Transformation – 74

Chemical, Biological, Radiological, Nuclear, and High-Yield Explosives Consequences Management – 266

Extending the Tactical Wireless Internet in Support of USMC Distributed Operations – 72

Landpower and Network-Centric Operations: How Information in Today's Battlespace can be Exploited – 68

Quantifying the Probabilities of Selection of Surface Warfare Officers to Executive Officer – 236

Rip Channel Migration in the Nearshore – 92

The SAFIRE and an Initial Network-Centric Warfare Evaluation – 265

Understanding Command and Control – 74

WARNING SYSTEMS

Sample Entropy and Random Forests: A Methodology for Anomaly-based Intrusion Detection and Classification of Low-bandwidth Malware Attacks – 218

Selecting Appropriate Counter-Measures in an Intrusion Detection Framework – 216

WASTE DISPOSAL

Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 36

Interim Storage and Long Term Disposal of Research Reactor Spent Fuel – 114

Performance Assessment Monitoring Plan for the Hanford Site Low-Level Burial Grounds. Revision 1 – 110

WASTE MANAGEMENT

Performance Assessment Monitoring Plan for the Hanford Site Low-Level Burial Grounds. Revision 1 – 110

WATER IMMERSION

Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

WATER QUALITY

The Characteristics of Spanish Reservoirs – 106

User's Manual for the National Water Information System of the U.S. Geological Survey – 271

WATER TEMPERATURE

Effects of Water Temperature on Cardiac Autonomic Nervous System Modulation during Foot Immersion (Foot Bath) – 140

WATER TREATMENT

Catalytic Enzyme-Based Methods for Water Treatment and Water Distribution System Decontamination. 1. Literature Survey – 168

WATER WAVES

Three-Dimensional Analysis of Azimuthal Dependence of Sound Propagation through Shallow-Water Internal Solitary Waves – 44

WATER

Catalytic Enzyme-Based Methods for Water Treatment and Water Distribution System Decontamination. 1. Literature Survey – 168

The Characteristics of Spanish Reservoirs – 106

User's Manual for the National Water Information System of the U.S. Geological Survey – 271

WATERWAYS

2006 Navigation Charts. J. Bennett Johnston Waterway, Red River Shreveport, Louisiana to Mouth of Red River Mile 235 to Mile O P.P.R.M. 4th Edition – 101

WAVE PACKETS

A New Application of the Channel Packet Method for Low Energy 1-D Elastic Scattering – 107

WAVE PROPAGATION

High-Speed Photographic Study of Wave Propagation and Impact Damage in Transparent Aluminum Oxynitride (AION) – 91

Improving the Performance of Perfectly Matched Layers by Means of hp-Adaptivity – 243

WAVEGUIDE ANTENNAS

Driving Point Impedance for a Linear Array of Half-Width Leaky-Wave Antenna (Preprint) – 77

WEAPON SYSTEMS

Thermo-mechanical Analysis of Ground-based Directed Energy Weapons on Satellites and Intercontinental Ballistic Missiles – 24

WEATHER FORECASTING

Seasonal Prediction with the GEOS GCM – 118

WEIGHT (MASS)

The Role of Possible Feedback Mechanisms in the Effects of Altered Gravity on Formation and Function of Gravireceptors of Mollusks and Fish – 151

WEIGHTLESSNESS SIMULATION

Angiotensinogen Expression in Vascular Tissues of Simulated Weightless Rats – 154

WEIGHTLESSNESS

Behavior of Gravisensitive Cells on 2D and 3D Clinostats – 144

Depressed Tetanic Contractile Function Cannot be Compensated by Increasing Stimulating Frequency in Unloaded Soleus Muscle – 124

Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems – 145

Environmental Challenge Impairs Prefrontal Brain Functions – 158

Exploration Life Support Directions – 188

Influence of Weightlessness and Apnea on Heart Rate and Blood Pressure Regulation during Exercise – 121

Intracranial Pressure Increases during Weightlessness. A Parabolic Flights Study – 151

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by a Simulation Study – 158

Virtual Environment a Behavioral and Countermeasure Tool for Assisted Gesture in Weightlessness: Experiments during Parabolic Flight – 125

WELDED JOINTS

Effect of Tritium and Decay Helium On Weldment Fracture Toughness – 52

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-3. Recent MIT Research on Residual Stresses and Distortion in Welded Structures – 49

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-4. Shipyard Aluminum/Steel Welded Transition Joints – 49

Weld Shrinkage Study – 48

WELDED STRUCTURES

The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-3. Recent MIT Research on Residual Stresses and Distortion in Welded Structures – 49

WELDING

Closure Welding Radioactive Materials Containers at the Department of Energy (DOE) Hanford Site – 57

WIND TUNNEL TESTS

The X-43A and B-52B Tunnel Test – 295

The X-43A Force and Moment Analysis – 292

WIND TUNNELS

Wind Tunnel Renovation, Flow Verification and Flapping Wing Analysis – 2

WINDSHIELDS

Automotive Replacement Glass Windshields from China. Investigation No. 731-TA-922 (Final). Determination and Views of the Commission – 53

WINGS

Displacement Theories for Inflight Deformed Shape Predictions of a Long Span Flying Wing – 287

Simultaneous Flight Demonstration of Three Wing Deflection Measurement Approaches – 287

Wind Tunnel Renovation, Flow Verification and Flapping Wing Analysis – 2

WINTER

Seasonal Prediction with the GEOS GCM – 118

Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

Winter Air Quality Study, 2004-2005. Results from Yellowstone National Park – 107

WIRELESS COMMUNICATION

A General Framework for Analyzing, Characterizing, and Implementing Spectrally Modulated, Spectrally Encoded Signals – 190

A Scalable Logical Coordinates Framework for Routing in Wireless Sensor Networks – 216

Analytical Modeling of Medium Access Control Protocols in Wireless Networks – 219

Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department – 61

Electromagnetic Disturbance Measurement by Using Amplitude Probability Distribution for Protecting Digital Wireless Communication Systems – 61

Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

Light Reconnaissance Vehicle (LRV): Enhancing Command, Control, Communications, and Computers and Information Systems (C4I) to Tactically Employed Forces via a Mobile Platform – 216

Limited Evaluation of an 802.11b Air-to-Ground Wireless Datalink (Project 'HAVE HALO' – 22

Power Measurement Emitted by UWB System in Time Domain – 63

Software Defined Radio, its Programmable Signal-Processing Unit, and Central Control Signal-Processing Unit – 64

Software Defined Radio Prototype (II): Implementation and Evaluation of IEEE 802.11 Wireless LAN – 214

Statistical Analysis of Wireless Networks: Predicting Performance in Multiple Environments – 221

Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

WIRE

Carbon and Certain Alloy Steel Wire Rod from Brazil, Canada, Germany, Indonesia, Mexico, Moldova, Trinidad and Tobago, Turkey, and Ukraine. Investigations Nos. 701-TA-417-421 and 731-TA-953, 954, 956-959, 961, and 962 (Final). Determinations and Views of the Commission – 47

Development of an Electrical Wire Interconnect System Risk Assessment Tool – 9

Prestressed Concrete Steel Wire Strand from Japan. Investigation No. AA1921-188 (Second Review) – 47

WIRING

Development of an Electrical Wire Interconnect System Risk Assessment Tool – 10

WORKLOADS (PSYCHOPHYSIOLOGY)

On System Scalability – 215

Performance and Psychophysiological Measures of Fatigue Effects on Aviation Related Tasks of Varying Difficulty – 7

WORLD WIDE WEB

Contracting out Governmental Web Services (Externalisation de l'hebergement de sites web gouvernementaux) – 223

Implementing OWL Defaults – 210

NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

X RAY ASTRONOMY

Capella Corona Revisited: A Combined View from XMM-Newton RGS Chandra HETGS, and LETGS – 277

X RAY DIFFRACTION

Optical and magnetic properties of Eu-doped GaN – 42

X RAY SPECTROMETERS

Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

X RAYS

X-Ray Digital Radiography and Computed Tomography of High Energy Density Physics (HEDP) Material, Subassemblies and Targets – 248

X-Ray Digital Radiography and Computed Tomography of ICF and HEDP Materials, Subassemblies and Targets – 247

X-37 VEHICLE

The X-37 Hot Structure Control Surface Testing – 291

X-38 CREW RETURN VEHICLE

Parachute Testing for the NASA X-38 Crew Return Vehicle – 29

X-43 VEHICLE

Predictions of Aerostructures Operational Flight Life Using the Half-Cycle Crack Growth Program – 293

The X-43A Flush Airdata Sensing Research – 295

The X-43A Force and Moment Analysis – 292

XENON

A Method for Calculating Viscosity and Thermal Conductivity of a Helium-Xenon Gas Mixture – 31

YAG LASERS

Hysteretic Loss Reduction in Striated YBCO – 42

YBCO SUPERCONDUCTORS

Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 50

Hysteretic Loss Reduction in Striated YBCO – 42

YELLOWSTONE NATIONAL PARK (ID-MT-WY)

Winter Air Quality Study, 2004-2005. Results from Yellowstone National Park – 107

ZAMBIA

HIV/AIDS Prevention in Zambia: A Preliminary Study of Obstacles to Behavior Change in the Copperbelt – 177

ZERO ANGLE OF ATTACK

Hypersonic Laminar Instability on Round Cones Near Zero Angle of Attack – 86

Personal Author Index

A., Artemenko Olga
Gene Expression of delta-1- and delta-3-Cyclins in Root Meristem Cells of Pisurn Sativurn L. under Clinorotation – 150

Abasolo, D. E.
New Technique for Simulation of Microgravity and Variable Gravity Conditions – 161

Abdalla, M.
Provably Secure Passwork-Based Authentication in TLS – 189

Abdelzaher, Tarek
A Scalable Logical Coordinates Framework for Routing in Wireless Sensor Networks – 216

Abell, Brian
Limited Investigation and Characterization of Boundary Avoidance Tracking (Project HAVE BAT) – 6

Abernathy, C R
Optical and magnetic properties of Eu-doped GaN – 41

Abraham, Robert T
Hypoxia as a Driving Force for Genetic Instability During Breast Tumorigenesis – 175

Abuert, B.
Search for B(sup +) Yields phi pi(sup +) and B(sup o) Decays – 245

Study of Inclusive B- and overbar B (sup o) Decays to Flavor-Tagged D, D(sub s) and lambda (sup +)(sub c) – 248

Adams, Frauke
Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Adams, John W
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

Adams, John
Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 105

Adibi, Jafar
KOJAK Group Finder: Scalable Group Detecllon via Integrated Knowledge-Based and Statistical Reasoning – 236

Adolphsen, C.
Optimization of the X-Band Structure for the JLC/NLC – 261

Ahn, C H
Atomically Smooth Epitaxial Ferroelectric Thin Films for the Development of a Nonvolatile, Ultrahigh Density, Fast, Low Voltage, Radiation-Hard Memory – 79

Ahrens, L. A.
Acceleration of Polarized Protons in the AGS with Two Helical Partial Snakes – 261

Ahrens, L.
Measurements and Modeling of Eddy Current Effects in BNL's AGS Booster – 249

Performance and Capabilities of the NASA Space Radiation Laboratory at BNL – 283

Akella, Aditya
Endpoint-Based Routing Strategies for Improving Internet Performance and Resilience – 238

Akema, Tatsuo
Effects of Heat Stress on the Regeneration of Injured Skeletal Muscle in Rats – 126

Akira, Suzuki
Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department – 61

Akiyama, Hideo
Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Akkerman, H.
Devices Having Large Organic Semiconductor Crystals and Methods of Making the Same – 76

Alberici, G.
Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

Albert, Jan
Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

Alberts, David S
Campaigns of Experimentation: Pathways to Innovation and Transformation – 74

Understanding Command and Control – 74

Albertson, Cindy w.
Mach 4 Test Results of a Dual-Flowpath, Turbine Based Combined Cycle Inlet – 10

Alekhina, M.
Characteristics of the Eyes Pursuit Function during Readaptation to Terrestrial Gravity after Prolonged Flights Aboard the International Space Station – 182

Aleksandrova, N. P.
Evaluation of Spare Capacities of the Respiratory Muscles during Hypokinesia – 186

Alestrom, P.
European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Alla, Guekht
Mechanical Stimulation of the Foot Support Zones as a Way to Maintain Activity of the Tonic Muscular System during Functional Support Deprivation – 154

Allan, James
Web Page Clustering using Heuristic Search in the Web Graph – 267

Allen, Michael J.
Autonomous Soaring for Small Unmanned Aerial Vehicles (UAVs) – 291

Evaluation of Active Aeroelastic Wing Flight Controls Technology – 290

Almasi, A.
Audiological Findings in Antiorthostatic Position Modelling Microgravitation – 146

A;lmer. Bkperm
Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device – 126

Alonso, A.
New Technique for Simulation of Microgravity and Variable Gravity Conditions – 161

Alvarez, P. D.
Rotary Shaft Sealing Assembly – 94

Ambrose, R.
WTEC Panel Report on International Assessment of Research and Development in Robotics – 189

Ambur, D. R.
Low-Velocity Impact Response of Sandwich Beams with Functionally Graded Core – 36

Ameloot, M.
High Performance Laser Scanning Confocal Microscope for Microgravity Research – 134

Amneus, J. S.
Methods and Apparatus to Reduce Turbine Engine Nozzle Basesheet Stresses – 19

Amo, Hiroyoshi
A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope – 60

An, J.
CThC7 25 nJ Passively Mode-Locked Fiber Laser at 1080 nm – 259

Anderson, Michael
Detecting, Classifying, and Handling Contradictions in a Large, Dynamic Information Environment – 226

Anderson, Robert L
Fracture of Grooved Kinetic Energy Rods Subject to Oblique Impact – 203

Andrews, J. W.
Required Surveillance Performance Accuracy to Support 3-Mile and 5-Mile Separation in the National Airspace System – 7

Anthony P.
Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

Anthony, P.
Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

Antonutto, Guglielmo
Artificial Gravity: Physiological Perspectives for Long-Term Space Exploration – 159

Apetre, N. A.
Low-Velocity Impact Response of Sandwich Beams with Functionally Graded Core – 36

Arai, Kenlchi
Electromagnetic Field Distribution Measurements using an Optically Scanning Probe System – 61

Araki, Katsuhiko
Trends in Research and Development of Software Defined Radio – 59

Arbeille, P.
Calf Tissue Liquid Stowage and Muscular and Deep Vein Distension in Orthostatic Tests after a 90-Day Head Down Bed Rest – 125

Arbeille, Ph
Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest – 148

Arbeille, Ph.
WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

Archer, D. E.
List Mode Multichannel Analyzer – 83

Archer, Rick
A Simulation-Based Tool to Train Rapid Decision-Making Skills for the Digital Battlefield – 202

Ardabievskaya, Ana
Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats – 134

Arenz, A.
The German ISS Experiment Cellular Responses to Radiation in Space (CERASP): The Effects of Single and Combined Space Flight Conditions on Mammalian Cells – 158

Arepalli, S.
Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Arepalli, Sivaram
Carbon Nanotube Activities at NASA-Johnson Space Center – 245

Arias, F
On Optimizing the Configuration of Time-Transfer Links Used to Generate TAI – 24

Arkin, Ronald
Integrated Mission Specification and Task Allocation for Robot Teams - Part 1: Design and Implementation – 225

Integrated Mission Specification and Task Allocation for Robot Teams - Part 2: Testing and Evaluation – 225

Armengol, J
The Characteristics of Spanish Reservoirs – 106

Armstrong, Lawrence E
Fluid and Electrolyte Needs for Preparation and Recovery From Training and Competition – 41

Arnesen, Tonje Nanette
Perception of Body Vertical in Microgravity during Parabolic Flight – 145

Arnold, J.
Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Arnold, Steven M.
Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

Aronne, Giovanna
SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

Artamonov, A. A.
Effect of 6-Days of Support Withdrawal on Characteristics of Balance Function – 128

Artemenko, O. A.
Actin Organization and Gene Expression in Beta Vulgaris Seedlings under Clinorotation – 123

Differentiation of Plant Graviperceiving and Graviresponding Cells in Altered Gravity – 124

Aryananda, Lijin
Online and Unsupervised Face Recognition for Humanoid Robot: Toward Relationship with People – 225

Aschwanden, Pascal
Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Astroem, S.
Feasibility Study: A Swedish Integrated Assessment Model – 113

Athena Science Team
Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

Athitsos, Vassilis
Detecting Instances of Shape Classes That Exhibit Variable Structure – 227

Atkinson, Simon R
The Agile Organization: From Informal Networks to Complex Effects and Agility – 75

Aubert, B.
Observation of B(sup o) Meson Decay to A (sup plus or minus)(sub 1) (1260) pi (sup plus or minus) – 244

Audebert, P.
Calf Tissue Liquid Stowage and Muscular and Deep Vein Distension in Orthostatic Tests after a 90-Day Head Down Bed Rest – 125

Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest – 148

August, Peter
Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results – 269

Austin, Steve
Toward a Real-Time Spoken Language System Using Commercial Hardware – 191

Avan, P.
Intracranial Pressure Increases during Weightlessness. A Parabolic Flights Study – 151

Ayers, Jeffrey K.
NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Ayuso, Damaris
Portability in the Janus Natural Language Interface – 204

B., Elmann-Larsen
Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

Babayan, S. E.
Method of Processing a Substrate – 34

Babbick, Maren
Short-Term Exposure of Arabidopsis Cell Cultures to Hyper-G: Short-Term Changes in Transcription Regulator Expression – 140

Babcock, S. A.
Support Motion Effects in a Timber Trestle Bridge: Physical and Analytical Modeling – 98

Bacabac, R. G.
Modulation of Gene Expression in Bone Cells during Strain-Adapted Bone Remodeling – 150

Rapid Nitric Oxide Production by Bone Cells in Response to Mechanical Vibration – 148

Bachkosky, J
Naval Electromagnetic (EM) Gun Technology Assessment – 246

Backman, R B
Registration for Tactical Imagery: An Updated Taxonomy – 224

Baer, Lisa A.
Centrifugation Effects on Estrous Cycling, Mating Success and Pregnancy Outcome in Rats – 156

Prenatal Centrifugation: A Mode1 for Fetal Programming of Body Weight? – 138

Baevsky, R. M.
Results of Cardiorespiratory System Autonomic Regulation Investigations during Long Term International Space Station Missions: Experiment 'Pulse' – 161

Bahm, Catherine
The X-43A (Hyper-X) Flies Into the Record Books – 291

Bahm, Cathy
Hyper-X Research Vehicle Mach 7 and Mach 10 Mission Guidance, Navigation, and Control Performance – 292

Bai, M.
Acceleration of Polarized Protons in the AGS with Two Helical Partial Snakes – 261

Bailey, Howard
Eye-Safe Laser Radar 3-D Imaging – 228

Baird, B.
Nanobiotechnology: Report of the National Nanotechnology Initiative Workshop. Held in Arlington, Virginia on October 9-11, 2003 – 46

Baker, Eva G
U.S. Geological Survey National Computer Technology Meeting (7th): Program and Abstracts, Held in New Orleans, Louisiana, April 10-15, 1994 – 193

Bakos, Agnes
Production of Cytokines by Human PBMCs in Simulated Microgravity – 149

Balazs L.
Environmental Challenge Impairs Prefrontal Brain Functions – 158

Balogh, J.
Support Motion Effects in a Timber Trestle Bridge: Physical and Analytical Modeling – 98

Balthrop, Barbara H
U.S. Geological Survey National Computer Technology Meeting (7th): Program and Abstracts, Held in New Orleans, Louisiana, April 10-15, 1994 – 193

Baltzell, Kimberly
Exploring Early Detection Methods: Using the Intraductal Approach to Predict Breast Cancer – 171

Bambha, Neal K
Design Considerations for Optically Connected Systems on Chip – 81

Banker, John
The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-4. Shipyard Aluminum/Steel Welded Transition Joints – 49

Bao, Jun-Xiang
Angiotensinogen Expression in Vascular Tissues of Simulated Weightless Rats – 153

Bao, Z.
Thin Dielectric Layers on Substrates, and Methods of Making the Same – 76

Baranov, V. M.
Evaluation of Spare Capacities of the Respiratory Muscles during Hypokinesia – 186

Results of Cardiorespiratory System Autonomic Regulation Investigations during Long Term International Space Station Missions: Experiment 'Pulse' – 161

Baranovska, M.
Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Barate, R.
Observation of B(sup o) Meson Decay to A (sup plus or minus)(sub 1) (1260) pi (sup plus or minus) – 244

Search for B(sup +) Yields phi pi(sup +) and B(sup o) Decays – 245

Study of Inclusive B- and overbar B (sup o) Decays to Flavor-Tagged D, D(sub s) and lambda (sup +)(sub c) – 248

Bareille, Marie-Pierre
Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 152

Barenghi, Livia
Advantages of Simulated Microgravity in the Production of Compounds of Industrial Relevance – 160

Effects of Space-Flight Simulation on Human Cells – 140

Barndt, Eric
Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 1 of 2 – 112

Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 2 of 2 – 112

Barnes, Paul N
Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 49

Hysteretic Loss Reduction in Striated YBCO – 42

Barros, A I
Inventory of Simulation and Modeling for the Analysis of Ground Manoeuvre Performance (inventarisatie van vragen en modellen voor de analyse van het grondgebonden optreden) – 240

Barrows, Danny A.
Simultaneous Flight Demonstration of Three Wing Deflection Measurement Approaches – 287

Barry, Chris
Speaker Adaptation Using Multiple Reference Speakers – 73

Bartoe, John-David F.
The International Space Station: A Pathway to the Future – 273

Bartram, Phillip W
Decomposition of GD on CeO2/Alumina Adsorbents in a Gas Chromatograph On-Column Injector Tube Reactor – 42

Barty, C. P. J.
CThC7 25 nJ Passively Mode-Locked Fiber Laser at 1080 nm – 259

Baskaran, Vijayakumar
Intelligent Rover Execution for Detecting Life in the Atacama Desert – 271

Baskaran, Vijay
Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Batkai, Laszlo
Production of Cytokines by Human PBMCs in Simulated Microgravity – 149

Bauch, A
On Optimizing the Configuration of Time-Transfer Links Used to Generate TAI – 24

Bauer, Lujo
Device-Enabled Authorization in the Grey System – 194

Baumann, Ethan
Hyper-X Research Vehicle Mach 7 and Mach 10 Mission Guidance, Navigation, and Control Performance – 292

The X-43A Flush Airdata Sensing Research – 295

Baumstark-Khan, C.
The German ISS Experiment Cellular Responses to Radiation in Space (CERASP): The Effects of Single and Combined Space Flight Conditions on Mammalian Cells – 158

Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

Baumstark-Khan, Christa
Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

Beach, L A
Progress Report on Fast Breeder Reactor Safety Studies – 93

Beard, K.
Simulations of MANX, A Practical Six Dimensional Muon Beam Cooling Experiment – 249

Beghuin, D.
High Performance Laser Scanning Confocal Microscope for Microgravity Research – 134

Bekey, G.
WTEC Panel Report on International Assessment of Research and Development in Robotics – 189

Bekkerman, Ron
Web Page Clustering using Heuristic Search in the Web Graph – 267

Belanich, James
Videogame-Based Training Success: The Impact of Trainee Characteristics - Year 2 – 202

Belavy, D. L.
MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Belcastro, Christine
Gain-Scheduled Fault Tolerance Control Under False Identification – 19

Beller, Gisela
A Perspective for Ultrasonic Assessment of Osteoporotic Changes of Bone Structure in Proximal Tibia – 143

Measures of Complexity to Quantify Bone Loss and Estimate Strength of Human Lumbar Vertebrae: Comparison of pQCT Image Analysis with Bone Histomorphometry and Biomechanical Tests – 181

Belyavskaya, Ninel A.
Changes in the Topography of Cellular Components in Pea Root Statocytes Exposed to High Gradient Magnetic Field – 133

Bencze, G.
Audiological Findings in Antiorthostatic Position Modelling Microgravitation – 146

Benguria, Alberto
Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 142

Benjamin, Andrew L.
Human Exploration and Avionic Technology Challenges – 17

Bennett, Rachael
The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

Benzel, Terry V
Preliminary Security Requirements for SecureCore Hardware – 191

Ben-Zvi, I.
ERL High-Energy Cooler for RHIC – 264

Berg, J. S.
Choice of Proton Driver Parameters For a Neutrino Factory – 263

Bernardini, Sara
Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Berner, C
Aerodynamic Characteristic of the A3 DRDC-ISL Reference Projectile: Missile with Lattice Fins – 2

Bernhard, J T
A Commemoration of Deschamps' and Sichak's 'Microstrip Microwave Antennas': 50 Years of Development, Divergence, and New Directions – 80

Bernier, A
Aerodynamic Characteristic of the A3 DRDC-ISL Reference Projectile: Missile with Lattice Fins – 2

Bernstein, Max
New Optical Constants for Amorphous and Crystalline H2O-ice – 257

Bernsterin, A.
Use of Antineutrino Detectors for Nuclear Reactor Safeguards Effectiveness Assessment – 247

Bessent, Shedrick
Internet Protocol Over Telemetry Testing for Earth Science Capability Demo Summary – 289

Best, D. R.
Interim Storage and Long Term Disposal of Research Reactor Spent Fuel – 114

Betke, Margrit
Detecting Instances of Shape Classes That Exhibit Variable Structure – 227

Bevan, A.
Combined Phase Space Characterization at the PEP-II IP Using Single-Beam and Luminous-Region Measurements – 250

Bezrukov, Vladislav
Relations Between Prooxidant and Antioxidant Variables in Hypergravity and Aging – 133

Bhaskara, Ganesha
Preliminary Security Requirements for SecureCore Hardware – 191

Bhattacharyya, Shuvra S
Contention-Conscious Transaction Ordering in Embedded Multiprocessors Systems – 234

Design Considerations for Optically Connected Systems on Chip – 81

First Version of a Dataflow Interchange Format – 209

Bhattachrayya, Shuvra S
System Synthesis for Polymorphous Computing Architectures – 209

Binder, Michael J
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

Binder, R
Spin-Based Photonics via Electromagnetically Induced Transparency – 258

Binner, Jane M
Analyzing Divisia Rules Extracted from a Feedforward Neural Network – 208

Binot, R. A.
ESA Ground Based Facilities – 154

Birenzvige, Amnon
Determination of MS2 Bacteriophage Stability at Low pH Using the Integrated Virus Detection System (IVDS) – 92

Biticchi, R.
Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

Bjarnason, Stephen
ChromaBlast - a Data Visualization Tool – 178

Blasiak, J.
Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

Blaskiewicz, M.
Successful Bunched Beam Stochastic Cooling in RHIC – 262

Blendell, John E
2006 Gordon Research Conference on Ceramics, Solid Studies In – 54

Block, Ingrid
Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight? – 142

Hypergravity Modulates Cyclic GMP Efflux in Nitric Oxide-Stimulated Human Melanocytic Cells – 143

Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP – 135

Bobrow, R. J.
Motion-Based Visualization – 76

Bobrow, Robert J
Portability in the Janus Natural Language Interface – 204

Boeder, Paul A.
Ionizing Radiation Environment on the International Space Station: Performance vs. Expectations for Avionics and Material – 283

Boehmer, Greg
A Network-Centric Operations Case Study: US/UK Coalition Combat Operations During Operation Iraqi Freedom – 68

Boese, Andrea
Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Bogacz, A.
Simulations of MANX, A Practical Six Dimensional Muon Beam Cooling Experiment – 249

Boisen, Sean
The BBN Spoken Language System – 71

Bolia, Robert S
Collaboration Technology in Military Operations: Lessons Learned from the Corporate Domain – 208

Bona, M.
Observation of B(sup o) Meson Decay to A (sup plus or minus)(sub 1) (1260) pi (sup plus or minus) – 244

Search for B(sup +) Yields phi pi(sup +) and B(sup o) Decays – 245

Study of Inclusive B- and overbar B (sup o) Decays to Flavor-Tagged D, D(sub s) and lambda (sup +)(sub c) – 248

Bonlie, J. D.
Titan Laser at LLNL – 259

Borchers, Bruce
An Evaluation of the Vapor Phase Catalytic Ammonia Removal Process for Use in a Mars Transit Vehicle – 278

Borghese, Ferdinando
Optical Properties of Biological Aerosols – 258

Borovik, A. S.
Hemodynamic Changes in Post-Suspension Rats during Gradual Hemorrhage – 133

Borowiec, James A
Regulation of MDM2 Activity by Nucleolin – 179

Boruta, Mike
The Nutating Engine-Prototype Engine Progress Report and Test Results – 16

Bos, Jelte E.
Vestibular Adaptation to Changing Gravity Levels and the Orientation of Listing's Plane – 149

Boschmann, Michael
Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Bosworth, John
The NASA F-15 Intelligent Flight Control Systems: Generation II – 285

Boudagov, R S
The Pathogenesis and Therapy of Combined Radiation Injury – 174

Boutigny, D.
Observation of B(sup o) Meson Decay to A (sup plus or minus)(sub 1) (1260) pi (sup plus or minus) – 244

Search for B(sup +) Yields phi pi(sup +) and B(sup o) Decays – 245

Study of Inclusive B- and overbar B (sup o) Decays to Flavor-Tagged D, D(sub s) and lambda (sup +)(sub c) – 248

Bowles, Jeffrey V\g
An Overview of the Role of Systems Analysis in NASA's Hypersonics Project – 1

Boyd, J. L.
Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects – 147

Boyd, Jason L.
Effect of Sampling Schedule on Pharmacokinetic Parameter Estimates of Promethazine in Astronauts – 129

Boyle, Richard D.
The Role of Possible Feedback Mechanisms in the Effects of Altered Gravity on Formation and Function of Gravireceptors of Mollusks and Fish – 151

Boyles, Katie A.
Orion Aerodynamics for Hypersonic Free Molecular to Continuum Conditions – 2

Bradamante, Silvia
Advantages of Simulated Microgravity in the Production of Compounds of Industrial Relevance – 160

Effects of Space-Flight Simulation on Human Cells – 140

Bradley, Robert
Lunar Dust Activation and Related Studies – 274

Braham, S.
Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

Brand, Timothy
A Reusable Design for Precision Lunar Landing Systems – 281

Brandsma, M G
Analysis Methods and Models for Small Unit Operations – 240

Bratton, R. C.
In-Plant Testing of High-Efficiency Hydraulic Separators. (Annual Report, July 21, 2004-July 20, 2005) – 87

Bravar, A.
Acceleration of Polarized Protons in the AGS with Two Helical Partial Snakes – 261

Brayer, Kenneth
The Core Protocol Set for the Global Grid – 223

Breazeal, Cynthia
Characterizing and Processing Robot-Directed Speech – 66

Breisacher, Kevin
Metallized Gelled Propellants Combustion Experiments in a Pulse Detonation Engine – 56

Brennan, J. M.
Successful Bunched Beam Stochastic Cooling in RHIC – 262

Brennan, John K
Cavity-Bias Sampling in Reaction Ensemble Monte Carlo Simulation – 40

Dual Control Cell Reaction Ensemble Molecular Dynamics: A Method for Simulations of Reactions and Adsorption in Porous Materials – 39

Molecular Simulation of the Vapor-Liquid Phase Behavior of Lennard-Jones Mixtures in Porous Solids – 39

Reaction Ensemble Molecular Dynamics: Direct Simulation of the Dynamic Equilibrium Properties of Chemically Reacting Mixtures – 39

Brenner, Marin J.
A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 286

Brenner, Martin J.
Aeroelastic Flight Data Analysis with the Hilbert-Huang Algorithm – 292

Nonlinear Aeroelastic System Identification with Application to Experimental Data – 286

Bresina, John L.
The K9 On-Board Rover Architecture – 230

Bresson, E.
Provably Secure Passwork-Based Authentication in TLS – 189

Briggs, R. J.
Helical Pulse Line Structures for Ion Acceleration – 244

Brill, Randall L
Discrimination of Complex Synthetic Echoes by an Echolocating Bottlenose Dolphin – 252

Brinckmann, Enno
Biolab Experiment Development Status 2005 – 123

Last Call for Biorack: Results of 82 Experiments in Orbit – 154

Brinkley, James W
Dynamic Response of the Human Head to + Gx Impact – 184

Britten, J. A.
Titan Laser at LLNL – 259

Broadaway, Susan C.
Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity – 144

Brockett, Alan T
A Simulation-Based Tool to Train Rapid Decision-Making Skills for the Digital Battlefield – 202

Broekhuijsen, M P
Fast Detection of Ciprofloxacin Resistance - Part II – 166

Fast Detection of Ciprofloxacin Resistance, Part I – 165

Bromeis, Birgit
Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight? – 142

Bromelis, Birgit
Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP – 135

Brooks, J. N.
Scrape-Off Layer Plasmas for ITER with 2nd X-Point and Convective Transport Effects – 260

Broughton, R M
Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin – 34

Brown, C M
DARPA Improving Warfighter Information Intake Under Stress -- Augmented Cognition. Volume 1. Phase 2: Concept Validation Experiment – 187

Brown, Edward
Angiogenic Signaling in Living Breast Tumor Models – 163

Brown, James L.
Mars Aerocapture Systems Study – 29

Brown, K. A.
Measurements and Modeling of Eddy Current Effects in BNL's AGS Booster – 249

Performance and Capabilities of the NASA Space Radiation Laboratory at BNL – 283

Brown, Robert H.
Spectroscopy of Kuiper Belt Objects and Centaurs – 275

Brown, W. D.
X-Ray Digital Radiography and Computed Tomography of High Energy Density Physics (HEDP) Material, Subassemblies and Targets – 248

X-Ray Digital Radiography and Computed Tomography of ICF and HEDP Materials, Subassemblies and Targets – 247

Brown, W K
Biological Parameters of Impact – 15

Browning, Brett
Person Tracking From a Dynamic Balancing Platform – 228

Bruckner, J.
Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

Bualat, Maria
The K9 On-Board Rover Architecture – 230

Buck, Gregory M.
Fabrication of 0.0075-Scale Orbiter Phosphor Thermography Test Models for Shuttle RTF Aeroheating Studies – 85

Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

Buck, Karl
Bouchon d'oreille a attenuation active adaptee aux bruits d'helicoptere (Ear Plugs for Active Attenuation Adapted for Helicopter Noises) (Gehoerschutzstopsel mit aktriver Daempfung, geeignet fuer Hubschrauberlaerm) – 12

Bui, Trong
Study of the New Air-Launched Small Missile (ALSM) Phoenix Hypersonic Flight Research Test Bed – 294

The Dryden Aerospike Rocket Test – 290

Bulmer, R. H.
Scrape-Off Layer Plasmas for ITER with 2nd X-Point and Convective Transport Effects – 260

Buravkov, S. V.
Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

The Effect of Simulated Microgravity on Nitrergic Innervation of the Middle Cerebral Artery – 124

Buravkova, L. B.
Cytotoxic Activity of Natural Killer Cells in Vitro under Microgravity – 147

Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

Burch, William
Shallow Water UXO Technology Demonstration Site, Scoring Record Number 2 – 251

Burcham, Bill
The C-17 Throttles-Only Control Evaluation and Simulation Validation – 284

Burgard, Wolfram
A System for Three-Dimensional Robotic Mapping of Underground Mines – 101

Burke, D. L.
Optimization of the X-Band Structure for the JLC/NLC – 261

Burkeper, C. M.
Methods and Apparatus to Reduce Turbine Engine Nozzle Basesheet Stresses – 19

Burneka, Chris
Analyzing Requirements for and Designing a Collaborative Tool Based on Functional and User Input – 16

Buschbacher, Mark
The NASA F-15 Intelligent Flight Control Systems: Generation II – 285

Bush, Joseph
Detailed Fuel Cell Demonstration Site Summary Report: Naval Hospital at Marine Corps Air Ground Combat Center - Twentynine Palms – 106

Butina, A. J., Sr.
The Logistic Path from the International Space Station to the Moon and Beyond – 25

Buzer, L.
Intracranial Pressure Increases during Weightlessness. A Parabolic Flights Study – 151

C. A,. Richardson
Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

Cai, Y.
Doubling the PEP-II Luminosity in Simulations – 264

Luminosity Improvement at PEP-II Based on Optics Model and Beam-Beam Simulation – 265

Caird, J. A.
Titan Laser at LLNL – 259

Calaga, R.
Observation of Long-Range Beam-Beam Effect in RHIC and Plans for Compensation – 263

Caldwell, Gregory
Visually Based Timeline Debrief Toolset for Team Training AAR – 204

Caldwell, John A
Performance and Psychophysiological Measures of Fatigue Effects on Aviation Related Tasks of Varying Difficulty – 7

Callahan, Jeremy
Metrics of METOC Forecast Performance and Operational Impacts on Carrier Strike Operations – 11

Calomiris, Jon J
Inactivation of Bacillus Anthracis Spores Delivered as Liquid Suspension or Aerosol to Self-Decontaminating Fabric – 54

Cameron, P.
Summary of Coupling and Tune Feedback Results During RHIC Run 6, and Possible Implications for LHC Commissioning – 263

Campbell, Melissa
Development of a Test Facility for Air Revitalization Technology Evaluation – 8

Campbell, Ryan J
Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results – 269

Campbell, W. T.
Dual Mode Display with a Backlight Filter for an Unactivated Light Emitting Diode – 82

Cancedda, R.
Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

Cannell, G. R.
Closure Welding Radioactive Materials Containers at the Department of Energy (DOE) Hanford Site – 57

Cannon, B. D.
Reduction of Residual Amplitude Modulation Frequency-Modulated Signals – 84

Cao, Qing
A Scalable Logical Coordinates Framework for Routing in Wireless Sensor Networks – 216

Cao, Xin-Sheng
Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory – 142

Cappelli, M. A.
CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy – 45

Langmuir Probe Distortions and Probe Compensation in an Inductively Coupled Plasma – 260

Capri, A.
Calf Tissue Liquid Stowage and Muscular and Deep Vein Distension in Orthostatic Tests after a 90-Day Head Down Bed Rest – 125

Carey, William
The ERASMUS Experiment Archive – 129

Carley, Kathleen M
ORA 2006: User's Guide – 210

Carlile, Donna L
Air Flow Patterns Around Several Biological Point Detection System Configurations – 91

Carney, Barbara
Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems – 262

Carroll, S. A.
Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 36

Carson, R. T.
Big Storm Named Katrina – 117

Carstens, Christian B
Localization of Tactile Signals as a Function of Tactor Operating Characteristics – 90

Carter, Robert
Compressed Elastomer Method for Internal Pressure Testing – 54

Carucci, Daniel J
Proteomics in Malaria – 166

Casey, K.
Low-Frequency Electromagnetic Backscatter from Buries Tunnels – 247

Casey, Rachael C.
Mechanism of Action for Anti-Radiation Vaccine in Reducing the Biological Impact of High-Dose Irradiation – 184

Cassarino, Craig
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 105

Castagnolo, Dario
SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

Castellsaguer, J.
Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Castiglioni, Paolo
Adaptation of the Baroreflex Sensitivity to Microgravity: Data from the STS-107 Columbia Mission – 152

Castro-Rivera, Emely
The Role of Semaphorin 3B (SEMA3B) in the Pathogenesis of Breast Cancer – 175

Catalan, A.
Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Catherall, A.
Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

Cathy A , Newell
Diagnosis and Treatment of Combat Related Post-Traumatic Stress Disorder. An Abstract Bibliography – 270

Cechetto, Angela
Cortical Regions Associated with Orthostatic Stress in Conscious Humans – 137

Cettl, L.
Pilots' Examination in a Rapid LBNP Exposure – 136

Chalt, B.
Method and System for Mass Spectroscopy – 257

Chalupsky, Hans
KOJAK Group Finder: Scalable Group Detecllon via Integrated Knowledge-Based and Statistical Reasoning – 236

Chan, P. K.
NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Chan, William
PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD – 3

Chandler, R F
Biological Parameters of Impact – 15

Chang, Fu-Lung
NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Chang, Julius
Sensor Systems for Biological Agent Attacks: Protecting Buildings and Military Bases – 93

Chang, Y.
Seasonal Prediction with the GEOS GCM – 118

Chappell, S.
Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

Charlie, W. A.
Support Motion Effects in a Timber Trestle Bridge: Physical and Analytical Modeling – 98

Chelcea, Tiberiu
Adding Faster with Application Specific Early Termination – 212

Chelnaya, N. A.
Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G – 126

Chen. Silvia
Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

Chen, Wayne
Dynamic Response of an Alternative Tissue Simulant, Physically Associating Gels (PAG) – 38

Cheng, Hong-Wei
Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity – 157

Chernikova, A. G.
Heart Rate Variability in Evaluation of Functional State and Types of Autonomic Regulation under Conditions of Space Flight – 132

Results of Cardiorespiratory System Autonomic Regulation Investigations during Long Term International Space Station Missions: Experiment 'Pulse' – 161

Cheuvront, Samuel N
Fluid and Electrolyte Needs for Preparation and Recovery From Training and Competition – 41

Chevassut, O.
Provably Secure Passwork-Based Authentication in TLS – 189

Chiang, I. H.
Performance and Capabilities of the NASA Space Radiation Laboratory at BNL – 283

Chiaviello, Angela
Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Chimack, Michael J
Energy and Process Optimization and Benchmarking of Army Industrial Processes – 105

Chin, Ernest
The Effects of Colloidal Processing on the Densification of Titanium Diboride (TiB2) - Alumina (Al2O3) Composites – 41

Chitwood, Connie
Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 1 of 2 – 112

Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 2 of 2 – 112

Chokani, Ndaona
Quiet Tunnel Experiments of Shock/Boundary Layer Interactions – 1

Chometon, G.
Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Chong, Waiyian
Detecting, Classifying, and Handling Contradictions in a Large, Dynamic Information Environment – 226

Chow, Louis
Personal Cooling for Extra-Vehicular Activities on Mars – 274

Chow, Yen-Lu
The BBN Spoken Language System – 71

Christ, Richard E
A Simulation-Based Tool to Train Rapid Decision-Making Skills for the Digital Battlefield – 202

Christman, Gerard J
Coalition Interoperability: A Modeled Approach – 72

Chua, J.
Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Chute, Rebecca D.
Evaluation of Cabin Crew Technical Knowledge – 3

Cilli, M.
Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

Claessens, D.
High Performance Laser Scanning Confocal Microscope for Microgravity Research – 134

Clancey, William J.
Are You Talking to Me? Dialogue Systems Supporting Mixed Teams of Humans and Robots – 223

Clark, B.C.
Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

Clarke, Jerry A
Coupling Between CTH and LS-DYNA for Thermal Postprocessing: Application to Propellant Cookoff From a Residual Penetrator – 261

Clarke, Robert
Evaluation of Active Aeroelastic Wing Flight Controls Technology – 290

Clayton, J D
Dynamic Plasticity and Fracture in High Density Polycrystals: Constitutive Modeling and Numerical Simulation – 261

Modeling Dynamic Plasticity and Spall Fracture in High Density Polycrystalline Alloys – 48

Clement, Gilles
Perception of Body Vertical in Microgravity during Parabolic Flight – 145

Understanding Visual Perception in the Perspective of Gravity – 137

Cobb, Coleman B
Hysteretic Loss Reduction in Striated YBCO – 42

Coen, Peter G.
Shaped Sonic Boom Experiment – 293

Cogoli, A.
A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

Cogoli, Augusto
Effects of Vector-Averaged Gravity on the Response to Different Stimulatory Signals in T-Cells – 146

Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Cogoli, Marianne
The Biolab Facility Responsible Center at the German Aerospace Center DLR – 155

Cogoli-Greuter, M.
A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

Cohen, Barbara A.
Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

Cohen, B.
Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

Cohen, H.
Method and System for Mass Spectroscopy – 257

Cohen, Paul
The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

Coinu, Rita
Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Colaianni, A J
Logistics Maturity Evaluator – 217

Cole, Gregory S.
Development of a Gravity-Insensitive Heat Pump for Lunar Applications – 95

Colin, F.
3-D Ballistocardiography, A Tool Revisited for Following Astronaut Cardiovascular Function? – 132

Colket, M B
Advanced Fuel Development and Fuel Combustion. Delivery Order 0005: Mitigation of Particulates Using Fuel Additives – 55

Collings, Edward
Hysteretic Loss Reduction in Striated YBCO – 42

Colocho, W.
Luminosity Improvement at PEP-II Based on Optics Model and Beam-Beam Simulation – 265

Colozza, Anthony J.
Evaluation of Long Duration Flight on Venus – 282

Combault, S
Selecting Appropriate Counter-Measures in an Intrusion Detection Framework – 216

Comtois, J. M.
Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

Conerly, Shawn
Aerodynamic Aerosol Concentrators – 91

Connors, Michael P
Development and Evaluation of a Device for the Prevention of Arm Flail Injuries – 16

Conrad, Kendall
HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 242

Convertino, Victor A.
Restoration of Central Blood Volume: Application of a Simple Concept and Simple Device to Counteract Cardiovascular Instability in Syncope and Hemorrhage – 151

Cook, Nicolas
AIDS in Africa – 170

Cooke, William H.
Restoration of Central Blood Volume: Application of a Simple Concept and Simple Device to Counteract Cardiovascular Instability in Syncope and Hemorrhage – 151

Corwin, Michael
Driving Point Impedance for a Linear Array of Half-Width Leaky-Wave Antenna (Preprint) – 76

Costello, Mark
Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results – 86

Costes-Salon, Marie-Claude
Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 152

Cotting, M. Christopher
Generic Guidance and Control Law Development for Six-Degree-of-Freedom (DOF) Simulation to Support Conceptual Aircraft Design – 286

Couderc, F.
Study of Inclusive B- and overbar B (sup o) Decays to Flavor-Tagged D, D(sub s) and lambda (sup +)(sub c) – 248

Coudrec, F.
Search for B(sup +) Yields phi pi(sup +) and B(sup o) Decays – 245

Couerc, F.
Observation of B(sup o) Meson Decay to A (sup plus or minus)(sub 1) (1260) pi (sup plus or minus) – 244

Courant, E. D.
Acceleration of Polarized Protons in the AGS with Two Helical Partial Snakes – 261

Cova, Maria
Quantitative MR Imaging for the in Vivo Assessment of Trabecular Bone Quality – 181

Covell, Peter F.
Simulation and Analyses of Multi-Body Separation in Launch Vehicle Staging Environment – 23

Covelli, Bianca
Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Cox, D. M.
WTEC Panel Report on Nanostructure Science and Technology: R and D Status and Trends in Nanoparticles, Nanostructured Materials, and Nanodevices – 35

Cox, N.
Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus? – 277

Cox, S.
Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

Cox, Timothy H.
Generic Guidance and Control Law Development for Six-Degree-of-Freedom (DOF) Simulation to Support Conceptual Aircraft Design – 286

Coyne, James C
Using the Internet to Collaborate with Consumers in Redefining a Psychosocial Agenda for Families with Hereditary Breast Cancer – 174

Crary, Karl
A Separate Compilation Extension to Standard ML (Revised and Expanded) – 195

Crawford, Elisabeth
Learning Dynamic Time Preferences in Multi-Agent Meeting Scheduling – 192

Creel, J. R.
Higher Order Chemistry Models in the CFD Simulation of Laser-Ablated Carbon Plumes – 88

Crimp, Melissa J
The Effects of Colloidal Processing on the Densification of Titanium Diboride (TiB2) - Alumina (Al2O3) Composites – 41

Cross, R.
Titan Laser at LLNL – 259

Cruciani, Everlyn
2004 Research Engineering Annual Report – 284

Cruden, B. A.
Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Crues, Edwin Z.
Integrated Simulation Design Challenges to Support TPS Repair Operations – 272

Cruikshank, Dale P.
Spectroscopy of Kuiper Belt Objects and Centaurs – 275

Csengery, A.
Audiological Findings in Antiorthostatic Position Modelling Microgravitation – 146

Cucinotta, F. A.
Managing Space Radiation Risks on Lunar and Mars Missions: Risk Assessment and Mitigation – 186

Stability of Radiation Induced Chromosome Damage in Human Peripheral Blood Lymphocytes – 185

Culkin, Andy
Obstacle Marking and Vehicle Guidance Science and Technology Objective (OMVG-STO) Augmented Reality for Enhanced Command and Control and Mobility – 69

Cumming, Stephen
Verification of the Active Aeroelastic Wing Aerodynamic Model with Flight Test Results – 291

Cummings, Mary L
Collaboration Technology in Military Operations: Lessons Learned from the Corporate Domain – 208

Cunningham, Kyle
The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

Cuppens, F
Selecting Appropriate Counter-Measures in an Intrusion Detection Framework – 216

Curran, Allen R
Applications of the MuSES Infrared Signature Code – 91

Currano, Joseph
A Novel Method for Measurement of Total Hemispherical Emissivity – 21

Curtis, Christopher K
Analyzing Requirements for and Designing a Collaborative Tool Based on Functional and User Input – 16

Cuzzi, Jeffrey N.
Recent Highlights in Ring Structure, Dynamics, and Composition – 275

Czigler, I.
Environmental Challenge Impairs Prefrontal Brain Functions – 158

D., Felsenberg
Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

D. L., Belavy
Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

da Silva, Leandro D
Sociable Interfaces – 229

Dach, Rolf
GPS Carrier Phase Analysis Noise on the USNO-PTB Baselines – 233

Damon, Christopher
Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results – 269

D'Amore, L.
Haynes 230 Mini-Can Welding to Support Planned Irradiation Testing of Candidate Space Fuel Materials – 22

Dane, C. B.
Relay Telescope, High Power Laser Alignment System, and Laser Peening Method and System Using Same – 259

Stimulated Brillouin Scattering Mirror System, High Power Laser and Laser Peening Method and System Using Same – 259

Danelon, Furio
The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by a Simulation Study – 158

Daniels, Christopher C.
Apollo Seals: A Basis for the Crew Exploration Vehicle Seals – 97

Dankiewicz, Lois A
Discrimination of Complex Synthetic Echoes by an Echolocating Bottlenose Dolphin – 252

D'Antonio, J. P.
Alternator Electrical Feedthrough Insulator Materials for Project Prometheus(B-MT(AMSI)-44) – 256

Darwish, Kareem
CLIR Experiments at Maryland for TREC-2002: Evidence Combination for Arabic-English Retrieval – 269

Das, Pranab K.
Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight? – 142

Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP – 135

Das, Salil
Is Peripheral Benzodiazepine Receptor (PBR) Gene Expression Involved in Breast Cancer Suppression by Dietary Soybean Protein? – 171

Datesman, A. M.
Alternator Electrical Feedthrough Insulator Materials for Project Prometheus(B-MT(AMSI)-44) – 256

Davey, M. R.
Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

Davin, John P
Algorithmic and Domain Centralization in Distributed Constraint Optimization Problems – 230

Davis, Duane T
Design, Implementation and Testing of a Common Data Model Supporting Autonomous Vehicle Compatibility and Interoperability – 224

Davis, J
On Optimizing the Configuration of Time-Transfer Links Used to Generate TAI – 24

Davis, Mark
The X-43A and B-52B Tunnel Test – 295

The X-43A Flush Airdata Sensing Research – 295

The X-43A Force and Moment Analysis – 292

Dawson, J. W.
CThC7 25 nJ Passively Mode-Locked Fiber Laser at 1080 nm – 259

de Alfaro, Luca
Game Models for Open Systems – 241

Model Checking Discounted Temporal Properties – 242

Sociable Interfaces – 229

de Moraes, Renato M
Performance Analysis of Wireless Networks – 218

de Souza, Paulo Jr.
Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

DeCastro, Jonathan A.
Rate-Based Model Predictive Control of Turbofan Engine Clearance – 19

Decker, F. J.
Luminosity Improvement at PEP-II Based on Optics Model and Beam-Beam Simulation – 265

DeFrank, Joseph J
Catalytic Enzyme-Based Methods for Water Treatment and Water Distribution System Decontamination. 1. Literature Survey – 168

deGroh, Kim, K.
Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation – 282

deHaan, A.
Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest – 123

deJong, Herman A. A.
A Brief Overview of Animal Hypergravity Studies – 130

Del Bimbo, Alberto
An Invariant Representation for Matching Trajectories Across Uncalibrated Video Streams – 233

deL. Pulcini, Elinor
Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity – 144

delaRosa, R.
New Technique for Simulation of Microgravity and Variable Gravity Conditions – 161

DellaPenna, A.
Summary of Coupling and Tune Feedback Results During RHIC Run 6, and Possible Implications for LHC Commissioning – 263

Demaeseleer, Wim
Investigating Human Cognitive Performance during Spaceflight – 121

DeMange, Jeffrey J.
Further Investigations of High Temperature Knitted Spring Tubes for Advanced Control Surface Seal Applications – 97

Improved Seals for High Temperature Airframe Applications – 96

Performance Evaluations of Ceramic Wafer Seals – 37

DeMicco, Veronica
SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

Demkowicz, L
Improving the Performance of Perfectly Matched Layers by Means of hp-Adaptivity – 243

Dempsey, C. A.
The Logistic Path from the International Space Station to the Moon and Beyond – 25

Den, Mitsue
A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope – 60

Denis, Galanov
Mechanical Stimulation of the Foot Support Zones as a Way to Maintain Activity of the Tonic Muscular System during Functional Support Deprivation – 154

Denise, P.
Intracranial Pressure Increases during Weightlessness. A Parabolic Flights Study – 151

Denti, Paolo
Optical Properties of Biological Aerosols – 258

Denton, Trip
Drexel Object Occlusion Repository (DOOR) – 241

Derbenev, Y.
Simulations of MANX, A Practical Six Dimensional Muon Beam Cooling Experiment – 249

DeReno, Matt
ORA 2006: User's Guide – 210

Deroanne, C.
Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Dever, Joyce A.
Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation – 282

deVet, S. J.
Diminished Performance of Bacterial Fuel Cells in Microgravity – 141

deVoigt, Martin
Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

Diaz, Esther M.
Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 31

Dibley, Ryan P.
Evaluation of Active Aeroelastic Wing Flight Controls Technology – 290

Dick, Kevin
Authoritative SSL Auditor – 222

Didier, Fass
Virtual Environment a Behavioral and Countermeasure Tool for Assisted Gesture in Weightlessness: Experiments during Parabolic Flight – 125

Dietle, L. L.
Rotary Shaft Sealing Assembly – 94

Dietz, William
PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD – 3

Dijk, W C van
Fast Detection of Ciprofloxacin Resistance - Part II – 166

Fast Detection of Ciprofloxacin Resistance, Part I – 165

Dijkstra, C.
Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

DiLorenzo, P. A.
Prometheus Hot Leg Piping Concept – 32

Dimotakis, Paul
Reducing DoD Fossil-Fuel Dependence – 56

diPrampero, Pietro E.
Artificial Gravity: Physiological Perspectives for Long-Term Space Exploration – 159

DiRienzo, Marco
Adaptation of the Baroreflex Sensitivity to Microgravity: Data from the STS-107 Columbia Mission – 152

Ditmeyer, Steven R
Network-Centric Railroading Utilizing Intelligent Railroad Systems – 72

Dobbins, Justin A.
Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

Dodd, Marylin
Exploring Early Detection Methods: Using the Intraductal Approach to Predict Breast Cancer – 171

Doersksen, R E
Weld Shrinkage Study – 48

Dolgashev, V.
Optimization of the X-Band Structure for the JLC/NLC – 261

Dommel, Hans-Peter
Network Support for Group Coordination – 220

Donati, A.
SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

Dong, Wei
Molecular Simulation of the Vapor-Liquid Phase Behavior of Lennard-Jones Mixtures in Porous Solids – 39

Donohue, Casey
Meteorological Support for the Pathfinder- Plus Aeroelastic Research Flights – 289

Dooley, Michael J
Limited Evaluation of an 802.11b Air-to-Ground Wireless Datalink (Project 'HAVE HALO' – 22

Dorda, U.
Observation of Long-Range Beam-Beam Effect in RHIC and Plans for Compensation – 263

Dosel, P.
Pilots' Examination in a Rapid LBNP Exposure – 136

Dost, Ascander
Limited-Domain Speech-to-Speech Translation between English and Pashto – 228

Dowding, John
Are You Talking to Me? Dialogue Systems Supporting Mixed Teams of Humans and Robots – 223

Downes, Hilary
Asteroidal Differentiation Processes Deduced from Ultramafic Achondrite Ureilite Meteorites – 280

Drake, Aaron
In-Flight Skin Friction Measurements Using Oil Film Interferometry – 10

Dreibus, G.
Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

Dressen, Sharon
Sensor Systems for Biological Agent Attacks: Protecting Buildings and Military Bases – 93

Dreyer, Derek
Understanding and Evolving the ML Module System – 212

Drikakis, Dimitris
Implicit Large Eddy Simulation for Unsteady Turbulent Flows – 86

Drzal, Peter L
Multiscale Mechanical Characterization of Biomimetic Physically Associating Gels – 53

Duenow, Joel
Amplitude Analysis and Modeling of Regional Phases in PNE Profiles in Northern Eurasia and Seismic Regionalization – 115

Dugan, Jeffery L
40'x44' Metal Pallet With Metal Adapters With PA125 Metal Boxes, MIL-STD-1660 First Article Tests – 57

Dukovich, John A
Analytic Methods for Tactical Air Warfare - 2006. Air Campaign and Mathematical Analysis – 243

Dunbar, Melisa G.
Evaluation of Cabin Crew Technical Knowledge – 3

Dunlap, Patrick H., Jr.
Apollo Seals: A Basis for the Crew Exploration Vehicle Seals – 97

Further Investigations of High Temperature Knitted Spring Tubes for Advanced Control Surface Seal Applications – 97

Performance Evaluations of Ceramic Wafer Seals – 37

Dunlap, Patrick H.
Improved Seals for High Temperature Airframe Applications – 96

Dunn, K.
Workers' Exposures to n-Propyl Bromide at a Helicopter Transmission Factory – 110

Dupuis, A
Aerodynamic Characteristic of the A3 DRDC-ISL Reference Projectile: Missile with Lattice Fins – 2

Duretete, A.
Intracranial Pressure Increases during Weightlessness. A Parabolic Flights Study – 151

Durham, Laura M
Limited Evaluation of an 802.11b Air-to-Ground Wireless Datalink (Project 'HAVE HALO' – 22

Durrant-Whyte, Hugh
Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised) – 101

Duston, Christopher
Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems – 262

DuWaldt, John
Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 1 of 2 – 112

Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 2 of 2 – 112

Duwe, Helmut
Core Data Model Proposal for Physiology Research in Space – 125

Dyke, R. Eric
Mars Aerocapture Systems Study – 29

Eberius, M.
European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Ebert, R
Potential of Remote Laser Vibration Sensing for Military Applications – 94

Eckes, B.
Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Eckhause, Jeremy M
Analytic Methods for Tactical Air Warfare - 2006. Air Campaign and Mathematical Analysis – 243

Edquist, Karl T.
Mars Aerocapture Systems Study – 29

Eduardo, Pasquale
SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

Edward, W.
Integrated Interface Electronics for Reconfigurable Sensor Array – 83

Edwards, T. B.
Statistical Review of Cesium Carbonate Fusion Measurements of Archived Glass Samples from the DWPF Process – 45

Ehrenfreund, P.
Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus? – 277

Eiseman, P
Improved Modeling Tools For High Speed Reacting Flows – 237

Elashvili, Ilya
Determination of MS2 Bacteriophage Stability at Low pH Using the Integrated Virus Detection System (IVDS) – 92

Elayat, H. A.
Use of Antineutrino Detectors for Nuclear Reactor Safeguards Effectiveness Assessment – 247

Elizabeth, Kordyum
A Role of Peroxidases in Acceleration of the Aging of Potato Minitubers under Influence of Microgravity – 151

Ellermann, T.
Test of a Filter Pack Combined with a PM10 Inlet. Final Report from NMR Project – 113

Elliott, Linda R
Iconic Representation and Dynamic Information Fidelity: Implications for Decision Support – 77

Localization of Tactile Signals as a Function of Tactor Operating Characteristics – 90

Ellis, William Y
Enhancement of an Analytical Method for the Determination of Squalene in Anthrax Vaccine Absorbed Formulations – 40

Ellzy, Michael W
Decomposition of GD on CeO2/Alumina Adsorbents in a Gas Chromatograph On-Column Injector Tube Reactor – 42

Elmann-Larsen, B.
MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Emami, Saied
Mach 4 Test Results of a Dual-Flowpath, Turbine Based Combined Cycle Inlet – 10

Emri, M.
Environmental Challenge Impairs Prefrontal Brain Functions – 158

Endo, Yochiro
Integrated Mission Specification and Task Allocation for Robot Teams - Part 1: Design and Implementation – 225

Integrated Mission Specification and Task Allocation for Robot Teams - Part 2: Testing and Evaluation – 225

Engelke, Charles W
Spectral Irradiance Calibration in the Infrared. XVI. Improved Accuracy in the Infrared Spectra of the Secondary and Tertiary Standard Calibration Stars – 253

Epelman, Slava
Mitigation Strategies for Acute Radiation Exposure during Space Flight – 183

Epstein, Susan B
State Department and Related Agencies: FY2006 Appropriations and FY2007 Request – 70

Eshbaugh, Jonathan P
Respirator Filter Efficiency Testing Against Particulate and Biological Aerosols Under Moderate to High Flow Rates – 95

Eslin, Linda
Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 105

Esser, Paul
The Biolab Facility Responsible Center at the German Aerospace Center DLR – 155

Essfeld, Dieter
Influence of Weightlessness and Apnea on Heart Rate and Blood Pressure Regulation during Exercise – 121

Euliss, Gary
Design Considerations for Optically Connected Systems on Chip – 81

Ewert, Michael K.
Development of a Gravity-Insensitive Heat Pump for Lunar Applications – 95

Eyring, Greg
Sensor Systems for Biological Agent Attacks: Protecting Buildings and Military Bases – 93

Fadyukova, O. E.
The Effect of Simulated Microgravity on Nitrergic Innervation of the Middle Cerebral Artery – 124

Faella, Marco
Model Checking Discounted Temporal Properties – 242

Sociable Interfaces – 229

Fahlsing, George A
Camouflaging Vehicles Using Field Expedient Materials, Commercial Hardware Store Materials, Camouflage Nets, and Rubber Conveyer Belt Material – 258

Fair, Michael
The K9 On-Board Rover Architecture – 230

Falcetti, G.
MISS: Mice on International Space Station – 162

Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

Faloutsos, Christos
Data Mining on an OLTP System (Nearly) for Free – 270

Fan, W.
Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Faroma. Darop
Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device – 126

Fast, Stephen A
Radio Propagation Prediction Software for Complex Mixed Path Physical Channels – 198

Felsenberg, D.
MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest – 123

Fenyol, Eva Maria
Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

Ferber, M. K.
Comprehensive Creep and Thermophysical Performance of Refractory Materials – 55

Ferguson, David
A System for Three-Dimensional Robotic Mapping of Underground Mines – 101

Ferm, M.
Test of a Filter Pack Combined with a PM10 Inlet. Final Report from NMR Project – 113

Fernandez, Fernando
Exploration and Policy Reuse – 235

Probabilistic Reuse of Past Policies – 235

Ferno, R. C.
Choice of Proton Driver Parameters For a Neutrino Factory – 263

Ferrigno, Giancario
The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by a Simulation Study – 158

Fiamingo, C
Inventory of Simulation and Modeling for the Analysis of Ground Manoeuvre Performance (inventarisatie van vragen en modellen voor de analyse van het grondgebonden optreden) – 240

Fill, Tom
A Reusable Design for Precision Lunar Landing Systems – 281

Finkbeiner, Joshua R.
Apollo Seals: A Basis for the Crew Exploration Vehicle Seals – 97

Fischer, R. A.
Integrated Interface Electronics for Reconfigurable Sensor Array – 83

Fischer, W.
Beam Pipe Desorption Rate in RHIC – 263

Observation of Long-Range Beam-Beam Effect in RHIC and Plans for Compensation – 263

Fisher, Jody L.
Mars Aerocapture Systems Study – 29

Fitzgerald, Julie
The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

Fitzgerald, Maria P
Naval Submarine Medical Research Laboratory Command History, OPNAV 5750-1 Fiscal Year 2005 – 165

Fitzpatrick, Paul
Characterizing and Processing Robot-Directed Speech – 66

Fleischer, Iris
Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

Fleming, David P.
Transient Response of Rotor on Rolling-Element Bearings with Clearance – 96

Fletcher, Douglas G.
Arc Jet Flow Properties Determined from Laser- Induced Fluorescence of Atomic Species – 85

Flick, Bradley
2004 Research Engineering Annual Report – 284

Florens, Laurence
Proteomics in Malaria – 166

Flynn, Michael
An Evaluation of the Vapor Phase Catalytic Ammonia Removal Process for Use in a Mars Transit Vehicle – 278

Fontana, V.
Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

Ford, Barry N
ChromaBlast - a Data Visualization Tool – 178

Forehand, David
Top vs. Bottom Charging of the Dielectric in RF MEMS Capacitive Switches (Preprint) – 78

Forster, Aaron M
Multiscale Mechanical Characterization of Biomimetic Physically Associating Gels – 53

Fortezza, Raimondo
SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

Foster, John E.
Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 31

Frabl, W.
Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

Franchi, Ian
Asteroidal Differentiation Processes Deduced from Ultramafic Achondrite Ureilite Meteorites – 280

Franck, Douglas L
Chasing the Sun - The In-Flight Evaluation of an Optical Head Tracker – 93

Franco, Horacio
Limited-Domain Speech-to-Speech Translation between English and Pashto – 228

Franconi, Flavia
Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

Franconi, FLavia
Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Frandsen, Michael
Limited-Domain Speech-to-Speech Translation between English and Pashto – 228

Frank, R
Potential of Remote Laser Vibration Sensing for Military Applications – 94

Franks, Lisa P
The Effects of Colloidal Processing on the Densification of Titanium Diboride (TiB2) - Alumina (Al2O3) Composites – 41

Franz, Markus
Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

Franz, Russ
Internet Protocol Over Telemetry Testing for Earth Science Capability Demo Summary – 289

Space-based Telemetry and Range Safety (STARS) Phased Array Antenna Controller – 289

The F-15B Embedded Global Positioning System/Inertial Navigation System Instrumentation System Upgrade – 293

Frazier, John M
Cell-Like Entities: On the Boundary Between Non-Living and Living – 178

Frederick, M. J.
Initial Assessment of Environmental Barrier Coatings for the Prometheus Project – 53

Frederick, Phil
Operator Control Units for the Dismounted Soldier – 226

Frederickson, Joshua M
Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results – 269

Freeman, Kenneth
A Security Model for Space Based Communication – 27

French, James C
Content Locality in Distributed Digital Libraries – 266

Friman, B.
Can We Discover the QCD Critical Point at RHIC – 248

Frollo, I.
Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Fromenteau, Joel
Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

Fry, Chuck
Intelligent Rover Execution for Detecting Life in the Atacama Desert – 271

Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Fry, John
Limited-Domain Speech-to-Speech Translation between English and Pashto – 228

Fu, Zhao-Jun
Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity – 157

Fuhrman, Linda
A Reusable Design for Precision Lunar Landing Systems – 281

Fujii, Katsumi
Evaluation of Uncertainty of Horn Antenna Calibration with the Frequency range of 1 GHz to 18 GHz. – 62

Fukanaga, Kaori
Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

Fukunaga, Kaori
Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

Fuller, Charles A.
Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Fullmer, Chane L
Floor Acquisition Multiple Access (FAMA) for Packet-Radio Networks – 226

Fults, Scott
Detecting, Classifying, and Handling Contradictions in a Large, Dynamic Information Environment – 226

Funtova, L. L.
Results of Cardiorespiratory System Autonomic Regulation Investigations during Long Term International Space Station Missions: Experiment 'Pulse' – 161

Furdyna, J
Spin-Based Photonics via Electromagnetically Induced Transparency – 258

Furukawa, Tsuyoshi
Service Management System for IP Services – 213

Gaines, Edward
The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-4. Shipyard Aluminum/Steel Welded Transition Joints – 49

Gajsek, Peter
International Seminar on The Role of Dosimetry in High-Quality EMF Risk Assessment Held in Ljubljana, Slovenia and Zagreb, Croatia on 13-15 September 2006 – 246

Galdorisi, George
Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 74

Galina, Martyn
A Role of Peroxidases in Acceleration of the Aging of Potato Minitubers under Influence of Microgravity – 151

Gallardo, J. C.
Choice of Proton Driver Parameters For a Neutrino Factory – 263

Galleri, G.
A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

Galleri, Grazia
Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Gallnier, Michel
Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 152

Gallo, Luis E
Propagation Modeling of Wireless Systems on Shipboard External Decks – 68

Galofaro, Joel T.
Experimental Results of Thin-Film Photovoltaic Cells in a Low Density LEO Plasma Environment: Ground Tests – 29

Ganger, Greg
Data Mining on an OLTP System (Nearly) for Free – 270

Gao, Fang
Depressed Tetanic Contractile Function Cannot be Compensated by Increasing Stimulating Frequency in Unloaded Soleus Muscle – 124

Garab, Sandor
Detailed Structural Analysis on Retinal Vascular Bed by Automated Computer Processing of Fluorescein Angiography – 133

Structural Reappraisal of Dendritic Tree of Cerebellar Purkinje Cell for Novel Functional Modeling of Elementary Sensorimotor Adaptive Processes – 147

Garcia-Luna-Aceves, J J
A Comparison of Known Classes of Reliable Multicast Protocols – 227

A Hybrid Collision Avoidance Scheme for Ad Hoc Networks – 5

A Simple MPLS-based Flow Aggregation Scheme for Providing Scalable Quality of Service – 219

Chapter 7. Node-Centric Hybrid Routing for Wireless Internetworking – 69

Floor Acquisition Multiple Access (FAMA) for Packet-Radio Networks – 226

MPATH: A Loop-free Multipath Routing Algorithm – 219

Network Support for Group Coordination – 220

On-demand Loop-Free Routing in Ad Hoc Networks Using Source Sequence Numbers – 222

Performance of Directional Collision Avoidance in Multihop Wireless Networks – 5

WiNN: An Efficient Method for Routing Short-Lived Flows – 222

Garcia-Moreno, Francesc Tinto
Understanding Visual Perception in the Perspective of Gravity – 137

Gardner, C.
Measurements and Modeling of Eddy Current Effects in BNL's AGS Booster – 249

Gardner, G.
Performance and Capabilities of the NASA Space Radiation Laboratory at BNL – 283

Gardner, Paul D
Respirator Filter Efficiency Testing Against Particulate and Biological Aerosols Under Moderate to High Flow Rates – 95

Garriss, Scott
Device-Enabled Authorization in the Grey System – 194

Gasnikova, N. M.
Influence of Rat Hindlimb Suspension on Sarcolemmal Dystrophin and its Sensitivity to Mechanical Damage – 122

Gasset, Gilbert
Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems – 145

Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 142

Gassner, D.
Performance and Capabilities of the NASA Space Radiation Laboratory at BNL – 283

Gayda, John
Burst Testing and Analysis of Superalloy Disks With a Dual Grain Microstructure – 51

Gazdzicki, M.
Can We Discover the QCD Critical Point at RHIC – 248

Gdowski, G. E.
Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 36

Gea, L. M.
CFD Simulation of the Space Shuttle Launch Vehicle with Booster Separation Motor and Reaction Control Plumes – 27

Geers, V. C.
Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus? – 277

Gellert, R.
Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

Gennadly, Martyn
A Role of Peroxidases in Acceleration of the Aging of Potato Minitubers under Influence of Microgravity – 151

George, K.
Managing Space Radiation Risks on Lunar and Mars Missions: Risk Assessment and Mitigation – 186

Stability of Radiation Induced Chromosome Damage in Human Peripheral Blood Lymphocytes – 185

Gerrits, K.
Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest – 123

Gerstenmaier, William H.
The International Space Station: A Pathway to the Future – 273

Gerzer, Rupert
Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight? – 142

Hypergravity Modulates Cyclic GMP Efflux in Nitric Oxide-Stimulated Human Melanocytic Cells – 143

Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP – 135

Ghahramani, Zoubin
Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised) – 101

Ghalam, A.
Single-Bunch Instability Driven by The Electron Cloud Effect in the Positron Damping Ring of the International Linear Collider – 244

Gilde, Gary
The Effects of Colloidal Processing on the Densification of Titanium Diboride (TiB2) - Alumina (Al2O3) Composites – 41

Gilstrap, Raymond
A Security Model for Space Based Communication – 27

Ginn, Starr
Flutter Analysis for the Centerline Instrumented Pylon (CLIP) with Airdata Boom Attachment – 287

Girbik, A. M.
Prometheus Hot Leg Piping Concept – 32

Girton, James B
Technical and Scientific Evaluation of EM-APEX in Hurricane Frances – 117

Glanchandanl, Y. B.
Micro-Discharge Optical Source Apparatus and Method and System for Analyzing a Sample – 82

Glass, John C
Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

Glass, Thomas E.
Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

Glenn, J. W.
Measurements and Modeling of Eddy Current Effects in BNL's AGS Booster – 249

Godfrey, Alison G
Optimizing Daytime Short Sleep Episodes to Maximize Performance in a Stressful Environment – 183

Godwin, Andrew
The Nuclear Death Domain Protein p84N5; a Candidate Breast Cancer Susceptibility Gene – 171

Goel, A.
Fullerenic Structures and Such Structures Tethered to Carbon Materials – 249

Goerger, Niki C
The Army Digital Terrain Catalog II (ADTC) – 210

Goerger, Simon R
The Army Digital Terrain Catalog II (ADTC) – 210

Goerlich, R.
European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Goetze, Dirk
Influence of Finite Element Software on Energy Release Rates Computed Using the Virtual Crack Closure Technique – 37

Goldberg, A.
Mechanical and Thermal Properties of Ultra-High Carbon Steel Containing Aluminum – 50

Goldsmith, Charles L
Top vs. Bottom Charging of the Dielectric in RF MEMS Capacitive Switches (Preprint) – 78

Goldstein, Seth C
Adding Faster with Application Specific Early Termination – 212

Golubev, V. B.
B-Meson Semileptonic Decays at BABAR – 245

Goncharnko, Igor
A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope – 60

Gonda, Teresa G
Applications of the MuSES Infrared Signature Code – 91

Gonzalex-Camacho, Fernando
Altered Gravity Causes the Changes in the Protein NopA100 in Plant Cell Nucleoli – 139

Gonzalez-Camacho, Fernando
Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems – 145

Goodenough, John B
On System Scalability – 215

Gordon, Carl W
A Photo-Computer Technique for Design and Analysis of Personal Protective Equipment – 200

Gorog, J. P.
Improved Materials for High-Temperature Black Liquor Gasification – 35

Goronkin, H.
WTEC Panel Report on Nanostructure Science and Technology: R and D Status and Trends in Nanoparticles, Nanostructured Materials, and Nanodevices – 35

Goshorn, Rebekah
Maritime Domain Awareness: The Key to Maritime Security Operational Challenges and Technical Solutions – 74

Goto, Katsumasa
Effects of Heat Stress on the Regeneration of Injured Skeletal Muscle in Rats – 126

Gotoh, Kaoru
Effects of Spread Spectrum Clocking on Measured Noise Spectra – 64

Electromagnetic Disturbance Measurement by Using Amplitude Probability Distribution for Protecting Digital Wireless Communication Systems – 61

Power Measurement Emitted by UWB System in Time Domain – 63

Gotoh, T
On Optimizing the Configuration of Time-Transfer Links Used to Generate TAI – 24

Govindaraju, Dinesh
Person Tracking From a Dynamic Balancing Platform – 228

Gowin, Wolfgang
A Perspective for Ultrasonic Assessment of Osteoporotic Changes of Bone Structure in Proximal Tibia – 143

Measures of Complexity to Quantify Bone Loss and Estimate Strength of Human Lumbar Vertebrae: Comparison of pQCT Image Analysis with Bone Histomorphometry and Biomechanical Tests – 181

Grachev, S A
Experiments on the Biological Action of Neutrons Performed in the Former Soviet Union: A Historical Review – 255

Graeber, David A
Collaboration Technology in Military Operations: Lessons Learned from the Corporate Domain – 208

Graham, Jeffrey
Are You Talking to Me? Dialogue Systems Supporting Mixed Teams of Humans and Robots – 223

Granda, Jose J.
International Space Station Centrifuge Rotor Models A Comparison of the Euler-Lagrange and the Bond Graph Modeling Approach – 96

Gray, Nancy R
2006 Gordon Research Conference on Ceramics, Solid Studies In – 54

Gordon Research Conference on Electrodeposition – 81

Graybeal, Sarah R.
Entry Abort Determination using Non-adaptive Neural Networks for Mars Precision Landers – 28

Greendyke, R. B.
Higher Order Chemistry Models in the CFD Simulation of Laser-Ablated Carbon Plumes – 88

Greene, Francis A.
Orion Aerodynamics for Hypersonic Free Molecular to Continuum Conditions – 2

Griffioen-Young, H J
Analysis Methods and Models for Small Unit Operations – 240

Griffith, Mark S.
Fabrication of 0.0075-Scale Orbiter Phosphor Thermography Test Models for Shuttle RTF Aeroheating Studies – 85

Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

Grigorieva, O. V.
Cytotoxic Activity of Natural Killer Cells in Vitro under Microgravity – 147

Grimshaw, Andrew S
Dispelling Seven Myths about Grid Resource Management – 215

Grimshaw, Andrew
From Metacomputing to Metabusiness Processing – 192

Grindle, Laurie
The X-43A (Hyper-X) Flies Into the Record Books – 291

Grivel, Jean-Charles
Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

Grober, Robert
Reducing DoD Fossil-Fuel Dependence – 56

Groen, Eric L.
Vestibular Adaptation to Changing Gravity Levels and the Orientation of Listing's Plane – 149

Groh, Jeffrey L
Landpower and Network-Centric Operations: How Information in Today's Battlespace can be Exploited – 68

Grosz, A.
Audiological Findings in Antiorthostatic Position Modelling Microgravitation – 146

Environmental Challenge Impairs Prefrontal Brain Functions – 158

Grzyll, Lawrence R.
Development of a Gravity-Insensitive Heat Pump for Lunar Applications – 95

Gu, M. F.
Capella Corona Revisited: A Combined View from XMM-Newton RGS Chandra HETGS, and LETGS – 277

Guadarrama, Seratna
Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity – 144

Guarnieri, Vincenzo
Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study – 124

Gubbins, Keith E
Reaction Ensemble Molecular Dynamics: Direct Simulation of the Dynamic Equilibrium Properties of Chemically Reacting Mixtures – 39

Guenther, Kurt
Verification and Validation of Neural Networks in Flight Control Systems – 288

Guglielmi, Giuseppe
Quantitative MR Imaging for the in Vivo Assessment of Trabecular Bone Quality – 181

Guignandon, Alain
Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

Gulevskaja, T. S.
Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G – 126

Gulgnandon, A.
Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Gunga, H.-C.
Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

Gupta, R.
Capella Corona Revisited: A Combined View from XMM-Newton RGS Chandra HETGS, and LETGS – 277

Gutkowski, R. M.
Support Motion Effects in a Timber Trestle Bridge: Physical and Analytical Modeling – 98

Gyekenyesi, John Z.
Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

Haas, Andrww
The BBN Spoken Language System – 71

Haas, Michael W
The SAFIRE and an Initial Network-Centric Warfare Evaluation – 265

Hackel, L.
Relay Telescope, High Power Laser Alignment System, and Laser Peening Method and System Using Same – 259

Stimulated Brillouin Scattering Mirror System, High Power Laser and Laser Peening Method and System Using Same – 259

Haeder, Donat-P.
Behavior of Gravisensitive Cells on 2D and 3D Clinostats – 144

Haehnel, Dirk
A System for Three-Dimensional Robotic Mapping of Underground Mines – 101

Haering, Edward A.,Jr.
Shaped Sonic Boom Experiment – 293

Haglund, John S
Aerodynamic Aerosol Concentrators – 91

Hahn, Andrew S.
Next Generation NASA GA Advanced Concept – 8

Hahn, Marco
Implicit Large Eddy Simulation for Unsteady Turbulent Flows – 86

Haines, Thomas J
Light Reconnaissance Vehicle (LRV): Enhancing Command, Control, Communications, and Computers and Information Systems (C4I) to Tactically Employed Forces via a Mobile Platform – 216

Haladich, Marco
SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

Ham, R. K.
Laboratory Study to Investigate Gaseous Emissions and Solids Decomposition During Composting of Municipal Solid Wastes – 113

Hamada, Lira
Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

Hamil, Jonathan T
Analysis of Layered Social Networks – 193

Hamilton, Douglas R.
Mitigation Strategies for Acute Radiation Exposure during Space Flight – 183

Hammond, Dianne
Lunar Dust Activation and Related Studies – 274

Hamory, Phil
Higher Resolution Strain Gage Data Acquisition – 288

Two Serial Data to Pulse Code Modulation System Interfaces – 293

Hamory, Philip J.
Reconfigurable Instrumentation Signal Conditioning – 290

Hampp, R.
Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

Hampp, Ruediger
Short-Term Exposure of Arabidopsis Cell Cultures to Hyper-G: Short-Term Changes in Transcription Regulator Expression – 140

Han, Chung-Hye
Development and Evaluation of a Korean Treebank and its Application to NLP – 266

Han, Daikwon
Integrating Geographic Information Systems (GIS) Into Breast Cancer Epidemiologic Research – 172

Han, Na-Rare
Development and Evaluation of a Korean Treebank and its Application to NLP – 266

Hanazawa, Masahiro
Development of Exposure Systems and Exposure Assessment for Studies on Biological Effect of Electromagnetic Field – 64

Studies on Dosimetry of Human-Body Exposure to Electromagnetic Field – 63

Handschuh, Robert F.
Operational Influence on Thermal Behavior of High-Speed Helical Gear Trains – 98

Hang, Richard
Internet Protocol Over Telemetry Testing for Earth Science Capability Demo Summary – 289

Hang, RIchard
Reconfigurable Instrumentation Signal Conditioning – 290

Hanley, K. W.
Workers' Exposures to n-Propyl Bromide at a Helicopter Transmission Factory – 110

Hanousek, J.
Pilots' Examination in a Rapid LBNP Exposure – 136

Hansen, Eric G
Multilingual Phoneme Models for Rapid Speech Processing System Development – 65

Hansen, Jennifer
The C-17 Throttles-Only Control Evaluation and Simulation Validation – 284

Hansen, P. D.
TRIPLE LUX-B: Phagocytosis in Mussel Hemocytes – 144

Hanson, Curt
Networked Unmanned Aerial Vehicle Teams (NUAVT) – 288

Hanssen, J. E.
Test of a Filter Pack Combined with a PM10 Inlet. Final Report from NMR Project – 113

Hansson, Othar
The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

Hapala, I.
Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Harb, J. N.
Microscopic Batteries for MEMS Systems – 82

Hargens, A. R.
WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

Hargens, Alan R.
Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Harima, Katsushige
Total Radiated Power of Radio Transmitters Measured in a Reverberation Chamber – 60

Harkay, K.
Single-Bunch Instability Driven by The Electron Cloud Effect in the Positron Damping Ring of the International Linear Collider – 244

Harker, D. E.
Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus? – 277

Harleston, Evelyn F
Logistics Maturity Evaluator – 217

Harmon, Nancy
Visually Based Timeline Debrief Toolset for Team Training AAR – 204

Harper, Robert
A Separate Compilation Extension to Standard ML (Revised and Expanded) – 195

Harris, David L
Chasing the Sun - The In-Flight Evaluation of an Optical Head Tracker – 93

Harris, F.
Relay Telescope, High Power Laser Alignment System, and Laser Peening Method and System Using Same – 259

Stimulated Brillouin Scattering Mirror System, High Power Laser and Laser Peening Method and System Using Same – 259

Harris, G. S.
Required Surveillance Performance Accuracy to Support 3-Mile and 5-Mile Separation in the National Airspace System – 7

Hart, Angela
Internal Cargo Integration – 26

Hart, Peter W
A Management Perspective of the Department of Defense (DoD) Internet Protocol Version 6 (IPv6) Transition Plan, Where it is Today, and Where it Needs to be by the Year 2008 – 197

Hartmann, Lynn C
Benign Breast Disease: Toward Molecular Prediction of Breast Cancer Risk – 164

Hartsfield, Carl R
Reactive Shear Layer Mixing and Growth Rate Effects on Afterburning Properties for Axisymetric Rocket Engine Plumes – 30

Harvey, M.
Measurements and Modeling of Eddy Current Effects in BNL's AGS Booster – 249

Hasberg, M P
Inventory of Simulation and Modeling for the Analysis of Ground Manoeuvre Performance (inventarisatie van vragen en modellen voor de analyse van het grondgebonden optreden) – 240

Hashimoto, Masashi
Real-Time Application Traffic Monitoring System for Streaming Data Quality Evaluation – 213

Haugan, Timothy J
Hysteretic Loss Reduction in Striated YBCO – 42

Hayashi, Hitoshi
A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59

Hayes, Richard E
Campaigns of Experimentation: Pathways to Innovation and Transformation – 74

Understanding Command and Control – 74

Hazi, A.
Gamma-Ray Bursts Shower the Universe with Metals – 276

Small Particle May Answer Large Physics Questions – 274

He, P.
Beam Pipe Desorption Rate in RHIC – 263

Hebel, M
Potential of Remote Laser Vibration Sensing for Military Applications – 94

Heer, M. A.
WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

Heer, Martina
Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Heinrichs, D. P.
Criticality Safety Evaluation of a LLNL Training Assembly for Criticality Safety (TACS) – 255

Hellweg, C. E.
The German ISS Experiment Cellular Responses to Radiation in Space (CERASP): The Effects of Single and Combined Space Flight Conditions on Mammalian Cells – 158

Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

Helweg, David A
Discrimination of Complex Synthetic Echoes by an Echolocating Bottlenose Dolphin – 252

Hemm, Robert V
Analytic Methods for Tactical Air Warfare - 2006. Air Campaign and Mathematical Analysis – 243

Hemmersbach, Ruth
Behavior of Gravisensitive Cells on 2D and 3D Clinostats – 144

Hemrick, J. G.
Comprehensive Creep and Thermophysical Performance of Refractory Materials – 55

Improved Materials for High-Temperature Black Liquor Gasification – 35

Hendrix, Alfred M.
The Outcome of ATC Message Complexity on Pilot Readback Performance – 9

Hendrix, Ruby
The Outcome of ATC Message Complexity on Pilot Readback Performance – 9

Hengartner, Urs
Access Control to Information in Pervasive Computing Environments – 267

Henggeler, Daniele
Effects of Vector-Averaged Gravity on the Response to Different Stimulatory Signals in T-Cells – 146

The Biolab Facility Responsible Center at the German Aerospace Center DLR – 155

Henning, A.
Statement of Work for Studies in BlueGene/L Scalability and Reconfigurability – 189

Henton, Glen C
Extending the Tactical Wireless Internet in Support of USMC Distributed Operations – 72

Henzinger, Thomas A
Model Checking Discounted Temporal Properties – 242

Heritsch, Scott
Limited Investigation and Characterization of Boundary Avoidance Tracking (Project HAVE BAT) – 6

Hermansson, Patrik
Benchmarking and Validation of IR Signature Programs: SensorVision, CAMEO-ESA and RadThermIR – 195

Herranz, Raul
Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 142

Herrin, Jason S.
Metal-Silicate Segregation in Asteroidal Meteorites – 279

Hes, B. J. M.
Do Perception and Postrotatory Vestibulo-Ocular Reflex Share the Same Gravity Reference? – 153

Heuschel, Eugene R
Time-Frequency, Bi-Frequency Detection Analysis of Noise Technology Radar – 252

Heyeres, Antoine
Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

Hibbert, Kirk R
A Need for Systems Architecture Approach for Next Generation Mine Warfare Capability – 197

Hickle, Curtis
Wind Tunnel Renovation, Flow Verification and Flapping Wing Analysis – 2

Hicks, R. F.
Method of Processing a Substrate – 34

Hides, J.
MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Higo, Yoko
How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

Hill, R. J. A.
Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

Hirano, Masahiko
Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Hirayanagi, Kaname
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

Hiroshi, Masuzawa
Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department – 61

Hite, J
Optical and magnetic properties of Eu-doped GaN – 41

Hjaimiri, S. A.
Distributed Oscillator Architectures – 75

Ho, G.
Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Hobbs, Jerry R
Coherence and Coreference – 270

Hochstedler, Robert
Implementation of a Modular Fly away Kits (FLAK) for C4ISR in order to counter Asymmetric Threats in the Coalition Riverine and Maritime Theatres – 73

Hock, B.
Phagocytosis as a Biomarker for Stress Responses – 139

Hocken, R. J.
Instrumentation and Metrology for Nanotechnology: Report of the National Nanotechnology Initiative Workshop. Held in Gaithersburg, Maryland on January 27-29, 2004 – 84

Hodgkinson, John
Verification and Validation of Neural Networks in Flight Control Systems – 288

Hodgson, E.
Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

Hoehler, Tori M.
An Energetic Concept of Habitability for the Deep Subsurface – 187

Hoel, L. A.
Comparative Evaluation of Air and Auto Travel Between Urban Regions (Quantifying Intercity Modal Accessibility) – 3

Hofacre, Kent C
Respirator Filter Efficiency Testing Against Particulate and Biological Aerosols Under Moderate to High Flow Rates – 95

Hoff, L.
Summary of Coupling and Tune Feedback Results During RHIC Run 6, and Possible Implications for LHC Commissioning – 263

Hoffman, Paul C
Testing of 7050-T7451 Aluminum Strain-Life Coupons for a Probabilistic Strain-Life Curve – 14

Hoffmann, Uwe
Influence of Weightlessness and Apnea on Heart Rate and Blood Pressure Regulation during Exercise – 121

Hogan, Robert
Automated Classification of Thermal Infrared Spectra Using Self-organizing Maps – 272

Holcomb, Franklin H
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 105

Detailed Fuel Cell Demonstration Site Summary Report: Naval Hospital at Marine Corps Air Ground Combat Center - Twentynine Palms – 106

Holekamp, Kara
Thermal Band Atmospheric Correction Using Atmospheric Profiles Derived from Global Positioning System Radio Occultation and the Atmospheric Infrared Sounder – 103

Honaker, R. Q.
In-Plant Testing of High-Efficiency Hydraulic Separators. (Annual Report, July 21, 2004-July 20, 2005) – 87

Hopins, John W.
Fabrication of 0.0075-Scale Orbiter Phosphor Thermography Test Models for Shuttle RTF Aeroheating Studies – 85

Horiuchi, Timothy K
The Microchip Optera Project – 77

Horkachuck, Mike
ISS Payloads Office Utilization/Research Cargo Familiarization – 27

Horn, Daniel B
Videogame-Based Training Success: The Impact of Trainee Characteristics - Year 2 – 202

Horn, E. R.
Hardware Development for Electrophysiological Long-Term Studies in Space – 141

SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

Hornero, R.
New Technique for Simulation of Microgravity and Variable Gravity Conditions – 161

Horsmon, Jr, Albert W
The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IIIB-2: Permanent Composite Cladding of Deteriorating Steel Hulls – 50

Hortman, Billy S
Usable Knowledge Gained or Refined for Personnel Serving in the Operating Forces Through Naval Postgraduate School's Distributed Learning Program – 205

Horton, W S
Thermomechanical Cycling Investigation of Cu and Niti Reinforced Lead-Free Solder – 49

Hosokawa, M
On Optimizing the Configuration of Time-Transfer Links Used to Generate TAI – 24

Hotchko, Nathaniel J.
Simulation and Analyses of Multi-Body Separation in Launch Vehicle Staging Environment – 23

Howard, J. B.
Fullerenic Structures and Such Structures Tethered to Carbon Materials – 249

Hseuh, H. C.
Beam Pipe Desorption Rate in RHIC – 263

Hsu, Michael
The Design and Implementation of a Prototype Web-Portal for the Integrated Mobile Alerting System (IMAS) – 206

Hu, E.
WTEC Panel Report on Nanostructure Science and Technology: R and D Status and Trends in Nanoparticles, Nanostructured Materials, and Nanodevices – 35

Hu, X.
Managing Space Radiation Risks on Lunar and Mars Missions: Risk Assessment and Mitigation – 186

Huang, An-Cheng
Building Self-configuring Services Using Service-specific Knowledge – 194

Huang, H.
Acceleration of Polarized Protons in the AGS with Two Helical Partial Snakes – 261

Beam Pipe Desorption Rate in RHIC – 263

Huang, T S
Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin – 34

Huber, K.
Phagocytosis as a Biomarker for Stress Responses – 139

Hudson, Larry D.
The X-37 Hot Structure Control Surface Testing – 291

Hudson, Larry
Fiber Optic Sensor Attachment Development and Performance Evaluations – 285

Hudson, Pierre
Asteroidal Differentiation Processes Deduced from Ultramafic Achondrite Ureilite Meteorites – 280

Huebner, Heather M
Naval Submarine Medical Research Laboratory Command History, OPNAV 5750-1 Fiscal Year 2005 – 165

Hugentobler, Urs
GPS Carrier Phase Analysis Noise on the USNO-PTB Baselines – 233

Hughes, William O.
Application of the Bootstrap Statistical Method in Deriving Vibroacoustic Specifications – 100

Hughson, R. L.
WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

Huisjes, H
WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis-)Mounted Soldier – 196

Humphrey, Marty A
Dispelling Seven Myths about Grid Resource Management – 215

Hurley, Elizabeth
Lunar Dust Activation and Related Studies – 274

Hurley, Sean M
Signal-to-Noise Ratio Gains and Synchronization Requirements of a Distributed Radar Network – 80

Huynh, An
Integrated Simulation Design Challenges to Support TPS Repair Operations – 272

Hwang, James C
Top vs. Bottom Charging of the Dielectric in RF MEMS Capacitive Switches (Preprint) – 78

Hwu, Shian U.
Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

Hyla, Bret M
Sample Entropy and Random Forests: A Methodology for Anomaly-based Intrusion Detection and Classification of Low-bandwidth Malware Attacks – 218

Iarlsson, Ingrid
Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

Ilieva, Iliana
A New Space Greenhouse Concept Development for Optimal Plant Growth – 144

Illmer, Norbert
Biolab Crew Training – 155

Ingria, Robert
The BBN Spoken Language System – 71

Irina, Sayenko
Mechanical Stimulation of the Foot Support Zones as a Way to Maintain Activity of the Tonic Muscular System during Functional Support Deprivation – 154

Iriso, U.
Beam Pipe Desorption Rate in RHIC – 263

Irvin, Cynthia E
Preliminary Security Requirements for SecureCore Hardware – 191

Isakeit, Dieter
The ERASMUS Experiment Archive – 129

Ishigami, Shinobu
Effects of Spread Spectrum Clocking on Measured Noise Spectra – 64

Electromagnetic Disturbance Measurement by Using Amplitude Probability Distribution for Protecting Digital Wireless Communication Systems – 61

Power Measurement Emitted by UWB System in Time Domain – 63

Ishihara, Akihiko
Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading – 160

Ivanov, O. G.
Effect of 6-Days of Support Withdrawal on Characteristics of Balance Function – 128

Ivanova, Krassimira
Hypergravity Modulates Cyclic GMP Efflux in Nitric Oxide-Stimulated Human Melanocytic Cells – 143

Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP – 135

Ivanova, Tania
A New Space Greenhouse Concept Development for Optimal Plant Growth – 144

Iwase, Satoshi
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

J., Hides
Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

J., Rittweger
Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

Jacobson, Steve
Networked Unmanned Aerial Vehicle Teams (NUAVT) – 288

Jacques, Bernard
Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 152

Janney, R. P.
Moving from Bilateral to Multilateral Medical Operations – 22

Jansen, M. B.
Monitor Activity, Temperature and Heart Rate with a Mouse Telemeter to be used for Animal Research on Board the International Space Station – 127

Jarchow, Thomas
Neurovestibular Adaptation to Short Radius Centrifugation – 150

Jaszlics, Sheila L
Obstacle Marking and Vehicle Guidance Science and Technology Objective (OMVG-STO) Augmented Reality for Enhanced Command and Control and Mobility – 69

Jeevarajan, Antony
Lunar Dust Activation and Related Studies – 274

Jelinski, L.
WTEC Panel Report on Nanostructure Science and Technology: R and D Status and Trends in Nanoparticles, Nanostructured Materials, and Nanodevices – 35

Jennings, Thomas J
Development and Evaluation of a Device for the Prevention of Arm Flail Injuries – 16

Jensen, G K
A Regenerative Frequency Divider of Improved Stability – 78

Improvements in Regenerative Frequency Dividers – 78

Portable Precision Frequency Meter – 57

Jensen, Randy
Visually Based Timeline Debrief Toolset for Team Training AAR – 204

Jeong, Jinseong
Envelope Switched Doherty Power Amplifier For RF Applications (Preprint) – 77

Jesneck, Jonathan
A Computer-Aided Diagnosis System for Breast Cancer Combining Digital Mammography and Genomics – 178

Jewsbury, Peter
The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-2: Areal Coverage Using Friction Surfacing – 33

Ji, J. S.
Langmuir Probe Distortions and Probe Compensation in an Inductively Coupled Plasma – 260

Jiang, Z
GPS Carrier Phase Analysis Noise on the USNO-PTB Baselines – 233

Jin, Li-jie
From Metacomputing to Metabusiness Processing – 192

Johnson, Duane
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

Johnson, Jeffrey R
Proteomics in Malaria – 166

Johnson, L M
U.S. Navy Radar Systems Survey – 78

Johnson, M. S.
Comparison of Techniques to Reduce Bremsstrahlung Background Radiation from Monoenergetic Photon Beams – 247

Johnson, N.
Haynes 230 Mini-Can Welding to Support Planned Irradiation Testing of Candidate Space Fuel Materials – 22

Johnson, Nicholas L.
A LEO Satellite Postmission Disposal Study using LEGEND – 279

The Disposal of Spacecraft and Launch Vehicle Stages in Low Earth Orbit – 26

Johnson, Paul K.
A Method for Calculating Viscosity and Thermal Conductivity of a Helium-Xenon Gas Mixture – 31

Performance and Operational Characteristics for a Dual Brayton Space Power System With Common Gas Inventory – 31

Johnson, R. E.
Toxecon Retrofit for Mercury and Multi Pollutant Control on Three 90-MW Coal Fired Boilers – 114

Johnson, R. P.
Simulations of MANX, A Practical Six Dimensional Muon Beam Cooling Experiment – 249

Johnson, R.
Cavity BPM with Dipole-Mode-Selective Coupler – 250

Johnson, Scott L
Beam Control of Extremely Agile Relaying Laser Source for Bifocal Relay Mirror Spacecraft – 24

Jones, Brian E
A Computer Graphics-Based Target Detection Model – 198

Jones, J. A.
Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

Jones, Jeffrey A.
Mechanism of Action for Anti-Radiation Vaccine in Reducing the Biological Impact of High-Dose Irradiation – 184

Jones, John H.
Early Planetary Differentiation: Comparative Planetology – 276

Jones, R. M.
Optimization of the X-Band Structure for the JLC/NLC – 261

Jones, Thomas
Flight Test of the Engine Fuel Schedules of the X-43A Hyper-X Research Vehicles – 290

Jordan, C.
Haynes 230 Mini-Can Welding to Support Planned Irradiation Testing of Candidate Space Fuel Materials – 22

Jordan, Jens
Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Jordan, Kevin
Evaluation of Cabin Crew Technical Knowledge – 3

Jost, P. D.
ESA Ground Based Facilities – 154

Josyula, Darsana
Detecting, Classifying, and Handling Contradictions in a Large, Dynamic Information Environment – 226

Juliano, Thomas F
Dynamic Response of an Alternative Tissue Simulant, Physically Associating Gels (PAG) – 38

Multiscale Mechanical Characterization of Biomimetic Physically Associating Gels – 53

Jurani, M.
Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Jurns, John
Metallized Gelled Propellants Combustion Experiments in a Pulse Detonation Engine – 56

Justh, Hilary L.
Mars Aerocapture Systems Study – 29

Kadwa, Binaifer
Public Risk Assessment of Off-Nominal Genesis Entries – 25

Kahn, S. M.
Capella Corona Revisited: A Combined View from XMM-Newton RGS Chandra HETGS, and LETGS – 277

Kalkum, M.
Method and System for Mass Spectroscopy – 257

Kalsi, M. S.
Rotary Shaft Sealing Assembly – 94

Kaminski, Sharon
Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation – 282

Kamiya, Atsunori
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

Kancler, David E
Analyzing Requirements for and Designing a Collaborative Tool Based on Functional and User Input – 16

Kania, Robert
Operator Control Units for the Dismounted Soldier – 226

Kantzos, Pete
Burst Testing and Analysis of Superalloy Disks With a Dual Grain Microstructure – 51

Kapat, Jay
Personal Cooling for Extra-Vehicular Activities on Mars – 274

Karlsson, Anders
Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

Katano, Hisako
Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Kathol, Andreas
Limited-Domain Speech-to-Speech Translation between English and Pashto – 228

Katsumi, Fujii
Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department – 61

Katz, D
Naval Electromagnetic (EM) Gun Technology Assessment – 246

Katz, H. E.
Devices Having Large Organic Semiconductor Crystals and Methods of Making the Same – 76

Layer Incorporating Particles with a High Dielectric Constant – 81

Thin Dielectric Layers on Substrates, and Methods of Making the Same – 76

Katz, Lawrence
U.S. Army Aviator Job Analysis – 4

Katz, Yarden
Implementing OWL Defaults – 210

Kauff, Noah D
Modifiers of the Efficacy of Risk-Reducing Salpingo-Oophorectomy for the Prevention of Breast and Ovarian Cancer in Carriers of BRCA1 and BRCA2 – 172

Kawabe, Naoko
How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

Kawai, Hiroki
Development of Exposure Systems and Exposure Assessment for Studies on Biological Effect of Electromagnetic Field – 64

Kawano, Fuminori
Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading – 160

How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

Mechanical and/or Neural Activity-Dependent Regulation of Soleus Muscle Fibers of MDX Mice – 159

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

Kawashima, Muenari
A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59

Kay, James T
Development of Future Course Content Requirements Supporting the Department of Defense's Internet Protocol Version 6 Transition and Implementation – 191

Kearns, Kim
Metallized Gelled Propellants Combustion Experiments in a Pulse Detonation Engine – 56

Keceli, Fuat
Dataflow Interchange Format and a Framework for Processing Dataflow Graphs – 209

Kecelli, Fuat
First Version of a Dataflow Interchange Format – 209

Keener, William K
An Activity-Dependent Assay for Ricin and Related RNA N-Glycosidases Based on Electrochemiluminescence – 162

Keeter, Robert R
The Army Digital Terrain Catalog II (ADTC) – 210

Keiser, J. R.
Improved Materials for High-Temperature Black Liquor Gasification – 35

Kelley-Loughnane, Nancy
Cell-Like Entities: On the Boundary Between Non-Living and Living – 178

Kempel, Leo
Driving Point Impedance for a Linear Array of Half-Width Leaky-Wave Antenna (Preprint) – 76

Kemper, R
WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis-)Mounted Soldier – 196

Kennelly, Robert A., Jr.
In-Flight Skin Friction Measurements Using Oil Film Interferometry – 10

Kerbeci, P.
Calf Tissue Liquid Stowage and Muscular and Deep Vein Distension in Orthostatic Tests after a 90-Day Head Down Bed Rest – 125

Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest – 148

WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

Kesavan, Jana S

Characteristics and Sampling Efficiencies of OMNI 3000 Aerosol Samplers – 43

Characteristics and Sampling Efficiency of Eight-Unit Linear Slot Impactor (EULSI) – 43

Ketten, Darlene R

Experimental Measures of Blast and Acoustic Trauma in Marine Mammals – 167

Khaiyer, Mandana M.

NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Khandelia, Mukul

Contention-Conscious Transaction Ordering in Embedded Multiprocessors Systems – 234

Khanna, R

Optical and magnetic properties of Eu-doped GaN – 41

Khusnutdinova, D. R.

Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions – 122

Khusnutdinova, D. R\g

Effect of 7-Days Dry Immersion in Combination with Mechanical Stimulation of Foot Support Zones upon Resistance to Fatigue of Knee Extensors and Flexors – 156

Kielb, R

Improved Modeling Tools For High Speed Reacting Flows – 237

Kikolaev, P.

Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Killian, James

Sensor Systems for Biological Agent Attacks: Protecting Buildings and Military Bases – 93

Kilmain, Charles J.

Operational Influence on Thermal Behavior of High-Speed Helical Gear Trains – 98

Kim, D.

CThC7 25 nJ Passively Mode-Locked Fiber Laser at 1080 nm – 259

Kim, J. S.

CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy – 45

Langmuir Probe Distortions and Probe Compensation in an Inductively Coupled Plasma – 260

Kim, Jungho

A Novel Method for Measurement of Total Hemispherical Emissivity – 21

Kim, M. H.

Managing Space Radiation Risks on Lunar and Mars Missions: Risk Assessment and Mitigation – 186

Kimball, Owen

Recognition Using Classification and Segmentation Scoring – 71

Kimmerly, Derek S.

Cortical Regions Associated with Orthostatic Stress in Conscious Humans – 137

Kimoto, Mari

Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

Kimura, Nobuhiro

High Availability Server Platform for Operations Support System – 213

Kirchner, S.

Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

Kirk, H. G.

Choice of Proton Driver Parameters For a Neutrino Factory – 263

Kirsch, K. A.

Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

Kirschbaum, C.

Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

Kiss, John Z.

Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems – 145

Kissner, Lea

Privacy-Preserving Set Operations – 239

Kitazawa, Hironori

Development of the Measurement Technology of the Spurious Emission from Primary Radar – 62

Kitmacher, Gary H.

Reference Guide to the International Space Station – 30

The International Space Station: A Pathway to the Future – 273

Klaus, Susanne

Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Klein-Nulend, J.

Modulation of Gene Expression in Bone Cells during Strain-Adapted Bone Remodeling – 150

Klingelhoefer, Goestar

Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

Klink, M H van

WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis-)Mounted Soldier – 196

Kloeris, Vickie

Food and Nutrition for the Moon Base: What we have Learned in 45 Years of Space Flight – 179

Klymchuk, Dmytro

Changes in Ultrastructure of Mitochondria in Root Apex Cells of Soybean Seedlings in Microgravity – 147

Knapp, D. A.

List Mode Multichannel Analyzer – 83

Knight, Doyle

RTO WG 10: Test Cases for CFD Validation of Hypersonic Flight – 86

Knijnenburg, S G

WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis-)Mounted Soldier – 196

Knorr, D.

Haynes 230 Mini-Can Welding to Support Planned Irradiation Testing of Candidate Space Fuel Materials – 22

Ko, Eon-Suk

Development and Evaluation of a Korean Treebank and its Application to NLP – 266

Ko, Mingyung

First Version of a Dataflow Interchange Format – 209

Ko, William L.

Displacement Theories for Inflight Deformed Shape Predictions of a Long Span Flying Wing – 287

Predictions of Aerostructures Operational Flight Life Using the Half-Cycle Crack Growth Program – 293

Kobus, D A

DARPA Improving Warfighter Information Intake Under Stress -- Augmented Cognition. Volume 1. Phase 2: Concept Validation Experiment – 187

Koes, David

Adding Faster with Application Specific Early Termination – 212

Kohmuench, J. N.

In-Plant Testing of High-Efficiency Hydraulic Separators. (Annual Report, July 21, 2004-July 20, 2005) – 87

Koike, Kunimasa

Evaluation of Uncertainty of Horn Antenna Calibration with the Frequency range of 1 GHz to 18 GHz. – 62

Uncertainty Estimation of Loop Antenna Calibration System in MF/HF Band – 62

Kojima, Atsushi
Effects of Heat Stress on the Regeneration of Injured Skeletal Muscle in Rats – 126

Kokes, Joseph
Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results – 86

Kolinsky, Regine
Investigating Human Cognitive Performance during Spaceflight – 121

Koller, Daphne
Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised) – 101

Kolovski, Vladimir
Implementing OWL Defaults – 210

Kolsti, Kyle
Limited Investigation and Characterization of Boundary Avoidance Tracking (Project HAVE BAT) – 6

Komilis, D.
Laboratory Study to Investigate Gaseous Emissions and Solids Decomposition During Composting of Municipal Solid Wastes – 113

Kondrachuk, Alexander V.
Changes in the Topography of Cellular Components in Pea Root Statocytes Exposed to High Gradient Magnetic Field – 133

The Role of Possible Feedback Mechanisms in the Effects of Altered Gravity on Formation and Function of Gravireceptors of Mollusks and Fish – 151

Koontz, Steven L.
Ionizing Radiation Environment on the International Space Station: Performance vs. Expectations for Avionics and Material – 283

Kordyum, E. L.
Actin Organization and Gene Expression in Beta Vulgaris Seedlings under Clinorotation – 123

Differentiation of Plant Graviperceiving and Graviresponding Cells in Altered Gravity – 124

Kordyum, Elizabeth L.
Altered Gravity Causes the Changes in the Protein NopA100 in Plant Cell Nucleoli – 139

Kornilova, L.
Characteristics of the Eyes Pursuit Function during Readaptation to Terrestrial Gravity after Prolonged Flights Aboard the International Space Station – 182

Korth, David
Integrated Human-Robotic Missions to the Moon and Mars: Mission Operations Design Implications – 230

Kosenko, M M
Effects of Techa River Radiation Contamination on the Reproductive Function of Residents – 174

Kostov, Plamen
A New Space Greenhouse Concept Development for Optimal Plant Growth – 144

Kostyk, Christopher
Full Field Thermal Protection System Health Monitoring System for Crew Exploration Vehicles – 290

Kou, L
Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin – 34

Koutchouk, J. P.
Observation of Long-Range Beam-Beam Effect in RHIC and Plans for Compensation – 263

Kovats, Keith E
Assessing the Potential Value of FORCEnet Technologies Within the JFMCC Planning Process Using the Knowledge Value Added Methodology – 211

Kowoll, R.
Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

Kowtko, Jacqueline C
Data Collection and Analysis in the Air Travel Planning Domain – 73

Kozanecki, W.
Combined Phase Space Characterization at the PEP-II IP Using Single-Beam and Luminous-Region Measurements – 250

Kozeko, L. Ye
Actin Organization and Gene Expression in Beta Vulgaris Seedlings under Clinorotation – 123

Kozeko, L. Ye.
Differentiation of Plant Graviperceiving and Graviresponding Cells in Altered Gravity – 124

Kozlovskaya, I. B.
Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions – 122

Effect of 6-Days of Support Withdrawal on Characteristics of Balance Function – 128

Effect of 7-Days Dry Immersion in Combination with Mechanical Stimulation of Foot Support Zones upon Resistance to Fatigue of Knee Extensors and Flexors – 156

Kraemer, Kathleen E
Spectral Irradiance Calibration in the Infrared. XVI. Improved Accuracy in the Infrared Spectra of the Secondary and Tertiary Standard Calibration Stars – 253

Kranzusch, Kara M.
Entry Abort Determination using Non-adaptive Neural Networks for Mars Precision Landers – 28

Krasnov, I. B.
Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G – 126

Kroetz-Fahning, M.
Phagocytosis as a Biomarker for Stress Responses – 139

Kroll, Quin D.
Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

Krueger, Ronald
Influence of Finite Element Software on Energy Release Rates Computed Using the Virtual Crack Closure Technique – 37

Krueger, Seth R
Simulation of Cylinder Implosion Initiated by Underwater Explosion – 206

Krutchinsky, A.
Method and System for Mass Spectroscopy – 257

Kuang, A.
Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

Kubala, Francis
Search Algorithms for Software-Only Real-Time Recognition with Very Large Vocabularies – 234

Speaker Adaptation Using Multiple Reference Speakers – 73

Kubisiak, Chris
U.S. Army Aviator Job Analysis – 4

Kucukozyigit, Ali C
Electronic Warfare (EW) Historical Perspectives and Its Relationship to Information Operations (IO) - Considerations for Turkey – 202

Kuhajda, Francis P
Inhibition of Fatty Acid Synthase (FAS): A New Drug for Breast Cancer Chemoprevention – 165

Kuhl, Christopher T
Studies in Forecasting Upper-Level Turbulence – 13

Kukreja, Sunil, L.
A Least Absolute Shrinkage and Selection Operator (LASSO) for Nonlinear System Identification – 286

Kukreja, Sunil L.
Nonlinear Aeroelastic System Identification with Application to Experimental Data – 286

Kumar, Rakesh
Indian Nuclear Command and Control Dilemma – 67

Kumar, V.
WTEC Panel Report on International Assessment of Research and Development in Robotics – 189

Kumei, Yasuhiro
Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

Kumel, Yasuhiro
Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Kunimasa, Koike
Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department – 61

Kuroiwa, Hiroshi
Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

Kurokawa, Hideo
Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

Kurths, Juergen
An Innovative Approach for the Assessment of 3D Structures in Trabecular Bone – 122

Kurtz, J
Improving the Performance of Perfectly Matched Layers by Means of hp-Adaptivity – 243

Kuwabara, Takuhito
A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope – 60

Kuykendoll, Kathryn
Fabrication of 0.0075-Scale Orbiter Phosphor Thermography Test Models for Shuttle RTF Aeroheating Studies – 85

Kvetnansky, R.
Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Kwong-Yan, Lok
100X Joint Battlespace Infosphere (JBI) – 216

LaBash, Charles
Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results – 269

LaFolette, R. C.
Microscopic Batteries for MEMS Systems – 82

LaFond, Karen
The Evaluation of Project Management Performance on Two Software Maintenance Projects Based on a CMMI Framework – 205

Lahut, Matt
The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

Lai, Shu T
Analytic Models for a Spherical Satellite Charging in Sunlight at any Spin Rate – 21

Aspects of Spacecraft Charging in Sunlight – 21

Lamb, Jerry C
Naval Submarine Medical Research Laboratory Command History, OPNAV 5750-1 Fiscal Year 2005 – 165

Lamb, Timothy G
Future Small Unmanned Aerial System (SUAS) Flight And Mission Control Support System (FMCSS) Design – 13

Lambers, Britta
Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight? – 142

Effects of Vector-Averaged Gravity on the Response to Different Stimulatory Signals in T-Cells – 146

Molecular Mechanisms of Gravity-Dependent Signaling in Human Melanocytic Cells Involve Cyclic GMP – 135

Lambert, Charles A.
Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

Lambert, Ch.
Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Lambert, H. E.
Use of Antineutrino Detectors for Nuclear Reactor Safeguards Effectiveness Assessment – 247

Lambrineas, Peter
The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-2: Areal Coverage Using Friction Surfacing – 33

Lan, Yong Bo
How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

Mechanical and/or Neural Activity-Dependent Regulation of Soleus Muscle Fibers of MDX Mice – 159

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

Landis, Geoffrey A.
Evaluation of Long Duration Flight on Venus – 282

Landreth, Kent A
Extending the Tactical Horizon: Networking Aircraft to Enable Persistent Surveillance and Target Development for SOF – 12

Landry, Kenneth J
The Performance and Compatibility of Thin Client Computing with Fleet Operations – 220

Lane, Helen
Food and Nutrition for the Moon Base: What we have Learned in 45 Years of Space Flight – 179

Lapiere, Charles M.
Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

Laribee, Lena
Development of Methodical Social Engineering Taxonomy Project – 220

Laroche, Norbert
Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

Lastnik, Abraham L
A Photo-Computer Technique for Design and Analysis of Personal Protective Equipment – 200

Lau, P.
Three Dimensional Culture of the Murine Osteoblastic Cell Line OCT-1 on Collagen Coated Microcarriers – 122

Lawler, John
A Novel Method for Measurement of Total Hemispherical Emissivity – 21

Lawrence, Lemuel S
An Object-Oriented View of Backend Databases in a Mobile Environment for Navy and Marine Corps Applications – 198

Lawson, B. Michael
Exploration Life Support Directions – 188

Lazauski, Colin J
Tools for Multidimensional Visualization of Acoustic Modeling Outputs in a Geospatial Environment: Phase 1 - Feasibility Results – 269

Le, Phong D
The Design and Implementation of a Prototype Web-Portal for the Integrated Mobile Alerting System (IMAS) – 206

Leary, R.
Improved Materials for High-Temperature Black Liquor Gasification – 35

LeBlanc, Troy
Integrated Human-Robotic Missions to the Moon and Mars: Mission Operations Design Implications – 230

Lee, David A
Analytic Methods for Tactical Air Warfare - 2006. Air Campaign and Mathematical Analysis – 243

Lee, Eungkuk
Hysteretic Loss Reduction in Striated YBCO – 42

Lee, J
Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin – 34

Lee, Juhnyoung
Issues in Developing Object-Oriented Database Systems for Real-Time Applications – 192

Lee, M. W.
Inversion of Elastic Impedance for Unconsolidated Sediments – 87

Lee, Mark
GPS Carrier Phase Analysis Noise on the USNO-PTB Baselines – 233

Lee, Myung-Joon
Issues in Developing Object-Oriented Database Systems for Real-Time Applications – 192

Lee, P.
Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

Lee, S. M. C.
WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

Lee, Toby
Optimizing CAT-ASVAB Item Selection Using Form Assembly Techniques – 241

Lee, Young
Integrated Human-Robotic Missions to the Moon and Mars: Mission Operations Design Implications – 230

Lefkofsky, Ryan
Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

Legay, Axel
Sociable Interfaces – 229

Lehmann, Wolfgang
An Upgradeable Agent-Based Model to Explore Non-Linearity and Intangibles in Peacekeeping Operations – 207

LeMair, Anita F.
Vestibular Adaptation to Changing Gravity Levels and the Orientation of Listing's Plane – 149

Lemmons, Neil
ISS Commercial Cargo Service: Requirements and Constraints Summary – 25

Lenahan, Jack
Are DoD Network Centric Policies, Processes and Edge Organizations Sufficiently Adaptable to Adequately Respond to the Impact of Globalization? – 71

Are Service Oriented Architectures the Only Valid Architectural Approach for the Transformation to Network Centric Warfare? – 221

Lengyel, B A
Physical Optics of Metal Plate Media Part 1, Theoretical Considerations – 258

Lennon, Clifton G
A Game-Theoretic Model for Repeated Helicopter Allocation Between Two Squads – 237

Lenser, Scott
On-line Robot Adaptation to Environmental Change – 239

Leo, Donald J.
Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

Lesuer, D. R.
Mechanical and Thermal Properties of Ultra-High Carbon Steel Containing Aluminum – 50

Levin, Timothy E
Preliminary Security Requirements for SecureCore Hardware – 191

Levine, Brian N
A Comparison of Known Classes of Reliable Multicast Protocols – 227

Levine, L. H.
Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

Levis, William R
Unsteady Casewall Pressure Measurements in a Transonic Compressor during Steam Induced Stall – 18

Lewis, Grace A
Workshop on Program Generation and Model-Driven Architecture – 200

Lewis, Nate
Reducing DoD Fossil-Fuel Dependence – 56

Leyh, G. E.
Marx Modulator Development Program for the International Linear Collider – 249

Li, Hongyan
Amplitude Analysis and Modeling of Regional Phases in PNE Profiles in Northern Eurasia and Seismic Regionalization – 115

Li, Jin-Sheng
Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory – 142

Li, Z.
Cavity BPM with Dipole-Mode-Selective Coupler – 250

Optimization of the X-Band Structure for the JLC/NLC – 261

Liang, J
Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin – 34

Liao, James C
DNA MIcroarray-Assisted Modeling of Metabolic and Regulatory Networks With Applications to Bio-Defense – 169

Lilja, Hans
Novel Protein Microarray Technology to Examine Men with Prostate Cancer – 169

Lim, Peter
Enhancement of an Analytical Method for the Determination of Squalene in Anthrax Vaccine Absorbed Formulations – 40

Lin, Amy
Development of a Test Facility for Air Revitalization Technology Evaluation – 8

Lin, Mike C
Energy and Process Optimization and Benchmarking of Army Industrial Processes – 105

Lin, Yohan
The X-43A Flight System Highlights and Challenges for the Second and Third Flights – 294

Linderman, Richard W
100X Joint Battlespace Infosphere (JBI) – 216

Lindstrom, Joel
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 105

Linzey, W. G.
Development of an Electrical Wire Interconnect System Risk Assessment Tool – 9

Liou, J.-C.
A LEO Satellite Postmission Disposal Study using LEGEND – 279

Lisal, Martin
Dual Control Cell Reaction Ensemble Molecular Dynamics: A Method for Simulations of Reactions and Adsorption in Porous Materials – 39

Reaction Ensemble Molecular Dynamics: Direct Simulation of the Dynamic Equilibrium Properties of Chemically Reacting Mixtures – 39

Liscinsky, D S
Advanced Fuel Development and Fuel Combustion. Delivery Order 0005: Mitigation of Particulates Using Fuel Additives – 55

Litt, Jonathan S.
Evaluation of an Outer Loop Retrofit Architecture for Intelligent Turbofan Engine Thrust Control – 18

Litvinova, K. S.
Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcromeric Cytoskeletal Proteins of Hindlimb Suspended Rats – 120

Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent – 127

Liu, Y.
Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

Liuzzo, M. I.
A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

Lizotte, Jeremy R.
Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

Lo, Joseph
A Computer-Aided Diagnosis System for Breast Cancer Combining Digital Mammography and Genomics – 178

Lobascio, Cesare
Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study – 124

Lochner, Michael J
Decomposition of GD on CeO2/Alumina Adsorbents in a Gas Chromatograph On-Column Injector Tube Reactor – 42

Lockley, Steven
Reproductive and Hormonal Risk Factors for Breast Cancer in Blind Women – 176

Loginov, V. I.
Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G – 126

Logothetis, Christopher J
The Clinical Development of Thalidomide as an Angiogenesis Inhibitor Therapy for Prostate Cancer – 167

Loh, Yin-Chung
Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

Lohani, Sumit
System Synthesis for Polymorphous Computing Architectures – 209

Lokos, William A.
Simultaneous Flight Demonstration of Three Wing Deflection Measurement Approaches – 287

Long, Brian S
Implementation of a Distributed Time Based Simulation of Underwater Acoustic Networking Using Java – 252

Long, Timothy E.
Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

Lorincz, E. N.
Do Perception and Postrotatory Vestibulo-Ocular Reflex Share the Same Gravity Reference? – 153

Lovelace, William M
Multi-User Performance Issues in Wireless Impulse Radio Networks – 70

Lovis, Pascal
Effects of Vector-Averaged Gravity on the Response to Different Stimulatory Signals in T-Cells – 146

Lowe, K. C.
Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

Lu, Sao-Dung
Development of a Test Facility for Air Revitalization Technology Evaluation – 8

Lu, Y.
Magnetic Random Access Memory Using Memory Cells with Rotated Magnetic Storage Elements – 83

Luccio, A. U.
Symplectic Interpolation – 256

Ludlam, T.
Can We Discover the QCD Critical Point at RHIC – 248

Luft, Friederich C.
Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Luft, Friedrich C.
Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Lukacas, IV, John A
Hit-to-Kill Guidance Algorithm for the Interception of Ballistic Missiles During the Boost Phase – 207

Luke, S. J.
List Mode Multichannel Analyzer – 83

Lund, John J
Field Programmable Gate Array Hysteresis Control of Parallel Connected Inverters – 206

Luo, Y.
Summary of Coupling and Tune Feedback Results During RHIC Run 6, and Possible Implications for LHC Commissioning – 263

Lurie, Keith G.
Restoration of Central Blood Volume: Application of a Simple Concept and Simple Device to Counteract Cardiovascular Instability in Syncope and Hemorrhage – 151

Luttrell, G. H.
In-Plant Testing of High-Efficiency Hydraulic Separators. (Annual Report, July 21, 2004-July 20, 2005) – 87

Lutzmann, Peter
Potential of Remote Laser Vibration Sensing for Military Applications – 94

Lux, Scott M
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

Canola Oil Fuel Cell Demonstration: Volume 3 - Technical, Commercialization, and Application Issues Associated with Harvested Biomass – 105

Ma, Jin
Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats – 129

Angiotensinogen Expression in Vascular Tissues of Simulated Weightless Rats – 153

Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity – 157

Macalanda, Eduardo C
Radio Frequency Identification (RFID) for Naval Medical Treatment Facilities (MTF) – 168

MacDonald, Adam
Blind Deconvolution of Anisoplanatic Images Collected by a Partially Coherent Imaging System – 94

Machula, Michael
Orbiter Repair Maneuver Contingency Separation Methods and Analysis – 26

Macias, B. R.
WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

MacKay, W. W.
Feasibility of a Spin Decoherence Measurement – 262

Symplectic Interpolation – 256

Mackey, T. C.
Hanford Double-Shell Tank Thermal and Seismic Project ANSYS Benchmark Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank – 99

Hanford Double-Shell Tank Thermal and Seismic Project Buckling Evaluation Methods and Results for the Primary Tanks – 99

Hanford Double-Shell Tank Thermal and Seismic Project Dytran Analysis of Seismically Induced Fluid-Structure Interaction in a Hanford Double-Shell Primary Tank – 99

Hanford Double-Shell Tank Thermal and Seismic Project Establishment of Methodology for Time Domain-Structure Interaction Analysis of a Hanford Double-Shell Tank – 99

Hanford Double-Shell Tank Thermal and Seismic Project Seismic Analysis of Hanford Double-Shell Tanks – 111

Hanford Double-Shell Tank Thermal and Seismic Project Summary of Combined Thermal and Operating Loads – 85

MacLean, John
Integrated Simulation Design Challenges to Support TPS Repair Operations – 272

Maginn, E. J.
Strategic Design and Optimization of Inorganic Sorbents for Cesium, Strontium and Actinides – 46

Mahan, Robert P
Iconic Representation and Dynamic Information Fidelity: Implications for Decision Support – 77

Maier, Jeanette
Effects of Space-Flight Simulation on Human Cells – 140

Mailloux, R J
A Commemoration of Deschamps' and Sichak's 'Microstrip Microwave Antennas': 50 Years of Development, Divergence, and New Directions – 80

Majumdar, Rupak
Model Checking Discounted Temporal Properties – 242

Makkonen, U.
Test of a Filter Pack Combined with a PM10 Inlet. Final Report from NMR Project – 113

Makoto, Sakasai
Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department – 61

Maletic, Amy
Logistics Maturity Evaluator – 217

Maliakal, A. J.
Layer Incorporating Particles with a High Dielectric Constant – 81

Maliev, Vladislav
Mechanism of Action for Anti-Radiation Vaccine in Reducing the Biological Impact of High-Dose Irradiation – 184

Malmquist, David L
Weld Shrinkage Study – 48

Maluf, David A.
Sensing Super-Position: Human Sensing Beyond the Visual Spectrum – 182

Manderscheid, Jane M.
Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

Maner, R. M.
Dual Mode Display with a Backlight Filter for an Unactivated Light Emitting Diode – 82

Manieri, P.
SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

Manieri, Pierfilippo
Biolab Experiment Development Status 2005 – 123

Mano, Tada-aki
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

Manry, Rebecca A
Performance Comparison between Rough and Smooth-Cast Blades in a Low-Speed Multistage Compressor – 86

Mantzouris, Georgios
Thermo-mechanical Analysis of Ground-based Directed Energy Weapons on Satellites and Intercontinental Ballistic Missiles – 24

Marco, Roberto
Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 142

Marcus, John G
Logistics Maturity Evaluator – 217

Margolis, Leonid B.
Different Pathogenesis of CCR5-Using Primary HIV-1 Isolates from Non-Switch and Switch Virus Patients in Human Lymphoid Tissue Ex Vivo – 162

Markel, T.
Plug-In Hybrid Electric Vehicle Energy Storage System Design. Preprint – 104

Marquez-Chisolm, Daniel J
Natural Frequencies and Mode Shapes of a Nonlinear, Uniform Cantilevered Beam – 245

Martin John G.
An Overview of the Role of Systems Analysis in NASA's Hypersonics Project – 1

Martindale, Michael
A Discrete-Event Simulation Model for Evaluating Air Force Reusable Military Launch Vehicle Post-Landing Operations – 23

Martyn, G. G.
Actin Organization and Gene Expression in Beta Vulgaris Seedlings under Clinorotation – 123

Differentiation of Plant Graviperceiving and Graviresponding Cells in Altered Gravity – 124

Martz, H. E.
X-Ray Digital Radiography and Computed Tomography of High Energy Density Physics (HEDP) Material, Subassemblies and Targets – 248

X-Ray Digital Radiography and Computed Tomography of ICF and HEDP Materials, Subassemblies and Targets – 247

Martzivanon, M.
Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

Marusic, A.
Summary of Coupling and Tune Feedback Results During RHIC Run 6, and Possible Implications for LHC Commissioning – 263

Marwan, Norbert
An Innovative Approach for the Assessment of 3D Structures in Trabecular Bone – 122

Mas, J.
Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Masabuchi, Koichi
The National Shipbuilding Research Program, 1991 Ship Production Symposium Proceedings: Paper No. IVB-3. Recent MIT Research on Residual Stresses and Distortion in Welded Structures – 49

Mason, Lee S.
Performance and Operational Characteristics for a Dual Brayton Space Power System With Common Gas Inventory – 31

Masseling, B. H. C. J.
Monitor Activity, Temperature and Heart Rate with a Mouse Telemeter to be used for Animal Research on Board the International Space Station – 127

Mastrapa, Rachel
New Optical Constants for Amorphous and Crystalline H2O-ice – 257

Masuzawa, Hiroshi
Evaluation of Uncertainty of Horn Antenna Calibration with the Frequency range of 1 GHz to 18 GHz. – 62

Uncertainty Estimation of Loop Antenna Calibration System in MF/HF Band – 62

Matia, Isabel
Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems – 145

Matos, Antonio P
Characterization and Application of Four-Layer Semiconductor Structures in Pulse Mode Operation – 79

Matsakis, D
On Optimizing the Configuration of Time-Transfer Links Used to Generate TAI – 24

Matsakis, Demetrios
GPS Carrier Phase Analysis Noise on the USNO-PTB Baselines – 233

Matsui, Munehiro
Software Defined Radio Prototype (II): Implementation and Evaluation of IEEE 802.11 Wireless LAN – 214

Matsumoto, Yasushi
Effects of Spread Spectrum Clocking on Measured Noise Spectra – 64

Electromagnetic Disturbance Measurement by Using Amplitude Probability Distribution for Protecting Digital Wireless Communication Systems – 61

Power Measurement Emitted by UWB System in Time Domain – 63

Matsuoka, Yoshikazu
Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading – 160

How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

Mechanical and/or Neural Activity-Dependent Regulation of Soleus Muscle Fibers of MDX Mice – 159

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

Matsuzawa, Shu-ichi
The Role of Siah1-Induced Degradation of Beta-Catenin in Androgen Receptor – 165

Mattar, L.
WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

Mauger, J.
List Mode Multichannel Analyzer – 83

Mawby, David
A Network-Centric Operations Case Study: US/UK Coalition Combat Operations During Operation Iraqi Freedom – 68

Mayes, Bessie
Beyond MARC: New Trends for the Library of the Future – 267

Mayes, P E
A Commemoration of Deschamps' and Sichak's 'Microstrip Microwave Antennas': 50 Years of Development, Divergence, and New Directions – 80

Mays, Thomas A
Low Voltage Electrolytic Capacitor Pulse Forming Inductive Network for Electric Weapons – 80

McCarthy, Catherine E.
Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation – 282

McClain, Bryan J
Experimentation in a Collaborative Planning Environment – 207

McClung, Christina
Shallow Water UXO Technology Demonstration Site, Scoring Record Number 2 – 251

McCook, D.
MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

McCoy, T.
Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

McCoy, Tim
Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

McCubbin, Patrick E
Determination of MS2 Bacteriophage Stability at Low pH Using the Integrated Virus Detection System (IVDS) – 92

McCune, Jonathan M
Device-Enabled Authorization in the Grey System – 194

McDermott, Patricia L
A Simulation-Based Tool to Train Rapid Decision-Making Skills for the Digital Battlefield – 202

McDougall, Ian
A Network-Centric Operations Case Study: US/UK Coalition Combat Operations During Operation Iraqi Freedom – 68

McEwen, Heather K.
Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 31

McFarland, Andrew R
Aerodynamic Aerosol Concentrators – 91

McFerron, Michael P
Light Reconnaissance Vehicle (LRV): Enhancing Command, Control, Communications, and Computers and Information Systems (C4I) to Tactically Employed Forces via a Mobile Platform – 216

McGeogh, James E
Portable Precision Frequency Meter – 57

McGowan, Jason M
A Game-Theoretic Model for Repeated Helicopter Allocation Between Two Squads – 237

McHale, James
Case Study: Accelerating Process Improvement by Integrating the TSP and CMMI – 11

McKee, S. A.
Statement of Work for Studies in BlueGene/L Scalability and Reconfigurability – 189

McLaughlin, D J
U.S. Navy Radar Systems Survey – 78

McNabb, D. P.
Comparison of Techniques to Reduce Bremsstrahlung Background Radiation from Monoenergetic Photon Beams – 247

McWherter, Shaun
Damage Emulation in the Dryden C-17 Simulation Estimating Maximum Torque Tolerance – 294

The C-17 Throttles-Only Control Evaluation and Simulation Validation – 284

Medina, Francisco Javier
Altered Gravity Causes the Changes in the Protein NopA100 in Plant Cell Nucleoli – 139

Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems – 145

Medina, Javier
Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 142

Mehta, Unmeel B.
An Overview of the Role of Systems Analysis in NASA's Hypersonics Project – 1

Meitner, Peter L.
The Nutating Engine-Prototype Engine Progress Report and Test Results – 16

Meloni, Dionigia
Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Meloni, M. A.
A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

Meloni, Maria A.
Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Mendeck, Gavin F.
Public Risk Assessment of Off-Nominal Genesis Entries – 25

Menezes de Carvalho, Marcelo
Analytical Modeling of Medium Access Control Protocols in Wireless Networks – 219

Meng, Qinjun
Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats – 129

Merce, R
The Characteristics of Spanish Reservoirs – 106

Merrill, Gerald A
A Quantitative Electrochemiluminescence Assay for Clostridium perfringens alpha toxin – 163

Merzlikina, N. V.
Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

Messerly, M. J.
CThC7 25 nJ Passively Mode-Locked Fiber Laser at 1080 nm – 259

Meyer, Emily Ann
Sensor Systems for Biological Agent Attacks: Protecting Buildings and Military Bases – 93

Meyer, Jr, Huber W
Coupling Between CTH and LS-DYNA for Thermal Postprocessing: Application to Propellant Cookoff From a Residual Penetrator – 261

Meyers, B C
Workshop on Program Generation and Model-Driven Architecture – 200

Meyers, M. E.
Specifications, Pre-Experimental Predictions, and Test Plate Characterization Information for the Prometheus Critical Experiments – 51

Michalakes, John
Data Structure and Parallel Decomposition Considerations on a Fibonacci Grid – 214

Michikami, Daisaku
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

Michler, C
Improving the Performance of Perfectly Matched Layers by Means of hp-Adaptivity – 243

Middenorf, Matthew S
The SAFIRE and an Initial Network-Centric Warfare Evaluation – 265

Midtlyng, P. J.
European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Migeotte, P. -F.
Respiratory Sinus Arrhythmia: A Marker of Decreased Parasympathetic Modulation after Short Duration Spaceflight – 151

Migeotte, P.-F.
3-D Ballistocardiography, A Tool Revisited for Following Astronaut Cardiovascular Function? – 132

Migeotte, Pierre-Francois
Investigating Human Cognitive Performance during Spaceflight – 121

Mikecz, P.
Environmental Challenge Impairs Prefrontal Brain Functions – 158

Miki, Iwama
Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department – 61

Miller, Brandon
Limited Investigation and Characterization of Boundary Avoidance Tracking (Project HAVE BAT) – 6

Miller, Christopher R
Statistical Analysis of Wireless Networks: Predicting Performance in Multiple Environments – 221

Miller, Kasey C
An Object-Oriented View of Backend Databases in a Mobile Environment for Navy and Marine Corps Applications – 198

Miller, Robert A
Energy and Process Optimization and Benchmarking of Army Industrial Processes – 105

Miller, T. F.
Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions – 122

Minarovits, Janos
Production of Cytokines by Human PBMCs in Simulated Microgravity – 149

Miner, Roy
Analysis of Operational Pace Versus Logistical Support Rate in the Ground Combat Element of a Marine Expeditionary Brigade – 203

Minetree, Courtney M
Rip Channel Migration in the Nearshore – 92

Mineur, P.
Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Ming, Douglas W.
Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

Ming, D.W.
Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

Minnis, Patrick
NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Minteer, S. D.
Immobilized Enzymes in Biocathodes – 82

Mishkin, Andrew
Integrated Human-Robotic Missions to the Moon and Mars: Mission Operations Design Implications – 230

Mital, Subodh K.
Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

Mitra, B.
Micro-Discharge Optical Source Apparatus and Method and System for Analyzing a Sample – 82

Mittlefehldt, D. W.
Metal-Silicate Segregation in Asteroidal Meteorites – 279

Mittlefehldt, David W.
Asteroidal Differentiation Processes Deduced from Ultramafic Achondrite Ureilite Meteorites – 280

Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

Mittlefehldt, D.W.
Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

Miyazaki, Toshiaki
Real-Time Application Traffic Monitoring System for Streaming Data Quality Evaluation – 213

Miyazawa, Yoshiyuki
Development of the Measurement Technology of the Spurious Emission from Primary Radar – 62

Miyota, Yukihiro
Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

Moeller, D.
Provably Secure Passwork-Based Authentication in TLS – 189

Moffat, James
The Agile Organization: From Informal Networks to Complex Effects and Agility – 75

Moghaddam, Saeed
A Novel Method for Measurement of Total Hemispherical Emissivity – 21

Mohty, D.
Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest – 148

Moldwin, Mark
Spacecraft Instrumentation to Measure and Stimulate Space Particles and Plasma Waves in the Medium-Earth Orbit (MEO) Regime – 115

Moloney, P.
Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Montemerlo, Michael
A System for Three-Dimensional Robotic Mapping of Underground Mines – 101

Montgomery, Ron W.
Aircraft Accidents and Incidents Associated With Visual Disturbances From Bright Lights During Nighttime Flight Operations – 184

Moore, Patrick W
Discrimination of Complex Synthetic Echoes by an Echolocating Bottlenose Dolphin – 252

Morais, Jose
Investigating Human Cognitive Performance during Spaceflight – 121

Morales-Rojas, Hugo
Metal Cation Mediated Hydrolysis of Phosphono-Formate Diesters: Chemoselectivity and Catalysis – 33

More, Massimo
Effects of Head Down Tilt upon Cortisol and Sex Hormones – 120

Moreno, Maria
Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Morgan, M. G.
In-Flight Ratio Frequency Spectrum Measurements of Commercial Aircraft Cabins – 65

Morgan, M. J.
Effect of Tritium and Decay Helium On Weldment Fracture Toughness – 52

Morgunov, V. A.
Morphology of Brain Vessels in the Tail Suspended Rats Exposed to Intermittent 2 G – 126

Morita, Sadao
Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Morozov, Igor B
Amplitude Analysis and Modeling of Regional Phases in PNE Profiles in Northern Eurasia and Seismic Regionalization – 115

Morozova, Elena
Amplitude Analysis and Modeling of Regional Phases in PNE Profiles in Northern Eurasia and Seismic Regionalization – 115

Morris, Richard V.
Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

Morrison, J G
DARPA Improving Warfighter Information Intake Under Stress -- Augmented Cognition. Volume 1. Phase 2: Concept Validation Experiment – 187

Morrison, Peter L
Effectiveness of Introductory Flight Screening (IFS) for USA Navy and Marine Corps Student Pilots – 4

Morrow, R. C.
Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

Moss, Cynthia
The Microchip Optera Project – 77

Moss, James N.
Orion Aerodynamics for Hypersonic Free Molecular to Continuum Conditions – 2

Moss, Robert A
Metal Cation Mediated Hydrolysis of Phosphono-Formate Diesters: Chemoselectivity and Catalysis – 33

Moukhina, A. M.
Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent – 127

Moukhina, Alexandra
Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats – 134

Moy, Paul
Dynamic Response of an Alternative Tissue Simulant, Physically Associating Gels (PAG) – 38

Multiscale Mechanical Characterization of Biomimetic Physically Associating Gels – 53

Mprrbramd. :ema
Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device – 126

Mravec, B.
Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Mueller, Aaron J
Survey of Available Artificial Intelligence Technologies for Addition Into Delta3D – 199

Muellerschkowski, Uwe
Biolab Crew Training – 155

Mulder, E. R.
Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest – 123

Muller, M.
European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Munk, Michelle M.
Mars Aerocapture Systems Study – 29

Muradian, Khachik
Relations Between Prooxidant and Antioxidant Variables in Hypergravity and Aging – 133

Murooka, Takahiro
Real-Time Application Traffic Monitoring System for Streaming Data Quality Evaluation – 213

Murphy, Brian T.
Transient Response of Rotor on Rolling-Element Bearings with Clearance – 96

Murphy, Dennis
Landpower and Network-Centric Operations: How Information in Today's Battlespace can be Exploited – 68

Murphy, VII, Tom
A Separate Compilation Extension to Standard ML (Revised and Expanded) – 195

Murthy, Pappu L. N.
Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

Muscettola, Nicola
Intelligent Rover Execution for Detecting Life in the Atacama Desert – 271

Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Musgrave, M. E.
Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

Mustachio, Nicholas
The International Space Station: A Pathway to the Future – 273

Naegle, Brad
Developing Software Requirements Supporting Open Architecture Performance Goals in Critical DoD System-of-Systems – 205

Nagaoka, Tomoaki
Development of Exposure Systems and Exposure Assessment for Studies on Biological Effect of Electromagnetic Field – 64

Studies on Dosimetry of Human-Body Exposure to Electromagnetic Field – 63

Nagatsu, Naohide
Standardization Activities on Optical Networking – 59

Nagle, David
Data Mining on an OLTP System (Nearly) for Free – 270

Nagy, E.
Audiological Findings in Antiorthostatic Position Modelling Microgravitation – 146

Naito, T.
Cavity BPM with Dipole-Mode-Selective Coupler – 250

Nakagawa, Tadao
A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59

Nakagawara, Van B.
Aircraft Accidents and Incidents Associated With Visual Disturbances From Bright Lights During Nighttime Flight Operations – 184

Nannini, Christopher J
Analysis of the Assignment Scheduling Capability for Unmanned Aerial Vehicles (ASC-U) Simulation Tool – 14

Nark, Douglas M.
On the Development of an Efficient Parallel Hybrid Solver with Application to Acoustically Treated Aero-Engine Nacelles – 17

Nash, Steve
PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD – 3

Nasution, Fajar Hamonangan
Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

Natalia, Krisanova
Comparison of the Effects of DL-threo-Beta-Benzyloxyaspartate on the Glutamate Release from Synaptosomes before and after Exposure of Rats to Artificial Gravity – 148

Natrajan, Anand
Dispelling Seven Myths about Grid Resource Management – 215

Naughton, Michelle J
Quality of Life and Functional Status Across the Life Course – 177

Naumov, I.
Characteristics of the Eyes Pursuit Function during Readaptation to Terrestrial Gravity after Prolonged Flights Aboard the International Space Station – 182

Nawrocki, Elise
Interactive Electronic Technical Manuals (IETMs) Annotated Bibliography – 270

Neal, Dwayne D
A Quantitative Electrochemiluminescence Assay for Clostridium perfringens alpha toxin – 163

Nelson, W T
Collaboration Technology in Military Operations: Lessons Learned from the Corporate Domain – 208

Nelsson, Claes
Benchmarking and Validation of IR Signature Programs: SensorVision, CAMEO-ESA and RadThermIR – 195

Nemes, Janos
Detailed Structural Analysis on Retinal Vascular Bed by Automated Computer Processing of Fluorescein Angiography – 133

Nemirovskaya, T. L.
Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent – 127

Nemirovskaya Tatiana
Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats – 134

Netreba, A. I.
Dynamics of Changes of Shin and Hip Muscles Contractile Properties under Dry Immersion Conditions – 122

Effect of 7-Days Dry Immersion in Combination with Mechanical Stimulation of Foot Support Zones upon Resistance to Fatigue of Knee Extensors and Flexors – 156

Nevins, Stephen C.
Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

Newsome, James
GEM: Graph EMbedding for Routing and Data-Centric Storage in Sensor Networks without Geographic Information – 221

Ng, Andrew Y
Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised) – 101

Ng, Howard
Internet Protocol Over Telemetry Testing for Earth Science Capability Demo Summary – 289

Nguyen, Duc T.
On the Development of an Efficient Parallel Hybrid Solver with Application to Acoustically Treated Aero-Engine Nacelles – 17

Nguyen, Hung T.
Integrated Simulation Design Challenges to Support TPS Repair Operations – 272

Nguyen, Long
Search Algorithms for Software-Only Real-Time Recognition with Very Large Vocabularies – 234

Nguyen, Louis H.
International Space Station Centrifuge Rotor Models A Comparison of the Euler-Lagrange and the Bond Graph Modeling Approach – 96

Nguyen, Louis
NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Nguyen, Thuy D
Preliminary Security Requirements for SecureCore Hardware – 191

Nguyen-Tuong, Anh
Dispelling Seven Myths about Grid Resource Management – 215

Nicola, Senesi
Assessing the Effect of Humic Acids on Germinating a Native American Plant – 43

Nieminen, Petteri
Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study – 124

Nikjoo, H.
Managing Space Radiation Risks on Lunar and Mars Missions: Risk Assessment and Mitigation – 186

Nina, Himmelreich
Comparison of the Effects of DL-threo-Beta-Benzyloxyaspartate on the Glutamate Release from Synaptosomes before and after Exposure of Rats to Artificial Gravity – 148

Nishikawa, Kenjiro
A Wideband RF Chipset for Multi-band Direct Conversion Transceivers – 59

Nishimura, M.
Effects of Water Temperature on Cardiac Autonomic Nervous System Modulation during Foot Immersion (Foot Bath) – 140

Nishizono, Toshihiro
High Availability Server Platform for Operations Support System – 213

Service Management System for IP Services – 213

Noffz, Greg
Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

Nolan, Margaret
Visually Based Timeline Debrief Toolset for Team Training AAR – 204

Nooij, Suzanne A. E.
Vestibular Adaptation to Changing Gravity Levels and the Orientation of Listing's Plane – 149

Nord, Robert L
Proceedings of the Second Software Architecture Technology User Network (SATURN) Workshop – 196

Nordeen, Michele L.
NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Normand, H.
Intracranial Pressure Increases during Weightlessness. A Parabolic Flights Study – 151

Norris, Lee
A Reusable Design for Precision Lunar Landing Systems – 281

Nosochkov, Y.
Luminosity Improvement at PEP-II Based on Optics Model and Beam-Beam Simulation – 265

Noszek, Annamaria
Detailed Structural Analysis on Retinal Vascular Bed by Automated Computer Processing of Fluorescein Angiography – 133

Structural Reappraisal of Dendritic Tree of Cerebellar Purkinje Cell for Novel Functional Modeling of Elementary Sensorimotor Adaptive Processes – 147

Nourizadeh-Lillabadi, R.
European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Novatnack, John
Drexel Object Occlusion Repository (DOOR) – 241

Nunez, F.
Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Nunziati, Walter
An Invariant Representation for Matching Trajectories Across Uncalibrated Video Streams – 233

Nusgens, B. V.
Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Nusgens, Betty V.
Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

Nyerges, Jana R
HIV/AIDS Prevention in Zambia: A Preliminary Study of Obstacles to Behavior Change in the Copperbelt – 176

Oard, Douglas W
CLIR Experiments at Maryland for TREC-2002: Evidence Combination for Arabic-English Retrieval – 269

Oberai, Assad A
Towards the Early Detection of Breast Cancer in Young Women – 175

Oberly, Charles E
Hysteretic Loss Reduction in Striated YBCO – 42

O'Brien, Emmett
Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

OBrien, Emmett
Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

O'Connell, W. J.
Use of Antineutrino Detectors for Nuclear Reactor Safeguards Effectiveness Assessment – 247

Oda, Kazuhiro
Standardization Activities on Optical Networking – 59

Ogawa, Tomoya
A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope – 60

Oh, David Y.
Mars Aerocapture Systems Study – 29

Ohira, Yoshinobu
Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading – 160

Effects of Heat Stress on the Regeneration of Injured Skeletal Muscle in Rats – 126

Mechanical and/or Neural Activity-Dependent Regulation of Soleus Muscle Fibers of MDX Mice – 159

Ohmi, K.
Simulation of the Electron Cloud for Various Configurations of a Damping Ring for the ILC – 264

Ohya, Keiichi
Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Oke, Yoshihiko
How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

OLeary, Debbie D.
Cortical Regions Associated with Orthostatic Stress in Conscious Humans – 137

Oleg, Ivanov
Mechanical Stimulation of the Foot Support Zones as a Way to Maintain Activity of the Tonic Muscular System during Functional Support Deprivation – 154

Olena, Nedukha
A Role of Peroxidases in Acceleration of the Aging of Potato Minitubers under Influence of Microgravity – 151

Olsen, Morten Hannevik
Perception of Body Vertical in Microgravity during Parabolic Flight – 145

Ommert, Bill
Operator Control Units for the Dismounted Soldier – 226

Ono, K.
Effects of Water Temperature on Cardiac Autonomic Nervous System Modulation during Foot Immersion (Foot Bath) – 140

Ono, Kumiko
Effect of Swimming Suits' Difference at Supine Position in Water on Heart Rate, Rectal Temperature and Sense of Subjective Temperature – 161

Onodera, S.
Effects of Water Temperature on Cardiac Autonomic Nervous System Modulation during Foot Immersion (Foot Bath) – 140

Onodera, Sho
Effect of Swimming Suits' Difference at Supine Position in Water on Heart Rate, Rectal Temperature and Sense of Subjective Temperature – 161

Onufer, Jeff
PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD – 3

Onyeama, Charles
Adding Faster with Application Specific Early Termination – 212

Ordonez, Michael A
Critical Infrastructure Protection: How to Assess and Provide Remedy to Vulnerabilities in Telecom Hotels – 67

Oriti, Salvatore M.
Update on Extended Operation of Stirling Convertors in Thermal Vacuum at NASA Glenn Research Center – 32

Orlin, James B
A Faster Strongly Polynomial Minimum Cost Flow Algorithm – 231

Ortiz, John E
Absolute Position Measurement for Automated Guided Vehicles using the Greedy DeBruijn Sequence – 233

Orvis, Karin A
Videogame-Based Training Success: The Impact of Trainee Characteristics - Year 2 – 202

Orzech, Mary A
Dynamic Response of the Human Head to + Gx Impact – 184

Osga, Glenn
HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 242

Ostendorf, Mari
Recognition Using Classification and Segmentation Scoring – 71

O'Sullivan, Joshua D
A Concept of Operations for the Use of Emergent Open Internet Technologies as the Basis for a Network-Centric Environment – 268

O'Sullivan, Lindsay M
Measuring the Value of Graduate Manpower Systems Analysis Education for Naval Officers – 58

Oswald, Jay J.
High Temperature Evaluation of an Active Clearance Control System Concept – 98

Ota, Hiroyasu
Electromagnetic Field Distribution Measurements using an Optically Scanning Probe System – 61

Oulianova, L P
The Pathogenesis and Therapy of Combined Radiation Injury – 174

Ovampva. Lrasso,ora
Are Clock Genes Involved in Altered Circadian Rhythms during Space Flight? – 142

Paez, Thomas L.
Application of the Bootstrap Statistical Method in Deriving Vibroacoustic Specifications – 100

Page, David
Knowledge-Intensive, Interactive and Efficient Relational Pattern Learning – 229

Pagnutti, Mary
Thermal Band Atmospheric Correction Using Atmospheric Profiles Derived from Global Positioning System Radio Occultation and the Atmospheric Infrared Sounder – 103

Paiva, M.
3-D Ballistocardiography, A Tool Revisited for Following Astronaut Cardiovascular Function? – 132

Respiratory Sinus Arrhythmia: A Marker of Decreased Parasympathetic Modulation after Short Duration Spaceflight – 151

Pak, Chan-gi
Updating the Finite Element Model to Match Ground Vibration Test Data – 285

Palaszewski, Bryan
Metallized Gelled Propellants Combustion Experiments in a Pulse Detonation Engine – 56

Palikonda, Rabindra
NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Paliy, Oleg
Cell-Like Entities: On the Boundary Between Non-Living and Living – 178

Palmer, Martha
Development and Evaluation of a Korean Treebank and its Application to NLP – 266

Palumbo, Giuseppe
Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Palumbo, Nathan
Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

Pamadi, Bandu N.
Simulation and Analyses of Multi-Body Separation in Launch Vehicle Staging Environment – 23

Pankop, Courtney
Ionizing Radiation Environment on the International Space Station: Performance vs. Expectations for Avionics and Material – 283

Pao, H. Y.
Low-Frequency Electromagnetic Backscatter from Buries Tunnels – 247

Papa, Joseph W
Camouflaging Vehicles Using Field Expedient Materials, Commercial Hardware Store Materials, Camouflage Nets, and Rubber Conveyer Belt Material – 258

Papadimitriou, Spiros
Parameter-Free Spatial and Stream Mining – 268

Parati, Gianfranco
Adaptation of the Baroreflex Sensitivity to Microgravity: Data from the STS-107 Columbia Mission – 152

Pardo, D
Improving the Performance of Perfectly Matched Layers by Means of hp-Adaptivity – 243

Parisi, Gianni
Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study – 124

Park, J H
Optical and magnetic properties of Eu-doped GaN – 41

Park, Sungwoo
A Programming Language for Probabilistic Computation – 235

Park, Taigyoo
Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

Parker, Allen R., Jr.
Development of Portable Fiber Bragg Grating Interrogation System – 285

Parker, B.
Recent Progress Designing Compact Superconducting Final Focus Magnets for the ILC – 244

Parsia, Bijan
Implementing OWL Defaults – 210

Parson, Daniel E.
Approaches to Cycle Analysis and Performance Metrics – 89

Partridge, H.
Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Pascaud, L.
Calf Tissue Liquid Stowage and Muscular and Deep Vein Distension in Orthostatic Tests after a 90-Day Head Down Bed Rest – 125

Paschall, Steve
A Reusable Design for Precision Lunar Landing Systems – 281

Pashenko, A. V.
Astronauts Autonomic Regulation Reserves Evaluation during Pre- and Post-flight Examinations – 153

Results of Cardiorespiratory System Autonomic Regulation Investigations during Long Term International Space Station Missions: Experiment 'Pulse' – 161

Pathak, Atul
Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 152

Patterson, Michael J.
Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 31

Pattyn, Nathalie
Investigating Human Cognitive Performance during Spaceflight – 121

Pavy-Le-Traon, Anne
Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 152

Payer, J. H.
Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 36

Payne, B. T.
Higher Order Chemistry Models in the CFD Simulation of Laser-Ablated Carbon Plumes – 88

Payne, Kathryn A
Evaluation of Causes of Large 96-H and 120-H Track Errors in the Western North Pacific – 117

Pearton, S J
Optical and magnetic properties of Eu-doped GaN – 41

Pecorelli, Lia
Effects of Head Down Tilt upon Cortisol and Sex Hormones – 120

Pedotti, Antonio
The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by a Simulation Study – 158

Pedrocchi, Alessandra
The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by a Simulation Study – 158

Pellis, N. R.
Human Adaptation Genetic Response Suites: Toward New Interventions and Countermeasures for Spaceflight – 157

Pencil, Eric J.
Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 31

Pendleton, Y. J.
Spectroscopy of Kuiper Belt Objects and Centaurs – 275

Peng, Zhen
Top vs. Bottom Charging of the Dielectric in RF MEMS Capacitive Switches (Preprint) – 78

Perchonok, Michele
Food and Nutrition for the Moon Base: What we have Learned in 45 Years of Space Flight – 179

Perlis, Donald
Detecting, Classifying, and Handling Contradictions in a Large, Dynamic Information Environment – 226

Perna, Joseph A
Protective Clothing and Life Support Equipment Applicable to a Desert Environment – 188

Perz, Michael R
Integrating Stakeholder Requirements Across Generations of Technology – 199

Pestana, Mark
Internet Protocol Over Telemetry Testing for Earth Science Capability Demo Summary – 289

Peter, Nicolas
Understanding Visual Perception in the Perspective of Gravity – 137

Petersen, Leaf E
Certifying Compilation for Standard ML in a Type Analysis Framework – 195

Peterson, J. R.
Capella Corona Revisited: A Combined View from XMM-Newton RGS Chandra HETGS, and LETGS – 277

Peterson, Pat
Toward a Real-Time Spoken Language System Using Commercial Hardware – 191

Petrak, J.
Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Petrat, Guido
Core Data Model Proposal for Physiology Research in Space – 125

Petricek, J.
Pilots' Examination in a Rapid LBNP Exposure – 136

Piazza, Anthony
Development of Portable Fiber Bragg Grating Interrogation System – 285

Fiber Optic Sensor Attachment Development and Performance Evaluations – 285

Pickett, R.
Motion-Based Visualization – 76

Pieper, A G
Progress Report on Fast Breeder Reactor Safety Studies – 93

Piester, D
On Optimizing the Configuration of Time-Transfer Links Used to Generate TAI – 24

Piner, Thomas J
Improving Clinical Efficiency of Military Treatment Facilities – 179

Pippia, P.
A Quantitative Analysis of Human Monocytes Motility in Modelled Low Gravity Conditions – 131

Pippia, Proto
Modeled Gravity Alters the Cell Metabolism 'Rate' and not the Cell Metabolism – 127

Modeled Microgravity Modifies the NA(+), K(+)-ATPase Activity in Rat Heart Homogenates – 131

Pivi, M.
Simulation of the Electron Cloud for Various Configurations of a Damping Ring for the ILC – 264

Single-Bunch Instability Driven by The Electron Cloud Effect in the Positron Damping Ring of the International Linear Collider – 244

Placeway, Paul
Search Algorithms for Software-Only Real-Time Recognition with Very Large Vocabularies – 234

Toward a Real-Time Spoken Language System Using Commercial Hardware – 191

Plaunt, Chris
Intelligent Rover Execution for Detecting Life in the Atacama Desert – 271

Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Podlubnaya, Z. A.
Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcromeric Cytoskeletal Proteins of Hindlimb Suspended Rats – 120

Podlubnaya, Zoya
Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats – 134

Pointcheval, D.
Provably Secure Passwork-Based Authentication in TLS – 189

Poli, Mark A
A Quantitative Electrochemiluminescence Assay for Clostridium perfringens alpha toxin – 163

An Activity-Dependent Assay for Ricin and Related RNA N-Glycosidases Based on Electrochemiluminescence – 162

Polishchuk, Olexandr V.
Changes in the Topography of Cellular Components in Pea Root Statocytes Exposed to High Gradient Magnetic Field – 133

Polk, J. D.
Moving from Bilateral to Multilateral Medical Operations – 22

Pomeroy-Huff, Marsha
Case Study: Accelerating Process Improvement by Integrating the TSP and CMMI – 11

Pongpaibool, Pornanong
Development of Exposure Systems and Exposure Assessment for Studies on Biological Effect of Electromagnetic Field – 64

Studies on Dosimetry of Human-Body Exposure to Electromagnetic Field – 63

Poplawski, J. V.
Transient Response of Rotor on Rolling-Element Bearings with Clearance – 96

Popov, Dmitri
Mechanism of Action for Anti-Radiation Vaccine in Reducing the Biological Impact of High-Dose Irradiation – 184

Popova, A. F.
Ultrastructural Peculiarities and Galactolipid Contents in Chlorella Cells in Altered Gravity – 131

Porcher, M.
Lower Limb & Portal Veins Echography for Predicting Risk of Thrombosis during a 90-D Bed Rest – 148

Porciani, M.
SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

Postal, Mark
Coalition Interoperability: A Modeled Approach – 72

Postek, M. T.
Instrumentation and Metrology for Nanotechnology: Report of the National Nanotechnology Initiative Workshop. Held in Gaithersburg, Maryland on January 27-29, 2004 – 84

Power, J. B.
Magnetic Levitation and Gravity: Influences on Microbial Systems – 146

Magnetic Levitation: Development of Experimental Techniques for Application to Biological Systems – 141

Powers, J. J.
Specifications, Pre-Experimental Predictions, and Test Plate Characterization Information for the Prometheus Critical Experiments – 51

Powers, Michael A.
Fabrication of 0.0075-Scale Orbiter Phosphor Thermography Test Models for Shuttle RTF Aeroheating Studies – 85

Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

Pozzo, Marco
Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device – 126

Prabhu, E.
Solar Trough Organic Rankine Electricity System (STORES) Stage 1: Power Plant Optimization and Economics. November 2000-May 2005 – 104

Pratap, Jeffrey J.
Effect of Simulated Microgravity on Aspergillus Niger – 140

Pratikakis, Nikolaos
Mathematical Modeling of Rail Gun – 50

Precoda, Kristin
Limited-Domain Speech-to-Speech Translation between English and Pashto – 228

Predos, Don
Remote Sensing Time Series Product Tool – 103

Prendergast, George C
Breast Cancer Suppression by IDO Inhibitors – 173

Price, L.
Voluntary Agreements for Energy Efficiency or GHG Emissions Reduction in Industry: An Assessment of Programs Around the World – 111

Price, Patti J
Data Collection and Analysis in the Air Travel Planning Domain – 73

Price, Stephan D
Spectral Irradiance Calibration in the Infrared. XVI. Improved Accuracy in the Infrared Spectra of the Secondary and Tertiary Standard Calibration Stars – 253

Prinzo, O. Veronika
The Outcome of ATC Message Complexity on Pilot Readback Performance – 9

Prisk, G. Kim
3-D Ballistocardiography, A Tool Revisited for Following Astronaut Cardiovascular Function? – 132

Respiratory Sinus Arrhythmia: A Marker of Decreased Parasympathetic Modulation after Short Duration Spaceflight – 151

Prives, Carol L
Design and Testing of Bi-Functional, P-Loop-Targeted MDM2 Inhibitors – 173

Pronk, A
WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis-)Mounted Soldier – 196

Prugh, Amber
Inactivation of Bacillus Anthracis Spores Delivered as Liquid Suspension or Aerosol to Self-Decontaminating Fabric – 54

Pu, Zhengxiang
Personal Cooling for Extra-Vehicular Activities on Mars – 274

Punjabi, V.
Measurement of the Ratio GEP/GMP to Large Q(sub 2), Interesting Results form Jefferson Lab – 250

Purdy, Ralph E.
Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats – 129

Purser, James
Fibonacci Grids – 234

Purser,James
Data Structure and Parallel Decomposition Considerations on a Fibonacci Grid – 214

Putcha, Lakshmi
Effect of Sampling Schedule on Pharmacokinetic Parameter Estimates of Promethazine in Astronauts – 129

Putcha, L.
Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects – 147

Pyle, Barry H.
Analysis of Pdeudomonas aeruginosa Growth and Virulence in Modelled Microgravity – 144

Pyloudis, Konstantinos
Low Spectral Efficiency Trellis Coded Modulation Systems – 203

Qian, Zheng D
Restoration of Transforming Growth Factor Beta Signaling by Histone Deacetylase Inhibitors in Human Prostate Carcinoma – 177

Que, L.
Micro-Discharge Optical Source Apparatus and Method and System for Analyzing a Sample – 82

Quinones, Pablo-Alejandro
The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

Quiocho, Leslie J.
Integrated Simulation Design Challenges to Support TPS Repair Operations – 272

R., Darnell
Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

R., Toppenberg
Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

Rabbow, E.
Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

Radowicz, Jody L
Exploring Fields with Shift Registers – 232

Rafiq, A.
Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

Raftenberg, Martin N
Coupling Between CTH and LS-DYNA for Thermal Postprocessing: Application to Propellant Cookoff From a Residual Penetrator – 261

Raimondi, P.
Luminosity Improvement at PEP-II Based on Optics Model and Beam-Beam Simulation – 265

Rajkowski, Joseph
The Core Protocol Set for the Global Grid – 223

Rakleviciene, D.
Growth of Cress Seedlings and Morphogenesis of Root Gravisensors under Clino-Rotation and in Unidirectional Red or Blue Light – 120

Investigation of Cress Root Gravisensing under Low Magnitute Acceleration – 136

Ramacciotti, T.
SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

Ramakrishnan, Jayant
International Space Station Centrifuge Rotor Models A Comparison of the Euler-Lagrange and the Bond Graph Modeling Approach – 96

Ramseyer, George O
100X Joint Battlespace Infosphere (JBI) – 216

Ramshaw, Lance
Portability in the Janus Natural Language Interface – 204

Rangarajan, Hari
On-demand Loop-Free Routing in Ad Hoc Networks Using Source Sequence Numbers – 222

Robust Loop-Free On-Demand Routing in Ad Hoc Networks – 211

Ransom, Jonathon
Influence of Finite Element Software on Energy Release Rates Computed Using the Virtual Crack Closure Technique – 37

Rao, M. V. V. S.
CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy – 45

Langmuir Probe Distortions and Probe Compensation in an Inductively Coupled Plasma – 260

Rapoport, Alison L.
Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation – 282

Raubenheimer, T.
Single-Bunch Instability Driven by The Electron Cloud Effect in the Positron Damping Ring of the International Linear Collider – 244

Ray, J. D.
Winter Air Quality Study, 2004-2005. Results from Yellowstone National Park – 107

Reay, James H
Logistics Maturity Evaluator – 217

Rebak, R. B.
Framework for the Analysis of Localized Corrosion at the Proposed Yucca Mountain Repository – 36

Recio, Jose
Personal Cooling for Extra-Vehicular Activities on Mars – 274

Reddell, Brandon
Ionizing Radiation Environment on the International Space Station: Performance vs. Expectations for Avionics and Material – 283

Redden, Elizabeth S
Iconic Representation and Dynamic Information Fidelity: Implications for Decision Support – 77

Localization of Tactile Signals as a Function of Tactor Operating Characteristics – 90

Rega, Georgette
Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

Reginato, L. L.
Helical Pulse Line Structures for Ion Acceleration – 244

Reijonen, J.
Compact Neutron Generators for Medical, Home Land Security and Planetary Exploration – 253

Reiter, Michael K
Device-Enabled Authorization in the Grey System – 194

Reitz, Guenther
Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

Remsberg, Ellis E.
On the Observed Changes in Upper Stratospheric and Mesospheric Temperatures from UARS HALOE – 118

Ren, Xinling
Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats – 129

Renggli, B. J.
Methods and Apparatus to Reduce Turbine Engine Nozzle Basesheet Stresses – 19

Renn, J.
European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Repaka, V.
Comparative Evaluation of Air and Auto Travel Between Urban Regions (Quantifying Intercity Modal Accessibility) – 3

Repass, Lawrence M
Optimal Stationing of RADAR Pickets and Anti-Ballistic Missile Defenders for Long Range Surveillance and Tracking (LRS&T) and Ballistic Missile Defense (BMD) Operations – 92

Rescoria, Eric
Authoritative SSL Auditor – 222

Resink, M. E.
Scrape-Off Layer Plasmas for ITER with 2nd X-Point and Convective Transport Effects – 260

Rettberg, Petra
Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

Rexroth, P.
Use of Antineutrino Detectors for Nuclear Reactor Safeguards Effectiveness Assessment – 247

Reynolds, Linda K
A Framework for the Management of Evolving Requirements in Software Systems Supporting Network-Centric Warfare – 208

Reynolds, William R
Visual Through Infrared: Modeling Components and Methodologies for Estimating High Fidelity Ground Vehicle Signatures – 90

Rice, Betsy M
Reaction Ensemble Molecular Dynamics: Direct Simulation of the Dynamic Equilibrium Properties of Chemically Reacting Mixtures – 39

Rice, Christopher A
Fast Scene Based Nonuniformity Correction with Minimal Temporal Latency – 239

Richard, Michael
Verification and Validation of Neural Networks in Flight Control Systems – 288

Richards, Lance
Development of Portable Fiber Bragg Grating Interrogation System – 285

Fiber Optic Sensor Attachment Development and Performance Evaluations – 285

Richards, W. Lance
Displacement Theories for Inflight Deformed Shape Predictions of a Long Span Flying Wing – 287

Richardson, Aaron W
Respirator Filter Efficiency Testing Against Particulate and Biological Aerosols Under Moderate to High Flow Rates – 95

Richardson, C. A.
MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Richardson, Catharine
ChromaBlast - a Data Visualization Tool – 178

Richey, Colleen
Limited-Domain Speech-to-Speech Translation between English and Pashto – 228

Richmond, Richard
Eye-Safe Laser Radar 3-D Imaging – 228

Richter, B.
Is Naturalness Unnatural – 265

Riedel, Erik
Data Mining on an OLTP System (Nearly) for Free – 270

Riehemann, Susanne
Limited-Domain Speech-to-Speech Translation between English and Pashto – 228

Rifkin, J.
Cavity BPM with Dipole-Mode-Selective Coupler – 250

Rigley, Joe
Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 1 of 2 – 112

Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 2 of 2 – 112

Rijsman, David
Intelligent Rover Execution for Detecting Life in the Atacama Desert – 271

Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Rini, Dan
Personal Cooling for Extra-Vehicular Activities on Mars – 274

Rinker-Schaeffer, Carrie W
Post-Transcriptional Regulation of MKK4-A Stress Signaling Kinase Implicated in the Regulation of Metastatic Growth – 169

Riondino, Giuseppe
Effects of Head Down Tilt upon Cortisol and Sex Hormones – 120

Riot, V. J.
List Mode Multichannel Analyzer – 83

Ritter, H.
Can We Discover the QCD Critical Point at RHIC – 248

Rittweger, J.
MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest – 123

Rivera, Victor R
A Quantitative Electrochemiluminescence Assay for Clostridium perfringens alpha toxin – 163

An Activity-Dependent Assay for Ricin and Related RNA N-Glycosidases Based on Electrochemiluminescence – 162

Robbins, Tad J
Fuel Injection Strategy for a Next Generation Pulse Detonation Engine – 56

Roberts, Marcus L
A General Framework for Analyzing, Characterizing, and Implementing Spectrally Modulated, Spectrally Encoded Signals – 190

Roberts, R. B.
Motion-Based Visualization – 76

Robinson, Jeffrey S.
An Overview of the Role of Systems Analysis in NASA's Hypersonics Project – 1

Roden, S.
Moving from Bilateral to Multilateral Medical Operations – 22

Rodionov, Daniel S.
Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

Rodriguez, Mauricio
Cell-Like Entities: On the Boundary Between Non-Living and Living – 178

Roehr, W. R.
Magnetic Random Access Memory Using Memory Cells with Rotated Magnetic Storage Elements – 83

Roger, Laurent
Contracting out Governmental Web Services (Externalisation de l'hebergement de sites web gouvernementaux) – 223

Rogers, Stuart E.
PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD – 3

Rogers, Stuart
PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD – 3

Rognlien, T. D.
Scrape-Off Layer Plasmas for ITER with 2nd X-Point and Convective Transport Effects – 260

Rohleder, N.
Association of Hormonal Responses and Performance of Student Pilots during Acceleration Training on the Human Centrifuge – 135

Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

Rohlicek, Robin
Recognition Using Classification and Segmentation Scoring – 71

Rohrbaugh, Dennis K
Decomposition of GD on CeO2/Alumina Adsorbents in a Gas Chromatograph On-Column Injector Tube Reactor – 42

Romanek, Christopher S.
Asteroidal Differentiation Processes Deduced from Ultramafic Achondrite Ureilite Meteorites – 280

Romanov, Yu. A.
Influence of Long-Term Gravity Vector Changes on Human Mesenchymal Stem Cells in Vitro – 128

Romero, A.
Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Ronca, April E.
Centrifugation Effects on Estrous Cycling, Mating Success and Pregnancy Outcome in Rats – 156

Prenatal Centrifugation: A Mode1 for Fetal Programming of Body Weight? – 138

Rose, Christopher W
Flow Field Surveys in a Transonic Compressor Rig – 6

Ross, Kenton W.
Remote Sensing Time Series Product Tool – 103

Roukos, Salim
The BBN Spoken Language System – 71

Rouse, Jason
Device-Enabled Authorization in the Grey System – 194

Roush, Douglas L
Three-Dimensional Analysis of Azimuthal Dependence of Sound Propagation through Shallow-Water Internal Solitary Waves – 44

Roush, Ted L.
Automated Classification of Thermal Infrared Spectra Using Self-organizing Maps – 272

Rowe, Gary W
Shallow Water UXO Technology Demonstration Site, Scoring Record Number 2 – 251

Roy, Chad J
Efficacy of rSEB Vaccine and CpG ODN Administered by Inhalation in Monkeys – 167

Roy, Pritam
Sociable Interfaces – 229

Roy, Soumya
Chapter 7. Node-Centric Hybrid Routing for Wireless Internetworking – 69

Roychawdhury, Vwani
DNA MIcroarray-Assisted Modeling of Metabolic and Regulatory Networks With Applications to Bio-Defense – 169

Rucker, Rochelle N.
Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation – 282

Rumpf, R
Naval Electromagnetic (EM) Gun Technology Assessment – 246

Rushing, Linda S.
Centrifugation Effects on Estrous Cycling, Mating Success and Pregnancy Outcome in Rats – 156

Rushing, Linda
Prenatal Centrifugation: A Mode1 for Fetal Programming of Body Weight? – 138

Rusk, David T
Testing of 7050-T7451 Aluminum Strain-Life Coupons for a Probabilistic Strain-Life Curve – 14

Russ, Thomas A
KOJAK Group Finder: Scalable Group Detecllon via Integrated Knowledge-Based and Statistical Reasoning – 236

Russell, Christopher A
Performance and Psychophysiological Measures of Fatigue Effects on Aviation Related Tasks of Varying Difficulty – 7

Rutenbar, Peter
Device-Enabled Authorization in the Grey System – 194

Rutgers, R.
Diminished Performance of Bacterial Fuel Cells in Microgravity – 141

Ryan, Jack
Networked Unmanned Aerial Vehicle Teams (NUAVT) – 288

Ryan, Robert E.
Remote Sensing Time Series Product Tool – 103

Rykova, M. P.
Cytotoxic Activity of Natural Killer Cells in Vitro under Microgravity – 147

S., Wilson
Long-Term Overactivity in the Abdominal Oblique Muscles after 8 Weeks Bed-Rest -Possible Implications for Musculoskeletal Health – 121

Sa, R. C.
3-D Ballistocardiography, A Tool Revisited for Following Astronaut Cardiovascular Function? – 132

Respiratory Sinus Arrhythmia: A Marker of Decreased Parasympathetic Modulation after Short Duration Spaceflight – 151

Sabbatini, Massimo
The ERASMUS Experiment Archive – 129

Sahu, Jubaraj
Generating an Aerodynamic Model for Projectile Flight Simulation Using Unsteady, Time Accurate Computational Fluid Dynamic Results – 86

Saija, Rosalba
Optical Properties of Biological Aerosols – 258

Sakasai, Makoto
Evaluation of Uncertainty of Horn Antenna Calibration with the Frequency range of 1 GHz to 18 GHz. – 62

Uncertainty Estimation of Loop Antenna Calibration System in MF/HF Band – 62

Sako, M.
Capella Corona Revisited: A Combined View from XMM-Newton RGS Chandra HETGS, and LETGS – 277

Salama, Farid
Astrochemistry: Recent Advances in the Study of Carbon Molecules in Space – 275

Salerno, Mark D
Dynamic Response of the Human Head to + Gx Impact – 184

Sallam, A. El-Din
Hardware Development for Electrophysiological Long-Term Studies in Space – 141

SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

Salmon, J. G.
Microscopic Batteries for MEMS Systems – 82

Samareh, Jamshid
Simulation and Analyses of Multi-Body Separation in Launch Vehicle Staging Environment – 23

Sammataro, Michael A
Performance of a Liquid Flow Ultra-Compact Heat Exchanger – 44

Sams, Clarence F.
Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Sanabia, Elizabeth R
Objective Identification of Environmental Patterns Related to Tropical Cyclone Track Forecast Errors – 116

Sanders, Scot
Obstacle Marking and Vehicle Guidance Science and Technology Objective (OMVG-STO) Augmented Reality for Enhanced Command and Control and Mobility – 69

Sanderson, A.
WTEC Panel Report on International Assessment of Research and Development in Robotics – 189

Sandford, Scott
New Optical Constants for Amorphous and Crystalline H2O-ice – 257

Sanford, Thomas B
Technical and Scientific Evaluation of EM-APEX in Hurricane Frances – 117

Sankar, B. V.
Low-Velocity Impact Response of Sandwich Beams with Functionally Graded Core – 36

Sans, T
Selecting Appropriate Counter-Measures in an Intrusion Detection Framework – 216

Saparin, Peter
A Perspective for Ultrasonic Assessment of Osteoporotic Changes of Bone Structure in Proximal Tibia – 143

An Innovative Approach for the Assessment of 3D Structures in Trabecular Bone – 122

Measures of Complexity to Quantify Bone Loss and Estimate Strength of Human Lumbar Vertebrae: Comparison of pQCT Image Analysis with Bone Histomorphometry and Biomechanical Tests – 181

Sapunova, Svetlana
A New Space Greenhouse Concept Development for Optimal Plant Growth – 144

Sawicki, Jerzy T.
Transient Response of Rotor on Rolling-Element Bearings with Clearance – 96

Sayenko, D. G.
Effect of 6-Days of Support Withdrawal on Characteristics of Balance Function – 128

Scala, Michele
SAYSOY: Space Apparatus to Yield SOYsprouts: Growing Sprouts in a Growth Support System for Experiments on Unmanned Platforms in Space – 138

Scaringe, Robert P.
Development of a Gravity-Insensitive Heat Pump for Lunar Applications – 95

Schall, Stephen
Path Calculation and Packet Translation for UAV Surveillance in Support of Wireless Sensor Networks – 14

Schaller, Karin
Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Schartl, M.
European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Schaubert, D
A Commemoration of Deschamps' and Sichak's 'Microstrip Microwave Antennas': 50 Years of Development, Divergence, and New Directions – 80

Schepers, Deborah R
Characteristics and Sampling Efficiencies of OMNI 3000 Aerosol Samplers – 43

Scheuerlein, R. E.
Magnetic Random Access Memory Using Memory Cells with Rotated Magnetic Storage Elements – 83

Scheuring, R. A.
Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

Scheuring, RIchard
The Role of Spatial Disorientation in Fatal General Aviation Accidents – 4

Scheutz, Matt
ISS Commercial Cargo Service: Requirements and Constraints Summary – 25

Schiller, P.
MISS: Mice on International Space Station – 162

Schipper, John F.
Sensing Super-Position: Human Sensing Beyond the Visual Spectrum – 182

Schlegel, Todd T.
High-frequency ECG – 180

Schlemmer, M.
Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

Schmaeh, M.
Hardware Development for Electrophysiological Long-Term Studies in Space – 141

Schmidt, Vincent A
Analyzing Divisia Rules Extracted from a Feedforward Neural Network – 208

Schmitt, D. A.
ESA Ground Based Facilities – 154

Schneider, S. M.
WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

Schneider, Steve
Driving Point Impedance for a Linear Array of Half-Width Leaky-Wave Antenna (Preprint) – 76

Schneider, Steven P
Hypersonic Laminar Instability on Round Cones Near Zero Angle of Attack – 86

Schramm, Harrison C
An Analytic Framework for the War of Ideas – 231

Schreiber, Charla W
Effect of Span Variation on the Performance of a Cross Flow Fan – 6

Schroeder, Christian
Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

Schroeder, J. E.
Rotary Shaft Sealing Assembly – 94

Schuber, Marianne
Behavior of Gravisensitive Cells on 2D and 3D Clinostats – 144

The Biolab Facility Responsible Center at the German Aerospace Center DLR – 155

Schubert, S.
Seasonal Prediction with the GEOS GCM – 118

Schultz, John S
Offline Forensic Analysis Of Microsoft Windows XP Physical Memory – 201

Schultz-Varnholt, Dirk
Status of the SOS-LUX-Toxicity-Test on the International Space Station – 119

Schulze-Varnholt, D.
SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

Schwalm, Keith T
National Strategy to Secure Cyberspace – 217

Schwartmann, Dirk
Core Data Model Proposal for Physiology Research in Space – 125

Schwartz, George N
Limited Evaluation of an 802.11b Air-to-Ground Wireless Datalink (Project 'HAVE HALO' – 22

Schwartz, Richard
Search Algorithms for Software-Only Real-Time Recognition with Very Large Vocabularies – 234

Speaker Adaptation Using Multiple Reference Speakers – 73

Toward a Real-Time Spoken Language System Using Commercial Hardware – 191

Scj,aj. \h
SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

Sclaroff, Stan
An Invariant Representation for Matching Trajectories Across Uncalibrated Video Streams – 233

Detecting Instances of Shape Classes That Exhibit Variable Structure – 227

Scorgie, D G
Transient fault Currents in Aircraft D-C Systems – 16

Scott, C. D.
Higher Order Chemistry Models in the CFD Simulation of Laser-Ablated Carbon Plumes – 88

Scott, Linda J
Hurricane Katrina: Utilization of Private, Non-Governmental Health Professionals Time for New Strategies – 168

Scott, Stacey D
Collaboration Technology in Military Operations: Lessons Learned from the Corporate Domain – 208

Sebata, Kouichi
Development of the Measurement Technology of the Spurious Emission from Primary Radar – 62

Sedillo, Michael R
Chasing the Sun - The In-Flight Evaluation of an Optical Head Tracker – 93

Seeger, Jr , William D
Deployable Command and Control System for Over the Horizon Small Boat Operations – 69

Seeman, J.
Doubling the PEP-II Luminosity in Simulations – 264

Seghi, Steve
Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems – 262

Seibt, Dieter
Behavior of Gravisensitive Cells on 2D and 3D Clinostats – 144

The Biolab Facility Responsible Center at the German Aerospace Center DLR – 155

Seino, Kouichi
IP Network Technologies for the Ubiquitous Era – 59

Selvaganapathy, P.
Micro-Discharge Optical Source Apparatus and Method and System for Analyzing a Sample – 82

Senile, D. G.
Methods and Apparatus to Reduce Turbine Engine Nozzle Basesheet Stresses – 19

Serafini, L.
SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

Servotte, S.
Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Seshake, Hikaru
High Availability Server Platform for Operations Support System – 213

Severino, F.
Successful Bunched Beam Stochastic Cooling in RHIC – 262

Shahparnia, Shahrooz
First Version of a Dataflow Interchange Format – 209

Sham, Catherine C.
Space Shuttle Underside Astronaut Communications Performance Evaluation – 28

Shangle, Eric L
Real Estate Site Selection: An Application of Artificial Intelligence for Military Retail Facilities – 241

Shappell, S.
Developing A Methodology For Assessing Safety Programs Targeting Human Error In Aviation – 8

Sharma, S. P.
CF2 Detection in Radio-Frequency Ar/CHF3 Plasmas by Fourier Transform Infrared Spectroscopy – 45

Langmuir Probe Distortions and Probe Compensation in an Inductively Coupled Plasma – 260

Shattuck, Ruby
Iconic Representation and Dynamic Information Fidelity: Implications for Decision Support – 77

Shavlik, Jude
Knowledge-Intensive, Interactive and Efficient Relational Pattern Learning – 229

Shei, Yimin
ChromaBlast - a Data Visualization Tool – 178

Shenkman, B. S.
Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcromeric Cytoskeletal Proteins of Hindlimb Suspended Rats – 120

Influence of Rat Hindlimb Suspension on Sarcolemmal Dystrophin and its Sensitivity to Mechanical Damage – 122

Non-Uniform Shifts in MHC and SERCA Isoform Patterns in Unloaded Rat Soleus. Effects of Ca-Binding Agent – 127

Shenkman, Boris
Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats – 134

Sherby, O. D.
Mechanical and Thermal Properties of Ultra-High Carbon Steel Containing Aluminum – 50

Sherman, V.
Method and System for Mass Spectroscopy – 257

Shevchenko, G. V.
Actin Organization and Gene Expression in Beta Vulgaris Seedlings under Clinorotation – 123

Differentiation of Plant Graviperceiving and Graviresponding Cells in Altered Gravity – 124

Shiba, Hiroyuki
Software Defined Radio Prototype (I): System Design and Performance Evaluation – 191

Shiflet, G J
Optimizing Mechanical Properties and Thermal Stability of Age Hardenable Aluminum Alloys Through Theoretical Modeling, Alloy Modification and Thermal Mechanical Processing – 40

Shimokawa, Hitoyata
Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Shimokawa, Reiko
Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

Shin, Jong-Yeob
Gain-Scheduled Fault Tolerance Control Under False Identification – 19

Shinoda, Yo
Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading – 160

How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

Shinozuka, Takashi
Electromagnetic Disturbance Measurement by Using Amplitude Probability Distribution for Protecting Digital Wireless Communication Systems – 61

Total Radiated Power of Radio Transmitters Measured in a Reverberation Chamber – 60

Shiota, Sadaaki
Development of the Measurement Technology of the Spurious Emission from Primary Radar – 62

Shiozawa, Youke
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

Shirato, Yushi
Software Defined Radio Prototype (I): System Design and Performance Evaluation – 191

Shirreffs, Susan M
Fluid and Electrolyte Needs for Preparation and Recovery From Training and Competition – 41

Shockley, Keith J
Intelligent Maintenance Aid (IMA) – 81

Shoemaker, J. K.
WISE-2005: Integrative Cardiovascular Responses with LBNP during 60-Day Bed Rest in Women – 152

Shoemaker, J. Kevin
Cortical Regions Associated with Orthostatic Stress in Conscious Humans – 137

Shokoufandeh, Ali
Drexel Object Occlusion Repository (DOOR) – 241

Shono, Takashi
Software Defined Radio Prototype (II): Implementation and Evaluation of IEEE 802.11 Wireless LAN – 214

Shvartsburg, A. A.
High Performance Ion Mobility Spectrometry Using Hourglass Electrodynamic Funnel and Internal Ion Funnel – 89

Sickinger, Lisa R
Effectiveness of Non-Lethal Capabilities in a Maritime Environment – 200

Siegel, Jane
Interactive Electronic Technical Manuals (IETMs) Annotated Bibliography – 270

Siegel, R. W.
WTEC Panel Report on Nanostructure Science and Technology: R and D Status and Trends in Nanoparticles, Nanostructured Materials, and Nanodevices – 35

Siewiorek, Dan
The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

Simon, Laszlo
Detailed Structural Analysis on Retinal Vascular Bed by Automated Computer Processing of Fluorescein Angiography – 133

Structural Reappraisal of Dendritic Tree of Cerebellar Purkinje Cell for Novel Functional Modeling of Elementary Sensorimotor Adaptive Processes – 147

Simpson, A.
Plug-In Hybrid Electric Vehicle Energy Storage System Design. Preprint – 104

Sinclair, K. A.
Required Surveillance Performance Accuracy to Support 3-Mile and 5-Mile Separation in the National Airspace System – 7

Siperstein, Flor R
Dual Control Cell Reaction Ensemble Molecular Dynamics: A Method for Simulations of Reactions and Adsorption in Porous Materials – 39

Sipko, Marek M
Testing Template and Testing Concept of Operations for Speaker Authentication Technology – 58

Sirkin, Jeffrey M
Quantifying the Probabilities of Selection of Surface Warfare Officers to Executive Officer – 236

Sjoekvist, Stefan
Benchmarking and Validation of IR Signature Programs: SensorVision, CAMEO-ESA and RadThermIR – 195

Skinner, D.
Performance Monitoring of Parallel Scientific Applications – 188

Slattery, William H
Neurofibromatosis Type 2 (NF2) Natural History Consortium – 170

Slenzka, K.
European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Smeenk, B J
Inventory of Simulation and Modeling for the Analysis of Ground Manoeuvre Performance (inventarisatie van vragen en modellen voor de analyse van het grondgebonden optreden) – 240

Smerecnik, Mirco
Influence of Weightlessness and Apnea on Heart Rate and Blood Pressure Regulation during Exercise – 121

Smit, Th. H.
Modulation of Gene Expression in Bone Cells during Strain-Adapted Bone Remodeling – 150

Rapid Nitric Oxide Production by Bone Cells in Response to Mechanical Vibration – 148

Smith, Arthur H.
Journal of Gravitational Physiology, Volume 12, Number 1 – 119

Smith, B. L.
Comparative Evaluation of Air and Auto Travel Between Urban Regions (Quantifying Intercity Modal Accessibility) – 3

Smith, Diane M
Experimentation in a Collaborative Planning Environment – 207

Smith, Frederick
Development of a Test Facility for Air Revitalization Technology Evaluation – 8

Smith, Marcia S
China's Space Program: An Overview – 20

Smith, Mark
The X-43 Parameter Identification Research – 294

Smith, R. D.
High Performance Ion Mobility Spectrometry Using Hourglass Electrodynamic Funnel and Internal Ion Funnel – 89

Smith, S. R.
Cavity BPM with Dipole-Mode-Selective Coupler – 250

Smith, Scott M.
Food and Nutrition for the Moon Base: What we have Learned in 45 Years of Space Flight – 179

WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

Smith, William L, Jr.
NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Smith, William R
Dual Control Cell Reaction Ensemble Molecular Dynamics: A Method for Simulations of Reactions and Adsorption in Porous Materials – 39

Smithson, Scott B
Amplitude Analysis and Modeling of Regional Phases in PNE Profiles in Northern Eurasia and Seismic Regionalization – 115

Snodgrass, Joshua D
Low-Power Fault Tolerance for Spacecraft FPGA-Based Numerical Computing – 20

Snoecks, Luc H. E. H.
A Brief Overview of Animal Hypergravity Studies – 130

Snyder, Aaron
Solar Effects on Tensile and Optical Properties of Hubble Space Telescope Silver-Teflon(Registered Trademark) Insulation – 282

Snyder, CHristopher A.
An Overview of the Role of Systems Analysis in NASA's Hypersonics Project – 1

Soares, Fola
Verification and Validation of Neural Networks in Flight Control Systems – 288

Sobol, Margarita A.
Altered Gravity Causes the Changes in the Protein NopA100 in Plant Cell Nucleoli – 139

Solberg, Bennett J
Sleep Patterns of Naval Aviation Personnel Conducting Mine Hunting Operations – 183

Son, Sang H
Issues in Developing Object-Oriented Database Systems for Real-Time Applications – 192

Song, Dawn
GEM: Graph EMbedding for Routing and Data-Centric Storage in Sensor Networks without Geographic Information – 221

Privacy-Preserving Set Operations – 239

Sonnad, K.
Doubling the PEP-II Luminosity in Simulations – 264

Sorea, Maria
Sociable Interfaces – 229

Sowers, T. Shane
Evaluation of an Outer Loop Retrofit Architecture for Intelligent Turbofan Engine Thrust Control – 18

Spangenberg, Douglas A.
NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Spanggord, Ronald J
Enhancement of an Analytical Method for the Determination of Squalene in Anthrax Vaccine Absorbed Formulations – 40

Spangler, Lee
Canola Oil Fuel Cell Demonstration: Volume 2 - Market Availability of Agricultural Crops for Fuel Cell Applications – 105

Specker, Lawrence J
Development and Evaluation of a Device for the Prevention of Arm Flail Injuries – 16

Spinelli, Chris J
Limited Evaluation of an 802.11b Air-to-Ground Wireless Datalink (Project 'HAVE HALO' – 22

Spivey, Natalie
The F-15B Baseline Ground Vibration Testing – 288

Spohn, Marco A
Using Dominating Sets to Improve the Performance of Mobile Ad Hoc Networks – 232

Spyrou, Dimitrious
A New Framework for Software Visualization: A Multi-Layer Approach – 212

Stackpoole, M.
Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Stahlhut, Keir D
Refractivity in the Arctic Regions – 116

Stahr, Jeremiah B
A Study on Improving USA Air Force Space Systems Engineering and Acquisition – 23

Stallard, David
Evaluation Results for the Talk'n'Travel System – 71

The BBN Spoken Language System – 71

Stamatelatos, Nikolaos
A Measurement Study of BGP Blackhole Routing Performance – 211

Stanard, Terry
HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 242

Stanton, W.
MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Stapp, John P
Space Cabin Landing Impact Vector Effects on Human Physiology – 15

Starke, E A
Optimizing Mechanical Properties and Thermal Stability of Age Hardenable Aluminum Alloys Through Theoretical Modeling, Alloy Modification and Thermal Mechanical Processing – 40

Staves, Mark P.
Interactions of Light and Gravity in Chara Internodal Cells – 155

Stavroulakis, Georgios
Rapidly Deployable, Self Forming, Wireless Networks for Maritime Interdiction Operations – 66

Steckl, A J
Optical and magnetic properties of Eu-doped GaN – 41

Stegeman, D. F.
Peripherally and Centrally Induced Electromyographic Changes in 8 Weeks of Horizontal Bed Rest with and without Resistance Exercise with Concurrent Whole Body Vibration – 145

Resistance Exercise with Concurrent Whole Body Vibration Preserves Isometric Knee Extension Strength during 8 Weeks of Horizontal Bed Rest – 123

Stein, Jenny M.
Parachute Testing for the NASA X-38 Crew Return Vehicle – 29

Steinetz, Bruce M.
Apollo Seals: A Basis for the Crew Exploration Vehicle Seals – 97

Further Investigations of High Temperature Knitted Spring Tubes for Advanced Control Surface Seal Applications – 97

High Temperature Evaluation of an Active Clearance Control System Concept – 98

Improved Seals for High Temperature Airframe Applications – 96

Performance Evaluations of Ceramic Wafer Seals – 37

Steinfeld, Aaron
The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

Stephane, Beroud
Effects of Prolonged Head-Down Bed Rest with and Without Fly-Wheel Exercise on Heart Rate Variability – 152

Stephans, G.
Can We Discover the QCD Critical Point at RHIC – 248

Stephens, Craig A.
The X-37 Hot Structure Control Surface Testing – 291

Sternhufvud, C.
Feasibility Study: A Swedish Integrated Assessment Model – 113

Stettner, Roger
Eye-Safe Laser Radar 3-D Imaging – 228

Stewart, Randy
Thermal Band Atmospheric Correction Using Atmospheric Profiles Derived from Global Positioning System Radio Occultation and the Atmospheric Infrared Sounder – 103

Stieber, Christiane
Hypergravity Modulates Cyclic GMP Efflux in Nitric Oxide-Stimulated Human Melanocytic Cells – 143

Stoelinga, Marieelle
Model Checking Discounted Temporal Properties – 242

Stoffell, Kevin M
Implementation of a Quadrature Mirror Filter Bank on an SRC Reconfigurable Computer for Real-Time Signal Processing – 199

Stoliker, Patrick
2004 Research Engineering Annual Report – 284

Stone, M. E.
Interim Storage and Long Term Disposal of Research Reactor Spent Fuel – 114

Stone, T. W.
Optical Multistage Networks – 260

Stone, Thom
A Security Model for Space Based Communication – 27

Strassburger, Elmar
High-Speed Photographic Study of Wave Propagation and Impact Damage in Transparent Aluminum Oxynitride (AION) – 91

Straunch, Sebastian M.
Behavior of Gravisensitive Cells on 2D and 3D Clinostats – 144

Straus, B.
In-Flight Ratio Frequency Spectrum Measurements of Commercial Aircraft Cabins – 65

Strolka, Igor
Quantitative MR Imaging for the in Vivo Assessment of Trabecular Bone Quality – 181

Strollo, Felice
Effects of Head Down Tilt upon Cortisol and Sex Hormones – 120

Strollo, Giovanna
Effects of Head Down Tilt upon Cortisol and Sex Hormones – 120

Strpvers. Brian
Hyper-X Research Vehicle Mach 7 and Mach 10 Mission Guidance, Navigation, and Control Performance – 292

Stuart, B. C.
Titan Laser at LLNL – 259

Suarez, Max
Seasonal Prediction with the GEOS GCM – 118

Sugenoya, Jun-ichi
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

Sugiura, Akira
Use of Electromagnetic Energy and Resultant Noises – 63

Sugiura, Takao
Effects of Heat Stress on the Regeneration of Injured Skeletal Muscle in Rats – 126

Sugiyama, Tsutomu
Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

Total Radiated Power of Radio Transmitters Measured in a Reverberation Chamber – 60

Suhs, Norman
PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD – 3

Sullivan, Patrick D
Evaluation of Low-Pressure Drop Antimicrobial and Hybrid Air Filters – 95

Sullivan, Patrick J
Evaluating the Effectiveness of Waterside Security Alternatives for Force Protection of Navy Ships and Installations Using X3D Graphics and Agent-Based Simulation – 197

Sullivan, P.
Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

Sullivan, Roy M.
Review of Current State of the Art and Key Design Issues With Potential Solutions for Liquid Hydrogen Cryogenic Storage Tank Structures for Aircraft Applications – 18

Sumption, Michael
Hysteretic Loss Reduction in Striated YBCO – 42

Sun, Changhong
A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

Sun, Meg
Enhancement of an Analytical Method for the Determination of Squalene in Anthrax Vaccine Absorbed Formulations – 40

Sun, Xi-Qing
Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory – 142

Sun, Yushi
A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

Sundaresan, A.
Human Adaptation Genetic Response Suites: Toward New Interventions and Countermeasures for Spaceflight – 157

Susanto, Martinus B
Business Process Reengineering in the Inventory Management to Improve Aircraft Maintenance Operations in the Indonesian Air Force – 11

Suzuki, akira
Evaluation of Uncertainty of Horn Antenna Calibration with the Frequency range of 1 GHz to 18 GHz. – 62

Suzuki, Akira
Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

Uncertainty Estimation of Loop Antenna Calibration System in MF/HF Band – 62

Suzuki, Yoshiaki
Research Activities on EMC in NICT – 62

Svegzdiene, D.
Growth of Cress Seedlings and Morphogenesis of Root Gravisensors under Clino-Rotation and in Unidirectional Red or Blue Light – 120

Investigation of Cress Root Gravisensing under Low Magnitute Acceleration – 136

Sverdlov, A G
Experiments on the Biological Action of Neutrons Performed in the Former Soviet Union: A Historical Review – 255

Swasey, David
A Separate Compilation Extension to Standard ML (Revised and Expanded) – 195

Swearingen, Michelle E
The Range Managers Toolkit (RMTK) Noise Tool – 111

Sweat, Patricia A
The Importance of Artificial Intelligence for Naval Intelligence Training Simulations – 225

Swick, Justin R
Extending the Tactical Wireless Internet in Support of USMC Distributed Operations – 72

Swinbank, Richard
Data Structure and Parallel Decomposition Considerations on a Fibonacci Grid – 214

Fibonacci Grids – 234

Switzer, Jay A
Gordon Research Conference on Electrodeposition – 81

Sycara, Katia P
Semantic Web Services with Web Ontology Language (OWL-S) - Specification of Agent-Services for DARPA Agent Markup Language (DAML) – 219

Sylvestre, Bruno
Perception of Body Vertical in Microgravity during Parabolic Flight – 145

Symons, Marc H
Role of Rac GTPases in Chemokine-Stimulated Breast Carcinoma – 172

Syn, C. K.
Mechanical and Thermal Properties of Ultra-High Carbon Steel Containing Aluminum – 50

Szakall, Sz.
Environmental Challenge Impairs Prefrontal Brain Functions – 158

Tagliabue, Michele
The Relevance of the Minimization of Torque Exchange with the Environment in Weightlessness is Confirmed by a Simulation Study – 158

Takada, Hiroki
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

Takahasi, Masanori
Electromagnetic Field Distribution Measurements using an Optically Scanning Probe System – 61

Takashi, Shinozuka
Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department – 61

Talalaev, Alexandr S.
Expression of Small Heat Shock Proteins in Pea Seedlings under Gravity-Altered Conditions – 132

Talbi, Louisa
Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

Tamburini, Vittorio
Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study – 124

Tan, S. D.
Modulation of Gene Expression in Bone Cells during Strain-Adapted Bone Remodeling – 150

Tanaka, Takashi
A 3D Visualization System for Real-Time Space Weather Simulator with a Glassless Stereoscope – 60

Tanck, Esther
A Brief Overview of Animal Hypergravity Studies – 130

Tang, K.
High Performance Ion Mobility Spectrometry Using Hourglass Electrodynamic Funnel and Internal Ion Funnel – 89

Tank, J.
Results of Cardiorespiratory System Autonomic Regulation Investigations during Long Term International Space Station Missions: Experiment 'Pulse' – 161

Tank, Jens
Impact of Simulated Microgravity and Caloric Restriction on Autonomic Nervous System Function in Adipose Tissue – 138

Tarasova, O. S.
Hemodynamic Changes in Post-Suspension Rats during Gradual Hemorrhage – 133

Tarasova O. S.
The Effect of Simulated Microgravity on Nitrergic Innervation of the Middle Cerebral Artery – 124

Tartabini, Paul V.
Simulation and Analyses of Multi-Body Separation in Launch Vehicle Staging Environment – 23

Tarves, S. M.
Specifications, Pre-Experimental Predictions, and Test Plate Characterization Information for the Prometheus Critical Experiments – 51

Tatarinov, Alexey
A Perspective for Ultrasonic Assessment of Osteoporotic Changes of Bone Structure in Proximal Tibia – 143

Tatiana, Borisova
Comparison of the Effects of DL-threo-Beta-Benzyloxyaspartate on the Glutamate Release from Synaptosomes before and after Exposure of Rats to Artificial Gravity – 148

Tatiana, Miller
Mechanical Stimulation of the Foot Support Zones as a Way to Maintain Activity of the Tonic Muscular System during Functional Support Deprivation – 154

Tautz, Maurice F
Analytic Models for a Spherical Satellite Charging in Sunlight at any Spin Rate – 21

Aspects of Spacecraft Charging in Sunlight – 21

Tawara, Yasuo
Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

Taylor, Ellis R
Space Cabin Landing Impact Vector Effects on Human Physiology – 15

Taylor, Robert E
Testing of 7050-T7451 Aluminum Strain-Life Coupons for a Probabilistic Strain-Life Curve – 14

Taylor, Shawn C.
Further Investigations of High Temperature Knitted Spring Tubes for Advanced Control Surface Seal Applications – 97

High Temperature Evaluation of an Active Clearance Control System Concept – 98

Taylor, William R
Detailed Fuel Cell Demonstration Site Summary Report: Naval Hospital at Marine Corps Air Ground Combat Center - Twentynine Palms – 106

Temnikova, V.
Characteristics of the Eyes Pursuit Function during Readaptation to Terrestrial Gravity after Prolonged Flights Aboard the International Space Station – 182

Tenconi, C.
Mouse Drawer System (MDS): An Autonomous Hardware for Supporting Mice Space Research – 154

Terada, Masahiro
Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading – 160

How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

Mechanical and/or Neural Activity-Dependent Regulation of Soleus Muscle Fibers of MDX Mice – 159

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

Tesch, Per A.
Muscle Fiber Conduction and Fatigue during Dynamic Actions on a Flywheel Exercise Device – 126

Thaler, G T
Optical and magnetic properties of Eu-doped GaN – 41

Thayaparan, Thayananthan
ISAR Motion Compensation using the Registration-Restoration-Fusion Method – 93

Thayer, Scott
A System for Three-Dimensional Robotic Mapping of Underground Mines – 101

Operator Control Units for the Dismounted Soldier – 226

Thirumalainambi, Rajkumar
LISA Framework for Enhancing Gravitational Wave Signal Extraction Techniques – 276

Thomas, David J
Automated Thermal Camouflage Generation Program Status – 33

Thomenius, K. E.
Integrated Interface Electronics for Reconfigurable Sensor Array – 83

Thompson, David E.
LISA Framework for Enhancing Gravitational Wave Signal Extraction Techniques – 276

Thompson, S. D.
Required Surveillance Performance Accuracy to Support 3-Mile and 5-Mile Separation in the National Airspace System – 7

Thomsen, Jesper S.
An Innovative Approach for the Assessment of 3D Structures in Trabecular Bone – 122

Thomsen, Jesper Skovhus
Measures of Complexity to Quantify Bone Loss and Estimate Strength of Human Lumbar Vertebrae: Comparison of pQCT Image Analysis with Bone Histomorphometry and Biomechanical Tests – 181

Thorn, Valin
ISS Commercial Cargo Service: Requirements and Constraints Summary – 25

Thrun, Sebastian
A System for Three-Dimensional Robotic Mapping of Underground Mines – 101

Simultaneous Mapping and Localization with Sparse Extended Information Filters: Theory and Initial Results (revised) – 101

Tikhonov, M. A.
Evaluation of Spare Capacities of the Respiratory Muscles during Hypokinesia – 186

Tillinger, A.
Effect of Hypergravity on Catecholamine Levels in Telemetrically Collected Blood of Rats during Centrifugation – 136

Timchenko, albert
Relations Between Prooxidant and Antioxidant Variables in Hypergravity and Aging – 133

Toda, Kazuo
Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

Toffanin, Renato
Quantitative MR Imaging for the in Vivo Assessment of Trabecular Bone Quality – 181

Toledo-Ramirez, Rommel
Design of an Object Oriented and Modular Architecture for a Naval Tactical Simulator using Delta3D's Game Manager – 190

Tolliver, Justin
Hysteretic Loss Reduction in Striated YBCO – 42

Tomas, A.
Body Position Reproducibility and Joint Alignment Stability Criticality on a Muscular Strength Research Device – 161

Tomatis, Alfred
Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

Tomczak, Melanie
Cell-Like Entities: On the Boundary Between Non-Living and Living – 178

Tompkins, Paul
Model-Unified Planning and Execution for Distributed Autonomous System Control – 214

Topcagic, S.
Immobilized Enzymes in Biocathodes – 82

Torrey, J M
Detailed Fuel Cell Demonstration Site Summary Report: Naval Hospital at Marine Corps Air Ground Combat Center - Twentynine Palms – 106

Tosten, M. H.
Effect of Tritium and Decay Helium On Weldment Fracture Toughness – 52

Tou, Janet
Centrifugation Effects on Estrous Cycling, Mating Success and Pregnancy Outcome in Rats – 156

Towsley, Don
Study of Buffer Size in Internet Routers – 233

Toyoda, Ichihiko
Software Defined Radio Prototype (I): System Design and Performance Evaluation – 191

Tracino, Emanuele
Evaluation of Radiation Effects and Dose Thresholds Definition in the Remsim Study – 124

Tragardh, Elin
High-frequency ECG – 180

Tramel, Robert
PEGASUS 5: An Automated Pre-Processor for Overset-Grid CFD – 3

Tran, Van T.
Predictions of Aerostructures Operational Flight Life Using the Half-Cycle Crack Growth Program – 293

Trappe, S. M.
WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

Trepte, Qing Z.
NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Treu, B.
Immobilized Enzymes in Biocathodes – 82

Trevino, Luis A.
Rationale for Suit and Airlock Dust Mitigation – 271

Trevino, Luis
Personal Cooling for Extra-Vehicular Activities on Mars – 274

Trexler, Carl A.
Mach 4 Test Results of a Dual-Flowpath, Turbine Based Combined Cycle Inlet – 10

Triebel, Rudolph
A System for Three-Dimensional Robotic Mapping of Underground Mines – 101

Tron, L., Jr.
Environmental Challenge Impairs Prefrontal Brain Functions – 158

Trott, Kevin C
Simulation Development for Dynamic Situation Awareness and Prediction II – 201

Trott, Sandra
Cell-Like Entities: On the Boundary Between Non-Living and Living – 178

True, B
Advanced Fuel Development and Fuel Combustion. Delivery Order 0005: Mitigation of Particulates Using Fuel Additives – 55

Tsai, H. C.
Mechanical and Thermal Properties of Ultra-High Carbon Steel Containing Aluminum – 50

Tsoutis, Anastasios
An Analysis of the Joint Strike Fighter Autonomic Logistics System – 12

Tsvetovat, Maksim
Social Structure Simulation and Inference Using Artificial Intelligence Techniques – 227

Tsvirkoun, D. V.
Hemodynamic Changes in Post-Suspension Rats during Gradual Hemorrhage – 133
The Effect of Simulated Microgravity on Nitrergic Innervation of the Middle Cerebral Artery – 124

Tsyb, A F
The Pathogenesis and Therapy of Combined Radiation Injury – 174

Tudorica, Luminita A
Clinically Practical Magnetic Resonance Protocol for Improved Specifically in Breast Cancer Diagnosis – 176

Tungkahotara, Siroj
On the Development of an Efficient Parallel Hybrid Solver with Application to Acoustically Treated Aero-Engine Nacelles – 17

Tuominen, L. K.
Nutritional and Flavor Components of Brassica Xapa L. Grown on ISS – 157

Turner, Daniel D
Localization of Tactile Signals as a Function of Tactor Operating Characteristics – 90

Uehara, Kazuhiro
Trends in Research and Development of Software Defined Radio – 59

Ulam, Patrick
Integrated Mission Specification and Task Allocation for Robot Teams - Part 1: Design and Implementation – 225
Integrated Mission Specification and Task Allocation for Robot Teams - Part 2: Testing and Evaluation – 225

Ulring, Shari
The SAFIRE and an Initial Network-Centric Warfare Evaluation – 265

Umehira, Masahiro
Trends in Research and Development of Software Defined Radio – 59

Umemoto, Shiori
Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

Unruh, E.
TRIPLE LUX-B: Phagocytosis in Mussel Hemocytes – 144

Upadhyaya, Shambhu
A Comprehensive Reasoning Framework for Information Survivability (User Intent Encapsulation and Reasoning About Intrusion: Implementation and Performance Assessment) – 215

Uther, William T
Tree-Based Hierarchical Reinforcement Learning – 237

Utko, Natalie
Relations Between Prooxidant and Antioxidant Variables in Hypergravity and Aging – 133
Superoxide Dismutase, Catalase, Glutathione Peroxidase, and Glutothione Reductase in the Heart of Hypergravity-Treated and Aging Rats – 157

Utsler, James
Genetic Algorithm Based Optimization of Advanced Solar Cell Designs Modeled in SILVACO ATLAS(Trademark) – 104

Uva, Bianca Maria
Effects of Head Down Tilt upon Cortisol and Sex Hormones – 120

Vadrucci, Sonia
Effects of Vector-Averaged Gravity on the Response to Different Stimulatory Signals in T-Cells – 146

The Biolab Facility Responsible Center at the German Aerospace Center DLR – 155

Vaksman, Z.
Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects – 147

Valic, Blaz
International Seminar on The Role of Dosimetry in High-Quality EMF Risk Assessment Held in Ljubljana, Slovenia and Zagreb, Croatia on 13-15 September 2006 – 246

van den Broek, J
Analysis of Adaptive Team Concept through Simulation Models: A Survey (toetsing van adaptieve teamconcepten door middel van simulatiemodellen: een verkenning) – 240

Van Loon, J. J. W. A.
Modulation of Gene Expression in Bone Cells during Strain-Adapted Bone Remodeling – 150

Seeds-In-Space Education Experiment during the Dutch Soyuz Mission, DELTA – 137

Van Loon, Jack
Effects of Weightlessness on Cell Proliferation and Ribosome Biogenesis in Arabidopsis Root Meristems – 145

Van Noord, Jonathan L.
Ion Beam Characterization of a NEXT Multi-Thruster Array Plume – 31

Van Scheepstal, P G
Inventory of Simulation and Modeling for the Analysis of Ground Manoeuvre Performance (inventarisatie van vragen en modellen voor de analyse van het grondgebonden optreden) – 240

van Vliet, A J
Analysis Methods and Models for Small Unit Operations – 240

Vancas, Michael D
The Extratropical Transition of Tropical Storm Banyan – 116

Vande Sande, J. B.
Fullerenic Structures and Such Structures Tethered to Carbon Materials – 249

Vandergrift, Jeff
Toward a Real-Time Spoken Language System Using Commercial Hardware – 191

VanDeun, Jozef
Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

vandeVen, M.
High Performance Laser Scanning Confocal Microscope for Microgravity Research – 134

vanEssen, G.
Monitor Activity, Temperature and Heart Rate with a Mouse Telemeter to be used for Animal Research on Board the International Space Station – 127

VanLandingham, Mark R
Dynamic Response of an Alternative Tissue Simulant, Physically Associating Gels (PAG) – 38

Multiscale Mechanical Characterization of Biomimetic Physically Associating Gels – 53

vanLoon, Jack J. W. A.
A Brief Overview of Animal Hypergravity Studies – 130

vanLoon, Jack J.
Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 142

vanLoon, J.
Monitor Activity, Temperature and Heart Rate with a Mouse Telemeter to be used for Animal Research on Board the International Space Station – 127

vanNieuwenhoven, Frans A.
A Brief Overview of Animal Hypergravity Studies – 130

VanOostveldt, P.
High Performance Laser Scanning Confocal Microscope for Microgravity Research – 134

Varanasi, Chakrapani V
Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 49

Varchavskaia, Paulina
Characterizing and Processing Robot-Directed Speech – 66

Varghese, Susan
Systemic Oncolytic Cytokine HSV Therapy of Prostate Cancer – 164

Varkonyi, Andrea
Production of Cytokines by Human PBMCs in Simulated Microgravity – 149

Vatsa, A.
Modulation of Gene Expression in Bone Cells during Strain-Adapted Bone Remodeling – 150

Vaughan, Jr, David P
Exploration of Force Transition in Stability Operations Using Multi-Agent Simulation – 196

Vaughan, Ronald D.
Thermal Band Atmospheric Correction Using Atmospheric Profiles Derived from Global Positioning System Radio Occultation and the Atmospheric Infrared Sounder – 103

Vaughn, Kimberly
Ground Testing of Divot Ejection Systems for Lifting Insulating Foam Trajectory (LIFT) Program – 284

Vayner, Boris V.
Experimental Results of Thin-Film Photovoltaic Cells in a Low Density LEO Plasma Environment: Ground Tests – 29

Veeder, Glenn J.
Spectroscopy of Kuiper Belt Objects and Centaurs – 275

Veloso, Manuela
Exploration and Policy Reuse – 235

Learning Dynamic Time Preferences in Multi-Agent Meeting Scheduling – 192

Person Tracking From a Dynamic Balancing Platform – 228

Probabilistic Reuse of Past Policies – 235

Veneris, Pete H.
Fabrication of 0.0075-Scale Orbiter Phosphor Thermography Test Models for Shuttle RTF Aeroheating Studies – 85

Vergyri, Dimitra
Limited-Domain Speech-to-Speech Translation between English and Pashto – 228

Verhagen, Th L
WitnessMan: The Software Tool to Design, Analyse and Assess a Witness Pack with Respect to Military and Medical Effects on an (un)Protected (dis-)Mounted Soldier – 196

Versari, Silvia
Advantages of Simulated Microgravity in the Production of Compounds of Industrial Relevance – 160

Effects of Space-Flight Simulation on Human Cells – 140

Vervoort, Jozef
Orpheus 0 G or Ear in Microgravity: To Establish Symptoms Concomittant of Inner and Middle Ear and Osteoporosis in Microgravity – 131

Viaud, B.
Combined Phase Space Characterization at the PEP-II IP Using Single-Beam and Luminous-Region Measurements – 250

Viayaraghavan, Saketh
Metal Cation Mediated Hydrolysis of Phosphono-Formate Diesters: Chemoselectivity and Catalysis – 33

Vicker, D.
CFD Simulation of the Space Shuttle Launch Vehicle with Booster Separation Motor and Reaction Control Plumes – 27

Vico, Laurence
Microgravity-Induced Matrix Remodelling is Linked to Reduction in Tension of Human Dermal Fibroblasts – 135

Vigano, W.
SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

Vikhlyantsev, I. M.
Effects of Ca(+2) -Binding Agent EGTA on Fiber Contractility and Content of Sarcromeric Cytoskeletal Proteins of Hindlimb Suspended Rats – 120

Vikhlyantsev, Ivan
Tenotomy of M. Soleus Antagonists Prevents the Changes in Fiber Type Characteristics and Sarcomeric Cytoskeletal Proteins in Unloaded Rats – 134

Viles, Charles L
Content Locality in Distributed Digital Libraries – 266

Villa, Alessandro
Advantages of Simulated Microgravity in the Production of Compounds of Industrial Relevance – 160

Effects of Space-Flight Simulation on Human Cells – 140

Villard, Eric
Understanding Visual Perception in the Perspective of Gravity – 137

Vinogradova, O. L.
Effect of 7-Days Dry Immersion in Combination with Mechanical Stimulation of Foot Support Zones upon Resistance to Fatigue of Knee Extensors and Flexors – 156

Hemodynamic Changes in Post-Suspension Rats during Gradual Hemorrhage – 133

The Effect of Simulated Microgravity on Nitrergic Innervation of the Middle Cerebral Artery – 124

Vish, Jeffrey A
Guided Standoff Weapons: A Threat to Expeditionary Air Power – 5

Vishwanatha, Jamboor
Breast Cancer Therapy With Annexin 11 Nanoparticles – 164

Viveros, Leamon
Cell-Like Entities: On the Boundary Between Non-Living and Living – 178

Vogel, V.
Nanobiotechnology: Report of the National Nanotechnology Initiative Workshop. Held in Arlington, Virginia on October 9-11, 2003 – 46

Vogler, S.
Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

Volpe, M. A.
Moving from Bilateral to Multilateral Medical Operations – 22

Vutukury, Srinivas
A Simple MPLS-based Flow Aggregation Scheme for Providing Scalable Quality of Service – 219

MPATH: A Loop-free Multipath Routing Algorithm – 219

WiNN: An Efficient Method for Routing Short-Lived Flows – 222

Wade, Charles E.
Centrifugation Effects on Estrous Cycling, Mating Success and Pregnancy Outcome in Rats – 156

Prenatal Centrifugation: A Mode1 for Fetal Programming of Body Weight? – 138

Wagner, Alan
Integrated Mission Specification and Task Allocation for Robot Teams - Part 1: Design and Implementation – 225

Integrated Mission Specification and Task Allocation for Robot Teams - Part 2: Testing and Evaluation – 225

Wagner, Rick
Space Robotics: AWIMR an Overview – 223

Wagreich, Richard J
Methodology for Evaluating the Effectiveness of Collaborative Tools for Coordinating MDA Emergency Response – 204

Waid, M.
Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Wainwright, Gary A.
Rapid Fabrication of Flat Plate Cavity Phosphor Thermography Test Models for Shuttle Return-to-Flight Aero-Heating – 87

Wakana, Hiromitsu
Journal of the National Institute of Information and Communications Technology, Volume 53, No. 1 – 60

Wake, Kanako
Development of Exposure Systems and Exposure Assessment for Studies on Biological Effect of Electromagnetic Field – 64

Studies on Dosimetry of Human-Body Exposure to Electromagnetic Field – 63

Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

Waldron, W. L.
Helical Pulse Line Structures for Ion Acceleration – 244

Wall, Daniel S
Case Study: Accelerating Process Improvement by Integrating the TSP and CMMI – 11

Wallnau, Kurt
Workshop on Program Generation and Model-Driven Architecture – 200

Walsh, Michael J
Computing the Observed Information Matrix for Dynamic Mixture Models – 236

Wampler, Jeffrey L
HCI Design Patterns for C2: A Vision for a DoD Design Reference Library – 242

Wamsteker, J. A.
Seeds-In-Space Education Experiment during the Dutch Soyuz Mission, DELTA – 137

Wang, Hailin
Spin-Based Photonics via Electromagnetically Induced Transparency – 258

Wang, Jingbin
Detecting Instances of Shape Classes That Exhibit Variable Structure – 227

Wang, Jun
Iconic Representation and Dynamic Information Fidelity: Implications for Decision Support – 77

Wang, L.
Simulation of the Electron Cloud for Various Configurations of a Damping Ring for the ILC – 264

Wang, Xiao Dong
Different Responses in Soleus Muscle Fibers of Wistar and Wistar Hannover Rats to Hindlimb Unloading – 160

Mechanical and/or Neural Activity-Dependent Regulation of Soleus Muscle Fibers of MDX Mice – 159

Role of Afferent Input and Mechanical Load for Size Regulation of Rat Soleus Muscle – 160

Wang, XiaoDong
How Does the Nucleolar Number Involve in Muscle Fiber Atrophy? Response to beta-Guanidinopropionic ACD Supplementation – 139

Wang, Xiao-Yen J.
Conjugate Heat Transfer Analyses on the Manifold for Ramjet Fuel Injectors – 89

Wang, Yuanxun E
Envelope Switched Doherty Power Amplifier For RF Applications (Preprint) – 77

Wang, Yu
A Hybrid Collision Avoidance Scheme for Ad Hoc Networks – 5

Performance of Directional Collision Avoidance in Multihop Wireless Networks – 5

Wang, Z.
Comparison of Cognitive Performance Tests for Promethazine Pharmacodynamics in Human Subjects – 147

Wang, Zuwei
Effect of Sampling Schedule on Pharmacokinetic Parameter Estimates of Promethazine in Astronauts – 129

Wanzenberg, R.
Simulation of the Electron Cloud for Various Configurations of a Damping Ring for the ILC – 264

Ward, Thomas C.
Dielectric relaxation behavior of poly(acrylonitri1e-co-methacrylonitrile) microcapsules dispersed in a silicone matrix – 45

Dielectric Relaxation Behavior of Poly(acrylonitrile-co-methacrylonitrile) Microcapsules Dispersed in a Silicone Matrix – 35

Ware, C.
Motion-Based Visualization – 76

Warner, Scott A
The Effective Use of New Materials and Methodologies for Blast Mitigation in New and Renovated Facilities by the Armed Services – 100

Warren, Randy
Limited Investigation and Characterization of Boundary Avoidance Tracking (Project HAVE BAT) – 6

Warwick, Walter
A Simulation-Based Tool to Train Rapid Decision-Making Skills for the Digital Battlefield – 202

Agent-based Modeling of Dismounted Infantry Through Inclusion of Perceptions, Inferences and Associations Phase 1 – 269

Washington, Richard
The K9 On-Board Rover Architecture – 230

Watanabe, Soichi
Development of Exposure Systems and Exposure Assessment for Studies on Biological Effect of Electromagnetic Field – 64

Studies on Dosimetry of Human-Body Exposure to Electromagnetic Field – 63

Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

Watanabe, Yoriko
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

Waters, L. B. F. M.
Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus? – 277

Watson, J. K.
The Logistic Path from the International Space Station to the Moon and Beyond – 25

Watson, Willie R.
On the Development of an Efficient Parallel Hybrid Solver with Application to Acoustically Treated Aero-Engine Nacelles – 17

Watts, Roland
Strength Enhancement and Application Development of Carbon Foam for Thermal Management Systems – 262

Weber, Daniel J
Air Flow Patterns Around Several Biological Point Detection System Configurations – 91

Weber, W. J.
Radiation Effects in Nuclear Waste Materials – 33

Weerasooriya, Tusit
Dynamic Response of an Alternative Tissue Simulant, Physically Associating Gels (PAG) – 38

Multiscale Mechanical Characterization of Biomimetic Physically Associating Gels – 53

Weinstock, Charles B
On System Scalability – 215

Weischedel, Ralph M
Portability in the Janus Natural Language Interface – 204

Weldon, W
Naval Electromagnetic (EM) Gun Technology Assessment – 246

Welker, Troy C
Limited Evaluation of an 802.11b Air-to-Ground Wireless Datalink (Project 'HAVE HALO' – 22

Welsch, H.
Association of Hormonal Responses and Performance of Student Pilots during Acceleration Training on the Human Centrifuge – 135

Weresczak, A. A.
Comprehensive Creep and Thermophysical Performance of Refractory Materials – 55

West, S. L.
Effect of Tritium and Decay Helium On Weldment Fracture Toughness – 52

Westerman, John F
Detailed Fuel Cell Demonstration Site Summary Report: Naval Hospital at Marine Corps Air Ground Combat Center - Twentynine Palms – 106

Westersfield, T. C.
In-Plant Testing of High-Efficiency Hydraulic Separators. (Annual Report, July 21, 2004-July 20, 2005) – 87

Westhelle, Carlos H.
Mars Aerocapture Systems Study – 29

Weterings, K. A. P.
Seeds-In-Space Education Experiment during the Dutch Soyuz Mission, DELTA – 137

Wexler, Django
The RADAR Test Methodology: Evaluating a Multi-Task Machine Learning System with Humans in the Loop – 229

White, J
Improved Modeling Tools For High Speed Reacting Flows – 237

Whited, Vaughan
Analyzing Requirements for and Designing a Collaborative Tool Based on Functional and User Input – 16

Whiteman, Donald E.
Low Cost Ku-Band Satellite Transmitter System – 289

Whitsit, Kimberly
Interactions of Light and Gravity in Chara Internodal Cells – 155

Whitson, Peggy A.
Microgravity and Signaling Molecules in Rat Osteoblasts: Downstream of Receptor Tyrosine Kinase, G-Protein-Coupled Receptor, and Small GTP-Binding Proteins – 128

Whittaker, William
A System for Three-Dimensional Robotic Mapping of Underground Mines – 101

Wiberg, Kenneth C
Identifying Supervisory Control and Data Acquisition (SCADA) Systems on a Network via Remote Reconnaissance – 218

Wick, Charles H
Determination of MS2 Bacteriophage Stability at Low pH Using the Integrated Virus Detection System (IVDS) – 92

Wiegmann, D.
Developing A Methodology For Assessing Safety Programs Targeting Human Error In Aviation – 8

Wienands, U.
Doubling the PEP-II Luminosity in Simulations – 264

Wiersum, C J
Inventory of Simulation and Modeling for the Analysis of Ground Manoeuvre Performance (inventarisatie van vragen en modellen voor de analyse van het grondgebonden optreden) – 240

Wilcox, B.
WTEC Panel Report on International Assessment of Research and Development in Robotics – 189

Wilke, Doris
Core Data Model Proposal for Physiology Research in Space – 125

Wilkinson, N.
Haughton-Mars Project (HMP)/NASA 2006 Lunar Medical Contingency Simulation: An Overview – 279

Williams, Gary
Development of Portable Fiber Bragg Grating Interrogation System – 285

Williamson, Matthew M
Exploiting Natural Dynamics in Robot Control – 224

Willingham, V.
Stability of Radiation Induced Chromosome Damage in Human Peripheral Blood Lymphocytes – 185

Wilson, G. G.
Micro-Discharge Optical Source Apparatus and Method and System for Analyzing a Sample – 82

Wilson, Glenn F
Performance and Psychophysiological Measures of Fatigue Effects on Aviation Related Tasks of Varying Difficulty – 7

Wilson, S.
MRI Measures of the Lumbo-Pelvic Muscles in Bedrest and Follow Up: Implications for Exercise Countermeasures in Microgravity – 181

Wincheski, Buzz
A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

Winkler, C.
European Network using Fish as Osteoporosis Research Models (ENFORM) – 127

Winzell, Thomas
Benchmarking and Validation of IR Signature Programs: SensorVision, CAMEO-ESA and RadThermIR – 195

Wirth, D.
Association of Hormonal Responses and Performance of Student Pilots during Acceleration Training on the Human Centrifuge – 135

Free Cortisol and Salivary Alpha-Amylase Levels during a Six-Hour-Water Immersion in Healthy Young Men – 149

Wirtz, Michael
Core Data Model Proposal for Physiology Research in Space – 125

Wise, Daniel G
Air Flow Patterns Around Several Biological Point Detection System Configurations – 91

Wodnicki, R. B.
Integrated Interface Electronics for Reconfigurable Sensor Array – 83

Wojtsekhowski, B.
Nucleon Compton Scattering – 264

Wong, Ernest Y
The Army Digital Terrain Catalog II (ADTC) – 210

Wong-Jiru, Ann
Graph Theoretical Analysis of Network Centric Operations Using Multi-Layer Models – 65

Wood, Kathryn
Aircraft Accidents and Incidents Associated With Visual Disturbances From Bright Lights During Nighttime Flight Operations – 184

Wooden, D. H.
Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus? – 277

Woodward, C. E.
Is the tail of 73P-B/Schwassman-Wachman 1 chasing its Remnant Nucleus? – 277

Woody, Alfred
Energy and Process Optimization and Benchmarking of Army Industrial Processes – 105

Worek, William M
Energy and Process Optimization and Benchmarking of Army Industrial Processes – 105

Worley, S D
Antimicrobial Cellulose: Preparation and Application of 5-Methyl-5-Aminomethylhydantoin – 34

Wright, Anne
The K9 On-Board Rover Architecture – 230

Wright, Henry S.
Mars Aerocapture Systems Study – 29

Wu, H.
Distributed Oscillator Architectures – 75

Wu, K. C.
Surge Current Suppression in Power-Factor-Corrected AC-To-DC Converter with Capacitive Load – 84

Wu, Xing-Yu
Compound Mechanism Hypothesis on +Gz - Induced Brain Injury and Dysfunction of Learning and Memory – 142

Wubbels, Rene J.
A Brief Overview of Animal Hypergravity Studies – 130

Wyman, F E
Improvements in Regenerative Frequency Dividers – 78

Xie, Man-Jiang
Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity – 157

Yahja, Alex
Simulation Validation for Societal Systems – 200

Yajima, Kazuyoshi
Effect of Artificial Gravity with Exercise Load by Using Short-Arm Centrifuge with Bicycle Ergometer as a Countermeasure Against Disused Osteoporosis – 159

Yamada, Akira
High Availability Server Platform for Operations Support System – 213

Yamanaka, Yukio
Electromagnetic Disturbance Measurement by Using Amplitude Probability Distribution for Protecting Digital Wireless Communication Systems – 61

Evaluation of Uncertainty of Horn Antenna Calibration with the Frequency range of 1 GHz to 18 GHz. – 62

Power Measurement Emitted by UWB System in Time Domain – 63

Studies on Evaluation Methods of Compliance to Radio Radiation Protection Guidelines – 64

Total Radiated Power of Radio Transmitters Measured in a Reverberation Chamber – 60

Yamane, Kenichi
Service Management System for IP Services – 213

Yana, Kalinina
The Influence of Clinorotation on Root Cell Differentiation in Brassica Rapa Seedlings – 143

Yanchus, Nancy
Iconic Representation and Dynamic Information Fidelity: Implications for Decision Support – 77

Yates, III, John R
Proteomics in Malaria – 166

Yen, A.
Chemical Composition by the APXS along the Downhill Traverse of the Mars Exploration Rover Spirit at Gusev Crater – 280

Yen, Albert S.
Two Martian Winters at Gusev Crater and Meridiani Planum: New Results From the MER Mossbauer Spectrometers – 281

Yeung, Edward
Interactions of Light and Gravity in Chara Internodal Cells – 155

Yi, Yuhong
NASA-Langley Web-Based Operational Real-time Cloud Retrieval Products from Geostationary Satellites – 118

Yonehara, K.
Simulations of MANX, A Practical Six Dimensional Muon Beam Cooling Experiment – 249

Yoshioka, Hiroshi
Software Defined Radio Prototype (I): System Design and Performance Evaluation – 191

Yoshioka, Toshitada
Effects of Heat Stress on the Regeneration of Injured Skeletal Muscle in Rats – 126

Yoshiyuki, Miyazawa
Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department – 61

Youch, Daniel F
Efficient Calculation of Earth Penetrating Projectile Trajectories – 273

Young, Charles C
An Activity-Dependent Assay for Ricin and Related RNA N-Glycosidases Based on Electrochemiluminescence – 162

Young, Charles
A Quantitative Electrochemiluminescence Assay for Clostridium perfringens alpha toxin – 163

Young, Laurence R.
Neurovestibular Adaptation to Short Radius Centrifugation – 150

Young, M P
Progress Report on Fast Breeder Reactor Safety Studies – 93

Yowell, L.
Carbon Nanotube-Enhanced Carbon-Phenenolic Ablator Material – 38

Yu, Zhi-Bin
Depressed Tetanic Contractile Function Cannot be Compensated by Increasing Stimulating Frequency in Unloaded Soleus Muscle – 124

Yuan, Xiabin
Top vs. Bottom Charging of the Dielectric in RF MEMS Capacitive Switches (Preprint) – 78

Yukio, Yamanaka
Developments of ISO/IEC17025 Calibration Systems in Wireless Communications Department – 61

Yust, Nicholas A
Biaxially Textured Copper and Copper-Iron Alloy Substrates for Use in YBa2Cu3O7-x Coated Conductors – 49

Zaballos, Angel
Gene Expression Variations during Drosophila Metamorphosis in Space. The Gene Experiment in the Spanish Cervantes Mission to the ISS – 142

Zacot, Chimi
Shipboard Wireless Sensor Networks Utilizing Zigbee Technology – 67

Zafran, Justine M
Discrimination of Complex Synthetic Echoes by an Echolocating Bottlenose Dolphin – 252

Zahnle, Kevin
Earth After the Moon Forming Impact – 278

Zarro, Sarah E
Steady-State and Transient Measurements Within a Compressor Rotor During Steam-Induced Stall at Transonic Operational Speeds – 13

Zavada, J M
Optical and magnetic properties of Eu-doped GaN – 41

Zent, Aaron P.
A Historical Search for the Occurrence of Habitable Ground Ice at the Phoenix Landing Site – 278

Zeredo, Jorge
Hypergravity-Induced Changes of Neuronal Activities in CA1 Region of Rat Hippocampus – 130

Zeringue, Clint M
A New Application of the Channel Packet Method for Low Energy 1-D Elastic Scattering – 107

Zerkie, M. L.
Specifications, Pre-Experimental Predictions, and Test Plate Characterization Information for the Prometheus Critical Experiments – 51

Zhang, Lifan
Alterations in Vasoreactivity of Femoral Artery Induced by Hindlimb Unweighting are Related to the Changes of Contractile Protein in Rats – 129

Zhang, Li-Fan
Angiotensinogen Expression in Vascular Tissues of Simulated Weightless Rats – 153

Calcium Channels are Differentially Activated in Cerebral and Hindquarter Arteries of Rats during Simulated Microgravity – 157

System Specificity in Responsiveness to Intermittent -Gx Gravitation during Simulated Microgravity in Rats – 130

Zhang, Z.
Role of the RhoGTPases in the Cellular Receptivity and Reactivity to Mechanical Signals Including Microgravity – 134

Zhang, Zi-Tai
Angiotensinogen Expression in Vascular Tissues of Simulated Weightless Rats – 153

Zheng, Haishan
Amplitude Analysis and Modeling of Regional Phases in PNE Profiles in Northern Eurasia and Seismic Regionalization – 115

Zheng, Jing
Limited-Domain Speech-to-Speech Translation between English and Pashto – 228

Zhivov, Alexander M
Energy and Process Optimization and Benchmarking of Army Industrial Processes – 105

Zhou, Daniel
A Review of Polyphase Filter Banks and Their Application – 232

Zhu, Harry
A Tool Measuring Remaining Thickness of Notched Acoustic Cavities in Primary Reaction Control Thruster NDI Standards – 251

Zilberstein, Shlomo
Web Page Clustering using Heuristic Search in the Web Graph – 267

Zimmer, Robert
Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 1 of 2 – 112

Environmental Assessment for Capital Improvement Projects, Buckley Air Force Base, Colorado. Volume 2 of 2 – 112

Zimmermann, F.
Observation of Long-Range Beam-Beam Effect in RHIC and Plans for Compensation – 263

Zimpfer-Jost, Veronique
Bouchon d'oreille a attenuation active adaptee aux bruits d'helicoptere (Ear Plugs for Active Attenuation Adapted for Helicopter Noises) (Gehoerschutzstopsel mit aktriver Daempfung, geeignet fuer Hubschrauberlaerm) – 12

Zizi, Martin
Investigating Human Cognitive Performance during Spaceflight – 121

Zolesi, V.
SCORPI and SCORPI-T Neurophysiological Experiments on Animals in Space – 156

Zukauskas, A.
Growth of Cress Seedlings and Morphogenesis of Root Gravisensors under Clino-Rotation and in Unidirectional Red or Blue Light – 120

Zwart, S. R.
WIse-2005: Combined Aerobic and Resistive Exercise May Help Mitigate Bone Loss During 60-D Simulated Microgravity in Women – 185

Zwart, Sara
Food and Nutrition for the Moon Base: What we have Learned in 45 Years of Space Flight – 179