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Langley Research Center

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Information Program Office**

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Scientific and Technical Aerospace Reports (STAR) is an electronic abstract journal, listing citations with abstracts for aerospace-related reports obtained from worldwide sources. It is electronically published biweekly and announces documents that have recently been entered into the NASA Scientific and Technical Information (STI) Database. The documents are of the following types:

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- NASA-owned patents and patent applications
- Other U.S. Government agency and foreign patents and patent applications
- Domestic and foreign dissertations and theses.

Also included are two indexes, Subject Term and Personal Author. The Subject Term Index is generated from the *NASA Thesaurus* terms associated and listed with each document.

STAR subject coverage includes all aspects of aeronautics and space research and development, supporting basic and applied research, and applications. Aerospace aspects of Earth resources, energy development, conservation, oceanography, environmental protection, urban transportation, and other topics of high national priority are also covered.

Abstracts in *STAR* are categorized by 10 major subject divisions that are divided further into 76 specific subject categories. The subject divisions and categories are listed in the Table of Contents together with a note for each that defines its scope and provides any cross-references.

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Table of Contents

Subject Divisions

Document citations are grouped first by the following divisions. Select a division title to view the category-level Table of Contents.

A. Aeronautics
B. Astronautics
C. Chemistry and Materials
D. Engineering
E. Geosciences
F. Life Sciences
G. Mathematical and Computer Sciences
H. Physics
I. Social and Information Sciences
J. Space Sciences
K. General

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 searching on *NASA Thesaurus* subject terms and personal author names.

Subject Term Index

Personal Author Index

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Subject Categories of the Division A. Aeronautics

Select a category to view the collection of records cited. N.A. means no abstracts in that category.

01 Aeronautics (General) 1

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*.

02 Aerodynamics 2

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 Heat Transfer.*

03 Air Transportation and Safety 3

Includes passenger and cargo air transport operations; aircraft 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*.

04 Aircraft Communications and Navigation 4

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.*

05 Aircraft Design, Testing and Performance 4

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*.

07 Aircraft Propulsion and Power 6

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; 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*.

09 Research and Support Facilities (Air) 8

Includes airports, runways, hangers, and aircraft repair and overhaul facilities, wind tunnels, water tunnels, and shock tubes; flight simulators; and aircraft engine test stands. Also includes airport ground equipment and systems. For airport ground operation see *03 Air Transportation and Safety.* For astronautical facilities see *14 Ground Support Systems and Facilities (Space).*

Subject Categories of the Division B. Astronautics

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12 Astronautics (General) 10

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*.

13 Astrodynamics 11

Includes powered and free-flight trajectories; and orbital and launching dynamics.

15 Launch Vehicles and Launch Operations 11

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.*

16 Space Transportation and Safety 13

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

18 Spacecraft Design, Testing and Performance 18

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.*

20 Spacecraft Propulsion and Power 21

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*.

Subject Categories of the Division C. Chemistry and Materials

Select a category to view the collection of records cited. N.A. means no abstracts in that category.

23 Chemistry and Materials (General) 23

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 24 through 29*. For astrochemistry see category *90 Astrophysics*.

24 Composite Materials 27

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

25 Inorganic, Organic, and Physical Chemistry 35

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

26 Metals and Metallic Materials 41

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

27 Nonmetallic Materials 46

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

28 Propellants and Fuels 65

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*.

29 Space Processing 67

Includes space-based development of materials, compounds, and processes for research or commercial application. Also includes the development of materials and compounds in simulated reduced–gravity environments. For legal aspects of space commercialization see *84 Law, Political Science and Space Policy.*

Subject Categories of the Division D. Engineering

Select a category to view the collection of records cited. N.A. means no abstracts in that category.

31 Engineering (General) 68

Includes general research topics 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*.

32 Communications and Radar 71

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.*

33 Electronics and Electrical Engineering 77

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.*

34 Fluid Mechanics and Thermodynamics 85

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.*

35 Instrumentation and Photography 90

Includes remote sensors; measuring instruments and gauges; 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*.

36 Lasers and Masers 92

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*.

37 Mechanical Engineering 96

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*.

38 Quality Assurance and Reliability 99

Includes approaches to, and methods for reliability analysis and control, inspection, maintainability, and standardization.

39 Structural Mechanics 102

Includes structural element design, analysis and testing; dynamic responses of structures; weight analysis; fatigue and other structural properties; and mechanical and thermal stresses in structure. For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

Subject Categories of the Division E. Geosciences

Select a category to view the collection of records cited. N.A. means no abstracts in that category.

42 Geosciences (General) 105

Includes general research topics related to the Earth sciences, and the specific areas of petrology, minerology, and general geology. For other specific topics in geosciences see *categories 42 through 48*.

43 Earth Resources and Remote Sensing 107

Includes remote sensing of earth features, phenomena and resources by aircraft, balloon, rocket, and spacecraft; analysis or remote sensing data and imagery; development of remote sensing products; photogrammetry; and aerial photographs. For instrumentation see *35 Instrumentation and Photography.*

44 Energy Production and Conversion 127

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*.

45 Environment Pollution 129

Includes atmospheric, water, soil, noise, and thermal pollution.

46 Geophysics 134

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*.

47 Meteorology and Climatology 167

Includes weather observation forecasting and modification.

48 Oceanography 171

Includes the physical, chemical and biological aspects of oceans and seas; ocean dynamics, and marine resources. For related information see also *43 Earth Resources and Remote Sensing*.

Subject Categories of the Division F. Life Sciences

Select a category to view the collection of records cited. N.A. means no abstracts in that category.

51 Life Sciences (General) 172

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*.

52 Aerospace Medicine 194

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*.

53 Behavioral Sciences 201

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 Man/System Technology and Life Support 202

Includes human factors engineering; bionics, man–machine, life support, space suits and protective clothing. For related information see also *16 Space Transportation* and *52 Aerospace Medicine*.

Subject Categories of the Division G. Mathematical and Computer Sciences

Select a category to view the collection of records cited. N.A. means no abstracts in that category.

59 Mathematical and Computer Sciences (General) 209

Includes general topics and overviews related to mathematics and computer science. For specific topics in these areas see *categories 60 through 67*.

60 Computer Operations and Hardware 212

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*.

61 Computer Programming and Software 214

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.

62 Computer Systems 223

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.

63 Cybernetics, Artificial Intelligence and Robotics 227

Includes feedback and control theory, information theory, machine learning, and expert systems. For related information see also *54 Man/System Technology and Life Support.*

64 Numerical Analysis 232

Includes iteration, differential and difference equations, and numerical approximation.

65 Statistics and Probability 232

Includes data sampling and smoothing; Monte Carlo method; time series and analysis; and stochastic processes.

66 Systems Analysis and Operations Research 233

Includes mathematical modeling of systems; network analysis; mathematical programming; decision theory; and game theory.

67 Theoretical Mathematics 236

Includes algebra, functional analysis, geometry, topology set theory, group theory and and number theory.

Subject Categories of the Division H. Physics

Select a category to view the collection of records cited. N.A. means no abstracts in that category.

70 Physics (General) 236

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*.

71 Acoustics 237

Includes sound generation, transmission, and attenuation. For noise pollution see *45 Environment Pollution.* For aircraft noise see also *02 Aerodynamics* and *07 Aircraft Propulsion Propulsion and Power.*

72 Atomic and Molecular Physics 240

Includes atomic and molecular structure, electron properties, and atomic and molecular spectra. For elementary particle physics see *73 Nuclear Physics*.

73 Nuclear Physics 241

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*.

74 Optics 243

Includes light phenomena and the theory of optical devices. For lasers see *36 Lasers and Masers*.

75 Plasma Physics 245

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics*.

76 Solid-State Physics 248

Includes condensed matter physics, crystallography, and superconductivity. For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

77 Physics of Elementary Particles and Fields 251

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.*

Subject Categories of the Division I. Social and Information Sciences

Select a category to view the collection of records cited. N.A. means no abstracts in that category.

80 Social and Information Sciences (General) 252

Includes general research topics related to sociology; educational programs and curricula.

81 Administration and Management 253

Includes management planning and research.

82 Documentation and Information Science 255

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography. For computer documentation see *61 Computer Programming and*

85 Technology Utilization and Surface Transportation 265

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.

Subject Categories of the Division J. Space Sciences

Select a category to view the collection of records cited. N.A. means no abstracts in that category.

88 Space Sciences (General) 265

Includes general research topics related to the natural space sciences. For specific topics in space sciences see *categories 89 through 93*.

89 Astronomy 266

Includes observations of celestial bodies, astronomical instruments and techniques; radio, gamma-ray, x–ray, ultraviolet, and infrared astronomy; and astrometry.

90 Astrophysics 266

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

91 Lunar and Planetary Science and Exploration 268

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*.

92 Solar Physics 269

Includes solar activity, solar flares, solar radiation and sunspots. For related information see *93 Space Radiation.*

93 Space Radiation 270

Includes cosmic radiation; and inner and outer Earth radiation belts. For biological effects of radiation on plants and animals see *52 Aerospace Medicine*. For theory see *73 Nuclear Physics.*

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Typical Report Citation and Abstract

❶ **19970001126** NASA Langley Research Center, Hampton, VA USA
❷ **Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes**
❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;
❹ Mar. 1996; 130p; In English
❺ Contract(s)/Grant(s): RTOP 505-68-70-04
❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10’ to 50’, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65’ swept forebody serrations tended to roll together, while vortices from 40’ swept serrations were more effective in generating additional lift caused by their more independent nature.
❽ Author
❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

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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.

20010066971 Tsentralni Aerogidrodinamicheskii Inst., Zhukovsky, Russia
Aerospace Technologies of the 21st Century ***Final Report***
Jan. 2000; 120p; In English; 21st; New Technologies of Experimental Research and Simulation, 8-9 Jun. 2000, Berlin, Germany
Contract(s)/Grant(s): F61775-00-W-F061
Report No.(s): AD-A389698; EOARD-CSP00-5061; No Copyright; Avail: CASI; A02, Microfiche; A06, Hardcopy

The Final Proceedings for Aerospace Technologies of the XXI Century New Technologies of Experimental Research & Simulation, 8 June 2000 - 9 June 2000 This is an interdisciplinary conference. Topics include: Test Facilities and New Capabilities for Experimental Research; New Technologies of Experimental Research; Advances in the Field of Simulation; Investments in Aerospace; Advanced Technologies Commercialisation.
DTIC
Conferences; Aerospace Engineering; Aerospace Systems; Computational Fluid Dynamics; Wind Tunnel Tests

20010067658 National Aerospace Lab., Tokyo Japan
Numerical Simulation of a Hypersonic Non-Equilibrium Flow
Takaki, R.; Jun. 2000; 20p; In Japanese; Portions of this document are not fully legible
Report No.(s): PB2001-105899; NAL-TR-1407; Copyright; Avail: National Technical Information Service (NTIS), Microfiche

Numerical simulations of a hypersonic flow with high temperature effect were carried out. Park's two temperature model and a seven species and eighteen finite rate chemical reactions model were used in order to take account of thermally and chemically nonequilibrium effects. AUSMDV scheme was applied for convective terms. An efficient numerical algorithm, LU-SGS scheme and a point implicit method for source terms were used for time integration. Numerical results of an axis-symmetric flow around a semi-sphere are presented and compared with experimental data. A grid convergency check is also performed. Results indicate that the flow behind the shock tends strongly toward a non-equilibrium flow.
NTIS
Hypersonic Flow; Mathematical Models; Equilibrium Flow

20010067659 National Aerospace Lab., Tokyo Japan
System Design of the Renewed Transonic Flutter Testing Facility at NAL
Kikuchi, T.; Ejiri, H.; Morita, T.; Tamayama, M.; Nakamichi, J.; Jan. 2000; 56p; In Japanese; Original contains color illustrations
Report No.(s): PB2001-105896; NAL-TR-1401; Copyright; Avail: National Technical Information Service (NTIS), Microfiche

Part I consists of Chapters 1,2,3 and 4, which provide an outline of the performance of the old as well as the new system. PART II corresponds to Chapter 5, and describes the design concept and technical investigations concerning various issues in the renewal design, including the design of the pressure valve, high pressure tubes, chambers, test sections and prinum chamber. PART III consists of Chapter six and four appendices, and explains the measurement systems of the present facility. As a result of the present

studies, the renovation of the flutter testing facility was made possible by improvements in flow quality and renewal of hard ware bringing the new system up to a standard of performance as high as that of modern wind tunnels around the world.
NTIS
Wind Tunnels; Transonic Flutter; High Pressure; Flutter

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 Heat Transfer.

20010066191 California Inst. of Tech., Pasadena, CA USA
Whole-Field Measurements of Turbulent Flow for the Study of Aero-optical Effects ***Final Report, 15 Nov. 1996 - 15 Feb. 1998***
Dimotakis, Paul E.; May 11, 1998; 25p; In English
Contract(s)/Grant(s): F49620-94-1-0283
Report No.(s): AD-A345549; AFRL-SR-BL-TR-0471; No Copyright; Avail: Defense Technical Information Center (DTIC)

Aerooptical phenomena associated with the propagation of optical beams and imaging through turbulent index-of-refraction fields have been investigated. Using simultaneous imaging of optical-beam distortion and the turbulent index-or-refraction field, we have documented near-field behavior, following propagation through moderate-to-high Reynolds number jets and shear layers. For both flows, propagation through turbulence may result in the formation of caustics. Preliminary measurements using the Palomar 200” telescope confirm the formation of caustics in atmospheric propagation, using bright stars as sources. Spatial wavefront and wavefront-tilt measurements of beams emerging from jet and shear layer regions exhibit non-Kolmogorov behavior. Preliminary efforts to reconstruct images through turbulence indicate the need for both amplitude and wavefront-tilt measurements for reliable image reconstruction.
DTIC
Turbulent Flow; Wave Fronts; Shear Layers; Optical Properties; Kolmogorov Theory; Imaging Techniques; Image Reconstruction; High Reynolds Number

20010066498 NASA Ames Research Center, Moffett Field, CA USA
Computation of External Aerodynamics for a Canard Rotor/Wing Aircraft
Pandya, S., NASA Ames Research Center, USA; Aftosmis, M. J., NASA Ames Research Center, USA; [2000]; 14p; In English; 39th AIAA Aerospace Sciences and Exhibit, Jan. 2001, Reno, NV, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The aerodynamic loads on a Canard Rotor/Wing vehicle are investigated using inviscid numerical simulations to understand the aerodynamic characteristics of the vehicle during conversion from rotorcraft to fixed wing flight. Steady numerical simulations at five azimuthal rotor indices are presented over a quarter turn of the rotor, producing 19 points during a single rotation due to symmetry. A Cartesian mesh approach is used to compute the steady flow field. All computations are done with a faired over engine inlet and exit to be consistent with the wind tunnel model geometry. Modification to the geometry is suggested and the aerodynamic effect of the modification is discussed.
Author
Aerodynamic Characteristics; Computerized Simulation; Aerodynamic Loads; Rotary Wing Aircraft

20010066980 Boston Coll., Inst. for Scientific Research, Chestnut Hill, MA USA
Power Spectral Artifacts in Publishing Balloon Data and Implications Regarding Saturated Gravity Wave Theories, ***Sep. 1998 - Sep. 1999***
Dewan, E. M., Air Force Research Lab., USA; Grossbard, N., Boston Coll., USA; Journal of Geophysical Research; Feb. 27, 2000; ISSN 0148-0227; Volume 105, No. D4, pp. 4667-4683; In English
Contract(s)/Grant(s): F19628-98-C-0072; AF Proj. S321
Report No.(s): AD-A387832; AFRL-VS-TR-2000-1589; Paper-1999JD901108; Copyright; Avail: Defense Technical Information Center (DTIC)

There are several theories of atmospheric gravity wave power spectral densities (PSDs) which have been published. These, in turn, have inspired numerous experimental tests. The spectra involved are in the class denoted ’stochastic, red noise spectra’.

This means that most of the power is at the low-frequency end and obeys a power law falloff in going to higher frequency. The present paper describes how some published experimental spectra are flawed by an artifact of spectral analysis which has not heretofore been recognized in the literature. It involves both an amplitude fluctuation enhancement and a coupling between spectral amplitude and slope, and it can be avoided only by stringent control of spectral leakage. Because of 'trade-off' considerations every data set, depending on its length and signal characteristics, requires a different method of analysis. It is therefore required that PSD analysis programs must be adjusted and tested to fit each situation. For this purpose a simple method is described to simulate data of known general characteristics for test purposes (to avoid the pitfalls).
Author
Noise Spectra; Spectrum Analysis; Power Spectra

20010067040 NASA Langley Research Center, Hampton, VA USA
Simulation of Transonic Limit Cycle Oscillations Using a CFD Time-Marching Method
Tang, L., ZONA Technology, Inc., USA; Bartels, R. E., NASA Langley Research Center, USA; Chen, P. C., ZONA Technology, Inc., USA; Liu, D. D., Arizona State Univ., USA; [2001]; 10p; In English; 42nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference and Exhibit, 16-19 Apr. 2001, Seattle, WA, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Report No.(s): AIAA Paper 2001-1290; Copyright Waived; Avail: CASI; A02, Hardcopy; A01, Microfiche
CFD-based aeroelastic computations are performed to investigate the effect of nonlinear aerodynamics on transonic LCO (Limit Cycle Oscillations) characteristics of a two-dimensional supercritical wing with the NLR 7301section. It is found that the presentation of the viscous effects, including turbulence modeling, plays an important role on the accurate prediction of shock and LCO; and a small initial perturbation appears to produce large amplitude LCO at small mean pitch angle and plunge while a large amplitude initial perturbation produces small (or negligible) amplitude LCO at larger mean values. Also addressed in the paper is the issues related to multiblock MPI (Message Passing Interface) parallel computation.
Author
Aeroelasticity; Computational Fluid Dynamics; Turbulence Models; Aerodynamics; Angular Distribution

03
AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; aircraft 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.

20010066096 Air Force Research Lab., Air Vehicles Directorate, Wright-Patterson AFB, OH USA
Annotated Bibliography of Bird Hazards to Aircraft: Bird Strike Committee Citations 1967-1997 ***Final Report, Mar. 1991 - Jan. 1998***
Short, Jeffrey J.; Mar. 1998; 257p; In English
Report No.(s): AD-A345375; AFRL-VA-WP-TR-98-3024; No Copyright; Avail: Defense Technical Information Center (DTIC)
Over the past 30 years, much progress has been made to address the hazards proposed by birds to aircraft by the military, the aerospace industry, and international working groups. In an effort to "jump start" those researchers with bird hazard problems, the U.S. Air Force Research Laboratory has consolidated into a single document a significant portion of the literature on bird/aircraft interactions. This annotated bibliography of bird hazards to aircraft, termed ABBHA, is a compilation of citations with abstracts on a wide range of related topics such as bird strike tolerance engineering, bird hazard management and control, bird strike avoidance, and bird remains identification. ABBHA is available electronically and can be used with various word processing or bibliography management software. Computerization of the ABBHA reduces distribution costs, allows for frequent updates, and helps users to locate similar references on topics of interest through keyword "searches." The ABBHA citations included in this report include working papers published in the proceedings of the Bird Strike Committees of Europe, Canada, and the United States.
DTIC
Bird-Aircraft Collisions; Computer Systems Programs; Engineering Management; Bibliographies

20010066717 Illinois Univ., Urbana-Champaign, IL USA

A Study of Ice Accretion Physics to Improve the Ice Accretion on Airfoils ***Final Report, 7 Nov. 1996 - 30 Oct. 2000***

Bragg, Michael B., Illinois Univ., USA; July 2001; 5p; In English

Contract(s)/Grant(s): NAG3-1988; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

This three-year grant began on November 7, 1996 and was no-cost extended to end on October 30, 2000. The objectives of the grant were: (1) to examine the effect of wind tunnel turbulence on ice accretion; (2) to determine the relationship between ice accretion geometry and airfoil performance; and (3) To determine if the wake-survey method was an appropriate experimental technique for iced-airfoil drag measurement. As specified in the grant the primary deliverables for this research were annual reports in the form of AIAA papers presented at national meetings each year. Masters theses and annual oral reports to be given at NASA Lewis (now Glenn) were also deliverables. Six AIAA papers documented the research findings from this study, Mr. Chad Henze's Masters thesis describes the wind tunnel turbulence work in detail, and a summary of the icing wind tunnel turbulence work was published in the archival AIAA Journal of Aircraft. A brief summary of the findings is given. Please refer to the reports for the details of the studies and findings.

Author

Airfoils; Ice Formation; Wind Effects; Turbulence; Wind Tunnel Tests

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.

20010066483 Army Research Lab., Aberdeen Proving Ground, MD USA

A Comparison of Soldier Performance Using Current Land Navigation Equipment with Information Integrated on a Helmet-Mounted Display

Glumm, Monica M.; Marshak, William P.; Branscome, Teresa A.; McWesler, Mary; Patton, Debra J.; Apr. 1998; 107p; In English

Report No.(s): AD-A345254; ARL-TR-1604; No Copyright; Avail: Defense Technical Information Center (DTIC)

The report describes a field study designed to measure soldier performance of land navigation and other mission tasks using current navigational equipment and to compare these data with performance using navigational information integrated on a helmet-mounted display (HMD). Measures of stress, cognitive performance, and workload were also obtained. The results indicated that the soldiers traveled less distance between waypoints and experienced lower levels of mental workload using information presented on the HMD than they did using current navigational equipment. As might be expected, differences in time between manual and automatic map updates were significant, but no differences were found between current equipment and the HMD condition in object detection, determination of magnetic azimuth, or call for fire tasks. Differences between conditions in levels of stress and cognitive performance were not significant.

DTIC

Azimuth; Helmet Mounted Displays; Workloads (Psychophysiology)

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.

20010066148 National Aerospace Lab., Tokyo Japan

Technical Report of National Aerospace Laboratory. Position and Attitude Estimation of An Aircraft Using Image Processing of Runway

Sasa, S.; Gomi, H.; Ninomiya, T.; Inagaki, T.; Hamada, Y.; Aug. 2000; 37p; In Japanese; Original contains color illustrations

Report No.(s): PB2001-105891; NAL-TR-1411; Copyright; Avail: National Technical Information Service (NTIS), Microfiche

An image of an object provides information regarding the relative position and attitude to the object, and is useful for navigation of autonomous systems. In this paper, a method is proposed for measuring relative attitude and position of an airplane to an airport using the horizon and two parallel sidelines of the runway including the results of flight tests.
NTIS
Attitude (Inclination); Autonomy; Image Processing; Runways

20010066609 Army War Coll., Carlisle Barracks, PA USA
Why the U.S. Army Needs Corps Level Unmanned Aerial Vehicle Companies
Fant, Michael A., Army War Coll., USA; Mar. 01, 2001; 31p; In English
Report No.(s): AD-A389787; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

The first and only corps unmanned aerial vehicle (UAV) program, ”Hunter”, was terminated in January 1996, leaving all but one corps commander without the ability to shape the battle space. After completing the advanced concept technology demonstration, the Army released its high altitude endurance Predator UAV to the U.S. Air Force. Today, the Army’s focus is on the brigade commanders’ Tactical UAV - a system ill suited for corps imagery intelligence requirements. At issue is the gap in coverage and attendant loss of precision targeting capability created by the termination of the Hunter program. The Tactical UAV supports requirements out to 50 kilometers while Predator supports theater requirements down to 300 kilometers. The Army needs a Hunter or similar system to fill the gap between 50 and 300 kilometers, providing corps with the ability to shape the battle space in accordance with Army doctrine. This study identifies required capabilities and unique characteristics of corps requirements, and illuminates the tremendous risk incurred by not having parallel growth in UAV capability congruent with the transformed force. During Operation Allied Force, Task Force Hunter displayed to the Joint Force and V Corps Commanders the necessity for a corps level UAV.
DTIC
Pilotless Aircraft; Drone Aircraft; Aircraft Design; Aerial Reconnaissance

20010066744 NASA Langley Research Center, Hampton, VA USA
Dynamic Finite Element Predictions for Mars Sample Return Cellular Impact Test #4
Fasanella, Edwin L., Army Research Lab., USA; Billings, Marcus D., George Washington Univ., USA; June 2001; 26p; In English; Original contains color illustrations
Contract(s)/Grant(s): RTOP 728-50-10-01
Report No.(s): NASA/TM-2001-211023; L-18087; NAS 1.15:211023; ARL-TR-2539; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The nonlinear, transient dynamic finite element code, MSC.Dytran, was used to simulate an impact test of an energy absorbing Earth Entry Vehicle (EEV) that will impact without a parachute. EEVOs are designed to return materials from asteroids, comets, or planets for laboratory analysis on Earth. The EEV concept uses an energy absorbing cellular structure designed to contain and limit the acceleration of space exploration samples during Earth impact. The spherical shaped cellular structure is composed of solid hexagonal and pentagonal foam-filled cells with hybrid graphite-epoxy/Kevlar cell walls. Space samples fit inside a smaller sphere at the center of the EEVOs cellular structure. Pre-test analytical predictions were compared with the test results from a bungee accelerator. The model used to represent the foam and the proper failure criteria for the cell walls were critical in predicting the impact loads of the cellular structure. It was determined that a FOAM1 model for the foam and a 20% failure strain criteria for the cell walls gave an accurate prediction of the acceleration pulse for cellular impact.
Author
Impact Tests; Reentry Vehicles; Finite Element Method; Computerized Simulation

20010067158 RAND Corp., Santa Monica, CA USA
Assessing Competitive Strategies for the Joint Strike Fighter: Opportunities and Options
Birkler, John; Graser, John C.; Arena, Mark V.; Cook, Cynthia R.; Lee, Gordon; Mar. 2001; 112p; In English; Original contains color plates
Report No.(s): AD-A390514; RAND-MR-1362.0-OSD/JSF; Copyright; Avail: Issuing Activity

The Department of Defense should stick with its winner-take-all strategy to develop and produce the Joint Strike Fighter (JSF). But as a hedge to ensure later versions of this next-generation aircraft-which is slated to become the workhorse fighter for the Air Force, Navy, and Marine Corps-have the most effective and innovative sensor, computer, and software technologies, the Pentagon should consider spending money to keep a second developer and producer of these vital electronics components in the market. Such an investment in a second producer of such missions systems, the electronics eyes and ears of the JSF, could be relatively modest. But it would provide future decision makers with the option to competitively develop a second mission system

source when and if it were needed. So concludes this study of competitive strategies for the Joint Strike Fighter. Performed over the summer and early fall of 2000, we examined both near and long-term competition options, some in more detail and more quantitatively than others, constrained only by the available time (about four months). Throughout the study we obtained critical information from the competing program contractors and the Joint Strike Fighter Program Office. while much of that information was considered competition sensitive by the firms, in this report we present only our own analysis and conclusions, thus permitting unrestricted distribution.
DTIC
Software Engineering; Defense Program; Fighter Aircraft

20010067159 Air Force Research Lab., Human Research and Engineering Directorate, Aberdeen Proving Ground, MD USA
Flight Mechanics of an Elastic Symmetric Missile ***Final Report, Jun. 1999 - Jun. 2000***
Murphy, Charles H.; Mermagen, William H., Sr; Apr. 2000; 76p; In English
Report No.(s): AD-A390525; ARL-TR-2255; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The free-flight motion of an elastic missile is approximated with three bodies connected by two massless elastic cantilever beams. If the mass distribution of the three bodies is 1-2-1, the frequency of the symmetric oscillation of the outer bodies is within 5% of the classical frequency of the oscillation of a free-free beam. A second combined pitching antisymmetric flexing motion can occur with a frequency that is almost twice that of the symmetric flexing motion. As the beam stiffness is reduced, the symmetric flexing motion frequency approaches the rigid body aerodynamic zero-spin frequency, and the flight zero-spin aerodynamic frequency is considerably reduced. Moderate beam damping can cause dynamic instability for spins greater than the zero-spin aerodynamic frequency. Resonance mode amplification can occur when the spin is equal to the zero-spin aerodynamic frequency, but more importantly it can occur when the spin is equal to the two elastic flexing frequencies. Spin-yaw lock-in occurs at the lower elastic frequency.
DTIC
Flight Mechanics; Free Flight; Aeroelasticity

07
AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; 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.

20010066373 Defence Science and Technology Organisation, Airframes and Engines Div., Melbourne, Australia
DSTO International Conference on Health and Usage Monitoring
Forsyth, Graham F., Editor, Defence Science and Technology Organisation, Australia; February 2001; 84p; In English, 19-20 Feb. 2001, Australia
Report No.(s): AD-A387225; DSTO-GD-0262; DODA-AR-011-655; Copyright; Avail: Defense Technical Information Center (DTIC)

The concept of On-Condition Maintenance implies the need for Condition Monitoring to close the loop. Condition monitoring may be implemented at many levels requiring various degrees of complication. As relatively fragile machines with catastrophic outcomes possible for many failure types, aircraft has always used some degree on monitoring. Recently, engines, mechanical systems, and airframes on both fixed-wing aircraft and helicopters are being fitted with permanent monitoring systems. These systems are also becoming more integrated to the extent that some are now called 'Health and Usage Monitoring Systems', or HUMS. Following a successful conference on February 1999, DSTO have again sponsored an International Conference on Conference on Health and Usage Monitoring in conjunction with the Australian International Airshow in February, 2001.
Author
Systems Health Monitoring; Conferences

20010066491 NASA Ames Research Center, Moffett Field, CA USA
Power Requirement for Nonequilibrium MHD-Bypass Scramjet
Park, Chul, Eloret Corp., USA; Bogdanoff, David W., Eloret Corp., USA; Mehta, Unmeel, NASA Ames Research Center, USA; [2000]; 8p; In English; 39th AIAA Aerospace Sciences Meeting, Jan. 2001, Reno, NV, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Contract(s)/Grant(s): NAS2-99092; RTOP 242-74-10; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

It has been suggested previously that the performance of scramjet propulsion system may be improved by the use of magnetohydrodynamic (MHD) energy bypass: an MHD generator could be made to decelerate the flow entering the combustor, thereby improving combustion efficiency, and the electrical power generated could be made to accelerate the flow exiting from the combustor prior to expanding through the nozzle. In one of such proposed schemes, the MHD generator is proposed to be operated at a low temperature and ionization is to be achieved under nonequilibrium by the application of an external power. In the present work, the required power of such an external source is calculated assuming a 100%-efficient nonequilibrium ionization scheme. The power required is that needed to prevent the degree of ionization from reaching equilibrium with the low gas temperature. The flow is seeded with potassium or cesium. Specific impulse is calculated with and without turbulent friction. The results show that, for typical intended flight conditions, the specific impulse obtained is substantially higher than that of a typical scramjet, but the required external-power is several times that of the power generated in the MHD generator.
Author
Magnetohydrodynamic Generators; Propulsion; Supersonic Combustion Ramjet Engines; Nonequilibrium Ionization

20010067211 Air Force Inst. of Tech., School of Engineering and Management, Wright-Patterson AFB, OH USA
Computational Investigation of Aeromechanical HCF Effects in a Compressor Rotor, *Jan. 2000 - Mar. 2001*
White, Andrew L.; Mar. 2001; 107p; In English
Report No.(s): AD-A390531; AFIT/GAB/ENY/01M-09; No Copyright; Avail: CASI; A02, Microfiche; A06, Hardcopy

High-Cycle Fatigue is a major problem facing the gas turbine industry today. It has been investigated by many researchers, using many different methods. Due to its highly complex nature, designers still do not have adequate tools to accurately predict the onset of high-cycle fatigue. A three-dimensional Navier-Stokes program was used to perform a study of the unsteady aerodynamics on a compressor rotor. The effect of aerodynamic detuning on the forced response of a rotor blade was compared to a baseline tuned rotor case. Detuning consisted of a ten percent decrease in circumferential spacing between alternate pairs of blades. The high-cycle fatigue effects of this detuning were investigated by examining the unsteady forces and moments on the rotor blades and inlet guide vanes. Computations were performed using a three-dimensional NASA research code (ADPAC) on a cluster of five desktop PCs. Computational times were on the order of several days for a grid of approximately 500,000 cells. These computations showed that detuning of the rotor blade could result in a reduction in the forced response of the IGV and rotor blades. This reduction came without much loss in overall performance (less than ten percent) and therefore may he a viable option to reduce high-cycle fatigue.
DTIC
Compressor Rotors; Computational Fluid Dynamics; Gas Turbines; Fatigue (Materials)

20010067509 NASA Goddard Space Flight Center, Greenbelt, MD USA
Addressing EO-1 Spacecraft Pulsed Plasma Thruster EMI Concerns
Zakrzwski, C. M., NASA Goddard Space Flight Center, USA; Davis, Mitch, NASA Goddard Space Flight Center, USA; Sarmiento, Charles, NASA Glenn Research Center, USA; [2001]; 10p; In English; AIAA/ASME/SAE/ASEE Joint Propulsion Conference, 8-11 Jul. 2001, Salt Lake City, UT, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Report No.(s): AIAA Paper 2001-3641; Copyright Waived; Avail: CASI; A02, Hardcopy; A01, Microfiche

The Pulsed Plasma Thruster (PPT) Experiment on the Earth Observing One (EO-1) spacecraft has been designed to demonstrate the capability of a new generation PPT to perform spacecraft attitude control. Results from PPT unit level radiated electromagnetic interference (EMI) tests led to concerns about potential interference problems with other spacecraft subsystems. Initial plans to address these concerns included firing the PPT at the spacecraft level both in atmosphere, with special ground support equipment. and in vacuum. During the spacecraft level tests, additional concerns where raised about potential harm to the Advanced Land Imager (ALI). The inadequacy of standard radiated emission test protocol to address pulsed electromagnetic discharges and the lack of resources required to perform compatibility tests between the PPT and an ALI test unit led to changes in the spacecraft level validation plan. An EMI shield box for the PPT was constructed and validated for spacecraft level ambient testing. Spacecraft level vacuum tests of the PPT were deleted. Implementation of the shield box allowed for successful spacecraft level testing of the PPT while eliminating any risk to the ALI. The ALI demonstration will precede the PPT demonstration to eliminate any possible risk of damage of ALI from PPT operation.
Author
Attitude Control; Experiment Design; Pulsed Plasma Thrusters; Electromagnetic Interference

09
RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, runways, hangars, and aircraft repair and overhaul facilities; wind tunnels, water tunnels, and shock tubes; flight simulators; and aircraft engine test stands. Also includes airport ground equipment and systems. For airport ground operations see 03 Air Transportation and Safety. For astronautical facilities see 14 Ground Support Systems and Facilities (Space).

20010066093 Naval Facilities Engineering Command, San Bruno, CA USA
Final Environmental Impact Statement for Development of Facilities to Support Basing US Pacific Fleet F/A-18E/F Aircraft on the West Coast of the USA, Volume 1
May 1998; 743p; In English
Report No.(s): AD-A345862; No Copyright; Avail: Defense Technical Information Center (DTIC)

The purpose of the proposed action is to develop facilities to support the West Coast basing of the Navy's new F/A-18E/F aircraft. Development of the larger, longer-range F/A-18E/F aircraft was necessary to provide an airframe capable of accommodating new weapons and weapon systems. It is necessary that these aircraft be based on the West Coast to provide a balance in the force structure and to be near the West Coast stationed aircraft carriers on which the aircraft deploy. The proposed action includes siting 164 F/A-18E/F aircraft, locating associated military personnel and family members, and providing associated training functions at the receiving installation. In addition to the increased staffing and equipment levels, the proposed action would increase Navy activity and flight operations at the receiving installation. Specific facilities will be required to support the training operations and associated personnel. The two installations considered for the West Coast base are Naval Air Station (NAS) Lemoore and Naval Air Facility (NAF) EI Centro. NAS Lemoore is the preferred alternative evaluated in this environmental impact statement (EIS). This EIS evaluates the potential impacts to the human and natural environment that may result from development of facilities to support Navy basing of aircraft and personnel at a naval air station on the West Coast.
DTIC
Aircraft Carriers; Airframes; Environmental Surveys; Flight Operations

20010066145 National Aerospace Lab., Structures Div., Tokyo, Japan
Development of a Flow Visualization System using Smoke in a Closed-Return Type Low-Speed Wind Tunnel
Kikuchi, T.; Jan. 2000; 23p; In Japanese; Original contains color illustrations
Report No.(s): PB2001-105897; NAL-TR-1402; Copyright; Avail: National Technical Information Service (NTIS)

A flow visualization system using smoke was developed in a closed-return type low speed wind tunnel. The purpose of developing this system was to investigate the unsteady flow patterns around the 'NASA GA(W)-1' 2D airfoils which are oscillated in a pitching quasi-harmonic motion around axes near the leading edge and the trailing edge. The feature of this system is that both the smoke creating and smoke exhausting devices are installed in the settling chamber and at the down stream part of the test section. Consequently, it is possible to conduct long experiments without any other efforts to exhaust the smoke or any significant pollution of the tunnel walls by the smoke oil. The model driving system enables quasi-harmonic oscillation up to a frequency of 8Hz, with 3 electric motors controlled by a personal computer. It is also possible to automatically change the parameters; the mean-angles of attack, the amplitudes and the frequencies in a short time by monitoring the information on the CRT. The efficiency of experiments is highly improved as a result. The following is an outline of the visualization system and it's performance.
NTIS
Flow Visualization; Unsteady Flow; Flow Characteristics; Flow Distribution; Fluid Dynamics

20010066147 National Aerospace Lab., Computational Sciences Div., Tokyo, Japan
Technical Report of National Aerospace Laboratory. System Design for Jobs in a Numerical Wind Tunnel
Tsuchiya, M.; Aug. 2000; 42p; In Japanese; Portions of this document are not fully legible
Report No.(s): PB2001-105892; NAL-TR-1410; Copyright; Avail: National Technical Information Service (NTIS)

The Numerical Wind Tunnel (NWT) is a distributed memory parallel computer for research and development in numerical simulation. Effective utilization is a major consideration in the design on the NWT system. The authors produced user interfaces in NWT in the same manner as in the existing system (Fujitsu FACOM VP-2100), comprising shell-scripts (NS-Shell) and command procedures (NS-Command). Numerous job-processing functions were included, resulting in a system that may be used easily and with confidence and delivering high overall performance. Experiments confirmed that all goals for system effectiveness

were achieved. In this paper the authors present concepts and detailed functions of system design for NWT jobs, along with their availability.
NTIS
Systems Engineering; System Effectiveness; Wind Tunnels; Distributed Memory; Computers

20010066149 National Aerospace Lab., Tokyo Japan
Technical Report of National Aerospace Laboratory. Design of Control Law for Second Cockpit of MuPAL-a
Iijima, T.; Muraoka, K.; Funabiki, K.; Masui, K.; Aug. 2000; 26p; In Japanese; Original contains color illustrations
Report No.(s): PB2001-105890; NAL-TR-1412; Copyright; Avail: National Technical Information Service (NTIS), Microfiche

The National Aerospace Laboratory (NAL) is developing a new in-flight simulator, named MuPAL (Multi-Purpose Aviation Laboratory) - alpha. This report deals with the method of designing a FBW (Fly-By-Wire) flight mode control law, named '228 mode' control law for the 'Second Cockpit' of the MuPAL-alpha. The 'Second Cockpit' is an experimental cockpit in the cabin designed to provide a flexible environment for research on pilot interfaces and effects of motion cues. The '228 mode' is a 'direct link mode' which deflects the control surfaces to be proportional to pilot commands. The '228 mode' is used to check the FBW system function before engagement of the experimental control laws. The '228 mode' control law for the 'Second Cockpit' has been designed to take into account feel (force versus displacement) characteristics, and the different force gradient for right and left roll commands for the sidestick, and to satisfy the handling quality required to carry out mission tasks for the FBW system function check. A piloted flight simulation using a ground simulator was conducted to evaluate the handling qualities of this control law using the Cooper-Harper rating scale. The simulation results show that the '228 mode' control law designed for the 'Second Cockpit' enables the pilot to carry out mission tasks for the FBW system function check and that the sidestick for the 'Second Cockpit' is a useful control system for the MuPAL-alpha.
NTIS
Aeronautical Engineering; Cockpits; Control Theory

20010066333 California Univ., Dept. of Mechanical and Aeronautical Engineering, Davis, CA USA
A Methodology for Evaluating the Fidelity of Ground-Based Flight Simulators
Zeyada, Y., California Univ., USA; Hess, R. A., California Univ., USA; [1999]; 18p; In English; AIAA Modeling and Simulation Conference and Exhibit, 9-11 Aug. 1999, Portland, OR, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Contract(s)/Grant(s): NCC2-5238
Report No.(s): AIAA Paper 99-4034; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

An analytical and experimental investigation was undertaken to model the manner in which pilots perceive and utilize visual, proprioceptive, and vestibular cues in a ground-based flight simulator. The study was part of a larger research effort which has the creation of a methodology for determining flight simulator fidelity requirements as its ultimate goal. The study utilized a closed-loop feedback structure of the pilot/simulator system which included the pilot, the cockpit inceptor, the dynamics of the simulated vehicle and the motion system. With the exception of time delays which accrued in visual scene production in the simulator, visual scene effects were not included in this study. The NASA Ames Vertical Motion Simulator was used in a simple, single-degree of freedom rotorcraft bob-up/down maneuver. Pilot/vehicle analysis and fuzzy-inference identification were employed to study the changes in fidelity which occurred as the characteristics of the motion system were varied over five configurations. The data from three of the five pilots that participated in the experimental study were analyzed in the fuzzy-inference identification. Results indicate that both the analytical pilot/vehicle analysis and the fuzzy-inference identification can be used to reflect changes in simulator fidelity for the task examined.
Author
Flight Simulators; Vertical Motion Simulators; Pilot Performance; Accuracy

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.

20010066169 Sandia National Labs., Albuquerque, NM USA
Advanced Techniques for Real-Time Visualization of Data Intensive Missions
Platzbecker, M. R.; Ashcraft, G. W.; Owen, T. E.; Sturgis, B. R.; Jan. 2001; 24p; In English
Report No.(s): PB2001-106105; SAND2001-0172; No Copyright; Avail: National Technical Information Service (NTIS)

Software tools are currently under development for post flight data visualization, and their usefulness and reusability have been demonstrated on numerous spaced-based programs within Sandia. However, data from remote sensors are subject to transmission errors that yield nonphysical behavior in real-time data visualization applications. We propose to investigate the applicability of real-time processing algorithms and estimation theories, such as Kalman filters, that have been successfully applied in other fields. Results will be integrated into existing postflight visualization tools for Proof-of-Concept validation and for potential integration of real-time applications. Telemetry at Sandia National Laboratories focuses on gathering information from inaccessible flight test bodies such as satellites, space reentry vehicles, aircraft-delivered bombs, and earth penetrators. We help our customers acquire, process, protect, transmit, receive, and display scientific and engineering data using sensor-based information systems. Increased transmission rates from complex sensors are yielding ever larger data sets. Presenting results from these experiments as traditional numerical lists or two-dimensional plots is non-intuitive and time consuming.
NTIS
Information Systems; Real Time Operation; Scientific Visualization; Postflight Analysis; Software Engineering

20010066490 Universities Space Research Association, Columbia, MD USA
Space Research, Education, and Related Activities in the Space Sciences ***Annual Report, 1 Oct. 1999 - 30 Sep. 2000***
[2000]; 24p; In English
Contract(s)/Grant(s): NCC5-356; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Universities Space Research Association received an award of Cooperative Agreement #NCC5-356 on September 29, 1998. The mission of this activity, know as the Cooperative Program in Space Sciences (CPSS), is to conduct space science research and leading-edge instrumentation and technology development, enable research by the space sciences communities, and to expedite the effective dissemination of space science research, technology, data, and information to the educational community and the general public. to fulfill this mission, USRA recruits and maintains a staff of scientific researchers, operates a series of guest investigator facilities, organizes scientific meetings and workshops, and encourages various interactions with students and university faculty members.
Derived from text
Aerospace Engineering; Research; NASA Programs; Education; Aerodynamics; Aerospace Sciences

20010067016 British National Space Centre, Database Centre, Solihull, UK
Space UK, Issue 4, 4
June 2001; 24p; In English; Original contains color illustrations; Copyright; Avail: Issuing Activity

In this issue, Space UK has a new look, which we hope will make the magazine even more useful, and its information more easily accessible to all. Earlier this year, the Mir space station came back down to Earth. We have a detailed account of its final moments. There is an in-depth interview with Michael Foale, the British-born astronaut who has served on both Mir and the International Space Station. The Learning Zone is the new Space UK supplement for students of space. You will find it in the center pages of the magazine. The name of the supplement reflects the newly launched website (found at: www.lz.bnsc.gov.uk) which is packed full of news and information for anyone interested in space.
Derived from text
Astronomy; Mir Space Station

13
ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbital and launching dynamics.

20010066415 Instituto Nacional de Pesquisas Espacias, Sao Jose dos Campos, Brazil
Calculation and Simplification of The General Problem of Orbital Transfer ***Equacionamento e Simplificacoes do Problema Geral da Transferencia Orbital***
deFigueiredoRodrigues, Daniel Levy, Instituto Nacional de Pesquisas Espacias, Brazil; deOliveiraeSouza, Marcelo Lopes, Instituto Nacional de Pesquisas Espacias, Brazil; 2001; 16p; In Portuguese; VII Coloquio Brasilerio de Dinamica Orbital, November 1994, Santos, Brazil
Report No.(s): INPE-8203-PRE/3998; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In this work we present the equations of the general problem of orbit transfers considering structural and dynamic aspects normally not presented in the literature. Among others these aspects involve: 1) the rigidity of the flexibility of the vehicle; 2) the constance of the variation of its mass; 3) characteristics of the propulsive system (impulsive versus not impulsive thrust; control law of the thrust vector; disturbing torques due to the misalignment of the propulsive force with respect to the center of mass; variable thrust magnitude during the transfer, etc.). We also present the simplification more frequently found in the literature. We conclude with a broad vision of the equations used by Rodrigues and by others.
Author
Control Theory; Transfer Orbits; Computation

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.

20010066581 Air Force Inst. of Tech., Graduate School of Engineering and Management, Wright-Patterson AFB, OH USA
Quality Initiatives in the Air Force Development of Reusable Launch Vehicles
Galbreath, Charles S., Air Force Inst. of Tech., USA; Mar. 08, 2001; 111p; In English
Report No.(s): AD-A390204; AFIT/GSO/ENY/01M-03; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This thesis identifies useful tools and techniques available to aid the Air Force development of a reusable launch vehicle (RLV). These tools are identified by comparing traits found within the Lean Aerospace Initiative, Six Sigma and systems engineering. While identified specifically for the RLV effort, these tools and techniques will be of use to many development programs. Historical perspectives of both RLV development efforts within the Air Force and origins of modern quality teachings are provided to establish a common foundation of knowledge, upon which, further analysis can be conducted. This thesis, also, summarizes the current RLV effort within the Air Force and NASA. With the tool-set identified and the RLV effort enumerated, the tool-set and RLV effort are matched to determine the current level of integration. More importantly, the tools-set serves as the basis to form specific recommendations to aid the Air Force RLV effort.
DTIC
Reusable Launch Vehicles; Defense Program

20010066713 NASA Marshall Space Flight Center, Huntsville, AL USA
Launch Vehicle Design Process: Characterization, Technical Integration, and Lessons Learned
Blair, J. C., AI Signal Research, Inc., USA; Ryan, R. S., AI Signal Research, Inc., USA; Schutzenhofer, L. A., AI Signal Research, Inc., USA; Humphries, W. R., NASA Marshall Space Flight Center, USA; May 2001; 261p; In English
Report No.(s): NASA/TP-2001-210992; M-1018; NAS 1.60:210992; No Copyright; Avail: CASI; A12, Hardcopy; A03, Microfiche

Engineering design is a challenging activity for any product. Since launch vehicles are highly complex and interconnected and have extreme energy densities, their design represents a challenge of the highest order. The purpose of this document is to delineate and clarify the design process associated with the launch vehicle for space flight transportation. The goal is to define and characterize a baseline for the space transportation design process. This baseline can be used as a basis for improving effectiveness and efficiency of the design process. The baseline characterization is achieved via compartmentalization and technical integration of subsystems, design functions, and discipline functions. First, a global design process overview is provided in order to show responsibility, interactions, and connectivity of overall aspects of the design process. Then design essentials are

delineated in order to emphasize necessary features of the design process that are sometimes overlooked. Finally the design process characterization is presented. This is accomplished by considering project technical framework, technical integration, process description (technical integration model, subsystem tree, design/discipline planes, decision gates, and tasks), and the design sequence. Also included in the document are a snapshot relating to process improvements, illustrations of the process, a survey of recommendations from experienced practitioners in aerospace, lessons learned, references, and a bibliography.
Author
Launch Vehicles; Characterization; Design Analysis; Systems Integration

20010067392 NASA Marshall Space Flight Center, Huntsville, AL USA
Predictor-Corrector Entry Guidance for Reusable Launch Vehicles
Youssef, Hussein, Lockheed Martin Aeronautics Co., USA; Chowdhry, Rajiv, Lockheed Martin Aeronautics Co., USA; Lee, Howard, Lockheed Martin Aeronautics Co., USA; Zimmerman, Curtis, NASA Marshall Space Flight Center, USA; [2001]; 8p; In English; AIAA GNC Conference, 6-9 Aug. 2001, Montreal, Canada; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Contract(s)/Grant(s): NCC8-115; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

An online entry guidance algorithm has been developed using a predictor-corrector approach. The algorithm is designed for the Reusable Launch Vehicle (RLV) and is demonstrated by using, the X-33 model. The objective of the design is to handle widely dispersed entry conditions and deliver the vehicle at the Terminal Area Energy Management (TAEM) interface box within an acceptable tolerance and without violating any of the vehicle physical constraints. Combination of several control variables is used in testing the performance and computational requirement of the algorithm. The control variables are the bank angle, angle-of-attack and the time for roll reversal. The bank angle and angle-of-attack profiles are the nominal profiles plus the perturbations in each direction. The initial guess of the bank profile is a 45 degrees bank angle with reversal at 360 seconds from liftoff. A six-element state vector is propagated to the TAEM interface box through the integration of the equations of motion (EOM). Altitude, heading and range errors are computed between the desired and the achieved state at the TAEM interface. These errors are used to correct the initial guess of the control variables. This process is repeated until the errors meet an acceptable level at the TAEM interface. Several numerical optimization methods are used to evaluate the convergent property of the predictor-predictor methodology. Successful results are demonstrated using the X-33 model.
Author
X-33 Reusable Launch Vehicle; Predictor-Corrector Methods; Numerical Analysis; Algorithms

20010067422 NASA Goddard Space Flight Center, Greenbelt, MD USA
Design of the EO-1 Pulsed Plasma Thruster Attitude Control Experiment
Zakrzwski, Charles, NASA Goddard Space Flight Center, USA; Sanneman, Paul, Swales Aerospace, USA; Hunt, Teresa, Swales Aerospace, USA; Blackman, Kathie, Hammers Co., USA; [2001]; 11p; In English; AIAA/ASME/SAE/ASEE Joint Propulsion Conference, 8-11 Jul. 2001, Salt Lake City, UT, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Report No.(s): AIAA Paper 2001-3637; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Pulsed Plasma Thruster (PPT) Experiment on the Earth Observing 1 (EO-1) spacecraft has been designed to demonstrate the capability of a new generation PPT to perform spacecraft attitude control. The PPT is a small, self-contained pulsed electromagnetic Propulsion system capable of delivering high specific impulse (900-1200 s), very small impulse bits (10-1000 micro N-s) at low average power (less than 1 to 100 W). EO-1 has a single PPT that can produce torque in either the positive or negative pitch direction. For the PPT in-flight experiment, the pitch reaction wheel will be replaced by the PPT during nominal EO-1 nadir pointing. A PPT specific proportional-integral-derivative (PID) control algorithm was developed for the experiment. High fidelity simulations of the spacecraft attitude control capability using the PPT were conducted. The simulations, which showed PPT control performance within acceptable mission limits, will be used as the benchmark for on-orbit performance. The flight validation will demonstrate the ability of the PPT to provide precision pointing resolution. response and stability as an attitude control actuator.
Author
Design Analysis; Pulsed Plasma Thrusters; Attitude Control; Plasma Control; Experiment Design

20010067489 NASA Marshall Space Flight Center, Huntsville, AL USA
The Launch Systems Operations Cost Model
Prince, Frank A., NASA Marshall Space Flight Center, USA; [2001]; 14p; In English; 3rd Annual Joint ISPA/SCEA International Conference, 12-13 Jul. 2001, Washington, DC, USA; Sponsored by International Society of Parametric Analysts, Unknown; Original contains color illustrations; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

One of NASA's primary missions is to reduce the cost of access to space while simultaneously increasing safety. A key component, and one of the least understood, is the recurring operations and support cost for reusable launch systems. In order to predict these costs, NASA, under the leadership of the Independent Program Assessment Office (IPAO), has commissioned the development of a Launch Systems Operations Cost Model (LSOCM). LSOCM is a tool to predict the operations & support (O&S) cost of new and modified reusable (and partially reusable) launch systems. The requirements are to predict the non-recurring cost for the ground infrastructure and the recurring cost of maintaining that infrastructure, performing vehicle logistics, and performing the O&S actions to return the vehicle to flight. In addition, the model must estimate the time required to cycle the vehicle through all of the ground processing activities. The current version of LSOCM is an amalgamation of existing tools, leveraging our understanding of shuttle operations cost with a means of predicting how the maintenance burden will change as the vehicle becomes more aircraft like. The use of the Conceptual Operations Manpower Estimating Tool/Operations Cost Model (COMET/OCM) provides a solid point of departure based on shuttle and expendable launch vehicle (ELV) experience. The incorporation of the Reliability and Maintainability Analysis Tool (RMAT) as expressed by a set of response surface model equations gives a method for estimating how changing launch system characteristics affects cost and cycle time as compared to today's shuttle system. Plans are being made to improve the model. The development team will be spending the next few months devising a structured methodology that will enable verified and validated algorithms to give accurate cost estimates. to assist in this endeavor the LSOCM team is part of an Agency wide effort to combine resources with other cost and operations professionals to support models, databases, and operations assessments.
Author
Launch Costs; Mathematical Models; Cost Reduction; Spacecraft Launching; Cost Analysis; Assessments

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 and 15 Launch Vehicles and Launch Vehicles, and 18 Spacecraft Design, Testing and Performance. For space suits, see 54 Man/System Technology and Life Support.

20010066319 NASA Johnson Space Center, Houston, TX USA
STS-100 Post Flight Presentation
May 26, 2001; In English; Videotape: 19 min. 56 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001107902; JSC-1888; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

The crewmembers of STS-100, Commander Kent Rominger, Pilot Jeffrey Ashby, and Mission Specialists Chris Hadfield, Scott Parazynski, John Phillips, Umberto Guidoni, and Yuri Valentinovich Lonchakov, narrate this video as footage from the ceremonial breakfast, crew suitup, and launch of Endeavour are seen. Various on-orbit activities are shown, including the opening of the payload bay doors, the rendezvous and docking of Endeavour with the International Space Station (ISS), the installation and deployment of the ISS' Canadian Robotic Arm, the spacewalks, and a video tour through the length of the ISS. The video ends with Endeavour's undocking from the ISS and the landing of the orbiter.
CASI
Extravehicular Activity; International Space Station; Orbital Rendezvous; Robot Arms; Spacecraft Docking; Crew Procedures (Inflight); Spacecraft Launching; Endeavour (Orbiter)

20010066320 NASA Johnson Space Center, Houston, TX USA
STS-98 Post Flight Presentation
May 26, 2001; In English; Videotape: 19 min. 5 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001107901; JSC-1864; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

The crewmembers of STS-98, Commander Kenneth Cockrell, Pilot Mark Polansky, and Mission Specialists Bob Curbeam, Tom Jones, and Marsha Ivins, narrate this video as footage of from the ceremonial breakfast, crew suitup, and launch of Atlantis are seen. Various on-orbit activities are shown, including the opening of the payload bay doors, the rendezvous and docking of Atlantis with the International Space Station (ISS), the spacewalks, the installation of the Destiny Laboratory Module, and the crew playing in microgravity. The video ends with Atlantis undocking from the ISS and the landing of the orbiter.
CASI
Destiny Laboratory Module; Extravehicular Activity; International Space Station; Orbital Rendezvous; Spacecraft Docking; Spacecraft Launching; Atlantis (Orbiter); Crew Procedures (Inflight)

20010066321 NASA Johnson Space Center, Houston, TX USA
STS-102 Post Flight Presentation
Jun. 18, 2001; In English; Videotape: 20 min. 39 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001107900; JSC-1878; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

The crewmembers of STS-102, Commander James Wetherbee, Pilot James Kelly, and Mission Specialists Andrew Thomas and Paul Richards, narrate this video as footage of from the ceremonial breakfast, crew suitup, and launch of Discovery are seen. Various on-orbit activities are shown, including the opening of the payload bay doors, the rendezvous and docking of Discovery with the International Space Station (ISS), the spacewalks, and the transfer operations of moving cargo from the Leonardo Multipurpose Logistics Module. The video ends with Discovery undocking from the ISS and the landing of the orbiter.
CASI
Extravehicular Activity; International Space Station; Orbital Rendezvous; Spacecraft Docking; Spacecraft Launching; Crew Procedures (Inflight)

20010066389 NASA Johnson Space Center, Houston, TX USA
STS-104 Flight Day 1 Highlights
Jul. 13, 2001; In English; Videotape: 10 min. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001108017; BRF1429A; No Copyright; Avail: CASI; B01, Videotape-Beta; V01, Videotape-VHS

On this first day of the STS-104 mission, the crewmembers of Atlantis, Commander Steven Lindsey, Pilot Charles Hobaugh, and Mission Specialists Michael Gernhardt, James Reilly, and Janet Kavandi, are seen during the ceremonial breakfast before launch. The launch of Atlantis is shown, and exterior video scans of the orbiter show the payload bay after the bay doors are opened.
CASI
Atlantis (Orbiter); Crew Procedures (Preflight); Spacecraft Launching

20010066390 NASA Johnson Space Center, Houston, TX USA
STS-104 Flight Day 2 Highlights
Jul. 13, 2001; In English; Videotape: 16 min. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001108018; BRF1429B; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

On this second day of the STS-104 mission, the Space Shuttle Atlantis continues its approach to the International Space Station. External scans of the orbiter show the robotic arm checkout as it passes over the southern Pacific Ocean and Australia.
CASI
Robot Arms; Atlantis (Orbiter)

20010066392 NASA Johnson Space Center, Houston, TX USA
STS-104 Flight Day 3 Highlights
Jul. 14, 2001; In English; Videotape: 18 min. 45 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001108020; BRF1429C; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

On this third day of the STS-104 mission, the Atlantis Orbiter approaches and docks with the International Space Station (ISS). The crew of STS-104, Commander Steven Lindsey, Pilot Charles Hobaugh, and Mission Specialists Michael Gernhardt, James Reilly, and Janet Kavandi, and the Expedition 2 crew, Commander Yuriy Usachev and Flight Engineers James Voss and Susan Helms, are seen as they open the hatches between Atlantis and the ISS. External video shows the Quest airlock in the payload bay of Atlantis.
CASI
Air Locks; Atlantis (Orbiter); International Space Station; Crew Procedures (Inflight)

20010066393 NASA Johnson Space Center, Houston, TX USA
STS-104 Flight Day 4 Highlights
Jul. 15, 2001; In English; Videotape: 29 min. 52 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001108022; BRF1429D; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

On this fourth day of the STS-104 mission, Mission Specialists Michael Gernhardt and James Reilly are seen during their spacewalks as they attach equipment to the Quest airlock before the robotic arm of the International Space Station (ISS) lifts the airlock out of Atlantis' payload bay and moves it into position to be installed by Gernhardt and Reilly. The ceremonial cutting of the ribbon to Quest by STS-104 Commander Steven Lindsey and Expedition 2 Commander Yuriy Usachev is shown.
CASI
Air Locks; Extravehicular Activity; International Space Station; Crew Procedures (Inflight)

20010066998 NASA Johnson Space Center, Houston, TX USA
STS-104 Flight Day 6 Highlights
Jul. 17, 2001; In English; Videotape: 21 min. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001109806; BRF-1429F; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

Expedition 2 Flight Engineer Jim Voss is seen opening the hatch between the Unity Module and the Quest Airlock. An on-orbit interview with Expedition 2 Commander Yuriy Usachev and STS-104 Commander Steve Lindsey and Mission Specialist Charlie Hobaugh is shown as they answer questions about some problems with a previous spacewalk. As exterior shots of the International Space Station are seen, the air leak in the Unity Modules node pressure valve is described.
CASI
Air Locks; Extravehicular Activity; International Space Station; Leakage; Valves; Crew Procedures (Inflight)

20010066999 NASA Johnson Space Center, Houston, TX USA
STS-104 Flight Day 5 Highlights
Jul. 16, 2001; In English; Videotape: 19 min. 30 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001109807; BRF-1429E; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

The crewmembers of STS-104, Commander Steven Lindsey, Pilot Charles Hobaugh, and Mission Specialists Michael Gernhardt, James Reilly, and Janet Kavandi, and Expedition 2 Flight Engineer Susan Helms are seen during an on-orbit press conference, where they answer questions about the mission.
CASI
Spacecrews; Crew Procedures (Inflight); Extravehicular Activity

20010067000 NASA Johnson Space Center, Houston, TX USA
STS-104 Flight Day 8 Highlights
Jul. 19, 2001; In English; Videotape: 16 min. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001109808; BRF-1429H; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

Expedition 2 Flight Engineer Jim Voss and STS-104 Commander Steve Lindsey are seen in between the Unity Module and the Quest Airlock in the International Space Station as they replace the intermodular ventilation valve. Footage shows STS-104 Mission Specialist Janet Kavandi and Expedition 2 Flight Engineers Susan Helms and Jim Voss outfitting the Quest Airlock after Voss and Lindsey are finished with the repairs.
CASI
Air Locks; International Space Station; Valves; Crew Procedures (Inflight)

20010067025 NASA Johnson Space Center, Houston, TX USA
STS-104 Flight Day 7 Highlights
Jul. 18, 2001; In English; Videotape: 31 min. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001109810; BRF-1429G; No Copyright; Avail: CASI; B03, Videotape-Beta; V03, Videotape-VHS

External shots of the International Space Station (ISS) show the ISS' robotic arm in grappling position in preparation for lifting an oxygen tank out of the payload bay of Atlantis. Mission Specialists Michael Gernhardt and Jim Reilly are seen as they perform their spacewalks, installing the oxygen tank in place on the ISS.
CASI
Extravehicular Activity; International Space Station; Installing; External Tanks; Crew Procedures (Inflight)

20010067032 NASA Johnson Space Center, Houston, TX USA
Expedition 3 Crew Interview: Frank Culbertson, Jr.
Jul. 15, 2001; In English; Videotape: 55 min. 25 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001108189; JSC-1886A; No Copyright; Avail: CASI; B03, Videotape-Beta; V03, Videotape-VHS

Expedition 3 Commander Frank Culbertson is seen being interviewed before leaving to become part of the third resident crew on the International Space Station (ISS). He answers questions about his inspiration to become an astronaut and his career path. He discusses his expectations for life on the ISS and the experiments he will be performing while on board. Culbertson gives details on the spacewalks that will take place during the STS-105 mission (the mission carrying the Expedition 3 crew up to the ISS) and the unloading operations for the Multipurpose Logistics Module.
CASI
Extravehicular Activity; International Space Station; Spacecrews; Spaceborne Experiments; Space Station Modules

20010067041 NASA Johnson Space Center, Houston, TX USA
Expedition 3 Crew Interview: Mikhail Turin
Jul. 15, 2001; In English; Videotape: 41 min. 15 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001108191; JSC-1886C; No Copyright; Avail: CASI; B03, Videotape-Beta; V03, Videotape-VHS

Expedition 3 Flight Engineer Mikhail Turin is seen being interviewed before leaving to become part of the third resident crew on the International Space Station (ISS). He answers questions about his inspiration to become an astronaut and his career path. He discusses his expectations for life on the ISS and the experiments he will be performing while on board. Turin gives details on the spacewalks that will take place during the STS-105 mission (the mission carrying the Expedition 3 crew up to the ISS) and the unloading operations for the Multipurpose Logistics Module.
CASI
International Space Station; Spacecrews; Spaceborne Experiments; Extravehicular Activity

20010067042 NASA Johnson Space Center, Houston, TX USA
Expedition 3 Crew Interview: Vladimir Dezhurov
Jul. 15, 2001; In English; Videotape: 39 min. 15 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001108190; JSC-1886B; No Copyright; Avail: CASI; B03, Videotape-Beta; V03, Videotape-VHS

Expedition 3 Pilot Vladimir Dezhurov is seen being interviewed before leaving to become part of the third resident crew on the International Space Station (ISS). He answers questions about his inspiration to become an astronaut and his career path. He discusses his expectations for life on the ISS and the experiments he will be performing while on board. Dezhurov gives details on the spacewalks that will take place during the STS-105 mission (the mission carrying the Expedition 3 crew up to the ISS) and the unloading operations for the Multipurpose Logistics Module.
CASI
International Space Station; Spacecrews; Extravehicular Activity; Spaceborne Experiments; Loading Operations

20010067382 NASA Johnson Space Center, Houston, TX USA
STS-105 Crew Interview: Scott Horowitz
Jul. 23, 2001; In English; Videotape: 26 min. 16 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001110186; JSC-1884A; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

STS-105 Commander Scott Horowitz is seen during a prelaunch interview. He answers questions about his inspiration to become an astronaut, his career path, training for the mission, and his role in the mission's activities. He gives details on the mission's goals, which include the transfer of supplies from the Discovery Orbiter to the International Space Station (ISS) and the change-over of the Expedition 2 and Expedition 3 crews (the resident crews of ISS). Horowitz discusses the importance of the ISS in the future of human spaceflight.
CASI
Astronaut Training; Education; Astronauts; Crew Procedures (Inflight)

20010067389 NASA Johnson Space Center, Houston, TX USA
STS-105 Crew Interview: Dan Barry
Jul. 23, 2001; In English; Videotape: 34 min. 19 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001110140; JSC-1884D; No Copyright; Avail: CASI; B03, Videotape-Beta; V03, Videotape-VHS

STS-105 Mission Specialist Dan Barry is seen during a prelaunch interview. He answers questions about his inspiration to become an astronaut, his career path, training for the mission, and his role in the mission's activities. He gives details on the mission's goals, which include the transfer of supplies from the Discovery Orbiter to the International Space Station (ISS) and the change-over of the Expedition 2 and Expedition 3 crews (the resident crews of ISS). Barry discusses the importance of the ISS in the future of human spaceflight.
CASI
Astronaut Training; Education; Astronauts; Crew Procedures (Inflight)

20010067429 NASA Johnson Space Center, Houston, TX USA
STS-104 Flight Day 9 Highlights
Jul. 20, 2001; In English; Videotape: 19 min. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001110044; BRF-1429I; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

On this ninth day of the STS-104 mission, Mike Gernhardt and Jim Reilly are seen in the newly installed Quest Airlock performing a dry run for flight day ten's spacewalks' preparations. The crews of STS-104 (Commander Steven Lindsey, Pilot Charles Hobaugh, and Mission Specialists Mike Gernhardt, Jim Reilly, and Janet Kavandi) and Expedition 2 (Commander Yuriy Usachev and Flight Engineers James Voss and Susan Helms) answer questions about the STS-104 mission, the next day's spacewalks, and Expedition 2's stay on the International Space Station during an on-orbit interview. An external shot of the Atlantis Orbiter shows a water dump as it leaves the Shuttle and dissipates into space. Commander Lindsey gives a guided video tour of the Quest Airlock, displaying equipment and summarizing its purpose.
CASI
Air Locks; International Space Station; Spacecrews; Crew Procedures (Inflight)

20010067437 NASA Johnson Space Center, Houston, TX USA
STS-105 Crew Interview: Pat Forrester
Jul. 23, 2001; In English; Videotape: 24 min. 29 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001110188; JSC-1884C; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

STS-105 Mission Specialist Pat Forrester is seen during a prelaunch interview. He answers questions about his inspiration to become an astronaut, his career path, training for the mission, and his role in the mission's activities. He gives details on the mission's goals, which include the transfer of supplies from the Discovery Orbiter to the International Space Station (ISS) and the change-over of the Expedition 2 and Expedition 3 crews (the resident crews of ISS). Forrester discusses the importance of the ISS in the future of human spaceflight.
CASI
Astronaut Training; Education; Astronauts

20010067483 NASA Johnson Space Center, Houston, TX USA
STS-104 Flight Day 10 Highlights
Jul. 21, 2001; In English; Videotape: 28 min. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001110046; BRF-1429J; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

On this tenth day of the STS-104 mission, Mission Specialists Mike Gernhardt and Jim Reilly are seen as they perform their spacewalks, where they install Nitrogen Tank 3 on the Quest Airlock after the Canadarm lifts the tank out of the payload bay of Atlantis.
CASI
Extravehicular Activity; Spacecrews; Crew Procedures (Inflight); International Space Station

20010067484 NASA Johnson Space Center, Houston, TX USA
STS-104 Flight Day 11 Highlights
Jul. 22, 2001; In English; Videotape: 25 min. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001110045; BRF-1429K; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

On this 11th day of the STS-104 mission, Expedition 2 crewmembers, Commander Yuriy Usachev and Flight Engineers James Voss and Susan Helms, are seen in the Destiny Laboratory Module as they prepare for the departure of the STS-104 crew. Both the Expedition 2 crew and the STS-104 crew (Commander Steven Lindsey, Pilot Charles Hobaugh, and Mission Specialists Mike Gernhardt, Jim Reilly, and Janet Kavandi) are seen as they say their farewells and the STS-104 crew returns to the Space Shuttle. The undocking of Atlantis is shown and the International Space Station is seen against Earth and space as the orbiter flys around the station. The STS-104 crew answers questions about the mission in an on-orbit interview.
CASI
International Space Station; Spacecrews; Crew Procedures (Inflight); Spacecraft Docking

20010067505 NASA Johnson Space Center, Houston, TX USA
STS-105 Crew Interview: Rick Sturckow
Jul. 23, 2001; In English; Videotape: 11 min. 8 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001110189; JSC-1884B; No Copyright; Avail: CASI; B01, Videotape-Beta; V01, Videotape-VHS

STS-105 Pilot Rick Sturckow is seen during a prelaunch interview. He answers questions about his inspiration to become an astronaut, his career path, training for the mission, and his role in the mission's activities. He gives details on the mission's goals, which include the transfer of supplies from the Discovery Orbiter to the International Space Station (ISS) and the change-over of the Expedition 2 and Expedition 3 crews (the resident crews of ISS). Sturckow discusses the importance of the ISS in the future of human spaceflight.
CASI
Astronaut Training; Crew Procedures (Inflight); Astronauts

20010067506 NASA Johnson Space Center, Houston, TX USA
STS-104 Flight Day 12 Highlights
Jul. 23, 2001; In English; Videotape: 9 min. playing time, in color, with sound
Report No.(s): NON-NASA-VT-2001110187; BRF-1429L; No Copyright; Avail: CASI; B01, Videotape-Beta; V01, Videotape-VHS

On this 12th day of the STS-104 mission, the crew of Atlantis (Commander Steven Lindsey, Pilot Charles Hobaugh, and Mission Specialists Mike Gernhardt, Jim Reilly, and Janet Kavandi) continue their journey back to Earth after their departure from the International Space Station the day before. External shots of Atlantis are seen, as is a sunrise from orbit.
CASI
Spacecrews; Atlantis (Orbiter)

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.

20010066108 NASA Ames Research Center, Moffett Field, CA USA
Integrated Thermal Response Modeling System For Hypersonic Entry Vehicles
Chen, Y.-K., NASA Ames Research Center, USA; Milos, F. S., NASA Ames Research Center, USA; [2000]; 10p; In English; 39th AIAA Space Sciences Meeting and Exhibit, 8-11 Jan. 2001, Reno, NV, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Contract(s)/Grant(s): RTOP 242-90-00; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We describe all extension of the Markov decision process model in which a continuous time dimension is included ill the state space. This allows for the representation and exact solution of a wide range of problems in which transitions or rewards vary over time. We examine problems based on route planning with public transportation and telescope observation scheduling.
Author
Temperature Effects; Hypersonic Vehicles; Scheduling; Models

20010066366 Pittsburgh Univ., Pittsburgh, PA USA
Launch Support for the Skipper Satellite ***Final Report, 1 Aug. 1995 - 30 Apr. 1997***
Erdman, Peter; May 03, 2001; 10p; In English
Contract(s)/Grant(s): DAAH04-95-1-0541
Report No.(s): AD-A389978; ARO-34575.1-EG-SDI; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
Support was provided for a person to be at the Utah State Joint Operations Control Center (JOCC) during the flight of the Skipper satellite, and to develop software needed to display the spectrometers' data while the satellite is in orbit. A large amount of engineering and scientific data was to be collected during the flight of the Skipper satellite. These data needed to be reviewed in real time in order to evaluate the health of the satellite's subsystems and then to determine the next most reasonable step in the adaptive orbit strategy that was at the heart of the mission's design. In order to accomplish these ends, the scientific data needed to be disseminated to the members of the science team in absolute units for evaluation and interpretation. These tasks will required the development of specialized software for the conversion of the raw telemetry bit stream into calibrated data for graphic display in engineering units.
DTIC
Software Engineering; Data Reduction; Artificial Satellites; Spectrometers

20010066395 Naval Postgraduate School, Monterey, CA USA
The Design and Implementation of the Petite Amateur Naval Satellite (PANSAT) User Service Software
Hunter, George Kenneth; Mar. 1998; 296p; In English
Report No.(s): AD-A345676; No Copyright; Avail: Defense Technical Information Center (DTIC)
PANSAT is an experimental spread spectrum, store and forward communications micro satellite. The Chief of Naval Operations C4I staff (N6) sponsors the project in order to determine the feasibility and effectiveness of using such a low cost satellite to augment or eventually replace the existing military satellite communications architecture. While more than eight years of work has gone into the project, most of the nearly sixty theses thus far have dealt with hardware development. Prior to this thesis, the operations of the satellite were not formally defined, nor the desired software experiments specified. This thesis develops a detailed definition of the communications software and operating parameters for PANSAT. The formally specified communications software provides electronic mail, binary file transfer, and direct real time information exchange. This research also designs and develops experimental features which are non-existent on current micro satellites. The new features included provide the spacecraft with a pseudo positional awareness for a system with no sensor support for such, implement a new application layer protocol to optimize data communications, and perform self analysis to find and correct the effects of space anomalies in conjunction with a ground station. This thesis also implements a subset of the formally specified software for initial operations to begin with spacecraft's launch in October of 1998. Further implementation and refinement will be based on actual operational results from PANSAT.
DTIC
Communication Satellites; Spread Spectrum Transmission; Satellite Communication

20010066587 Air Force Inst. of Tech., School of Engineering, Wright-Patterson AFB, OH USA
Environmental Disturbance Modeling for Large Inflatable Space Structures
Davis, Donald J., Air Force Inst. of Tech., USA; Mar. 08, 2001; 219p; In English
Report No.(s): AD-A390192; AFIT/GSO/ENY/01M-02; No Copyright; Avail: CASI; A03, Microfiche; A10, Hardcopy
Tightening space budgets and stagnating spacelift capabilities are driving the Air Force and other space agencies to focus on inflatable technology as a reliable, inexpensive means of deploying large structures in orbit. Recent improvements in rigidization techniques make the use these inflatable structures feasible for a growing number of missions. For many of these missions, the primary design requirement is dimensional accuracy of the structure. Finite element analysis offers a means of predicting structural behavior in orbit. The analysis requires knowledge of external loads. This thesis examines the environmental disturbances which act upon large, orbiting structures. Calculations are made on a base model to relate the torques generated by these disturbances to the orbital altitude. This facilitates identification of the critical loads. An environmental disturbance model is then developed in MATLAB. The model calculates the critical loads on each element of a faceted structure as it propagates

through its orbit. A basic structure is defined and run through the model. Results and analysis for various orbits are presented to verify accuracy of the code and validate the derived torque-altitude relationships.
DTIC
Large Space Structures; Inflatable Structures; Mathematical Models; Disturbances

20010066771 Meteorological Satellite Center, Kiyose, Japan
Overview of MTSAT-1R Imager
Kigawa, Seiichiro, Meteorological Satellite Center, Japan; Meteorological Satellite Center Technical Note; [2001]; ISSN 0388-9653, No. 39, pp. 33-37; In Japanese; Copyright; Avail: Issuing Activity

Multi-functional Transport SATellite IR (MTSAT-1R) is a replacement satellite for MTSAT that was lost due to launch vehicle failure. MTSAT-1R will be launched in 2003. MTSAT-1R will have the imager that contains the state-of-the-art technology on board. This note makes a quick report on the performance of the imager.
Author
Meteorological Satellites; Imaging Radar; Remote Sensors; Meteorological Instruments; Imaging Spectrometers

20010066834 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
RIGEX: Preliminary Design of a Rigidized Inflatable Get-Away-Special Experiment, *Sep. 1999 - Marr. 2001*
DiSebastian, John D.; Mar. 2001; 146p; In English
Report No.(s): AD-A390157; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

As space structures grow in size and complexity, their weight and cost increase considerably. The use of inflatable and rigidizable structures offers drastic improvements in all areas of spacecraft design. The goal of this experiment is to verify and validate ground testing of inflation and rigidization methods for inflatable space structures. The Rigidized Inflatable Get-Away-Special Experiment is an autonomous, self-contained space shuttle experiment that will inflate and rigidize several structures. After inflation, the experiment will perform a structural analysis by exciting the rigidized structures and collecting vibration data. A systems engineering approach is utilized to make design decisions based on a total system and life-cycle perspective.
DTIC
Inflatable Space Structures; Large Space Structures; Spacecraft Design; Structural Analysis; Systems Engineering; Get Away Specials (STS)

20010067246 NASA Marshall Space Flight Center, Huntsville, AL USA
Thermographic/Nondestructive Evaluation of the Space Shuttle Main Engine Nozzle
Walker, J. L., NASA Marshall Space Flight Center, USA; Russell, S. S., NASA Marshall Space Flight Center, USA; Lansing, M. D., NASA Marshall Space Flight Center, USA; Caraccioli, P., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 8p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

The methods and results presented in this summary address the thermographic identification of interstitial leaks in the Space Shuttle Main Engine nozzles. A highly sensitive digital infrared camera is used to record the minute cooling effects associated with a leak source, such as a crack or pinhole, hidden within the nozzle wall by observing the inner 'hot wall' surface as the nozzle is pressurized. These images are enhanced by digitally subtracting a thermal reference image taken before pressurization, greatly diminishing background noise. The method provides a nonintrusive way of localizing the tube that is leaking and the exact leak source position to within a very small axial distance. Many of the factors that influence the inspectability of the nozzle are addressed; including pressure rate, peak pressure, gas type, ambient temperature and surface preparation.
Author
Leakage; Nozzle Walls; Thermography; Imaging Techniques; Nondestructive Tests

20010067249 NASA Marshall Space Flight Center, Huntsville, AL USA
Fabrication of Composite Combustion Chamber/Nozzle for Fastrac Engine
Lawrence, T., NASA Marshall Space Flight Center, USA; Beshears, R., NASA Marshall Space Flight Center, USA; Burlingame, S., NASA Marshall Space Flight Center, USA; Peters, W., NASA Marshall Space Flight Center, USA; Prince, M., NASA Marshall Space Flight Center, USA; Suits, M., NASA Marshall Space Flight Center, USA; Tillery, S., NASA Marshall Space Flight Center, USA; Burns, L., Thiokol Propulsion, USA; Kovach, M., Thiokol Propulsion, USA; Roberts, K., Thiokol Propulsion, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 11p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

The Fastrac Engine developed by the Marshall Space Flight Center for the X-34 vehicle began as a low cost engine development program for a small booster system. One of the key components to reducing the engine cost was the development of an inexpensive combustion chamber/nozzle. Fabrication of a regeneratively cooled thrust chamber and nozzle was considered too expensive and time consuming. In looking for an alternate design concept, the Space Shuttle's Reusable Solid Rocket Motor Project provided an extensive background with ablative composite materials in a combustion environment. An integral combustion chamber/nozzle was designed and fabricated with a silica/phenolic ablative liner and a carbon/epoxy structural overwrap. This paper describes the fabrication process and developmental hurdles overcome for the Fastrac engine one-piece composite combustion chamber/nozzle.
Author
Combustion Chambers; Ablative Materials; Fabrication; Nozzle Design

20010067274 NASA Marshall Space Flight Center, Huntsville, AL USA
X-33 LH2 Tank Failure Investigation Findings
Niedermeyer, M., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 30p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

The X-33 liquid hydrogen tank failure investigation found the following: (1) The inner skin microcracked and hydrogen infiltrated into it; (2) The cracks grew larger under pressure; (3) When pressure was removed, the cracks closed slightly; (4) When the tank was drained and warmed, the cracks closed and blocked the leak path; (5) Foreign object debris (FOD) and debond areas provided an opportunity for a leak path; and (6) There is still hydrogen in the other three lobes today.
Derived from text
Microcracks; X-33 Reusable Launch Vehicle; Accident Investigation; Propellant Tanks

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.

20010066774 Johns Hopkins Univ., Chemical Propulsion Information Agency, Columbia, MD USA
Overview of Pulse Detonation Propulsion Technology, *1942-1999*
Coleman, M. L.; Apr. 2001; 64p; In English
Contract(s)/Grant(s): SP0700-97-D-4004
Report No.(s): AD-A390257; CPIA-CPTR-70; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Propulsion systems based on the pulsed detonation cycle offer the potential to provide increased performance while simultaneously reducing engine weight, cost, and complexity, relative to conventional propulsion systems currently in service. The increased performance potential is due to the high thermodynamic efficiency of detonation combustion. The near constant volume heat addition process of the detonation cycle, along with the lack of a compression cycle lend to the high efficiency and specific impulse, simplicity, and low-cost of pulse detonation propulsion systems. Pulse detonation Engines (PDEs) have the potential for operation at speeds ranging from static to high-supersonic (Mis less than 5), with competitive efficiencies enabling supersonic operation beyond conventional gas turbine engine technology. Currently, no single engine cycle exists that has such a broad range of operability. Pulse Detonation Rocket Engines (PDREs) have the potential to drastically reduce the cost of upper stage and orbit-transfer propulsion systems, and are also attractive for lunar and planetary exploration, and landers and excursion vehicles that require throttling for soft landing. This report discusses the thermodynamic basis of pulse detonation propulsion technology and identifies the major technology initiatives currently underway in the USA.
DTIC
Pulse Detonation Engines; Combustion; Propulsion; Detonation; Propulsion System Configurations

20010067241 United Space Alliance, Kennedy Space Center, FL USA

Testing of Environmentally Preferable Aluminum Pretreatments and Coating Systems for Use on Space Shuttle Solid Rocket Boosters (SRB)

Clayton, C., United Space Alliance, USA; Raley, R., United Space Alliance, USA; Zook, L., United Space Alliance, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 10p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

The solid rocket booster (SRB) has historically used a chromate conversion coating prior to protective finish application. After conversion coating, an organic paint system consisting of a chromated epoxy primer and polyurethane topcoat is applied. An overall systems approach was selected to reduce waste generation from the coatings application and removal processes. While the most obvious waste reduction opportunity involved elimination of the chromate conversion coating, several other coating system configurations were explored in an attempt to reduce the total waste. This paper will briefly discuss the use of a systems view to reduce waste generation from the coating process and present the results of the qualification testing of nonchromated aluminum pretreatments and alternate coating systems configurations.

Author

Pretreatment; Waste Management; Aluminum Coatings; Primers (Coatings)

20010067273 NASA Marshall Space Flight Center, Huntsville, AL USA

Integrated High Payoff Rocket Propulsion Technologies Program Material Development Plan

Clinton, R. G., Jr., NASA Marshall Space Flight Center, USA; Stropki, M., Air Force Research Lab., USA; Cleyrat, D., Air Force Research Lab., USA; Stucke, B., Air Force Research Lab., USA; Phillips, S., Air Force Research Lab., USA; Reed, B., NASA Glenn Research Center, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 29p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

In this viewgraph presentation, IMWG (IHPRPT Materials Working Group) government and industry members, together with the IHPRPT (Integrated High Payoff Rocket Propulsion Technologies Program Material Development Plan) National Component Leads, have developed a materials plan to address the critical needs of the IHPRPT community: (1) liquids boost and orbit transfer; (2) solids boost and orbit transfer; (3) tactical propulsion; and (4) spacecraft propulsion. Criticality of materials' role in achieving IHPRPT goals is evidenced by the significant investment over the next five years.

Derived from text

Project Planning; Propulsion; NASA Programs

20010067310 Lockheed Martin Corp., GB Tech Sciences Lab., SSC, MS USA

Gas Emission Measurements from the RD 180 Rocket Engine

Ross, H. R., Lockheed Martin Corp., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 10p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

The Science Laboratory operated by GB Tech was tasked by the Environmental Office at the NASA Marshall Space Flight Center (MSFC) to collect rocket plume samples and to measure gaseous components and airborne particulates from the hot test firings of the Atlas III/RD 180 test article at MSFC. This data will be used to validate plume prediction codes and to assess environmental air quality issues.

Author

Gas Analysis; Plumes; Particulates; Air Sampling

20010067311 United Space Alliance, Kennedy Space Center, FL USA

Development of Lead Free Energy Absorber for Space Shuttle Blast Container

Balles, D., United Space Alliance, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 7p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

United Space Alliance Solid Rocket Booster (USA SRB) Element is responsible for the assembly and refurbishment of the non-motor components of the SRB as part of the Space Shuttle Vehicle (SSV) system, which is developed and managed by Marshall Space Flight Center (MSFC) in Huntsville, Alabama. Programs are underway to develop and evaluate environmentally acceptable materials for use on aerospace flight hardware in order to eliminate materials such as lead, and also by effective re-design, provide lighter and more efficient systems. The SRB blast container (BC) is made primarily from Inconel 718 material that interfaces with either Inconel 718 or aluminum alloy materials. Four Inconel 718 studs are used to hold down each of the SRBs

to the Mobile Launch Platform (MLP), and each stud is held in place by an upper frangible nut and lower conventional nut. The additional assembly of pyrotechnic initiators and booster cartridges to the frangible nuts allow for detonation on command, which splits the nuts in halves and releases the SRBs and attached SSV. The present BC along with a cast Lead liner/Shock absorber, contain the high energy pyrotechnic fragments as well as frangible nut elements after detonation, and protects the SSV from Foreign Object Damage (FOD). This paper discusses the benefits of replacing the cast lead liner with an open cell aluminum foam. Author

Energy Absorption; Foams; Performance Tests

20010067332 Advanced Ceramics Research, Inc., Tucson, AZ USA

Fabrication of Low-Cost, High-Temperature Composites for Rocket Propulsion Systems

Rigali, M. J., Advanced Ceramics Research, Inc., USA; Sutaria, M., Advanced Ceramics Research, Inc., USA; Mulligan, A. C., Advanced Ceramics Research, Inc., USA; Vaidyanathan, R., Advanced Ceramics Research, Inc., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Advanced Ceramics Research, Inc., (ACR) is currently developing two low-cost, flexible manufacturing processes to produce high-temperature composites with zirconium carbide (ZrC) matrices for use in current and future NASA and Department of Defense (DoD) propulsion applications. As a monolithic material, ZrC exhibits corrosion and ablation resistance at high temperatures. ZrC, however, does not possess the toughness and thermal shock resistance necessary to survive in many propulsion system applications. to enhance its toughness and thermal shock resistance, ACR is fabricating ZrC-based composites using two novel and low-cost composite fabrication techniques called Fibrous Monolith (FM) processing and Continuous Composite Co-extrusion (C3) processing. Fibrous Monolith processed composites are a new class of low-cost, bi- and multi-component structural ceramics. They exhibit mechanical properties similar to fiber composites or laminate structures, including very high fracture energies, damage tolerance, and graceful failure. Since they are monolithic powder-based composites, however, they can be manufactured by conventional powder processing techniques using inexpensive raw materials. C3 based on the Fibrous Monolith processing technology, utilizes an innovative approach to produce continuous fiber reinforced composites. In the C3 process, carbon fiber tow is passed through the center of a ceramic powder/thermoplastic binder feedstock during melt extrusion to produce a 'green' filament. The resulting filament is flexible, robust, and easily handled using traditional processing methods, i.e., hand lay-up or filament winding; it is then pyrolyzed and hot pressed to produce dense parts. This paper highlights the mechanical and physical properties of the ZrC-based composites currently under development by ACR using the both the FM and C3 fabrication processes. In addition, ACR is applying solid freeform fabrication (SFF) techniques to the production of these composite components currently being developed for several high-temperature DoD and NASA applications, including hot gas valves components, nozzles, thrust cells, and leading edges. Additional information is contained in the original extended abstract. Author

Fabrication; Low Cost; High Temperature; Zirconium Carbides; Extruding

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 24 through 29. For astrochemistry see category 90 Astrophysics.

20010066057 Parsons Engineering Science, Inc., Austin, TX USA

Methods to Quantify Uncertainty in Human Health Risk Assessment ***Final Report, 1996-1997***

Aurelius, Lea; Sassaman, Brian L.; February 1998; 211p; In English

Report No.(s): AD-A341095; AL-OE-BR-TR-1998-0003; No Copyright; Avail: Defense Technical Information Center (DTIC)

The purpose of this document is to provide an introductory handbook for the Air Force remedial project manager (RPM) and other health professionals, such as the Bioenvironmental Engineer, to identify the appropriate use of probabilistic techniques for a site, and the methods by which probabilistic risk assessment can be used to quantify uncertainty. This document assumes that the RPM or other health professional is somewhat familiar with the basics of the risk assessment and risk management decision making process as implemented in hazardous waste site remediations. This document emphasizes the Monte Carlo probabilistic method and the exposure assessment step of the human health risk assessment process. This includes the techniques and methodology as provided in the USA Environmental Protection Agency's Risk Assessment Guidance for Superfund (RAGS). Probabilistic risk assessment should be viewed as one of a set of appropriate tools in a tiered approach to performing enhanced

site specific risk assessment. Example calculations showing results of deterministic and probabilistic risk assessments are provided for illustration as well as several appendices that contain supporting information.
DTIC
Risk; Health; Military Air Facilities; Exposure; Monte Carlo Method; Hazardous Wastes

20010066086 Colorado State Univ., Fort Collins, CO USA
Biodegradation of Propylene Glycol-Based MIL-A-8243D Aircraft Deicer
Gooden, William J.; May 1998; 53p; In English
Contract(s)/Grant(s): F08637-96-M-6007; AF Proj. 1900
Report No.(s): AD-A344569; AL/EQ-TR-1997-0031; No Copyright; Avail: Defense Technical Information Center (DTIC)

Biological degradation of propylene glycol in propylene glycol-based MIL-A-8243D aircraft deicer was investigated under conditions designed to simulate degradation in the environment. Shake flask, static flask, and static culture tube experiments were conducted using water from Westover Air Force Reserve Base (AFRB) and Buckley Air National Guard Base (ANGB). Degradation in water from Westover AFRB was limited by phosphorous availability. Phosphorous from the phosphate buffer in the deicer accelerated degradation relative to pure propylene glycol. Degradation in flasks receiving supplemental nitrogen and phosphorous was rapid, and propylene glycol depleted within 6 days. Water from Buckley ANGB was more limited in nitrogen than phosphorous, and propylene glycol degradation for both deicer and pure propylene glycol was slow. Addition of supplemental nitrogen in the form of ammonia resulted in markedly higher degradation rates. Additional information on contaminant levels in and characteristics of runoff is needed to support future research. Information on the additives in commercial deicers, which is usually proprietary, is needed for evaluating potential environmental impacts and performing any needed research. Additional research on metabolites and intermediates of propylene glycol degradation would be particularly indicated if difficulties are encountered in reducing BOD and COD to acceptable levels in treatment facilities. The production of metabolytes during environmental degradation of propylene glycol should be verified as part of field studies.
DTIC
Deicers; Biodegradation; Additives; Environment Effects; Contaminants; Glycols; Propylene

20010066100 New Orleans Univ., Dept. of Chemistry, LA USA
Computational Investigation of the Stabilities of Some Proposed Molecules and Molecular-Anions
Politzer, Peter; Concha, Monica C.; Lane, Pat; May 22, 1998; 5p; In English
Contract(s)/Grant(s): N00014-97-1-0066
Report No.(s): AD-A345530; TR-108; No Copyright; Avail: Defense Technical Information Center (DTIC)

Density functional computational studies have shown that molecular structures from 1 to 6 do correspond to energy minima. Their calculated bond lengths are presented and discussed.
DTIC
Molecular Structure; Molecules; Computational Chemistry; Anions

20010066185 Federal Aviation Administration, Technical Center, Atlantic City, NJ USA
Fire Testing of Ethanol-Based Hand Cleaner *Final Report*
Marker, Timothy R.; Do, Dung; April 1998; 13p; In English
Report No.(s): AD-A345103; DOT/FAA/AR-TN-98/15; No Copyright; Avail: Defense Technical Information Center (DTIC)

A variety of laboratory and full-scale fire tests were conducted on an ethanol-based gel-type hand cleaner currently used in commercial aircraft lavatories. The waterless-type hand cleaner has a relatively low flash point, raising concern over its fire safety when in use in the galley area of commercial transport aircraft where radiant ovens are often located. The results indicated the gel hand cleaner is often difficult to ignite and can be extinguished relatively easily.
DTIC
Ethyl Alcohol; Cleaners; Fires

20010066226 General Electric Co., Schenectady, NY USA
Non-Toxic, Self Cleaning Silicone Foul Release Coatings
March 1998; 6p; In English
Contract(s)/Grant(s): N00014-96-C0145
Report No.(s): AD-A341101; No Copyright; Avail: Issuing Activity

For each test system, four test panels were prepared. Two were installed on each side of the ship. Annual evaluations, based on ship availability, are planned. MCCOSc focused on completing toxicity testing of nine test coatings. Overall, the most toxic

coating to all test organisms was RTVll + 10% ablative carbinol. The least toxic coatings were RTVll + 10% DMSCl5 and RTVll +10% ALT25l. All test results were presented at the DARPA-GE meeting held March 27, 1998 in Melbourne, Florida. University or Hawaii performed statistical analysis on laboratory and field data. Statistical analysis supported selection of top performing Coatings as well as confirmation of poor performers.
DTIC
Cleaning; Toxicity; Silicones; Coatings

20010066249 Brigham Young Univ., Dept. of Chemistry and Biochemistry, Provo, UT USA
Photophysical Properties of Bis-8-Hydroxyquinoline-Armed Diazatrithia-15-Crown-5 and Diazatrithia-16-Crown-5 Ligands
Bronson, R. T., Brigham Young Univ., USA; Bradshaw, Jerald S., Brigham Young Univ., USA; Savage, Paul B., Brigham Young Univ., USA; Fuangswasdi, Saowarux, Brigham Young Univ., USA; Lee, Sang C., Brigham Young Univ., USA; Apr. 17, 2001; 12p; In English
Contract(s)/Grant(s): N00014-98-1-0485; Proj-98PR05020-00
Report No.(s): AD-A389353; ONR-TR-26; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy
The preliminary photophysical properties of a diazatrithia-15-crown-5 and diazatrithia-15-crown-5 ligands containing two 8-hydroxyquinoline side arms (15, 16,18 and 19) are reported. The studies show that ligands 16 and 19 exhibit increased fluorescence in the presence of Zn(2+) indicating that these ligands could be chemical sensors for Zn(2+).
DTIC
Ligands; Zinc; Transition Metals; Complex Compounds; Metal Ions; Quinoxalines

20010067226 NASA Marshall Space Flight Center, Huntsville, AL USA
Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology
Griffin, D. E., Editor, NASA Marshall Space Flight Center, USA; Stanley, D. C., Editor, NASA Marshall Space Flight Center, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1178p; In English; 4th; 4th Conference on Aerospace Materials, Processes, and Environmental Technology, 18-20 September 2000, Huntsville, AL, USA; Sponsored by NASA Marshall Space Flight Center, USA; See also 20010067227 through 20010067338
Report No.(s): NASA/CP-2001-210427; M-988; NAS 1.55:210427; No Copyright; Avail: CASI; A99, Hardcopy; A10, Microfiche
The next millennium challenges us to produce innovative materials, processes, manufacturing, and environmental technologies that meet low-cost aerospace transportation needs while maintaining US leadership. The pursuit of advanced aerospace materials, manufacturing processes, and environmental technologies supports the development of safer, operational, next-generation, reusable, and expendable aeronautical and space vehicle systems. The Aerospace Materials, Processes, and Environmental Technology Conference (AMPET) provided a forum for manufacturing, environmental, materials, and processes engineers, scientists, and managers to describe, review, and critically assess advances in these key technology areas.
Author
Solvents; Cleaning; Protective Coatings; Composite Materials; Pollution Control; Spacecraft Construction Materials

20010067230 Environmental Technology and Education Center, Albuquerque, NM USA
Nonflammable, Nonaqueous, Low Atmospheric Impact, High Performance Cleaning Solvents
Dhooge, P. M., Environmental Technology and Education Center, USA; Glass, S. M., Environmental Technology and Education Center, USA; Nimitz, J. S., Environmental Technology and Education Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 9p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche
For many years, chlorofluorocarbon (CFC) and chlorocarbon solvents have played an important part in aerospace operations. These solvents found extensive use as cleaning and analysis (EPA) solvents in precision and critical cleaning. However, CFCs and chlorocarbon solvents have deleterious effects on the ozone layer, are relatively strong greenhouse gases, and some are suspect or known carcinogens. Because of their ozone-depletion potential (ODP), the Montreal Protocol and its amendments, as well as other environmental regulations, have resulted in the phaseout of CFC-113 and 1,1,1-trichloroethane (TCA). Although alternatives have been recommended, they do not perform as well as the original solvents. In addition, some analyses, such as the infrared analysis of extracted hydrocarbons, cannot be performed with the substitute solvents that contain C-H bonds. CFC-113 solvent has been used for many critical aerospace applications. CFC-113, also known as Freon (registered) TF, has been used extensively in NASA's cleaning facilities for precision and critical cleaning, in particular the final rinsing in Class 100 areas, with

gas chromatography analysis of rinse residue. While some cleaning can be accomplished by other processes, there are certain critical applications where CFC-113 or a similar solvent is highly cost-effective and ensures safety. Oxygen system components are one example where a solvent compatible with oxygen and capable of removing fluorocarbon grease is needed. Electronic components and precision mechanical components can also be damaged by aggressive cleaning solvents.
Derived from text
Solvents; Cleaners; Fluorocarbons; Chlorofluorocarbons

20010067231 Asahi Glass Co. Ltd., Performance Chemicals General Div., Ichihara, Japan
Aerospace Applications for AK-225
Kitamura, K., Asahi Glass Co. Ltd., Japan; Tsuzaki, M., Asahi Glass Co. Ltd., Japan; Stagliano, S., AGA Chemicals, Inc., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 11p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

Hydrochlorofluorocarbons (HCFC)-225 products are environmentally sensible alternatives in a variety of applications to CFC-113, perfluorocarbons (PFCs), and other HCFCs with high ozone depletion potential (ODP) values such as HCFC-141b. Many azeotrope-like mixtures and blends of AK-225 (a mixture of two isomers, HCFC-225ca (CF3CF2CHCl2) and HCFC-225cb (CClF2CF2CHClF)) and AK-225G (HCFC-225cb) have been commercialized by Asahi Glass. These HCFC-225 products are very similar to CFC-113 and its mixtures in physical properties, material compatibilities, and cleaning performance and are widely used in precision cleaning, electronics cleaning, and as a carrier solvent of fluorinated lubricants and silicones. HCFC-225 products are thermally stable and non-flammable. They have substantially lower global warming potential (GWP) than PFCs and hydrofluorocarbons and an extremely low ODP. AK-225 and most of HCFC-225 products are recoverable by distillation with no decomposition. An azeotrope-like mixture of AK-225, ethanol, and stabilizers (called AK-225AES) is suitable for many defluxing applications. The mixture of AK-225, ethanol, hydrocarbon, and stabilizers (AK-225T) that provides increased solvency was developed to solve a white residue problem which occasionally forms on printed circuit boards cleaned with AK-225AES. A blend of AK-225 and a surfactant (AK-225DH) for displacement drying after aqueous cleaning and other processes using water was also developed. A few plastics such as acrylic resin and stressed polycarbonate may crack with AK-225. AK-225FPL, a mixture of AK-225 and a fluorinated solvent, was specifically developed for these plastic cleaning applications. In this paper, fundamental properties and material compatibility of HCFC-225 products and their applications for aerospace related industries such as bearings, precision parts, and PCBs will be discussed. Typical cleaning procedures of HCFC-225 products, the toxicological data, and the status of regulations will be also described.
Author
Cleaning; Mixtures; Chlorofluorocarbons; Compatibility; Environment Effects

20010067232 Minnesota Mining and Mfg. Co., Saint Paul, MN USA
HFEs in the Aerospace Industry: A Logical Alternative to CFCs and Other Halogenated Cleaning Solvents
Hesselroth, D. A., Minnesota Mining and Mfg. Co., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 10p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

The past several years have seen an effort to find suitable replacements for ozone-depleting substances (ODSs) such as CFC-113, HCFC-141b, and 1,1,1 trichlorethane (TCA), as well as chlorinated solvents such as trichlorethylene (TCE), and methylene chloride (CH2O2). Replacement solvents must meet more stringent environmental and toxicological requirements, and maintain the performance and compatibility characteristics of the products they are replacing. Segregated hydrofluoroethers (HFEs) are ethers with fluorocarbon on one side of the oxygen atom and hydrocarbon on the other. Non-segregated HFEs may have both hydrogen and fluorine on one or both sides of the oxygen. Tests have shown that the segregated HFEs have superior environmental properties. HFEs are non-ozone depleting, have a relatively low global warming potential, (GWP) and most are exempt as volatile organic compounds (VOC) legislation. The commercially available HFEs have excellent toxicological properties. The HFEs and many of their azeotropes and co-solvents have excellent compatibility characteristics enabling them to be used with sensitive materials such as polycarbonate or acrylic. The use of HFEs neat, as azeotropic bends, or co-solvents enables them to clean a wide range of soils including light oils, silicones, waxes, and heavy greases. HFEs have been used as direct replacement cleaning solvents in many applications. As with CFC-113, HFEs can be used in a variety of non-cleaning applications. Heat transfer and electrical properties make them a suitable replacement in chillers, direct and indirect cooling, as well as dielectric constant temperature baths. HFEs and some of their azeotropes are used as carrier solvents for deposition of fluorochemical and silicone greases and coatings. HFEs with lubricious additives have proven to be an excellent near dry lubricant for drilling and

machining aluminum, replacing CFC-113 with a similar additive. With performance and compatibility properties similar to CFC-113, HFEs can be a safe alternative with little or no modification to the existing systems.
Author
Cleaners; Fluoro Compounds; Toxicity; Solvents; Halogen Compounds

20010067498 Bureau of Reclamation, Technical Service Center, Denver, CO USA
20-Year Performance of the Buried Geomembrane Lining at Mt. Elbert Reservoir
Swihart, J. J.; Gleason, E.; Apr. 2001; 30p; In English
Report No.(s): PB2001-105543; MERL-01-01; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This report discusses the performance after 20 years of service of the installed 290 acres of 45-mil reinforced chlorinated polyethylene (CPER) geomembrane in the Mt. Elbert pumped storage facility of the Mt. Elbert reservoir, as determined by periodic sampling and laboratory testing of the test coupons.
NTIS
Reservoirs; Geotechnical Fabrics

20010067513 Boston Univ., Dept. of Chemistry, Boston, MA USA
Dynamics of Highly Energetic Azabenzenes ***Final Report, Apr. 1996 - Dec. 2000***
Mullin, Amy S.; May 08, 2000; 9p; In English
Contract(s)/Grant(s): N00014-96-1-0798
Report No.(s): AD-A389972; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
Competition between unimolecular decomposition of highly energetic azabenzene molecules and relaxation via collisions with bath molecules is investigated to provide insight to the dynamics of prototypical explosive materials. High energy azabenzene molecules (4-5 eV) are prepared with pulsed tunable UV excitation and the resulting energy loss processes are monitored using high resolution transient infrared absorption spectroscopy. Nascent energy gain measurements in bath molecules such as CO2 and H2O provide information about the energy transfer partitioning, cross sections and distribution functions. Computer simulations using classical trajectory calculations help identify the molecular features that lead to efficient (or inefficient) energy loss pathways.
DTIC
Energy Transfer; Azines; Molecules; Energy Dissipation; Decomposition

24
COMPOSITE MATERIALS

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

20010066067 National Taiwan Univ. of Science and Technology, Dept. of Construction Engineering, Taipei, Taiwan, Province of China
Effects of Various Fineness Moduli of Fine Aggregate on Engineering Properties of High-Performance Concrete
Chang, Ta-Peng, National Taiwan Univ. of Science and Technology, Taiwan, Province of China; Lin, Shi-Hong, National Taiwan Univ. of Science and Technology, Taiwan, Province of China; Lin, Huang-Chin, National Taiwan Univ. of Science and Technology, Taiwan, Province of China; Lin, Ping-Ru, Tung Nan Inst. of Tech., Taiwan, Province of China; Journal of the Chinese Institute of Engineers; May 2001; ISSN 0253-3839; Volume 24, No. 3, pp. 289-300; In English
Contract(s)/Grant(s): NSC-85-2211-E-011-010; Copyright; Avail: Issuing Activity
The effects of various fineness moduli (FM) of fine aggregate on the engineering properties of high-performance concrete (HPC) were studied. Two kinds of coarse aggregates (stiff and soft) and three kinds of fine aggregates (FM = 3.24, 2.73, and 2.18) were used. The results indicate that the slump and flowability for all fresh concrete in this study right after mixing are between 265 and 280 mm, and 670 and 790 mm, respectively. The compressive strengths at the age of 29 days range from 60.2 to 68.7 MPa (stiff coarse aggregate), and 42.0 to 46.0 MPa (soft coarse aggregate), respectively. The corresponding moduli of elasticity are in the range between 27.5 and 29.1 GPa (stiff aggregate) and 25.2 GPa and 29.1 GPa (soft aggregate), respectively. Using the same concrete mixture, the coarsest fine aggregate (FM = 3.24) has better positive effects on the properties of the fresh and hardened HPC.
Author
Aggregates; Concretes; Fineness

20010066146 National Aerospace Lab., Tokyo Japan

Technical Report of National Aerospace Laboratory. Evaluation of Interlaminar Shear Strength Test Method for Heat Resistant Composite Materials

Noguchi, Y.; Aoki, Y.; Jun. 2000; 19p; In Japanese; Portions of this document are not fully legible

Report No.(s): PB2001-105894; NAL-TR-1408; Copyright; Avail: National Technical Information Service (NTIS), Microfiche

This paper describes the results of the investigation and evaluation of an interlaminar shear of carbon/carbon composite material (C/C materials) and silicon carbide/silicon carbide composite material (SiC/SiC materials). Data were collected by two test methods: a three-point flexural shear test method using a short beam specimen, and a compression shear test method using a double-notched specimen. The compression shear tests for C/C materials were carried out with fixing test jigs under various conditions, and the interlaminar shear strength of SiC/SiC materials was evaluated at the three air temperatures of 23 degrees C, 800 degrees C and 1000 degrees C.

NTIS

Refractory Materials; Shear Strength; Interlaminar Stress; Carbon-Carbon Composites

20010066203 Dayton Univ. Research Inst., OH USA

Composite Materials for Advanced Global Mobility Concepts ***Final Report, 15 Sep. 1999-31 Jul. 2000***

Han, K. K., Dayton Univ. Research Inst., USA; Oct. 2000; 62p; In English

Contract(s)/Grant(s): F33615-95-D-5029; AF Proj. 4347

Report No.(s): AD-A389381; UDR-TR-2000-00113; AFRL-ML-WP-TR-2001-4017; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A 3-D stress and strain model of woven fabric composites based on Reissner's variational principle was developed and the model included 29 unknown variables. Strength predictions were also included, obtained by introducing penalty energy terms. The model results show good agreement when compared with woven composite experiments and flat laminate experiments and models. This agreement includes moduli, strength, and failure modes. Similar 3-D modeling of graphitic foam structures was initiated using the tetrahedral strut geometry. The basic premise for the graphitic foam processing model was also laid out.

DTIC

Composite Materials; Mobility; Three Dimensional Models

20010066335 Army Research Lab., Weapons and Materials Research Directorate, Aberdeen Proving Ground, MD USA

Adherend Thermal Effects During Bonding with Inductively Heated Films ***Final Report, Sep. - Dec. 1998***

Wetzel, Eric D.; Fink, Brice K.; Apr. 2001; 54p; In English

Report No.(s): AD-A389305; ARL-TR-2461; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The thermal performance of an inductively heated film sandwiched between two identical adherends is investigated. Models for infinite conductivity finite thickness adherends, finite conductivity semi-infinite thickness adherends, and finite conductivity finite thickness adherends are presented. Calculations are performed for polymer-matrix composite, ceramic, and metal adherends for a variety of adherend thicknesses. The results show that for expected bonding applications, film heating rates will be reduced by a factor of l0-l00, as compared with insulated film heating rates with no attached adherends. Higher reductions in heating performance are noted for ceramic and metal adherends as compared with composite adherends. However, even with the most severe reductions in heating rates, bonding with inductively heated films is feasible.

DTIC

Bonding; Polymer Matrix Composites; Temperature Effects

20010066539 Aerospace Corp., El Segundo, CA USA

Burst Tests of Filament-Wound Graphite-Epoxy Tubes: Pathfinder Test Series for Delta II GEM Motor Cases

Chang, D. J.; Valenzuela, P. R.; Albright, T. V.; Dec. 20, 2000; 51p; In English

Contract(s)/Grant(s): F04701-00-C-0009

Report No.(s): AD-A390656; CSR-TR-2000(1494)-1; SMC-TR-01-11; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A test program was conducted to investigate the failure modes of undamaged and damaged graphite-epoxy cylindrical tubes subject to internal pressure, and to simulate the failure mode of the Delta graphite epoxy motor (GEM) case K404. There were two phases of this test program: the mini-test series and the pathfinder series. The mini-test series, using 1.5-in. diameter tubes, included five tests. The pathfinder series, using 4.00-in. diameter tubes, included 41 tests. Two types of intentional damage were made to some of the tubes: either a longitudinal-line cut or a single-point impact. A Kodak High Speed Motion Analyzer model 4540 was used to record images of the fracture process. Testing was conducted under three conditions: hydraulic pressurization,

pneumatic pressurization with solid inserts, and pneumatic pressurization with inert propellant inserts. Several failure modes were observed. A tube with a longitudinal cut can fail in three different modes: a local leakage mode, a bursting mode with a fracture initiating from the cut, or a bursting mode with complete tube disintegration. In testing of impact-damaged tubes, the results show that the burst pressure decreases with increasing impact load. At an impact load of 335 Ib, the burst pressure decreases by 33% compared to the undamaged condition. The failure initiation point of the impact-damaged tubes was not necessarily at the impact location. Apparently, impact can cause localized damage to other areas of tubes. However, thermography and ultrasound inspections failed to detect this damage. This is possibly because these nondestructive examination (NDE) techniques can detect delamination but not fiber breakage in composite materials.
DTIC
Burst Tests; Fiber Composites; Graphite-Epoxy Composites

20010066544 California Univ., Dept. of Chemistry and Biochemistry, Santa Barbara, CA USA
The Growth of Nanostructures and Composite Films on Solids: Simulation and Phenomelogical Theory ***Final Report, 15 Mar1998-14 Mar. 2001***
Metiu, Horia; May 07, 2001; 3p; In English
Contract(s)/Grant(s): F49620-98-1-0366
Report No.(s): AD-A390599; AFRL-SR-BL-TR-01-0353; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche
We have studied how the morphology of films grown by epitaxy changes after deposition, if we change the temperature. We have determined by simulations how isolated islands on a solid surface move or shrink by evaporation. We developed new methods to study how an ensemble of islands evolves when heated or when strain is imposed on the surface. This work provides an understanding of basic phenomena taking place during epitaxy.
DTIC
Composite Materials; Epitaxy; Solid Surfaces; Nanostructures (Devices)

20010066547 Arizona Univ., Aerospace and Mechanical Engineering, Tucson, AZ USA
An Inverse Approach for Capturing the Interaction of Macro- and Micro-Scales in Characterizing Bonded Composite Joints ***Final Report, 01 Apr. 1999-31 Mar. 2000***
Madenci, Erdogan, Arizona Univ., USA; May 2000; 11p; In English
Contract(s)/Grant(s): F49620-99-1-0216
Report No.(s): AD-A390502; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy
A technique has been developed to determine the critical interface fracture parameters of dissimilar material interfaces. This technique combines the experimental measurements at the micro-scale and analytical and numerical modeling at the macro-scale. With this grant, our Hitachi scanning electron microscope (SEM, backscatter, and X-ray), Model X-650, has been upgraded with a new 100-lb tensile sub-stage, three-point bending fixture load cell, and an extensometer, heating and cooling accessory (-130 C to 200 C). Also, the SEM has been refurbished with a Kevex-SIGMA fully loaded KS2 Level 2 microanalysis system with Digital Imaging and spectral processing model. With this instrumentation, the SEM provides the capability to characterize material at the micro-level, and permits capturing the effect of micro-properties in macro-analysis when determining engineering properties useful in design. As part of this grant, two graduate students involved in the research project funded by Semiconductor Research Corporation (SRC) have benefited significantly. Also, an undergraduate student received a summer internship from SRC to work on interface characterization with this technique.
DTIC
Bonded Joints; Composite Materials; Scanning Electron Microscopy; Semiconductors (Materials); Fracturing; Microanalysis

20010066875 NASA Langley Research Center, Hampton, VA USA
Heat Transfer in Adhesively Bonded Honeycomb Core Panels
Daryabeigi, Kamran, NASA Langley Research Center, USA; [2001]; 11p; In English; 35th AIAA Thermophysics Conference, 11-14 Jun. 2001, Anaheim, CA, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Report No.(s): AIAA Paper 2001-2825; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche
The Swann and Pittman semi-empirical relationship has been used as a standard in aerospace industry to predict the effective thermal conductivity of honeycomb core panels. Recent measurements of the effective thermal conductivity of an adhesively bonded titanium honeycomb core panel using three different techniques, two steady-state and one transient radiant step heating method, at four laboratories varied significantly from each other and from the Swann and Pittman predictions. Average differences between the measurements and the predictions varied between 17 and 61% in the temperature range of 300 to 500 K. In order to determine the correct values of the effective thermal conductivity and determine which set of the measurements or predictions

were most accurate, the combined radiation and conduction heat transfer in the honeycomb core panel was modeled using a finite volume numerical formulation. The transient radiant step heating measurements provided the best agreement with the numerical results. It was found that a modification of the Swann and Pittman semi-empirical relationship which incorporated the facesheets and adhesive layers in the thermal model provided satisfactory results. Finally, a parametric study was conducted to investigate the influence of adhesive thickness and thermal conductivity on the overall heat transfer through the panel.
Author
Conductive Heat Transfer; Finite Volume Method; Honeycomb Cores; Panels; Thermal Conductivity

20010066880 NASA Langley Research Center, Hampton, VA USA
Thermal Analysis and Design of Multi-layer Insulation for Re-entry Aerodynamic Heating
Daryabeigi, Kamran, NASA Langley Research Center, USA; [2001]; 10p; In English; 35th AIAA Thermophysics Conference, 11-14 Jun. 2001, Anaheim, CA, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA; Original contains color illustrations
Report No.(s): AIAA Paper 2001-2834; Copyright Waived; Avail: CASI; A02, Hardcopy; A01, Microfiche

The combined radiation/conduction heat transfer in high-temperature multi-layer insulations was modeled using a finite volume numerical model. The numerical model was validated by comparison with steady-state effective thermal conductivity measurements, and by transient thermal tests simulating re-entry aerodynamic heating conditions. A design of experiments technique was used to investigate optimum design of multi-layer insulations for re-entry aerodynamic heating. It was found that use of 2 mm foil spacing and locating the foils near the hot boundary with the top foil 2 mm away from the hot boundary resulted in the most effective insulation design. A 76.2 mm thick multi-layer insulation using 1, 4, or 16 foils resulted in 2.9, 7.2, or 22.2 percent mass per unit area savings compared to a fibrous insulation sample at the same thickness, respectively.
Author
Multilayer Insulation; Radiative Heat Transfer; Reentry Effects; Thermal Analysis; Aerodynamic Heating

20010066973 Princeton Univ., Dept. of Chemical Engineering, NJ USA
Biomimetic Processing of Ceramic Composites ***Final Report, 1 Jun. 1993 - 31 May 1997***
Aksay, Ilhan A.; Dabbs, Daniel M.; Apr. 02, 2001; 11p; In English
Contract(s)/Grant(s): DAAH04-93-G-0098
Report No.(s): AD-A390132; ARO-31268.1-MS-AAS; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Three task areas composed the research effort: (1) optimized depth of photocuring in a resin system, (2) improved resin/ceramic particle compatibilities consistent for use in stereolithography, and (3) developing the technique of ceramic stereolithography (CSL) for the fabrication of a ceramic matrix composite test structure. The depth of photocuring in a model resin system was investigated as a function of photoinitiator concentration. Polymer solutions were photocured using varying levels of energy and photoinitiator concentration. An optimal photoinitiator concentration maximizing the cure depth was observed. Two regimes were shown to exist in which shrinkage was minimized or maximized. A quantitative model was developed to describe the system's behavior. Good agreement with experiment was obtained and the model predicted both the existence and location of the optimal photoinitiator concentration and corresponding cure depth. After optimizing the resin/particle system, complex shaped structures were fabricated from ceramic powder compacts constructed using CSL. The main processing parameters in CSL such as layer thickness, resolution, hatch spacing, and overcure were found to depend on the light propagation in a concentrated dispersion, and a model was developed and used to optimize the fabrication of the ceramic structures.
DTIC
Biomimetics; Ceramic Matrix Composites; Composite Structures; Fabrication; Lithography

20010067228 Lockheed Martin Manned Space Systems, New Orleans, LA USA
Composite Manufacturing for Space Launch Vehicles
Knezevich, D. Y., Lockheed Martin Manned Space Systems, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Composite materials offer a large potential for performance increase and weight reduction over metallic components for advanced launch vehicles. Building composite hardware for large high-efficiency launch vehicles is one of the most demanding engineering challenges from the aspects of materials science, structure, and manufacturing. Modern launch vehicles require robust, durable, and reliable components capable of operating in cryogenic, high-pressure, and high-temperature environments, while in contact with highly volatile oxidizers and fuels. Lockheed Martin Space Systems Company, Michoud Operations, has developed critical technologies for this effort by building, testing, and flight qualifying composite hardware for launch vehicle

applications for numerous projects, such as the Space Shuttle, X-33, X-34, and the A2100 Satellite. Composite hardware built and tested by Lockheed Martin Space Systems Company includes high-temperature vehicle fairings and nose cones, launch vehicle intertank skirts, high-pressure cryogenic helium tanks, cryogenic liquid hydrogen and liquid oxygen tanks, feedlines, and tank coverplates. Composite manufacturing for space launch vehicles will soon be enhanced by activation of the National Center for Advanced Manufacturing (NCAM). Located at Michoud, NCAM will partner government, industry, and academia and bring on line fiber placement and autoclave capabilities that are required for production of large composite structures.
Author
Reusable Launch Vehicles; Manufacturing; Composite Structures; Composite Materials; Spacecraft Construction Materials

20010067229 NASA Marshall Space Flight Center, Huntsville, AL USA
Thermographic Analysis of Composite Cobonds on the X-33
Russell, S. S., NASA Marshall Space Flight Center, USA; Walker, J. L., NASA Marshall Space Flight Center, USA; Lansing, M. D., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 6p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

During the manufacture of the X-33 liquid hydrogen (LH2) Tank 2, a total of 36 reinforcing caps were inspected thermographically. The cured reinforcing sheets of graphite/epoxy were bonded to the tank using a wet cobond process with vacuum bagging and low temperature curing. A foam filler material wedge separated the reinforcing caps from the outer skin of the tank. Manufacturing difficulties caused by a combination of the size of the reinforcing caps and their complex geometry lead to a potential for trapping air in the bond line. An inspection process was desired to ensure that the bond line was free of voids before it had cured so that measures could be taken to rub out the entrapped air or remove the cap and perform additional surface matching. Infrared thermography was used to perform the procure 'wet bond' inspection as well a to document the final 'cured' condition of the caps. The thermal map of the bond line was acquired by heating the cap with either a flash lamp or a set of high intensity quartz lamps and then viewing it during cool down. The inspections were performed through the vacuum bag and voids were characterized by localized hot spots. In order to ensure that the cap had bonded to the tank properly, a post cure 'flash heating' thermographic investigation was performed with the vacuum bag removed. Any regions that had opened up after the preliminary inspection or that were hidden during the bagging operation were marked and filled by drilling small holes in the cap and injecting resin. This process was repeated until all critical sized voids were filled.
Author
Thermography; Voids; Joints (Junctions); Infrared Inspection; Nondestructive Tests

20010067237 Physical Sciences, Inc., Andover, MA USA
Lightweight Multi-Layer Structural Materials
Legner, H. H., Physical Sciences, Inc., USA; DiCristina, V., ThermoPhysical Sciences, USA; Marshall, D., Textron Systems Corp., USA; Singler, R., Textron Systems Corp., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

A new lightweight composite material with combined structural and thermal protection capability has been developed for both air vehicle and spacecraft applications. The basic concept consists of the integration of a high-density outer layer with a low-density foam core, using stitching loops to integrate the material three-dimensionally. The layers are chemically bonded and mechanically linked. The generalization of this technique to integrated structural materials with two high-density face plates sandwiching the low-density inner layer provides an entirely new approach to fabricating cost-effective aero-shell and spacecraft structural materials. These materials have been evaluated structurally, as well as thermally in arc-jet and laser tests. Thermal insulation performance exceeds that of standard heat protection materials. Measured compressive and bending strengths have shown substantial residual load-carrying capabilities. In addition, damage tolerance and crush strength properties have been demonstrated to be superior to comparable honeycomb structures.
Author
Composite Materials; Thermal Protection; Mechanical Properties

20010067250 NASA Marshall Space Flight Center, Huntsville, AL USA
Large Composite Structures Processing Technologies for Reusable Launch Vehicles
Clinton, R. C., Jr., NASA Marshall Space Flight Center, USA; Vickers, J. H., NASA Marshall Space Flight Center, USA; McMahon, W. M., NASA Marshall Space Flight Center, USA; Hulcher, A. B., NASA Marshall Space Flight Center, USA; Johnston, N. J., NASA Langley Research Center, USA; Cano, R. J., NASA Langley Research Center, USA; Belvin, H. L., NASA

Langley Research Center, USA; McIver, K., Boeing, USA; Franklin, W., Lockheed Martin Corp., USA; Sidwell, D., Lockheed Martin Corp., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 37p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

Significant efforts have been devoted to establishing the technology foundation to enable the progression to large scale composite structures fabrication. We are not capable today of fabricating many of the composite structures envisioned for the second generation reusable launch vehicle (RLV). Conventional 'aerospace' manufacturing and processing methodologies (fiber placement, autoclave, tooling) will require substantial investment and lead time to scale-up. Out-of-autoclave process techniques will require aggressive efforts to mature the selected technologies and to scale up. Focused composite processing technology development and demonstration programs utilizing the building block approach are required to enable envisioned second generation RLV large composite structures applications. Government/industry partnerships have demonstrated success in this area and represent best combination of skills and capabilities to achieve this goal.
Derived from text
Composite Structures; Fabrication; Reusable Launch Vehicles

20010067256 NASA Marshall Space Flight Center, Huntsville, AL USA
Concept for Determining the Life of Ceramic Matrix Composites Using Nondestructive Characterization Techniques
Effinger, M., NASA Marshall Space Flight Center, USA; Ellingson, B., Argonne National Lab., USA; Spohnholtz, T., Argonne National Lab., USA; Koenig, J., Southern Research Inst., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 22p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

An idea is put forth for a nondestructive characterization (NDC) generated algorithm-N curve to replace a S-N curve. A scenario for NDC life determination has been proposed. There are many challenges for the NDC life determination and prediction, but it could yield a grand payoff. The justification for NDC life determination and prediction is documented.
Derived from text
Characterization; Ceramic Matrix Composites; Nondestructive Tests; Life (Durability)

20010067260 NASA Marshall Space Flight Center, Huntsville, AL USA
Solid Freeform Fabrication of Continuous Fiber Reinforced Composites for Propulsion Applications
Vaidyanathan, R., Advanced Ceramics Research, Inc., USA; Fox, M., Advanced Ceramics Research, Inc., USA; Walish, J., Advanced Ceramics Research, Inc., USA; Rigali, M., Advanced Ceramics Research, Inc., USA; Cipriani, R., Advanced Ceramics Research, Inc., USA; Gillespie, J., Delaware Univ., USA; Yarlagadda, S., Delaware Univ., USA; Effinger, M., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 8p; In English; See also 20010067226
Contract(s)/Grant(s): NAS8-00084; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Monolithic ceramics lack the fracture toughness necessary to be considered for propulsion related applications. to be used for such applications, materials must possess low density, high elastic modulus, a low thermal expansion coefficient, high thermal conductivity, excellent erosion and oxidation/corrosion resistance, and flaw-insensitivity. They will in many cases also be required to possess the ability to be joined, to survive thermal cycling and multi-axial stress states, and for reusable applications the materials must maintain the above attributes after prolonged exposure to extremely harsh chemical environments. The final and possibly most important attributes for these materials are the need to be of low cost and readily available in large quantities.
Derived from text
Manufacturing; Fiber Composites; Fracture Strength; Reinforcing Fibers

20010067261 NASA Glenn Research Center, Cleveland, OH USA
An Example of Economic Value in Rapid Prototyping
Hauer, R. L., NASA Glenn Research Center, USA; Braunscheidel, E. P., NASA Glenn Research Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 19p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

Today's modern machining projects are composed more and more of complicated and intricate structure due to a variety of reasons including the ability to computer model complex surfaces and forms. The cost of producing these forms can be extremely high not only in dollars but in time to complete. Changes are even more difficult to incorporate. The subject blade shown is an excellent example. Its complex form would have required hundreds of hours in fabrication for just a simple prototype. The procurement would have taken in the neighborhood of six weeks to complete. The actual fabrication would have been an equal

amount of time to complete. An alternative to this process would have been a wood model. Although cheaper than a metal fabrication, it would be extremely time intensive and require in the neighborhood of a month to produce in-house.
Derived from text
Fabrication; Prototypes

20010067262 NASA Marshall Space Flight Center, Huntsville, AL USA
Composite,Cryogenic, Conformal, Common Bulkhead, Aerogel-Insulated Tank (CBAT)
Roberts, J. K., Thiokol Propulsion, USA; Kovach, M. P., Thiokol Propulsion, USA; McMahon, W. M., NASA Marshall Space Flight Center, USA; Finckenor, J. L., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 8p; In English; See also 20010067226; Copyright; Avail: Issuing Activity

The objective of the Composite, Cryogenic, Conformal, Common Bulkhead, Aerogel-insulated Tank (CBAT) Program is to evaluate the potential for using various new technologies in next generation Reusable Launch Vehicles (RLVs) through design, fabrication, and testing of a subscale system. The new technologies include polymer matrix composites (PMCs), conformal propellant storage, common bulkhead packaging, and aerogel insulation. The National Aeronautics and Space Administration (NASA) and Thiokol Propulsion from Cordant Technologies are working together to develop a design and the processing methodologies which will allow integration of these technologies into a single structural component assembly. Such integration will significantly decrease subsystem weight and reduce shape, volume, and placement restrictions, thereby enhancing overall launch system performance. This paper/presentation focuses on the challenges related to materials and processes that were encountered and overcome during this program to date.
Author
Technology Assessment; Reusable Launch Vehicles; Technology Utilization; Fabrication; Propellant Tanks

20010067265 NASA Johnson Space Center, Houston, TX USA
TransHab Materials Selection
Pedley, M. D., NASA Johnson Space Center, USA; Mayeaux, B., NASA Johnson Space Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 22p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

A viewgraph presentation gives an overview of the materials selection for the TransHab, the habitation module on the International Space Station (ISS). Details are given on the location of TransHab on the ISS, the multilayer inflatable shell that surrounds the module, the materials requirements (including information on the expected thermal environment), the materials selection challenges, the bladder materials requirements and testing, and meteoroid/debris shielding material.
CASI
Materials Tests; Mechanical Properties; Space Station Modules

20010067271 NASA Marshall Space Flight Center, Huntsville, AL USA
Development of Metal Matrix Composites for NASA's Advanced Propulsion Systems
Lee, J., NASA Marshall Space Flight Center, USA; Elam, S., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 8p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

The state-of-the-art development of several Metal Matrix Composites (MMC) for NASA's advanced propulsion systems will be presented. The goal is to provide an overview of NASA-Marshall Space Flight Center's on-going activities in MMC components for advanced liquid rocket engines such as the X-33 vehicle's Aerospike engine and X-34's Fastrac engine. The focus will be on lightweight, low cost, and environmental compatibility with oxygen and hydrogen of key MMC materials, within each of NASA's new propulsion application, that will provide a high payoff for NASA's Reusable Launch Vehicles and space access vehicles. In order to fabricate structures from MMC, effective joining methods must be developed to join MMC to the same or to different monolithic alloys. Therefore, a qualitative assessment of MMC's welding and joining techniques will be outlined.
Author
Metal Matrix Composites; Welding; Joints (Junctions)

20010067306 Naval Research Lab., Materials Science and Technology Div., Washington, DC USA
Easily Processable High Temperature and Flame Resistant Phthalonitrile Composites for Aerospace Applications
Keller, T. M., Naval Research Lab., USA; Jones, H. N., Naval Research Lab., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 7p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

The aerospace industry is utilizing structural composites in airframes and skins to reduce weight and to improve fuel efficiency. With an increase in future composite usage, materials with low flammability and high strength will be needed to maintain airframe loads in the next generation, reusable, and expendable aeronautical and space vehicle systems. Polymer-based materials are currently being used in non-structural and semi-structural applications in cabin interiors. The materials are fairly flammable and/or generate copious amounts of smoke in a fire scenario and do not meet the FAA goal of generating survivable aircraft cabin conditions for 15 minutes in post-crash fuel fire. Fiber-reinforced composites utilizing high temperature polymers are more resistant to ignition but can suffer from poor processing characteristics and mechanical properties. Increased usage of polymers and composites by the aerospace industry will demand materials with better fire performance, structural integrity, and ease of processability. Phthalonitrile-based composites under development at the NRL show excellent flame resistant properties and thermo-oxidative stability approaching 375 C. The phthalonitrile cure reaction is not accompanied by evolution of volatile by-products. Therefore, void-free components can be made easily from this resin system. The advantages and versatility of the phthalonitrile polymer may be realized in terms of ease of processing and superior properties. The phthalonitrile monomer can be cured into a thermoset resin using a wide variety of curing additives. Additionally, a prepolymer (B-staged resin) or prepolymerization composition may be prepared and stored for later usage with an indefinite shelf life under ambient conditions. The polymerization rate is also easily controllable as a function of curing additive and processing temperature for thick section composite fabrication. With regard to the thermal properties. the fully cured resins do not show a glass transition temperature up to 450 C and exhibit good mechanical property retention at elevated temperatures. The current state-of-the-art high temperature resin based on PMR polyimide, designated as PMR-15, shows promise up to 316 C but is accompanied by processing problems such as volatiles from residual solvent and a short processing or reaction time. The short reaction time translates to inadequate resin flow for fabricating thick and complicated composite structures. In light of these drawbacks with existing resin systems, phthalonitrile matrices show promise and may help further the usage of polymeric composites in applications that need high temperature and flame resistant capabilities.
Derived from text
Composite Structures; Flammability; Matrix Materials; Mechanical Properties

20010067308 Mississippi State Univ., Mechanical Engineering Dept., Mississippi State, MS USA
Vapor Grown Carbon Fiber/Phenolic Matrix Composites for Rocket Nozzles and Heat Shields
Patton, R. D., Mississippi State Univ., USA; Pittman, C. U., Jr., Mississippi State Univ., USA; Wang, L., Mississippi State Univ., USA; Day, A., Thiokol Propulsion, USA; Hill, J. R.; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 9p; In English; See also 20010067226
Contract(s)/Grant(s): NAS8-97091; F49620-99-1-0191; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

The ablation and mechanical and thermal properties of vapor grown carbon fiber (VGCF)/phenolic resin composites were evaluated to determine the potential of using this material in solid rocket motor nozzles. Composite specimens with varying VGCF loading (30%-50% wt) including one sample with ex-rayon carbon fiber plies were prepared and exposed to a plasma torch for 20 s with a heat flux of 16.5 MW/sq m at approximately 1650 C. Low erosion rates and little char formation were observed, confirming that these materials were promising for rocket motor nozzle materials. When fiber loadings increased, mechanical properties and ablative properties improved. The VGCF composites had low thermal conductivities (approximately 0.56 W/m-C) indicating they were good insulating materials. If a 65% fiber loading in VGCF composite can be achieved, then ablative properties are projected to be comparable to or better than the composite material currently used on the Space Shuttle Reusable Solid Rocket Motor (RSRM).
Author
Carbon Fibers; Composite Materials; Ablation; Mechanical Properties; Thermodynamic Properties

20010067317 Air Force Research Lab., Wright-Patterson AFB, OH USA
The Composites Affordability Initiative
Mistretta, J., Air Force Research Lab., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The Composites Affordability Initiative (CAI) is a multi-service and aerospace industry collaborative effort. This long-range initiative has the goal of developing the technologies and tools necessary to reduce the acquisition cost of composite structures by an order of magnitude. The current phase of CAI includes Joint Strike Fighter-related transition programs at Boeing and Lockheed Martin, plus a cooperative pervasive technology program. This is the second phase of a four-phase effort. to provide sufficient depth, all relevant areas including design, fabrication, assembly, analysis, quality, and cost models, must be advanced. In the past year, several large producibility articles have been developed to focus the fabrication and assembly technology

development process under the pervasive technology program. In addition, cost, analysis, and quality tools have been developed and enhanced.
Author
Composite Structures; Cost Analysis; Technology Utilization

25
INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY

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

20010066089 Utah Univ., Dept. of Chemistry, Salt Lake City, UT USA
Computer Simulation of Electrochemical Processes, *1 Jun. 1997 - 31 May 1998*
Voth, Gregory A.; Jun. 01, 1998; 16p; In English
Contract(s)/Grant(s): N00014-97-J-0265
Report No.(s): AD-A345660; Rept-97PR03964-01; No Copyright; Avail: Defense Technical Information Center (DTIC)

Large scale computer simulations are being performed to study heterogeneous electron transfer processes and related phenomena across the electrode/electrolyte interface. This research introduces microscopic computer simulation methods into the field of electrochemistry, impacting such important technologies as advanced power sources, sensors, displays, corrosion prevention, and electrochemical synthesis. A specific goal is to explicitly characterize the interplay of the solvent reorganization required for the electron transfer event near an electrode surface with chemically reactive (e.g., bond-breaking) processes. Novel ”first principles” simulations are being carried out with Car-Parrinello molecular dynamics techniques to treat the electronic structure of the system while computing the nuclear motions of the solvent molecules using no empirical approximations. Newly developed theoretical methods are also being implemented in the simulations which employ quantum path integral approaches. All of these methods are required to fully characterize highly complex condensed matter problems such as heterogeneous electron transfer.
DTIC
Computerized Simulation; Condensed Matter Physics; Corrosion Prevention; Electrodes; Electrolytes

20010066092 RVM Scientific, Inc., Santa Barbara, CA USA
Chemical Sensing in the Marine Environment *Final Report*
Holland, Paul M.; May 1998; 20p; In English
Contract(s)/Grant(s): N00014-96-C-0390
Report No.(s): AD-A345727; RVMS-CR-98-01; No Copyright; Avail: Defense Technical Information Center (DTIC)

The objective of the Chemical Sensing in the Marine Environment (CSME) program is the detection of trace levels of explosives and their degradation products in marine littoral environments. This involves developing an understanding of the influence of biological organisms on their distribution and fate, and the development of sampling techniques and strategies for studying these analyses in the near shore environment. During the OSME program, new methods for sampling and detecting trace levels of explosives from unexploded ordinance in seawater were developed and demonstrated. This included the development of a large manifold pumping system to allow sampling and solid phase extraction of up to 100 liters of seawater in 15-30 minutes. This system allows detection to parts-per-trillion levels, and can be monitored by underwater video and current meters to select preferred sampling stations. Diver manipulated ”wands” for the collection of large seawater samples were also demonstrated. This may have application for the study of other types of trace organic compounds in seawater. The role of RVM Scientific in the first phase of the CSME program has been to provide support in the areas of experimental design for sample collection, test site selection, coordination of OSME meetings and field tests, to participate in sample collection, documentation of results, and to provide help with trouble-shooting and the development backup approaches during field testing. The present report focuses on the sampling approaches and configurations used in the CSME field tests, and does not include discussion of explosive compounds and degradation products or CSME chemical analysis results, which will be presented elsewhere.
DTIC
Chemical Analysis; Coordination; Degradation; Detection; Diving (Underwater); Experiment Design; Explosives

20010066168 Oak Ridge National Lab., TN USA
Surface Charge and Ion Adsorption on Metal Oxides to 290 C
Wesolowski, D. J.; Palmer, D. A.; Benezeth, P.; Anovitz, L. A.; Machesky, M. L.; 2001; 10p; In English
Report No.(s): PB2001-106108; No Copyright; Avail: National Technical Information Service (NTIS)

The results of metal oxide surface protonation and specific ion adsorption studies are presented, which employed in situ pH monitoring in both conventional glass-electrode autotitrators to 50 C, and hydrogen-electrode concentration cells to 290 C. Our recent studies of rutile and magnetite surface protonation, and the sorption of Ca(2)+ on rutile surfaces are reviewed, and modeling of these results are discussed, including the development of a method to estimate the pH of zero charge of oxide surfaces from 0 to 300 C. New results are discussed on the protonation of zirconium oxide surfaces to 50 C and the sorption of Nd(3)+ on rutile surfaces from 25-250 C. We also discuss preliminary results on the sorption of oxalate and sulfate on rutile surfaces to 100 C. These studies demonstrate that both proton-induced surface charging and the specific adsorption of electrolyte ions on oxide surfaces increase as temperature increases into the hydrothermal regime.
NTIS
Adsorption; Surface Properties; Hydrogen Ions; Metal Oxides

20010066218 Edgewood Research Development and Engineering Center, Aberdeen Proving Ground, MD USA
Enhancement of the GD Catalytic Activity of the OPH Enzyme by Protein Engineering: Screening and Kinetic Analysis of Two Mutants *Final Report, Oct. 1993 - Feb. 1994*
Harvey, Steven P.; Apr. 1998; 23p; In English
Contract(s)/Grant(s): DA Proj. 101-61101-A-91-A
Report No.(s): AD-A345645; ERDEC-TR-492; No Copyright; Avail: Defense Technical Information Center (DTIC)

The enzyme organophosphate hydrolase (OPH) catalyzes the hydrolysis of several G-type nerve agents. The enzyme has relatively high levels of activity with DFP, GB. and GF but much less activity with GD. In these studies, different site-specific OPH mutants were tested for their activity levels on DFP and GD. Two mutants, 257L and 257V, were found to have 43-fold and 29-fold increased levels of GD activity, respectively. Kinetic analyses (Vmax and Km) of these mutants were conducted using GD as the substrate. A profile of activity versus pH was also completed for 257L. This is the first report of the successful enhancement of G-agent enzymatic activity through protein engineering.
DTIC
Mutations; Catalysts; Catalytic Activity; Organic Phosphorus Compounds

20010066355 Army Research Lab., Weapons and Materials Research Directorate, Aberdeen Proving Ground, MD USA
Thermodynamic Property Characterization for Plasmas Generated by an Ablating-Capillary Arc *Final Report, Jun. 1999 - Jun. 2000*
McQuaid, Michael J.; Nusca, Michael J.; Mar. 2001; 43p; In English
Report No.(s): AD-A389302; ARL-TR-2427; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The thermodynamic property database developed by McBride and Gordon for use with their program for calculating the chemical compositions of complex gas mixtures has been employed in a computational fluid dynamics (CFD) model for simulating plasma jets generated by ablating-capillary arc igniters. In this report, the methods employed in the development of the McBride and Gordon data are compared to those based on the ”standard” (DeBye-Huckel) theory employed for gases in which Coulomb interactions need to be considered. Predictions based on these two approaches are compared over pressure and temperature ranges relevant to an ablating-capillary arc jet. The comparison indicates that McBride and Gordon data, which does not include a ”first principles” correction for the influence of Coulomb interactions, still yields property determinations that are in good agreement with the standard. Moreover, it is shown that properties obtained from their database should not be corrected with terms that account for Coulomb interactions.
DTIC
Gases; Thermochemistry; Thermodynamic Properties; Plasma Jets; Gas Mixtures; Data Bases

20010066458 Wisconsin Univ., Dept. of Civil and Environmental Engineering, Madison, WI USA
Inactivation of Cryptosporidium Parvum in Natural Waters Using Free Chlorine
Starke, Jeffrey A.; May 2001; 136p; In English
Report No.(s): AD-A390359; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

Waterborne transmission of disease has been documented throughout history. One of the greatest contributions to 20% century society has been the advent and application of water treatment technologies. However, analysis of current World Health Organization (WHO) estimates of illness and mortality and epidemiological investigations in the USA still indicates that the threat

to public health from waterborne disease still exists. There are a plethora of contaminants (both chemical and microbiological) that impose a direct risk to public health in the USA. The USA Environmental Protection Agency (EPA) reviews these contaminants and focuses its efforts upon the chemicals and microorganisms that are entered on the Contaminant Candidate List (CCL). Although it has never appeared on the CCL, a large amount of research during the 1990s was focused upon Cryptosporidium parvum, a pathogenic waterborne parasite, to fmd methods and techniques to measure, remove, and inactivate it in drinking water supplies. C. parvum gained national public attention in 1993 when cryptosporidiosis in Milwaukee, Wisconsin infected an estimated 403,000 people and killed an estimated 65 to 100 people.
DTIC
Diseases; Public Health; Water Treatment; Potable Water

20010066482 North Carolina Univ., Raleigh, NC USA
Selected Energy Epitaxial Deposition and Low Energy Electron Microscopy of AlN, GaN and SiC Thin Films ***Quarterly Report, 1 Jan. - 31 Mar. 1998***
Davis, R. F.; Lamb, H. H.; Tsong, I. S.; Bauer, E.; Chen, E.; Mar. 1998; 24p; In English
Contract(s)/Grant(s): N00014-95-1-0122
Report No.(s): AD-A345293; No Copyright; Avail: Defense Technical Information Center (DTIC)
Epitaxial growth GaN films at reasonable rates and at grazing incidence and using conditions similar to those employed for growth in a low energy electron microscope (LEEM) have been achieved. Preliminary phtoluminescence studies showed near band edge luminescence accompanied by yellow luminescence at -2.2eV. In situ experiments in the LEEM at ASU to produce a clean GaN substrate surface for homoepitaxy were performed. Heating the substrate to 880 deg C produced a (lx1) structure with meandering steps on the surface. Cleaning the substrates using a N-atom flux produced different atomic structures depending on the N-atom flux and the substrate temperature. Low N-atom flux gave rise to a structure with clear steps while a higher N-atom flux produced a (3x3) surface with vanishing steps. Growth of GaN on the (3x3) surface produced faceted layers. Additional in situ cleaning research at NCSU of MOCVD- grown GaN/AlN/611-SiC substrates using NH3-seeded supersonic molecular beams was investigated. Surface carbon and oxygen concentrations of-1%, as evidenced by XPS, were achieved by heating at 7300C under a hyperthermal NH3 flux. Oxygen was removed primarily by thermal desorption. In contrast, carbon removal required heating under an NH flux Ex situ AFM reveals a smooth surface with parallel steps after NH3 beam cleaning. 3 Homoepitaxial growth of smooth, highly textured GaN films was accomplished at 7000C by employing a hyperthermal NH3 beam (0.61 eV) and an effusive Ga source.
DTIC
Electron Microscopes; Electron Microscopy; Energy Transfer

20010066579 Kansas Univ., Lawrence, KS USA
Gas-Phase Reactions of Negative Ions at Hyperthermal Energies ***Final Report, 1 Sep. 1996 - 31 Mar. 2000***
Hierl, Peter M.; Feb. 08, 2001; 4p; In English
Contract(s)/Grant(s): F49620-96-1-0409
Report No.(s): AD-A390235; AFRL-SR-BL-TR-01-0321; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche
A tandem mass spectrometer incorporating radio-frequency octupole ion guides has been designed, constructed, and tested. This instrument is capable of measuring absolute integral cross sections for gas-phase ion molecule reactions as functions of the reactants relative translation energy from thermal to hyperthermal energy (0.03 - 20 eV c.m.), and of the neutral reactant's temperature from 298 - 1000 K. A series of calibration studies have been carried out to verify the operating characteristics of this new instrument.
DTIC
Mass Spectrometers; Vapor Phases; Thermal Radiation; Reaction Kinetics

20010066590 Delaware State Coll., Dept. of Chemistry, Dover, DE USA
Acquisition of an Inert Atmosphere Dry Box ***Final Report, 1 Jun 1998-31 May 1999***
Wheeler, Kraig A., Delaware State Coll., USA; Mar. 06, 2000; 3p; In English
Contract(s)/Grant(s): F49620-98-1-0449
Report No.(s): AD-A390189; AFRL-SR-BL-TR-01-0331; No Copyright; Avail: CASI; A01, Microfiche; A01, Hardcopy
The acquisition of a Vacuum/Atmospheres NX1-21000 dry box has greatly strengthened the existing research programs in electrochemistry and materials science at Delaware State University (DSU). This instrumentation has equipped DSU with essential infrastructure support to aid researchers, as well as provide a hands-on teaching resource for student research assistants (undergraduate and graduate) in the synthesis and manipulation of air-sensitive materials. The equipment has been utilized in

research programs directed towards the study of advanced materials. Specifically these programs focus on the design and synthesis of non-linear optical materials and lithium rechargeable batteries supported by the Air Force Office of Scientific Research and the Department of Energy, respectively. The capabilities of the new instrument has allowed areas of research not previously explored at DSU, at the same time advancing the quality of research related instruction at DSU.
DTIC
Inert Atmosphere; Laboratory Equipment

20010066616 Avignon Univ., France
Workshop on Recent Advances in Fluorinated Surfactants
Jan. 27, 2001; 216p; In English, 26-27 Jan. 2001, Avignon, France; R
Contract(s)/Grant(s): N68171-01-M-5228
Report No.(s): AD-A390360; R/D-9087-CH-03; No Copyright; Avail: CASI; A03, Microfiche; A10, Hardcopy

This workshop aims to explore fundamental science questions related to fluorosurfactant assemblies, including micelles, microemulsions and vesicles; fluorosurfactant solutions and self-assembly in non-aqueous media such as fluorocarbons and dense carbon dioxide; fluorosurfactants in blood substitute formulations, oxygen and drug delivery systems; and fluorosurfactants in new coatings protocols and applications in microelectronics and patterning. Decontamination of warfare agents in a contamination event could be achieved by systems involving fluorinated surfactants.
DTIC
Contamination; Fluorocarbons; Surfactants; Fluorination

20010066783 Washington Univ., Dept. of Chemistry, Seattle, WA USA
Comprehensive Two-Dimensional Gas Chromatography and Chemometrics for the Analysis of Complex Mixtures
Fraga, Carlos G., Washington Univ., USA; Jan. 2000; 121p; In English
Report No.(s): AD-A390406; No Copyright; Avail: CASI; A02, Microfiche; A06, Hardcopy

The main goal of this dissertation is to enhance the analysis capabilities of comprehensive two-dimensional (2-D) gas chromatography (GC x GC) by applying chemometrics to extract component signals in the presence of significant interference, noise, or both. This is accomplished through three projects. The first project quantifies the theoretical analysis enhancement provided by the use of the generalized rank annihilation method (GRAM) for the analysis of component signals, i.e., peaks, that are unresolved in GC x GC separations. Monte Carlo simulations, modeled after real GC x GC data, are used to determine the conditions where the use of GRAM results in the successful analysis of unresolved peaks. This information is then used on Monte Carlo simulations of 2-D chromatograms. Ultimately, it is determined that the use of GRAM increases the average number of analyzable peaks by a factor of two for 2-D chromatograms that are 67 percent occupied by randomly distributed peaks. The use of GRAM should increase the number of analyzable peaks for all forms of comprehensive 2-D separations. The second project extends the use of GRAM analysis to the GC x GC separation of real world complex mixtures by the use of the standard addition method and bilinear data alignment. Standard addition and bilinear data alignment are used to correct peak width variations and retention time shifts that would otherwise negate the utility of GRAM. The use of GRAM, in part, reduces the separation time of three isomers in jet fuel by a factor of five compared to a single column GC separation. The use of bilinear data alignment improves GRAM quantification accuracy and precision by a factor of four. In addition, 2-D bilinear data alignment is introduced. The last project demonstrates the signal enhancement provided by GRAM. It substantially improves the quantitative precision and accuracy of GC x GC compared to peak integration.
DTIC
Gas Chromatography; Two Dimensional Models; Analytical Chemistry; Analysis (Mathematics)

20010067105 Politecnico di Milano, Milan, Italy
International Symposium on Special Topics in Chemical Propulsion ***Final Report***
Jul. 06, 2000; 443p; In English; 5th; Combustion of Energetic Materials, 18-22 Jun. 2000, Stresa, Italy; Original contains color plates
Contract(s)/Grant(s): F61775-00-W-F056
Report No.(s): AD-A389325; EOARD-CSP00-5056; No Copyright; Avail: CASI; A04, Microfiche; A19, Hardcopy

The Final Proceedings for 5th-ISICP Combustion of Energetic Materials, 19 June 2000-22 June 2000. This is an interdisciplinary conference. Topics include: Measurement techniques of thermophysical and ballistic properties of energetic

materials (in particular, solid rocket propellant explosives); how to handle data especially in the presence of sensible errors and noise; and to which extent the obtained data depend on the specific data reduction technique implemented.
DTIC
Combustion; Conferences; Chemical Propulsion; Aircraft Construction Materials; Electrical Properties

20010067293 Boeing Co., Rocketdyne Propulsion and Power, Canoga Park, CA USA
Elimination of Carbon Tetrachloride for Quantitative Hydrocarbon Analysis
Douglas, V. M., Boeing Co., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 10p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

The elimination of ozone depleting substances, such as carbon tetrachloride, has resulted in the use of new analytical techniques for cleanliness verification and contamination sampling. The last remaining application at Boeing Rocketdyne which required a replacement technique was the quantitative analysis of hydrocarbons by infrared spectrometry. This technique, which previously utilized carbon tetrachloride, was successfully modified using the SOC-400, a compact portable Fourier transform infrared (FTIR) manufactured by Surface Optics Corporation. This instrument can quantitatively measure and identify hydrocarbons from solvent flushing of hardware as well as directly analyze the surface of metallic components without the use of ozone depleting chemicals. Several sampling accessories were evaluated to perform hydrocarbon analysis for various applications.
Author
Hydrocarbons; Quantitative Analysis; Sampling; Carbon Tetrachloride

20010067298 Lawrence Livermore National Lab., Livermore, CA USA
A Mass Spectrometer-Based Tool for In-Process Analysis of RSRM Components
Meltzer, M., Lawrence Livermore National Lab., USA; Koester, C., Lawrence Livermore National Lab., USA; Sagers, N., Thiokol Propulsion, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Work to date is reported for a project testing the capabilities of a mass spectrometer-based system for analyzing in-situ organic compounds on a variety of substrates. The system, which was built at Lawrence Livermore National Laboratory, is termed a Contamination Analysis Unit (CAU) and employs vacuum and thermal desorption of surface residues, followed by ionization and analysis with a Leybold Inficon Transpector mass spectrometer. The CAU was employed in this study to examine soils, cleaner residues, and substrates on Space Shuttle Reusable Solid Rocket Motor (RSRM) components. Project work was supported by Thiokol Propulsion. Major project objectives include: (1) Determine if the CAU can detect solvent that has soaked into NBR insulation material; (2) Test the capabilities of the CAU for analyzing non-flat surfaces on the inside and outside surfaces of the RSRM and nozzle throat housing; (3) Determine if solvent extraction and gas chromatography approaches are able to enhance the surface analysis data available through use of the mass spectrometer-based CAU; (4) Determine the CAU's detection limit for various RSRM soils and cleaners; (5) Determine if contact of either Viton (registered) or silicon O-rings with critical substrates will result in any visual evidence of the contact, when observed under black light; and (6) Demonstrate CAU viability during routine RSRM manufacturing operations.
Author
Mass Spectrometers; Contamination; Detection; Space Shuttle Boosters

20010067302 NASA Marshall Space Flight Center, Huntsville, AL USA
Segregation Behavior of Sulfur and Other Impurities onto the Free Surfaces of ED-NI Deposits
Panda, B., IIT Research Inst., USA; Jerman, G., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 7p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Most researchers attribute grain boundary embrittlement in electro-deposited nickel (ED-Ni) to the presence of small quantities of sulfur as an impurity. It occurs in a highly mobile form that segregates to the grain boundaries. Evaluation of sulfur segregation requires that a sample be fractured through the grain boundaries. However, this action may not always be possible. ED-Ni is inherently tough at ambient temperature, especially if a low level of sulfur was intentionally maintained. A new method was developed to study sulfur and other migrant species to the grain boundaries, which also migrate to free surfaces. A test specimen is heated by a quartz lamp within the sample preparation chamber, allowing the mobile species to migrate to polished

free surfaces. There the mobile species are analyzed using X-ray photoelectron spectroscopy (XPS) also known as Electron Spectroscopy for Chemical Analysis (ESCA).
Author
Grain Boundaries; Sulfur; Deposits; Impurities

20010067328 NASA Marshall Space Flight Center, Huntsville, AL USA
Further Studies of Materials Compatibility in High-Test Hydrogen Peroxide
Gostowski, R., Austin Peay State Univ., USA; Owens, T., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Assessment of the compatibility of high-test hydrogen peroxide (HTP) with materials, in particular new materials such as composites, is critical to the development of new propulsion systems meeting requirements of reduced cost and environmental impact. While compatibility with HTP has been addressed previously, newer materials were not considered. The focus of this project was to develop a scheme for evaluation of HTP with all materials. In the previous summer, methods were developed for production of HTP on site, and preliminary steps were taken to evaluate materials. Methods investigated this summer have included accelerated aging by heating, coupled with assay of concentration and stabilization loss, observation of reactivity by means of Isothermal Microcalorimetry, and evaluation of changes to the materials by Short Beam Shear testing and by Photoacoustic-Fourier Transform Infrared Spectroscopy. Various metals, polymers, and composites were examined in this study.
Author
Hydrogen Peroxide; Compatibility; Composite Materials

20010067334 Surface Optics Corp., San Diego, CA USA
Detection, Identification, and Quantification of Surface Contamination
Szczesniak, M. M., Surface Optics Corp., USA; Beecroft, M., Surface Optics Corp., USA; Mattison, P., Surface Optics Corp., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Even low levels of surface contamination can affect in a negative way physical properties of metal surfaces, such as adhesion, bonding, and heat radiation. Detection of low contamination levels (below 1 microgram/sq m) on large surfaces (more than 1 inch in diameter) is a challenge. A portable infrared reflectometer is applied to this application with a high level of success. The reflectometer covers the spectral region required to detect both the hydrocarbons and silicones. It is achieved with a Fourier Transform Infrared spectrometer. The sampling interface depends on the finish of the studied surface. The highly finished mirror-like surfaces can be analyzed with a specular reflectance accessory. The rough surfaces (grit-blasted) can be analyzed with the diffuse reflectance accessory. The reflectometer measures infrared spectra of suspected areas. The measurable infrared spectrum is an indication of surface contamination. The infrared spectra can be searched against standard or custom spectral libraries, which results in contaminant identification. The level of contamination can be predicted by applying calibration curves or chemometrics, PLS, CLS. The surface, which can not be accessed directly, can be swabbed and the residue extracted into the VSphere (trademarked). The VSphere (tm) is a patented accessory for the detection of nonvolatile residues. The minimum detection limits will be presented and discussed.
Author
Detection; Identifying; Contamination

20010067418 Naval Research Lab., Washington, DC USA
A Numerical Model for the Development of a Boundary Layer Diffusion Flame over a Porous Flat Plate
Ananth, Ramagopal; Ndubizu, Chuka C.; Tatem, Patricia A.; Apr. 23, 2001; 67p; In English; Original contains color plates
Report No.(s): AD-A389659; NRL/MR/6183-01-8547; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Time-dependent solutions of full Navier-Stokes equations were obtained for gas phase combustion over a porous plate burner using Barely Implicit Flux Corrected Transport (BIC-FCT) algorithms. Unlike the previous boundary layer studies, our solutions are valid near the leading edge as well as the downstream. The simulations show formation of a triple flame structure, upon ignition near the leading edge. The triple flame gets weaker with time as it spreads across the porous plate and finally transitions to a typical boundary layer structure at steady state. The steady state solutions predict a maximum in axial velocity with distance from the solid surface and are similar to the existing experimental observations. The heat feedback from the flame to the surface shows a steep increase near the leading edge followed by a relatively slow decrease with distance from the leading edge. Away from the leading edge, the heat flux profile may be fitted by a power law. This is in sharp contrast to the existing boundary layer theories

that show a monotonic decrease in the heat feedback. The results show that 70% of the total heat feedback occurs close (within 3 cm) to the leading edge.
DTIC
Algorithms; Boundary Layers; Diffusion Flames; Mathematical Models; Porous Plates

20010067574 Oak Ridge National Lab., TN USA
Pressure Behavior of Actinides Via Synchrontron Radiation
Haire, R. G.; Heathman, S.; Le Bihan, T.; Lindbaum, A.; 2001; 16p; In English; Invited paper for the Second Euroconference and NEA Workshop on Speciation, Techniques and Facilities for Radioactive Materials at Synchrotron Light Sources, 10-13 Sep. 2000, Grenoble, France
Report No.(s): PB2001-106406; No Copyright; Avail: National Technical Information Service (NTIS)
Various aspects of performing high-pressure studies with radioactive f-elements using synchrotrons as sources of X-rays are discussed. The goal of these high-pressure studies is to explore the fundamental science occurring as pressure is applied to the actinide samples. One of the primary effects of pressure is to reduce interatomic distances, and the goal is to ascertain the changes in bonding and electronic nature of the system that result as atoms and electronic orbitals are forced closer together. Concepts of the science being pursued with these f-elements are outlined. A brief discussion of the behavior of americium meta under pressure performed recently at the ESRF is provided as an example of the high-pressure research being performed with synchrotron radiation. Also discussed here is the important role synchrotrons play and the techniques/procedures employed in high-pressure studies with actinides.
NTIS
Synchrotron Radiation; Pressure Effects; Actinide Series

26
METALS AND METALLIC MATERIALS

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

20010066220 California Inst. of Tech., Pasadena, CA USA
A Theory of Phase Transformation with Internal Variables ***Final Report, 15 Mar. 1995 - 15 Jan. 1998***
Bhattacharya, Kaushik; May 11, 1998; 5p; In English
Contract(s)/Grant(s): F49620-95-1-0109
Report No.(s): AD-A345651; AFRL-SR-BL-TR-98-0465; No Copyright; Avail: Defense Technical Information Center (DTIC)
Various internal variable theories for materials undergoing phase transformation have been developed. Specific topics include the relaxation phenomena in shape-memory alloys, domain patterns in ferroelectrics, the effect of texture on the shape-memory effect in polycrystals, the failure of ceramics and martensitic thin films.
DTIC
Ferroelectricity; Phase Transformations; Polycrystals; Shape Memory Alloys; Thin Films

20010066561 Colorado School of Mines, Golden, CO USA
The Use of Alloying Theory to Enhance the Properties of Magnesium
Olson, D. L., Colorado School of Mines, USA; Marya, M., Colorado School of Mines, USA; Wenman, D. W., Colorado School of Mines, USA; Olivas, J. D., Los Alamos National Lab., USA; Eliezer, D., Ben Gurion Univ. of the Negev, Israel; Proceedings of THERMEC 2000; [2000]; 7p; In English; THERMEC 2000, 5-8 Dec. 2000, Las Vegas, NV, USA
Contract(s)/Grant(s): DAAG55-98-1-0105
Report No.(s): AD-A386971; ARO-38336.14-MS; Copyright; Avail: Defense Technical Information Center (DTIC)
Alloying theory is used to propose and develop new magnesium alloys with improved mechanical properties, enhanced passivity, and reduced combustibility.
Author
Mechanical Properties; Magnesium Alloys; Alloying

20010066624 Ufa State Technical Aviation Univ., Inst. of Physics of Advanced Materials, Russia

Developing Nanostructures and Enhanced Properties in Heavy W Alloy through SPD Processing ***Final Report, 14 Jul. - 13 Sep. 2000***

Valiev, R. Z.; Alexandrov, I. V.; Sep. 2000; 17p; In English

Contract(s)/Grant(s): N68171-99-M-6634

Report No.(s): AD-A390239; R/D-8848-MS-C1; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The ways of fulfillment of severe plastic deformation (SPD) processes by equal channel angular (ECA) pressing of hard-to-deform low-ductility materials, namely W of the commercial purity and W alloy of W-Ni-Fe system were developed. To obtain ultra-fine grained (UFG) structures in these materials the dies for high-cycle ECA pressing were fabricated. For the first time ECA pressing was implemented and the optimal regimes of obtaining of bulk commercially pure (CP) W ingots with UFG structure were established. First experiments of ECA pressing of heavy alloy W-4.9%Ni-2.1% Fe were conducted. TEM and X-ray investigations of the SPD-processed CP W showed that the refinement of the structure up to a mean grain size less than 1 micrometers takes place during ECA pressing. The grains have mainly high angle boundaries that results in enhanced mechanical properties. Hardening of the investigated material during SPD was indicated by microhardness measurements. to attain further progress in refinement of W-alloy structure by ECA pressing and due to this increase their mechanical properties new ways were suggested.

DTIC

Nanotechnology; Plastic Deformation; Tungsten Alloys; Fabrication; Nanostructures (Devices)

20010067108 Valladolid Univ., ETS Ingenieros Industriales, Spain

Characterization of Semi-Insulating InP Wafers by Scanning Luminescence (SPL), Scanning Photocurrent (SPC) and Cathodoluminescence (CL). Study of the Wafer Homogeneity ***Final Report***

Lopez, Juan J., Valladolid Univ., Spain; Oct. 2000; 80p; In English

Contract(s)/Grant(s): F61775-99-W-E089

Report No.(s): AD-A389319; EOARD-SPC-99-4089; No Copyright; Avail: CASI; A01, Microfiche; A05, Hardcopy

This report results from a contract tasking Universidad of Valladolid as follows: The contractor will investigate the distribution of iron in InP wafers using the techniques of scanning photoluminescence and scanning photocurrent.

DTIC

Photoluminescence; Cathodoluminescence; Wafers; Luminescence; Photoelectricity; Indium Phosphides

20010067264 Georgia Inst. of Tech., Schools of Material Science and Engineering and Mechanical Engineering, Atlanta, GA USA

Low Density Monolithic Metal Honeycombs by Thermal Chemical Processing

Cochran, J., Georgia Inst. of Tech., USA; Lee, J. K. J., Georgia Inst. of Tech., USA; McDowell, D., Georgia Inst. of Tech., USA; Sanders, T., Georgia Inst. of Tech., USA; Church, B., Georgia Inst. of Tech., USA; Clark, J., Georgia Inst. of Tech., USA; Dempsey, B., Georgia Inst. of Tech., USA; Hayes, L., Georgia Inst. of Tech., USA; Hurysz, K., Georgia Inst. of Tech., USA; McCoy, T., Georgia Inst. of Tech., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 16p; In English; See also 20010067226

Contract(s)/Grant(s): N00014-99-1-1016; N00014-99-1-0852; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

A technology developed at Georgia Tech allows fabrication of thin-walled metal articles. Using conventional powder processing techniques, precise shapes were formed with non-metal precursors and subsequently converted to the metal state by a direct reduction process. The metal articles can be formed via powder forming techniques including extrusion, slurry coating of sacrificial cores, slurry casting methods (slip, pressure, centrifugal, tape, and gel casting), and dry pressing. by using fine powders in the micron and sub-micron range, articles that have small dimensions (i.e., micro- to millimeter) may be formed. Practical experience has shown that maximum particle sizes of 1/50 of the feature dimension are necessary for producing features with good precision. Through a properly controlled conversion process, the articles formed from brittle powder precursors (principally oxides) are chemically converted into a metal article with structural integrity and substantially the original shape. A variety of shapes have been formed by Honeycomb Extrusion, Spray Coating, Dry Pressing, Slip Casting, and Tape Casting. Demonstrated alloys include stainless steel, maraging steel, Inconel 617 and 718, Super Invar, and copper alloys. Demonstrated strength and specific energy absorption of a maraging honeycomb at 1.5 gm/cc were approximately 400 MPa and 100 Joules/gm respectively.

Author

Powder Metallurgy; Honeycomb Structures; Thin Walls

20010067281 NASA Johnson Space Center, Houston, TX USA

Promoted Combustion of Metals in a High-Pressure, Flowing Oxygen Environment

Maes, M. J., NASA Johnson Space Center, USA; Stoltzfus, J. M., NASA Johnson Space Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 6p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Traditional promoted combustion testing has used 0.125 inch diameter samples that are ignited in a pressurized, oxygen-enriched environment. Many years of testing this sample size have yielded useful data regarding threshold pressure, or the minimum oxygen pressure required to support self-sustained combustion. However, when a material is tested in a flowing system, the threshold pressure changes. White Sands Test Facility has developed a test system to burn samples in flowing gaseous oxygen. Current sample configurations are 0.5 inch diameter rods and 1.25 inch diameter pipes with pressures ranging up to 2000 psi and gas velocities reaching 200 ft/s. This paper describes the test apparatus, modifications made as the result of a fire, and a description of the tests currently being performed.

Author

Combustion; Performance Tests; Oxygen; Flammability

20010067299 NASA Marshall Space Flight Center, Huntsville, AL USA

Effects of Cryogenic Treatment on the Residual Stress and Mechanical Properties of an Aerospace Aluminum Alloy

Chen, P., IIT Research Inst., USA; Malone, T., NASA Marshall Space Flight Center, USA; Bond, R., IIT Research Inst., USA; Torres, P., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 5p; In English; See also 20010067226; No Copyright; Avail: CASI; A01, Hardcopy; A10, Microfiche

Investigators at Marshall Space Flight Center (MSFC) are studying the potential benefits of cryogenic treatment for aerospace Aluminum (Al) alloys. This paper reports the effects of cryogenic treatment on residual stress, tensile strength, hardness, fatigue life, and stress corrosion cracking (SCC) resistance.

Author

Aluminum Alloys; Cryogenics; Mechanical Properties

20010067300 Carnegie-Mellon Univ., Dept. of Materials Science and Engineering, Pittsburgh, PA USA

Toughness of Ultra High Strength AF1410 Type Steels

Iorio, L. E., Carnegie-Mellon Univ., USA; Garrison, W. M., Jr., Carnegie-Mellon Univ., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 10p; In English; See also 20010067226
Contract(s)/Grant(s): DMR-97-1260; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

This paper focuses on low to medium carbon secondary hardening steels in which the secondary hardening response is enhanced by cobalt additions. These steels are associated with both high strength and remarkably high toughnesses at these strength levels. The first steels of this type were the steels HP9-4-20 and HY180. The steel HY180 has been the basis for further development of steels in this class, such as AF1410 and AerMet 100. Factors which influence the toughnesses of these steels when the fracture mode is ductile or micro-void coalescence are discussed. Ductile fracture is emphasized because high upper shelf toughness can significantly improve toughness at test temperatures in the transition region where the toughness increases with increasing test temperature. When fracture is ductile the toughness is influenced by both the fine-scale microstructure and the inclusion particles distributed through the fine-scale microstructure. While these steels have fracture resistant finescale microstructures, inclusions can degrade the inherent toughness of the fine-scale microstructures. One can minimize the detrimental effects of inclusions on toughness by minimizing the inclusion volume fraction, by altering inclusion type to achieve the largest possible inclusion spacing when the inclusions are not resistant to void nucleation or by altering inclusion type to make the inclusions resistant to void nucleation. to getter sulfur as inclusions which are resistant to void nucleation one can use small titanium additions to form particles of titanium carbosulfide (Ti, CS). These particles are much more resistant to void nucleation than are particles of other sulfide types such as MnS, CrS or L2O2S. This resistance of particles of Ti2CS to void nucleation leads to large improvements in toughness in HY180, a steel with a carbon content of 0.10 wt%. In the last section of this paper the results of recent studies of the effects of gettering sulfur as Ti2CS on toughness as a function of carbon content at a constant inclusion volume fraction are reported.

Author

Voids; High Strength Steels; Toughness; Inclusions; Microstructure

20010067303 NASA Marshall Space Flight Center, Huntsville, AL USA

Statistical Analysis of Strength Data for an Aerospace Aluminum Alloy

Neergaard, L., IIT Research Inst., USA; Malone, T., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 9p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Aerospace vehicles are produced in limited quantities that do not always allow development of MIL-HDBK-5 A-basis design allowables. One method of examining production and composition variations is to perform 100% lot acceptance testing for aerospace Aluminum (Al) alloys. This paper discusses statistical trends seen in strength data for one Al alloy. A four-step approach reduced the data to residuals, visualized residuals as a function of time, grouped data with quantified scatter, and conducted analysis of variance (ANOVA).

Author

Aluminum Alloys; Statistical Analysis; Mechanical Properties; Acceptability

20010067320 California Inst. of Tech., Div. of Engineering and Applied Science, Pasadena, CA USA

Electrostatic Levitation Processing of Bulk Metallic Glass Forming Liquids

Hays, C. C., California Inst. of Tech., USA; Schroers, J., California Inst. of Tech., USA; Geyer, U., California Inst. of Tech., USA; Johnson, W. L., California Inst. of Tech., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Bulk metallic glass forming alloys are a novel group of multicomponent metallic alloys that exhibit exceptionally high resistance to crystallization in the undercooled liquid state. Compared with the rapidly quenched metallic glasses studied prior to 1990, these alloys can be vitrified at cooling rates is less than 10 K/sec. With critical cooling rates this low, standard processing methods can be employed. This point, together with their high mechanical strengths, shows that bulk metallic glasses are a promising material system for application as an engineering material. Considerable success has recently been achieved in toughening bulk metallic glasses using in situ formed ductile phase dendrites in a bulk metallic glass matrix. Processing of these composites involves interfacial reactions and atomic transport in the molten state; thus, knowledge of atomic diffusion constants is critical in this work, as it directly impacts the evolution of the microstructure during processing. Electrostatic levitation (ESL) processing provides an excellent means for examining the thermophysical properties of an undercooled liquid metal system. The advantages of this method are ideal for the study of liquid state properties of bulk metallic glass forming liquids. In this talk, we will discuss results obtained from recent ESL experiments conducted at the Marshall Space Flight Center ESL facility. We will review some of the experimental details required to use the ESL method as a platform for the determination of diffusion coefficients in the high temperature liquid and undercooled liquid regimes of a bulk metallic glass forming liquid, the latter topic being the experimental goal of our proposed NASA flight experiment. The determination of atomic diffusion constants is critical to understanding the processing and control of the dendritic structures in the in situ formed composites. Recently, we used the ESL to examine the bulk metallic glass forming ability in the Zr-Nb-Cu-Ni-Al alloy system. We have identified a composition that exhibits a substantially improved glass forming ability in comparison to neighboring compositions. Additional information is contained in the original extended abstract.

Derived from text

Metallic Glasses; Liquid Metals; Levitation

20010067325 NASA Glenn Research Center, Cleveland, OH USA

Microstructure, Mechanical Properties, Hot-Die Forming, and Joining of 47XD Gamma TiAl Rolled Sheets

Das, G., Pratt and Whitney Aircraft Group, USA; Draper, S., NASA Glenn Research Center, USA; Whittenberger, J. D., NASA Glenn Research Center, USA; Bartolotta, P. A., NASA Glenn Research Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The microstructure and mechanical properties, along with the hot-die forming and joining of Ti-47Al-2Nb-2Mn-0.8 vol% TiB, sheets (known as 47XD), produced by a low-cost rolling process, were evaluated. A near-gamma microstructure was obtained in the as-rolled condition. The microstructures of heat-treated sheets ranged from a recrystallized equiaxed near-gamma microstructure at 1,200 to 1,310 C, to a duplex microstructure at 1,350 C, to a fully lamellar microstructure at 1,376 C. Tensile behavior was determined for unidirectionally rolled and cross-rolled sheets for room temperature (RT) to 816 C. Yield stress decreased gradually with increasing deformation temperature up to 704 C; above 704 C, it declined rapidly. Ultimate tensile strength exhibited a gradual decrease up to 537 C before peaking at 704 C, followed by a rapid decline at 816 C. The modulus showed a gradual decrease with temperature, reaching approximately 72% of the RT value at 816 C. Strain to failure increased

slowly from RT to 537 C; between 537 C and 704 C it exhibited a phenomenal increase, suggesting that the ductile-brittle transition temperature was below 704 C. Fracture mode changed from transgranular fracture at low temperature, to a mixture of transgranular and intergranular fracture at intermediate temperature, to ductile fracture at 816 C, coupled with dynamic recrystallization at large strains. Creep rupture response was evaluated between 649 and 816 C over the stress range of 69 to 276 MPa. Deformation parameters for steady-state creep rate and time-to-rupture were similar: activation energies of approximately 350 kJ/mol and stress exponents of approximately 4.5. Hot-die forming of sheets into corrugations was done at elevated temperatures in vacuum. The process parameters to join sheets by diffusion bonding and brazing with TiCuNi 70 filler alloy were optimized for test coupons and successfully used to fabricate large truss-core and honeycomb structures. Nondestructive evaluation methods, e.g., ultrasonic C-scans and thermography along with metallography, were used to characterize bond quality. Microstructural evaluation during heat treatment, identification of phases at the braze/matrix interface, determination of shear strengths of brazed joints, and deformation mechanisms during tensile and creep processes will be discussed.
Author
Microstructure; Mechanical Properties; Deformation

20010067330 Alabama Univ., Dept. of Metallurgical and Materials Engineering, Tuscaloosa, AL USA
Laser Surface Modification of TiAl Intermetallics
McElory, S., Alabama Univ., USA; Reddy, R. G., Alabama Univ., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Using a Nd-YAG laser, laser processing of a series of Ti-Al alloys, including pure Ti, pure Al, and Ti-Al intermetallic compounds, has been studied. Scanning electron microscopy (SEM), x ray photoelectron spectroscopy (XPS), and optical microscopy were used to determine the surface morphological, chemical, and compositional characteristics of the laser processed samples. Analysis of results showed that cracks along grain boundaries caused by rapid heating and cooling of laser processing were the dominant characteristics of the surface morphologies of the laser processed samples. At content in the Ti-Al alloys plays a very important role in crack initiation and/or development. The more Al content in the samples, the more severe the cracks that developed after laser processing under the same conditions. These experiments were conducted at ambient conditions, resulting in surface oxidation layers being observed on the processed samples. XPS results indicate that the oxidation layer consists of adsorbed O2, Al2O3, TiO2, and TiO. In addition, Al enrichment was found in the oxide film of TiAl as well as in the oxidation layers formed on the surfaces of TiAl and TiAl intermetallics that were processed by the laser; which is different from the reported results for traditional oxidation of TiAl at elevated temperature.
Author
Aluminum Alloys; Titanium Alloys; Laser Applications; Oxidation

20010067333 Surface Treatment Technologies, Inc., Towson, MD USA
Electro Spark Alloy Processing for Aerospace Components
Riley, M., Surface Treatment Technologies, Inc., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Surface Treatment Technologies has employed the Electro Spark Alloying (ESA) process for three NASA hardware needs: (1) Repair of pitting corrosion on Solid Rocket Booster (SRB) o-ring grooves; (2) Repair of 24K gold coatings on Space Shuttle engine components; and (3) formation of burn-resistant alloy coatings on oxygen delivery hardware. The ESA process is a low-voltage arc welding technique in which an electrode deposits itself on a conductive metal or ceramic substrate. The resultant coating has the following key features: (1) Full metallurgical bond to the substrate; (2) Nano-grain structure; (3) No heat-affected zone in the base alloy; and (4) Capability of coating inside diameters and non-line-of-sight geometries. Nano-grain coatings of metal, intermetallic, and ceramic layers have been formed on test specimens and subjected to relevant customer tests. Process information, metallurgical data, and test results from Phase I Small Business Innovation Research and NASA-related contracts will be presented.
Author
Alloying; Maintenance; Welding; Coatings

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.

20010066075 Stevens Inst. of Tech., Hoboken, NJ USA
Quantitative Electron Holography of Macromolecular Structure ***Final Report, 1 Sep. 1997-31 Aug. 2000***
Libera, Matthew R., Stevens Inst. of Tech., USA; Mar. 20, 2001; 12p; In English
Contract(s)/Grant(s): DAAG55-97-1-0137
Report No.(s): AD-A388721; ARO-35185.19-MS; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The principal theme underlying this ARO-funded research is the development and application of quantitative electron-optical methods to measure polymer morphology at nano and meso length scales where traditional TEM methods based on differential heavy-element staining techniques fail. This research has developed and implemented phase-contrast imaging methods based on transmission electron holography and chemical imaging methods based on spatially resolved electron energy-loss spectroscopy. Among the compelling basic issues associated with these approaches are the identification of appropriate electron-polymer interactions (mean inner potential, valence and core-electron spectral fingerprints) as well as the response of virgin polymers to the ionizing radiation associated with a 100-200 keV electron beam. These techniques have been applied to a range of problems which require spatial resolution and spectral sensitivity not afforded by other approaches (e.g. optical, X-ray, neutron, etc.). Among the notable achievements of this work has been the determination of the nature of the epoxy-adherend interphase (in collaboration with Dr. S. McKnight, ARL) and the measurement of fast secondary electron damage profiles relevant to both electron microscopy and to e-beam nanolithography.
DTIC
Polymers; Holography; Electron Spectroscopy; Polymerization; Morphology; Electron Beams

20010066085 American Cyanamid Co., Bound Brook, NJ USA
Intrinsically Electrically Conducting Polymers as Corrosion Inhibiting Coatings
Stenger-Smith, John D.; Zarras, Peter; Miles, Melvin H.; Nelson, John G.; April 1998; 19p; In English
Report No.(s): AD-A344568; NAWCWPNS-TP-8364; No Copyright; Avail: Defense Technical Information Center (DTIC)

The history of conducting polymer research is reviewed and recent results in the area of conducting polymers as corrosion protective coatings are presented and discussed.
DTIC
Conducting Polymers; Corrosion Resistance; Protective Coatings

20010066099 Michigan Univ., Dept. of Materials Science and Engineering, Ann Arbor, MI USA
Non-Oxide Structural Ceramics - Alloy Design for Improved Sinterability and Mechanical Performance ***Final Report, 1 Jan. 1995 - 31 Dec. 1997***
Chen, I. W.; Tien, Tseng Ying; May 12, 1998; 8p; In English
Contract(s)/Grant(s): F4J9620-95-1-0119
Report No.(s): AD-A345523; AFRL-SR-BL-TR-98-0449; No Copyright; Avail: Defense Technical Information Center (DTIC)

Research on non-oxide structure ceramics including silicon nitride, silicon carbide and titanium diboride has been conducted Multiphase silicon nitride composites with melilite and other high nitrogen content grain boundary phases have been prepared. These composites can be sintered to high density and they show improved oxidation resistance. Mechanical properties have been evaluated and found to compare favorably with other silicon nitride materials. Phase relations have also been delineated for various rare-earth containing silicon nitride systems. An in-situ toughened alpha silicon nitride solid solution with a microstructure of elongated grains has been discovered. Compared with conventional silicon nitride, this material has a comparable strength and toughness but has 40% higher hardness. Phase relations of selected rare-earth containing alpha silicon nitride solid solutions have also been delineated. Composites of silicon carbide and titanium diboride have been prepared which also show a microstructure of elongated grains. These materials have improved strength and toughness compared to monolithic silicon carbide. In addition, the electrical conductivity has been improved by the addition of titanium diboride.
DTIC
Electrical Resistivity; Mechanical Properties; Microstructure; Mineralogy; Nitrogen; Oxidation Resistance; Rare Earth Elements; Silicon Carbides; Titanium

20010066101 Defence Research Establishment Atlantic, Dartmouth, Nova Scotia Canada
Aluminum Wire Rope Polyethylene Sheathing Failure
Hiltz, John A.; December 1997; 32p; In English; Original contains color plates
Report No.(s): AD-A345531; DREA-TM-97/258; No Copyright; Avail: Defense Technical Information Center (DTIC)

The results of an investigation of the cracking of the polyethylene (PE) sheathing on aluminum wire rope used on CF Ships are reported. The cracking had not been observed previously and there was concern that this might be related to a change in material or storage conditions. Thermal analysis techniques, such as differential scanning calorimetry (DSC) and pyrolysis-gas chromatography/mass spectrometry (py-GC/MS) indicated that the failed sheathing was higher density PE than the sheathing that did not crack. Analysis of the fracture surface of the cracked sheathing indicated that it had failed by a brittle slow crack growth mechanism. The failure of the higher density PE was attributed to stresses introduced when the sheathed wire rope was transferred to a reel with a smaller diameter. Although the wire rope with the uncracked sheathing had also been transferred to a reel with a smaller diameter, low density PE is less susceptible to this type of cracking.
DTIC
Crack Propagation; Gas Chromatography; Heat Measurement; Mass Spectroscopy; Polyethylenes; Thermal Analysis

20010066144 Purdue Univ., Joint Transportation Research Program, West Lafayette, IN USA
Evaluation of the Implementation of Hot Pour Sealants and Equipment for Crack Sealing in Indiana (An Implementation of Research Results for SPR-2076) ***Final Report***
Ward, D. R.; Apr. 2001; 114p; In English
Report No.(s): PB2001-105949; FHWA/IN/JTRP-2000/27; No Copyright; Avail: National Technical Information Service (NTIS)

This study was initiated as an implementation effort that would monitor, assist with and report on a new maintenance activity involving the trial use of hot pour crack sealant. Work associated with this new activity was qualitatively assessed over a period of several years. INDOT began by purchasing six oil-jacketed melters that were distributed to various sub-districts. Previous INDOT research indicated using hot pour sealant might save on labor expense because it lasted significantly longer than the current emulsion. Random observations were made of various sub-district crews using hot pour sealant and the results were reported to appropriate personnel. Inspection were made on field operations and equipment performance. The study resulted in the preparation of a written work activity, development of general guidelines for sealing, creation of a training video, the exchange of information and reporting of findings. As a result of this study and other efforts INDOT has purchased several more melters with improved features. The total volume of hot pour sealing being conducted is relatively small compared to emulsion sealing. Currently INDOT spends over two million dollars on crack sealing efforts. This study has prompted the need to conduct research that will examine the cost effectiveness of crack sealing.
NTIS
Sealers; Sealing; Cracks

20010066170 Sandia National Labs., Albuquerque, NM USA
Dynamical Properties of Polymers: Computational Modeling
Curro, J. G.; Rottach, D.; McCoy, J. D.; Jan. 2001; 42p; In English
Report No.(s): PB2001-106104; SAND2001-0171; No Copyright; Avail: National Technical Information Service (NTIS)

The free volume distribution has been a qualitatively useful concept by which dynamical properties of polymers, such as the penetrant diffusion constant, viscosity, and glass transition temperature, could be correlated with static properties. In an effort to put this on a more quantitative footing, we define the free volume distribution as the probability of finding a spherical cavity of radius R in a polymer liquid. This is identical to the insertion probability in scaled particle theory, and is related to the chemical potential of hard spheres of radius R in a polymer in the Henrys law limit. We used the Polymer Reference Interaction Site Model (PRISM) theory to compute the free volume distribution of semiflexible polymer melts as a function of chain stiffness. Good agreement was found with the corresponding free volume distributions obtained from MD simulations. Surprisingly, the free volume distribution was insensitive to the chain stiffness, even though the single chain structure and the intermolecular pair correlation functions showed a strong dependence on chain stiffness.
NTIS
Polymer Blends; Dynamic Characteristics

20010066210 Naval Air Warfare Center, Aircraft Div., Patuxent River, MD USA
Breakdown of Preservative Fluid MIL-PRF-46170 in Aircraft Hydraulic Systems
Moorman, Jeffrey W.; Mar. 29, 2001; 40p; In English; Original contains color plates
Report No.(s): AD-A389225; NAWCADPAX/TR-2000/59; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This document summarized a series of laboratory tests performed to identify material forming on hydraulic system filters of fleet aircraft. Additional information obtained from outside sources is also summarized for background. Laboratory pump testing showed rapid filter dogging with small amounts of preservative fluid (MU-PRF-46l70) in the system. Similar conditions with 100% hydraulic fluid (MIL-PRF-83282) did not clog filters at these rates. Preservative fluid at elevated temperatures showed breakdown, increase in acid number, and chemical attack of test coupons while hydraulic fluid alone does not degrade. Preservative fluid is not compatible with operating aircraft hydraulic systems.
DTIC
Aircraft Hydraulic Systems; Hydraulic Fluids; Preservatives

20010066374 Bowling Green State Univ., Center for Photochemical Sciences, OH USA
Color Intensity Contrast in Polymers Using Triarylmethane Leuconitriles as Color Formers
Malpert, John H., Bowling Green State Univ., USA; Grinevich, Oleg, Bowling Green State Univ., USA; Strehmel, Bernd, Bowling Green State Univ., USA; Jarikov, Viktor, Bowling Green State Univ., USA; Mejiritski, Alexander, Bowling Green State Univ., USA; Neckers, Douglas C., Bowling Green State Univ., USA; Tetrahedron; 2001; ISSN 0040-4020; Volume 57, pp. 967-974; In English
Contract(s)/Grant(s): N00014-97-1-0834; NSF 95-26755
Report No.(s): AD-A387412; Copyright; Avail: Defense Technical Information Center (DTIC)
Several triarylmethane leuconitriles have been synthesized. Color formation rates of triarylmethane dyes from corresponding leuconitriles have been compared in various media. Routes to color-on-demand processes are discussed.
Author
Color; Dyes; Brightness

20010066621 University of Southern Mississippi, Dept. of Polymer Science, Hattiesburg, MS USA
Size Exclusion Chromatography System ***Final Report, 1 Mar. 1999-31 Aug. 2000***
Mauritz, Kenneth A., University of Southern Mississippi, USA; Storey, Robson F., University of Southern Mississippi, USA; Mar. 05, 2001; 15p; In English
Contract(s)/Grant(s): DAAD19-99-1-0030
Report No.(s): AD-A390228; ARO-39454.1-CH-RIP; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy
Instrumentation was purchased as planned set up, and used to support the ongoing ARO grant ”Elastomeric Nanocomposites Based On Sol-Gel Reactions of Silicon Alkoxides In lonomeric Derivatives of Finely-Architectured Block Copolymers”. Research results are presented in the attached document.
DTIC
Block Copolymers; Elastomers; Chromatography; Nanocomposites

20010066887 NASA Langley Research Center, Hampton, VA USA
Effective Thermal Conductivity of High Porosity Open Cell Nickel Foam
Sullins, Alan D., George Washington Univ., USA; Daryabeigi, Kamran, NASA Langley Research Center, USA; [2001]; 12p; In English; 35th AIAA Thermophysics Conference, 11-14 Jun. 2001, Anaheim, CA, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Report No.(s): AIAA Paper 2001-2819; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche
The effective thermal conductivity of high-porosity open cell nickel foam samples was measured over a wide range of temperatures and pressures using a standard steady-state technique. The samples, measuring 23.8 mm, 18.7 mm, and 13.6 mm in thickness, were constructed with layers of 1.7 mm thick foam with a porosity of 0.968. Tests were conducted with the specimens subjected to temperature differences of 100 to 1000 K across the thickness and at environmental pressures of 10(exp -4) to 750 mm Hg. All test were conducted in a gaseous nitrogen environment. A one-dimensional finite volume numerical model was developed to model combined radiation/conduction heat transfer in the foam. The radiation heat transfer was modeled using the two-flux approximation. Solid and gas conduction were modeled using standard techniques for high porosity media. A parameter estimation technique was used in conjunction with the measured and predicted thermal conductivities at pressures of 10(exp -4) and 750 mm Hg to determine the extinction coefficient, albedo of scattering, and weighting factors for modeling the conduction thermal conductivity. The measured and predicted conductivities over the intermediate pressure values differed by 13%.
Author
Metal Foams; Porosity; Radiative Heat Transfer; Thermal Conductivity

20010066965 NASA Glenn Research Center, Cleveland, OH USA

Oxidation and Corrosion of Ceramics and Ceramic Matrix Composites

Jacobson, Nathan S., NASA Glenn Research Center, USA; Opila, Elizabeth J., Cleveland State Univ., USA; Lee, Kang N., Cleveland State Univ., USA; [2000]; 34p; In English; Current Opinion in Solid State and Materials Dcience, USA

Contract(s)/Grant(s): RTOP 708-90-13; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Ceramics and ceramic matrix composites are candidates for numerous applications in high temperature environments with aggressive gases and possible corrosive deposits. There is a growing realization that high temperature oxidation and corrosion issues must be considered. There are many facets to these studies, which have been extensively covered in some recent reviews. The focus of this paper is on current research, over the past two years. In the authors' view, the most important oxidation and corrosion studies have focused on four major areas during this time frame. These are; (I) Oxidation of precursor-based ceramics; (II) Studies of the interphase material in ceramic matrix composites; (III) Water vapor interactions with ceramics, particularly in combustion environments; and (IV) Development of refractory oxide coatings for silicon-based ceramics. In this paper, we shall explore the most current work in each of these areas.

Derived from text

Ceramic Matrix Composites; Ceramics; High Temperature Environments; Corrosion

20010067056 Oak Ridge National Lab., Metal and Ceramic Div., TN USA

Evaluation of Creep Property of AS800 Silicon Nitride from As-Processed Surface Regions

Lin, H. T.; Waters, S. B.; More, K. L.; Wimmer, J.; Li, C. W.; 2001; 12p; In English; Original contains color illustrations

Report No.(s): PB2001-105837; No Copyright; Avail: National Technical Information Service (NTIS)

Tensile creep studies were carried out to evaluate the creep performance of AS800 silicon nitride samples extracted from the surface and bulk regions of as-processed billets at 1350 degrees Centrigrade (C) in air. The objective of this study was to understand the creep properties of the silicon nitride in the as-processed surface region and determine if they are comparable to those obtained from the bulk region. The results indicated that samples from the as-processed surface region exhibited higher creep rates and shorter lifetimes as compared with those obtained from the bulk region. The poor creep performance of material from the as-processed surface region was due to the higher content of glassy phase enriched with oxygen and sintering additive elements.

NTIS

Silicon Nitrides; Tensile Creep; Structural Design

20010067233 NASA Marshall Space Flight Center, Huntsville, AL USA

Aerogel Projects Ongoing in MSFC's Engineering Directorate

Shular, D. A., NASA Marshall Space Flight Center, USA; Smithers, G. A., NASA Marshall Space Flight Center, USA; Plawsky, J. L., Rensselaer Polytechnic Inst., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 12p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

When we speak of an aerogel material, we are referring more to process and structure than to a specific substance. Aerogel, considered the lightest solid material, has been made from silica for seventy years. Resorcinol-formaldehyde, organic aerogels have been developed more recently. However, aerogel can be made from almost any type of substance, even lead. Because an aerogel is mostly air (about 99%), the solid substance used will affect the weight very little. The problem with aerogels is their low tensile strength and lack of elasticity. Therefore, the challenge is to find ways to make the stronger or ways to circumvent the strength issue. Organic aerogels have slightly higher strength than base silica aerogels, while the carbonized version has three to five times the break strength of the base aerogel.

Derived from text

Aerogels; Elastic Properties; Tensile Strength; Spacecraft Construction Materials

20010067234 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA USA

Electroactive Polymers as Artificial Muscles - Reality and Challenges

Bar-Cohen, Y., Jet Propulsion Lab., California Inst. of Tech., USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 37p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

Electroactive Polymers (EAPs) are emerging as effective displacement actuators. These materials offer the closest resemblance of biological muscle potentially enabling unique capabilities changing the paradigm about robots construction. Under a NASA task, several EAP driven mechanisms were developed including dust wiper, gripper, and robotic arm EAP are

inducing a low actuation force limiting the applications that can use their current capability. In recognition of this limitation a series of international forums were established including SPIE conference, Webhub, Newsletter, and Newsgroup. A challenge was posed to the EAP community to have an arm wrestling between robot that is equipped with EAP actuators and human.
Author
Electroactive Polymers; Muscles; Actuators; Robotics

20010067240 Thiokol Propulsion, Brigham City, UT USA
Asbestos Free Insulation Development for the Space Shuttle Solid Propellant Rocket Motor (RSRM)
Allred, L. D., Thiokol Propulsion, USA; Eddy, N. F., Thiokol Propulsion, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 11p; In English; See also 20010067226; Copyright; Avail: Issuing Activity

Asbestos has been used for many years as an ablation inhibitor in insulating materials. It has been a constituent of the acrylonitrile butadiene rubber (AS/NBR) insulation used to protect the steel case of the RSRM (Reusable Solid Rocket Motor) since its inception. This paper discusses the development of a potential replacement RSRM insulation design, several of the numerous design issues that were worked and processing problems that were resolved. The earlier design demonstration on FSM-5 (Flight Support Motor) of the selected 7% and 11% Kevlar (registered) filled EPDM (KF/EPDM) candidate materials was expanded. Full-scale process simulation articles were built and FSM-8 was manufactured using multiple Asbestos Free (AF) components and materials. Two major problems had to be overcome in developing the AF design. First, bondline corrosion, which occurred in the double-cured region of the aft dome, had to be eliminated. Second, KF/EPDM creates high levels of electrostatic energy (ESE), which does not readily dissipate from the insulation surface. An uncontrolled electrostatic discharge (ESD) of this surface energy during many phases of production could create serious safety hazards. Numerous processing changes were implemented and a conductive paint was developed to prevent exposed external insulation surfaces from generating ESE/ESD. Additionally, special internal instrumentation was incorporated into FSM-8 to record real-time internal motor environment data. These data included inhibitor insulation erosion rates and internal thermal environments. The FSM-8 static test was successfully conducted in February 2000 and much valuable data were obtained to characterize the AF insulation design.
Author
Asbestos; Insulation; Static Tests

20010067242 Oklahoma State Univ., Dept. of Chemistry, Stillwater, OK USA
Trivalent Chromium/Organically-Modified Silicate Composite Coatings for Corrosion Protection of Aluminum Alloys
Stesikova, E., Oklahoma State Univ., USA; Metroke, T. L., Oklahoma State Univ., USA; Kachurina, O., Oklahoma State Univ., USA; Knobbe, E. T., Oklahoma State Univ., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 8p; In English; See also 20010067226
Contract(s)/Grant(s): R2CSR-98-D-SBIR; SBIRE-S98-001; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Deposition of either trivalent chromium, Cr(III)-based, or Cr(VI)-based, conversion coatings onto aluminum 2024-T3 alloy (AA) was followed by the deposition of hybrid silicate materials; these coatings were produced by hydrolysis and condensation of tetraethylortho silicate/vinyltrimethoxysilane/3-(trimethoxysilyl)propyl-methacrylate. The potentiodynamic study of the Cr(VI)/silicate and Cr(III)/silicate composite coatings showed a significant shift of the polarization curves toward higher values of corrosion potential and lower values of corrosion current, relative to bare AA. Moreover, augmentation of corrosion resistance from 2.8 k(ohm)sq cm for bare AA, to 79-95 k(ohm)sq cm for the hybrid silicate coatings and further to 162-362 k(ohm)sq cm for the composite films was observed. The results of potentiodynamic polarization and salt spray analysis ultimately suggest that AA with the composite coatings resist corrosion much better than those with bare surface or single layer silicate coating. The impact of the Cr(III) conversion coating on corrosion resistance of the composite films is comparable to that of the Cr(VI)-based surface pretreatments. This implies that the environmentally compliant and non-toxic trivalent chromium conversion coating is a very good alternative for the hazardous and carcinogenic hexavalent chromium treatment.
Author
Aluminum Alloys; Composite Materials; Corrosion Prevention; Protective Coatings; Environment Protection

20010067243 Naval Research Lab., Washington, DC USA
HVOF Thermal Spray Coatings as an Alternative to Hard Chrome Plating on Military Aircraft
Sartwell, B. D., Naval Research Lab., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 8p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Functional hard chrome plating is a critical process associated with manufacturing and maintenance operations on aircraft, vehicles, and ships, both in the civilian and military sectors. Since chromium is on the Environmental Protection Agency list of 17 toxic materials, fairly stringent air and wastewater emission limits have been established by the EPA. Also, hard chrome plating utilizes chromium in the hexavalent state (hex-Cr), which is a known carcinogen. As a result, the Occupational Safety and Health Administration (OSHA) has established permissible exposure limits (PEL) for hex-Cr in the workplace at a level of 0.1 mg/m. However, recent studies have indicated that the cancer risk is significantly increased at this level, so it is anticipated that OSHA will issue a new hex-Cr PEL that is substantially less than the current value. This would unquestionably increase the cost of plating operations that may be prohibitive in certain activities. Compliance with increasingly stringent regulations under the broad category of environment, safety, and occupational health (ESOH) is leading many organizations to investigate alternative coating processes. However, it is also found that in many instances the in-service performance of hard chrome plating is not satisfactory, so some organizations have investigated and qualified alternative processes solely on the basis of performance, but these have generally been on a piecemeal basis instead of an across-the-board qualification. As a result of these types of studies, it is apparent that as opposed to many ESOH-driven projects that seek an alternative process/material that is the 'next-best thing' to the presently used process, for chrome plating replacement, it is possible to identify alternative processes that not only address ESOH issues but also improve performance. Improved performance is then translated into reduced life-cycle costs of the affected system.
Derived from text
Plating; Sprayed Coatings; Military Aircraft; Metal Coatings; Protective Coatings; Chromium

20010067244 United Space Alliance, Kennedy Space Center, FL USA
The Use of Ion Vapor Deposited (IVD) Aluminum for the Space Shuttle Solid Rocket Booster
Imre, W., United Space Alliance, USA; Novak, Howard, United Space Alliance, USA; Raley, Randy, United Space Alliance, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 9p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

United Space Alliance Solid Rocket Boosters (USA SRB) Element Materials and Processes (M&P) Department had recommended the use of Ion Vapor Deposited (IVD) aluminum coating as a replacement for cadmium plating, and chromated paint primers on both Ground Support Equipment (GSE) and SRB non-insulated flight hardware. IVD aluminum provides an extremely tenacious, environmentally compatible coating, that lends itself to many items presently requiring repainting or hazardous plating removal and greasing of steel parts to prevent subsequent corrosion from seawater and seacoast environment.
Author
Vapor Deposition; Aluminum Coatings; Performance Tests; Ion Plating

20010067251 Ogilvie Mills Ltd., Archer Daniels Midland, Montreal, Quebec Canada
Coating Removal Technology Using Starch Based Abrasives: A Review of Current Aerospace Application Using the Envirostrip Dry Stripping Process
Monette, D., Ogilvie Mills Ltd., Canada; Drake, C., Ogilvie Mills Ltd., Canada; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 11p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

Due to stringent environmental regulations enacted in the past ten years, methylene chloride (MC) has been phased out in many industries because it is harmful to the environment and to the workers exposed to it. The aerospace industry, historically a large user of MC, researched and adopted many environmentally acceptable alternatives to replace methylene chloride based paint strippers. This has proved to be a very difficult task as MC chemical strippers have been very effective in removing tough polyurethane/epoxy coating systems typically found on aircraft structures. A variety of new 'environmentally acceptable (EA) chemicals' were developed in the last five years to replace MC. These EA chemicals are considered safer because the chemicals are not as volatile, having very low evaporation rates. However, there are still some concerns that new EA chemicals may still pose unknown health risks to workers, as well as causing potential damage to aircraft structures due to long term ingress problems. Because MC strippers evaporate so quickly, problems associated with chemical ingress were rare. The potential for the new EA chemicals to damage and/or corrode sensitive aircraft structures is a new problem due to the low evaporation rates (low volatility) of these MC chemical substitutes. This paper will describe the methods of manufacturing these abrasive media products, the equipment used to apply the process, and the various applications for this technology in the Aerospace industry. Examples are selective stripping, metal bond adhesive removal, and interior aircraft panel refurbishment. The production use of this dry stripping method on the Northrop Grumman B-2 bomber, the NASA Space Shuttle, and other aircraft types will be reviewed.
Derived from text
Abrasives; Paint Removal; Methyl Chloride; Starches

20010067252 Florence Univ., Dept. di Chimica, Italy

Removal of Zirconia Thermal Barrier Coatings and MCrAlY Bond Coatings From Turbine Blades: A Comparison of Methods Based on Chemical Stripping Water Jet and Salt Bath

Scrivani, A., Florence Univ., Italy; Bardi, U., Florence Univ., Italy; Ballerini, G., Florence Univ., Italy; Bonacchi, D., Florence Univ., Italy; Fantini, M., Galvanica Parmense, Italy; Groppetti, R., Parma Univ., Italy; Ianelli, S., Parma Univ., Italy; Rizzi, G., Turbocoating S.p.A., Italy; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 9p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

In the aerospace field as well as in field of stationary gas turbines, thermal spray coatings are gaining considerable importance for the improvement the properties of Nickel-super-alloys materials surface. Thermal spray coatings are commonly used as antioxidation materials (mainly MCrAlY alloys) and as thermal barrier coatings (mainly Yttria partially stabilized Zirconia) and are applied on Nickel super-alloys (as for instance different kinds of Inconel). Coating removal is an important aspect in the production of these devices. Removal (or 'decoating' or 'stripping') is needed for the production of new components as well as for the reconditioning of 'in service' components. The present paper is dedicated to the a comparison of different stripping methods and to the characterization of the blades surface after removal of thermal spray coatings both of Zirconia and of MCrAlY. The results reported here show that chemical stripping is particularly suitable for MCrAlY coating removal and does not affect the substrate. Water jet stripping can successfully be used for Zirconia-MCrAlY system removal although care is needed to avoid substrate damage. Salt bath technologies have been found to be effective for TBC removal but not for MCrAlY removal.
Author

Thermal Control Coatings; Paint Removal; Salt Baths; Hydraulic Jets; Surface Treatment

20010067253 NASA Marshall Space Flight Center, Huntsville, AL USA

Joint EPA/NASA/USAF Interagency Depainting Study

Clark-Ingram, M., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 8p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Environmental regulations such as National Emission Standards for Hazardous Air Pollutants (NESHAPs) are drivers for the implementation of environmentally compliant methodologies in the manufacture of aerospace hardware. In 1995, the Environmental Protection Agency (EPA) promulgated the NESHAP for the Aerospace Manufacture and Rework (Aerospace NESHAP) industry. Affected facilities were to be in compliance by September 1998. Several aerospace manufacturing operations are regulated within the Aerospace NESHAP including Depainting operations. The National Aeronautics and Space Administration (NASA), EPA, and USA Air Force (USAF) combined resources to evaluate the performance of nine alternative depainting processes. The seven alternative depainting processes were: (1) Chemical stripping (non-methylene chloride); (2) Carbon Dioxide Blasting; (3) Xenon Flashlamp; (4) Carbon Dioxide Laser Stripping; (5) Plastic Media Blasting; (6) Sodium Bicarbonate Wet Stripping; and (7) Waterjet Blasting and Wheat Starch Blasting. All epoxy primer and polyurethane top coat system was applied to 2024-T3 clad and non-clad aluminum test specimens. Approximately 200 test specimens were evaluated in this study. Each coupon was subjected to three, four, or five complete depainting cycles. This paper discusses the conclusions from the study including the test protocol, test parameters, and achievable strip rates for the alternative depainting processes. Test data includes immersion corrosion testing, sandwich corrosion testing and hydrogen embrittlement testing for the non-methylene chloride chemical strippers. Additionally, the cumulative effect of the alternative depainting processes on the metallurgical integrity of the test substrate is addressed with the results from tensile and fatigue evaluations.
Author

Paint Removal; Performance Tests; Tensile Properties; Fatigue Tests; Surface Treatment

20010067254 NASA Marshall Space Flight Center, Huntsville, AL USA

Evaluation of Various Depainting Processes on Mechanical Properties of 2024-T3 Aluminum Substrate

McGill, P., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 49p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

Alternate alkaline and neutral chemical paint strippers have been identified that, with respect to corrosion requirements, perform as well as or better than a methylene chloride baseline. These chemicals also, in general, meet corrosion acceptance criteria as specified in SAE MA 4872. Alternate acid chemical paint strippers have been identified that, with respect to corrosion requirements, perform as well as or better than a methylene chloride baseline. However, these chemicals do not generally meet corrosion acceptance criteria as specified in SAE MA 4872, especially in the areas of non-clad material performance and hydrogen

embrittlement. Media blast methods reviewed in the study do not, in general, adversely affect fatigue performance or crack detectability of 2024-T3 substrate. Sodium bicarbonate stripping exhibited a tendency towards inhibiting crack detectability. These generalizations are based on a limited sample size and additional testing should be performed to characterize the response of specific substrates to specific processes.
Derived from text
Paint Removal; Mechanical Properties; Corrosion Tests; Fatigue Tests; Hydrogen Embrittlement; Aluminum Alloys

20010067257 Materials and Electrochemical Research Corp., Tucson, AZ USA
Low-Cost Ceramic Matrix Composites
Kowbel, W., Materials and Electrochemical Research Corp., USA; Bruce, C., Materials and Electrochemical Research Corp., USA; Tsou, K. T., Materials and Electrochemical Research Corp., USA; Withers, J. C., Materials and Electrochemical Research Corp., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 9p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Despite their unique properties, ceramic matrix composite materials have found use in a very limited number of applications. Current applications include rocket motor parts, turbojet parts, and thermal structures for space planes and other space probes. These applications are virtually price insensitive and are driven by the performance criteria. Numerous potential applications for continuous fiber ceramic matrix composites (CMC) have been identified including advanced heat engines, heat recovery equipment, burners and combustors, process equipment, waste incineration systems, and separation and filtration equipment. However, for composites to successfully compete with other engineering materials, their cost must be substantially reduced. These costs are strongly influenced by lengthy composite processing technologies. It is expected that at least a ten-fold decrease in the CMC composite prices is needed to provide a significant penetration of commercial markets.
Derived from text
Ceramic Matrix Composites; Manufacturing; Carbon-Carbon Composites

20010067258 NASA Marshall Space Flight Center, Huntsville, AL USA
Fabrication and Testing of Ceramic Matrix Composite Rocket Propulsion Components
Effinger, M. R., NASA Marshall Space Flight Center, USA; Clinton, R. C., Jr., NASA Marshall Space Flight Center, USA; Dennis, J., NASA Marshall Space Flight Center, USA; Elam, S., NASA Marshall Space Flight Center, USA; Genge, G., NASA Marshall Space Flight Center, USA; Eckel, A., NASA Glenn Research Center, USA; Jaskowiak, M. H., NASA Glenn Research Center, USA; Kiser, J. D., NASA Glenn Research Center, USA; Lang, J., NASA Glenn Research Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 27p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

NASA has established goals for Second and Third Generation Reusable Launch Vehicles. Emphasis has been placed on significantly improving safety and decreasing the cost of transporting payloads to orbit. Ceramic matrix composites (CMC) components are being developed by NASA to enable significant increases in safety and engineer performance, while reducing costs. The development of the following CMC components are being pursued by NASA: (1) Simplex CMC Blisk; (2) Cooled CMC Nozzle Ramps; (3) Cooled CMC Thrust Chambers; and (4) CMC Gas Generator. These development efforts are application oriented, but have a strong underpinning of fundamental understanding of processing-microstructure-property relationships relative to structural analyses, nondestructive characterization, and material behavior analysis at the coupon and component and system operation levels. As each effort matures, emphasis will be placed on optimizing and demonstrating material/component durability, ideally using a combined Building Block Approach and Build and Bust Approach.
Derived from text
Ceramic Matrix Composites; Reusable Launch Vehicles; Fabrication; Performance Tests; Engine Parts

20010067259 Advanced Ceramics Research, Inc., Tucson, AZ USA
Rapid Fabrication of Monolithic Ceramic Parts Reinforced with Fibrous Monoliths for Aerospace Applications
Vaidyanathan, R., Advanced Ceramics Research, Inc., USA; Walish, J., Advanced Ceramics Research, Inc., USA; Lombardi, J. L., Advanced Ceramics Research, Inc., USA; Fox, M., Advanced Ceramics Research, Inc., USA; Rigali, M., Advanced Ceramics Research, Inc., USA; Sutaria, M., Advanced Ceramics Research, Inc., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 7p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

High-temperature, structural ceramics are finding increasing applications for use as components in gas turbine engines and rocket motors. A particular advantage of utilizing ceramic components over those fabricated from superalloy materials is that the former exhibit significantly greater strength and thermal stability at elevated temperatures. This enables the engines to operate

at high temperatures and thus achieve greater efficiency. The reduced weight afforded by replacement of superalloy with ceramic turbine components has also been shown to increase the thrust efficiency of these engines. Furthermore, conventional turbine engines fabricated from aerospace alloys require elaborate cooling schemes in order to maintain their integrity when operating at elevated temperatures. These cooling systems are unattractive since they add extra weight, cost, and complexity to the turbine engine assembly. These problems could be eliminated if higher melting temperature materials, such as ceramics, were used in the manufacture of its engine components.
Derived from text
Ceramics; Gas Turbine Engines; Engine Parts; Toughness; Fiber Composites; Reinforcing Fibers

20010067272 Naval Research Lab., Chemistry Div., Washington, DC USA
Inorganic-Organic Hybrid Polymers for High Temperature Aerospace Applications
Keller, T. M., Naval Research Lab., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 6p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Our current interest in inorganic-organic linear hybrid polymers as precursors to high temperature thermosets and ceramics has led us to investigate the synthesis of novel materials containing silicon, carborane, and acetylenic segments. Several poly(carborane-siloxane-acetylene)s 1 (1) and 2 (2) and poly(siloxane-acetylene)s 3 (3) are being evaluated as high temperature matrix materials for composites and as precursor materials to ceramics for applications under extreme environmental conditions. The major advantage of our approach is that the desirable features of inorganics and organics such as high thermal and oxidative stability and processability are incorporated into the same polymeric chain. The siloxane units provide thermal stability and chain flexibility to polymeric materials. Siloxane-acetylene polymers have also been made but lack the thermal and oxidative stability that the carborane units possess. The chemistry involved in synthesizing poly(siloxane) and poly(carborane-siloxane) has been modified to accommodate the inclusion of an acetylenic unit in the backbone. The novel linear polymers have the advantage of being extremely easy to process and convert into thermosets or ceramics since they are either liquids at room temperature or low melting solids and are soluble in most organic solvents. They are designed as thermoset polymeric precursors. The cross-linking density of the thermosets is easily controlled as a function of the quantity of reactants used in the synthesis. The acetylenic functionality provides many attractive advantages relative to other cross-linking centers. The acetylene group remains inactive during processing at lower temperatures and reacts either thermally or photochemically to form conjugated polymeric cross-links without the evolution of volatiles. This paper is concerned with the processability and thermo-oxidative properties of 1 and 2, and the blending of 1 and 3 in an attempt to arrive at similar thermoset and ceramic compositions as found for copolymer 2 upon thermal treatment. Thermal analysis studies were performed on thermosets and ceramics obtained from 1, 2, and various blends from 1 and 3a.
Derived from text
Thermal Analysis; Matrix Materials; Ceramics; Polymer Chemistry

20010067275 Touchstone Research Lab. Ltd., Triadelphia, WV USA
Multifunctional Carbon Foams for Aerospace Applications
Rogers, D. K., Touchstone Research Lab. Ltd., USA; Plucinski, J., Touchstone Research Lab. Ltd., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226
Contract(s)/Grant(s): SBIR-99-04-01; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Carbon foams produced by the controlled thermal decomposition of inexpensive coal extracts exhibit a combination of structural and thermal properties that make them attractive for aerospace applications. Their thermal conductivity can be tailored between 0.5 and 100 W/mK through precursor selection/modification and heat treatment conditions; thus, they can serve in either thermal protection or heat transfer systems such as heat exchangers. Because their structure is essentially a 3D random network of graphite-like members, they also can be considered low-cost, easily fabricated replacements for multi-directional structural carbon fiber preforms. Strengths of over 4000 psi in compression are common. Their density can be designed between 0.1 and 0.8 g/cc, and they can be impregnated with a variety of matrices or used, unfilled, in sandwich structures. These foams also exhibit intriguing electrochemical properties that offer potential in high-efficiency fuel cell and battery applications, mandrels and tooling for composite manufacture, ablative performance, and fire resistance. This paper presents the results of research conducted under

NASA SBIR Topic 99.04.01, General Aviation Technology, supported from Langley Research Center. The potential of foam design through precursor selection, cell size and density control, density grading, and heat treatment is demonstrated.
Author
Carbon; Foams; Thermal Conductivity; Mechanical Properties

20010067277 Environmental Technology and Education Center, Albuquerque, NM USA
Low Environment Impact, High Performance Foam Blowing Agents Based on Iodofluorocarbons
Dhooge, P., Environmental Technology and Education Center, USA; Glass, S. M., Environmental Technology and Education Center, USA; Nimitz, J. S., Environmental Technology and Education Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 10p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs), including CFC-11, CFC-12, HCFC-141b, and HCFC-142b, have been used as high performance polymer foam blowing agents because of their physical properties, stability, relatively high molecular weight, and low toxicity. However, these blowing agents deplete stratospheric ozone, and have been or will soon be phased out of production in developed countries under the provisions of the Montreal Protocol and its amendments. CFC-11 and CFC-12 have already been phased out of production and replaced with HCFC-141b and HCFC-142b. Although HCFC-141b has been widely used as an interim blowing agent, its production is scheduled to cease in 2003. HCFC-142b production is scheduled to cease in 2010. In general, the blowing agent in insulating foam provides from 50% to 80% of the foam's insulating value. Substitute blowing agents such as hydrocarbons and CO, have low insulating value and diffuse out of the foam much more quickly than the CFCs and HCFCs, further reducing the insulating value of the foam as it ages. Hydrocarbon blowing agents introduce complications in manufacturing processes because they are flammable and they produce more flammable foam. Hydrofluorocarbon (HFC) blowing agents such as HFC-245fa, planned as the next standard blowing agents, have significantly higher vapor thermal conductivities than HCFC-141b or CFC-11. In addition, HFCs have moderate global warming potentials (GWTs). In the aerospace sector, where weight and volume are highly valued, there is a strong need for a rigid closed-cell polymer foam blowing agent that is non-ozone-depleting, nonflammable, relatively nontoxic, thermally stable, compatible with polymer materials, reasonably priced, and will produce foams with superior insulating value and superior insulation aging characteristics. The same is true in applications such as refrigerator and freezer insulation, where insulation value in a fixed size appliance is highly valued. A third high value application is refrigerated transport units, where weight and volume are also highly valued due to fuel use per weight.
Derived from text
Foams; Insulation; Fluorocarbons; Iodine Compounds; Chlorofluorocarbons

20010067278 Environmental Technology and Education Center, Albuquerque, NM USA
High-Performance, Low Environmental Impact Refrigerants
McCullough, E. T., Environmental Technology and Education Center, USA; Dhooge, P. M., Environmental Technology and Education Center, USA; Glass, S. M., Environmental Technology and Education Center, USA; Nimitz, J. S., Environmental Technology and Education Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 10p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Refrigerants used in process and facilities systems in the US include R-12, R-22, R-123, R-134a, R-404A, R-410A, R-500, and R-502. All but R-134a, R-404A, and R-410A contain ozone-depleting substances that will be phased out under the Montreal Protocol. Some of the substitutes do not perform as well as the refrigerants they are replacing, require new equipment, and have relatively high global warming potentials (GWPs). New refrigerants are needed that addresses environmental, safety, and performance issues simultaneously. In efforts sponsored by Ikon Corporation, NASA Kennedy Space Center (KSC), and the US Environmental Protection Agency (EPA), ETEC has developed and tested a new class of refrigerants, the Ikon (registered) refrigerants, based on iodofluorocarbons (IFCs). These refrigerants are nonflammable, have essentially zero ozone-depletion potential (ODP), low GWP, high performance (energy efficiency and capacity), and can be dropped into much existing equipment.
Author
Refrigerants; Fluorocarbons; Toxicity; Performance Tests; Environment Protection

20010067279 Boeing Co., Rocketdyne Propulsion and Power, Canoga Park, CA USA
VOC Compliant Wax Removal Process
Brown, A., Boeing Co., USA; Grimmett, D., Boeing Co., USA; Sylvia, M., Boeing Co., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 8p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Wax is often used as a maskant during plating operations to protect against unwanted deposits on hardware details. Historically, perchloroethylene was used to remove this wax at the completion of the plating operation. In 1994, perchloroethylene was eliminated from this process at Rocketdyne, and was replaced by a high temperature oil and a cleaning process based on a semi-aqueous cleaner. This semi-aqueous cleaner has a volatile organic content of 768 g/l and environmental management of this material has limited the location of the operation. It was therefore desirable to identify a replacement cleaner, which is not subject to these limitations and enable the process to be located in closer proximity to the other manufacturing areas processing the hardware. This would result in the elimination of transportation of the hardware, the schedule impact of moving it, and the risk associated with additional handling. A cleaner was identified which satisfied these requirements and Taguchi methodology was used to optimize the process using this material.
Author
Cleaners; Waxes; Removal; Volatile Organic Compounds

20010067280 Environmental Technology and Education Center, Albuquerque, NM USA
Highly Effective, Low Toxicity, Low Environmental Impact Total Flooding Fire Suppressants
Glass, S. M., Environmental Technology and Education Center, USA; Dhooge, P. M., Environmental Technology and Education Center, USA; Nimitz, J. S., Environmental Technology and Education Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 10p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Halon 1301 (CF3Br) has been used for decades as the primary fire suppression agent for areas where powder agents cannot be used because of concerns for sensitive equipment. Halon 1301 is an excellent extinguishing agent, effective at about 3% in air and quite non-toxic. It has an effective exposure limit much greater than its extinguishing concentration, so it can be used in normally occupied areas. The ability of a chemical to destroy stratospheric ozone is its ozone-depletion potential (ODP). ODP is the amount of ozone destroyed per pound of a chemical, relative to the standard CFC-11 with an ODP = 1.0. Because halons have been implicated in stratospheric ozone depletion, their production was stopped at the end of 1995 under the provisions of the Montreal Protocol plus later amendments. In the US, the Clean Air Act Amendments of 1990, Presidential directives, and DoD Directive 6050.9 implemented this phaseout. These regulations and penalties have provided strong incentives for US businesses to decrease CFC use. The Omnibus Budget Reconciliation Act of 1989 mandates high Federal taxes on CFCs and halons, designed to price them out of the market. The taxes also capture for the government the windfall profits that would otherwise go to producers as scarcity drives up prices. Several replacements have been developed for Halon 1301. One is carbon dioxide, which has been used as a firefighting agent for many years. However, a high concentration of carbon dioxide is necessary to inert fuels. The effective concentration for inerting with carbon dioxide is approximately 29%, which is above the concentration lethal to humans. HFC-227ea is being used extensively to replace Halon 1301 systems in nominally occupied areas and some normally unoccupied areas. However, since the effective concentration of HFC-227ea is about three to four times that of Halon 1301 the extinguishing systems have to be larger and new extinguishing systems have to be installed. HFC-125 is also being sold as an extinguishing agent (Nimitz). It has problems similar to HFC-227ea, with a greater concentration needed for effectiveness and the need to use a larger system. This is a particularly onerous penalty in aircraft and spacecraft, where weight and space are extremely important, and substitution is often impossible in existing aircraft due to space limitations.
Derived from text
Carbon Dioxide; Chlorofluorocarbons; Halon; Extinguishing; Fire Fighting

20010067283 NASA Johnson Space Center, Houston, TX USA
Resources Available for Hazards Analysis of Aerospace Fluids
Woods, S. S., Honeywell Technology Solutions, Inc., USA; Stewart, W. F., L and M Technologies, Inc., USA; Baker, D. L., NASA Johnson Space Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 9p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

In recent years, the legislative and executive branches of the federal government have pushed to make government more efficient and responsive to the needs of the marketplace. One of these initiatives, Public Law 104-113, also known as the National Technology Transfer and Advancement Act of 1995 (NTTAA), is designed to accelerate technology transfer to industry and promote government-industry partnership. Summarized, NTTAA states that '... all Federal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments. Government agencies must now determine if their in-house requirement-setting activities are sufficiently unique that no public interest is served by having them adopted by a voluntary consensus organization (VCO), or if not, to use or develop voluntary consensus standards. The Office of

Management and Budget (OMB) is chartered by the law to monitor federal agency progress and report the results to Congress. In response to NTTAA, agency-wide oxygen and hydrogen safety standards sponsored by the NASA Headquarters (HQ) Office of Safety and Mission Assurance (OSMA) were obvious choices for early adoption by VCOs. In 1996, HQ sought assistance from the Johnson Space Center (JSC) White Sands Test Facility (WSTF), the technical lead for development of these safety standards, to evaluate their adoption by VCOs. At that time, WSTF-developed propellant hazards manuals were likewise identified for possible VCO adoption. Subsequently, WSTF was asked to represent NASA for development of an international ISO safety standard for hydrogen use. Concurrent with these WSTF standards activities are related efforts to develop and publish propellant hazards analysis protocols and safety courses for the industrial, propellant use of oxygen, hydrogen, and hypergols. This paper reports on these efforts and describes WSTF's overall voluntary consensus standards program to coordinate the interchange of NASA's propellant hazards and safety information with industry.
Author
Propellants; Safety; Standards; Public Law

20010067284 Lockheed Martin Manned Space Systems, New Orleans, LA USA
Chemical Fingerprinting of Materials Developed Due to Environmental Issues
Smith, D. A., Lockheed Martin Manned Space Systems, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 4p; In English; See also 20010067226; No Copyright; Avail: CASI; A01, Hardcopy; A10, Microfiche

Instrumental chemical analysis methods are developed and used to chemically fingerprint new and modified External Tank materials made necessary by changing environmental requirements. Chemical fingerprinting can detect and diagnose variations in material composition. to chemically characterize each material, fingerprint methods are selected from an extensive toolbox based on the material's chemistry and the ability of the specific methods to detect the material's critical ingredients. Fingerprint methods have been developed for a variety of materials including Thermal Protection System foams, adhesives, primers, and composites.
Author
Chemical Analysis; Chemical Composition; Data Bases; Foams; Thermal Protection

20010067285 Guigne International Ltd., Paradise, Newfoundland Canada
Manufacture of Porous Ceramic Materials by Combustion Synthesis
Yi, H. C., Guigne International Ltd., Canada; Whelan, L. A., Guigne International Ltd., Canada; Guigne, J. Y., Guigne International Ltd., Canada; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 11p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

Porous ceramic materials are suitable for a wide variety of applications. By creating a porous ceramic, the properties of both porous materials and ceramic materials can be combined and utilized. The ideal applications for porous ceramic materials would include use in corrosive environments, thermal insulation, catalyst support, highly efficient engine filters, pre-forms for composite materials, and implants into which body tissue could easily attach and grow. Experiments have been carried out to produce a series of porous ceramic materials using the combustion synthesis technique. These porous materials have such ceramic matrices as AlO3, MgO, A12O3-MgO, and TiC2-A12O3. Studies were done to investigate and characterize the ignition and combustion characteristics of these systems as well as to control the porosity and pore distribution of the final products. The combustion wave velocity ranged from 1-5 mm/s and the combustion temperatures ranged from 1500-2000 C, depending on the chemistries. All materials exhibited a large degree of linear expansion (100-200%) during the combustion reactions. Typical apparent porosity (open and interconnected pores) for the materials was is greater than 70% and the overall porosity was is greater than 80%. Successful attempts were made to control the apparent and overall porosity of the products. This was done through the addition of a diluent and by physically confining the samples. As a result, the porosity can be made to vary controllably over a large range (42-83% apparent porosity). A technique has also been developed to increase the quality of the high porosity samples by improving the pore size and distribution. As a result, both the strength and modulus of these samples were increased substantially.
Author
Ceramics; Porous Materials; Porosity; Combustion Synthesis

20010067286 Thiokol Corp., Brigham City, UT USA

Chemical Aging of Environmentally Friendly Cleaners

Biegert, L. L., Thiokol Corp., USA; Evans, K. B., Thiokol Corp., USA; Olsen, B. D., Thiokol Corp., USA; Weber, B. L., Thiokol Corp., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 5p; In English; See also 20010067226

Contract(s)/Grant(s): NAS8-38100; Copyright; Avail: Issuing Activity

Use of cleaners in the manufacturing area demands bottles that will hold a sufficient amount of material and allow for easy and controlled dispensing by the operator without contamination or material leaching from the bottle. The manufacturing storage conditions are also a factor that may affect cleaner chemical integrity and its potential to leave a residue on the part. A variety of squeeze bottles stored in mild (72 F, 10% R.H., dark) and harsh (105 F, 50% R.H., fluorescent lighting) conditions were evaluated to determine the effect of environment and bottle exposure on ozone depleting chemicals (ODC) cleaners chemical composition. Low Density Polyethylene (LDPE) bottles were found to be quite permeable to all the cleaners evaluated in this study indicating this bottle type should not be used in the manufacturing area. Fluorinated Polyethylene (FLPE) bottles showed little cleaner loss and change in cleaner chemical composition over time suggesting these bottles would be acceptable for use. Chemical analysis indicates limonene containing cleaners show increased non-volatile residue (NVR) content with storage under harsh conditions. Some cleaners use BHT (butylated hydroxytoluene) as stabilizer and to protect against limonene oxidation. Under harsh conditions, BHT was quickly depleted resulting in higher NVR levels.

Author

Chemical Analysis; Cleaners; Aging (Materials)

20010067287 Honeywell Advanced Composites, Inc., Newark, DE USA

Advanced Ceramic Matrix Composites for Aerospace Applications

Patterson, B., Honeywell Advanced Composites, Inc., USA; Klacka, B., Honeywell Advanced Composites, Inc., USA; Garnier, J., Honeywell Advanced Composites, Inc., USA; Gray, P., Honeywell Advanced Composites, Inc., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 6p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Advanced ceramic matrix composites (CMCs) are an enabling technology for hypersonic trans-aerospace, missile and turbine engine applications demanding high performance utility. Honeywell Advanced Composites has developed a palette of CMCs in limited commercial production and in various stages of evaluation for aerospace related programs. CMCs include carbon fiber reinforced silicon carbide (C/SiC) and enhanced silicon carbide fiber reinforced silicon carbide (ESiCf/SiC). Hardware fabrication can use chemical vapor infiltration (CVI), silicon melt infiltration (MI), and chemical conversion processing techniques. C/SiC is a leading thermal heat shield protection material for several heat shield structural designs (RLV/SOV/SMV) and has demonstrated excellent low erosion hypersonic leading edge performance. Because of materials attributes of low density, high strength, and very high temperature capabilities, C/SiC has been in development for linear Aero-spike engine applications including ramp and pump. SiCf/SiC MI CMC is qualified as the only 2200 F, 20 Ksi, long duration materials for NASA high-speed civil transport advanced turbine engines. Commercial accomplishments also include more than 10,000 hours of field time in stationary power turbine engines (DOE-CFCC). Open literature C/SiC, E-SiC/SiC and SiC/SiC MI CMC thermal, mechanical data will be presented including customer approved hardware and test results. The following are selected viewgraphs from the presentation, which contains more detailed information.

Author

Ceramic Matrix Composites; Silicon Carbides; Aerospace Engineering; Mechanical Properties

20010067290 NASA Langley Research Center, Hampton, VA USA

Durability Characterization of Advanced Polymeric Composites at Cryogenic Temperatures

Gates, T. S., NASA Langley Research Center, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The next generation of reusable launch vehicles will require technology development in several key areas. of these key areas, the development of polymeric composite cryogenic fuel tanks promises to present one of the most difficult technical challenges. It is envisioned that a polymer matrix composite (PMC) tank would be a large shell structure capable of containing cryogenic fuels and carrying a range of structural loads. The criteria that will be imposed on such a design include reduced weight, conformal geometry, and impermeability. It is this last criterion, impermeability, that will provide the focus of this paper. The essence of the impermeability criterion is that the tank remains leak free throughout its design lifetime. to address this criterion, one of the first steps is to conduct a complete durability assessment of the PMC materials. At Langley Research Center, a durability assessment

of promising new polyimide-based PMCs is underway. This durability program has focused on designing a set of critical laboratory experiments that will determine fundamental material properties under combined thermal-mechanical loading at cryogenic temperatures. The test program provides measurements of lamina and laminate properties, including strength, stiffness, and fracture toughness. The performance of the PMC materials is monitored as a function of exposure conditions and aging time. Residual properties after exposure are measured at cryogenic temperatures and provide quantitative values of residual strength and stiffness. Primary degradation mechanisms and the associated damage modes are measured with both destructive and nondestructive techniques. In addition to mechanical properties, a range of physical properties, such as weight, glass transition, and crack density, are measured and correlated with the test conditions. This paper will report on the progress of this research program and present critical results and illustrative examples of current findings.
Author
Composite Structures; Durability; Polymer Matrix Composites; Cryogenic Fluid Storage

20010067294 Alabama Univ., Center for Automation and Robotics, Huntsville, AL USA
Ellipsometric Verification and Evaluation of Clean Surfaces
Thompson, W., Alabama Univ., USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 9p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

As precision cleaning techniques become more critical to the Aerospace Industry, good methods of verifying and evaluating those techniques become more important. Precision cleaning can often mean contamination thickness on the order of molecular diameters. Therefore, inspection instrumentation must be extremely precise. Ellipsometers provide the measurement capability necessary to determine the contamination of ’clean’ surfaces to within a few molecular diameters. This paper is an introduction to how ellipsometry plays a vital role in the verification and evaluation of ’clean’ surfaces for NASA’s Surface Contamination Analysis Technology (SCAT) Team.
Author
Cleaning; Proving; Contamination; Surface Treatment; Surface Properties

20010067295 NASA White Sands Test Facility, Las Cruces, NM USA
Improved Detection Technique for Solvent Rinse Cleanliness Verification
Hornung, S. D., Honeywell Technology Solutions, Inc., USA; Beeson, H. D., NASA White Sands Test Facility, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 11p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

The NASA White Sands Test Facility (WSTF) has an ongoing effort to reduce or eliminate usage of cleaning solvents such as CFC-113 and its replacements. These solvents are used in the final clean and cleanliness verification processes for flight and ground support hardware, especially for oxygen systems where organic contaminants can pose an ignition hazard. For the final cleanliness verification in the standard process, the equivalent of one square foot of surface area of parts is rinsed with the solvent, and the final 100 mL of the rinse is captured. The amount of nonvolatile residue (NVR) in the solvent is determined by weight after the evaporation of the solvent. An improved process of sampling this rinse, developed at WSTF, requires evaporation of less than 2 mL of the solvent to make the cleanliness verification. Small amounts of the solvent are evaporated in a clean stainless steel cup, and the cleanliness of the stainless steel cup is measured using a commercially available surface quality monitor. The effectiveness of this new cleanliness verification technique was compared to the accepted NVR sampling procedures. Testing with known contaminants in solution, such as hydraulic fluid, fluorinated lubricants, and cutting and lubricating oils, was performed to establish a correlation between amount in solution and the process response. This report presents the approach and results and discusses the issues in establishing the surface quality monitor-based cleanliness verification.
Author
Cleanliness; Proving; Detection; Solvents

20010067296 Aerospace Corp., Space Materials Lab., El Segundo, CA USA
Criteria for NVR Solvent Replacement
Coleman, D. J., Aerospace Corp., USA; Luey, K. T., Aerospace Corp., USA; Uht, J. C., Aerospace Corp., USA; Arnold, G. S., Aerospace Corp., USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 10p; In English; See also 20010067226
Contract(s)/Grant(s): F4701-93-C-0094; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Molecular film contamination is detected and monitored using a gravimetric laboratory process described in American Society for Testing and Materials (ASTM) standard methods. These processes currently specify the use of methylene chloride,

an organic solvent targeted for reduction by the Environmental Protection Agency. In this paper, we describe a request for a change in the solvent specified. We briefly review the criteria for the suggested replacement, ethyl acetate. The solubility criteria assembled for the replacement of methylene chloride are then used to evaluate the replacement of methylene chloride-based paint removers.
Author
Solvents; Replacing; Ethyl Compounds; Solubility

20010067297 Lockheed Martin Michoud Space Systems, New Orleans, LA USA
Criteria Surface Cleaning and Verification Alternatives
Melton, D. M., Lockheed Martin Michoud Space Systems, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 4p; In English; See also 20010067226; No Copyright; Avail: CASI; A01, Hardcopy; A10, Microfiche

As a result of federal and state requirements, historical critical cleaning and verification solvents such as Freon 113, Freon TMC, and Trichloroethylene (TCE) are either highly regulated or no longer available. Interim replacements such as HCFC 225 have been qualified, however toxicity, and future phaseout regulations necessitate long term solutions. The scope of this project was to qualify a safe and environmentally compliant LOX surface verification alternative to Freon 113, TCE and FICK 225. The main effort was focused on initiating the evaluation and qualification of HCFC 225G as an alternate LOX verification solvent. The project was scoped in FY 99/00 to perform LOX compatibility, cleaning efficiency, and qualification on flight hardware.
Author
Cleaning; Proving; Solvents; Chlorofluorocarbons

20010067301 Thiokol Propulsion, Brigham City, UT USA
Effects and Detection of Silicone and HD2 Grease Contaminants
Blanks, J. W., Thiokol Propulsion, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 9p; In English; See also 20010067226; Copyright; Avail: Issuing Activity

The bond integrity of Reusable Solid Rocket Motor (RSRM) bond systems can influence the overall system safety. The minimum level of different contaminants, especially silicone oils, present before various bond systems are weakened was evaluated. Application of an infrared spectrometer was used to detect and quantify sets of contaminants on selected composites and metal substrates. Techniques for applying the contaminants are discussed. Changes occurring with time at the contaminant/substrate interface were monitored. Use was made of these techniques to prepare bond specimens for determining the lowest level of common contaminants that are detrimental to selected bond systems.
Author
Contaminants; Greases; Bonded Joints; Fault Detection

20010067304 Lockheed Martin Michoud Space Systems, New Orleans, LA USA
Physical Evaluation of Cleaning Performance: We Are Only Fooling Ourselves
Pratz, E., Lockheed Martin Michoud Space Systems, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Surface cleaning processes are normally evaluated using visual physical properties, such as streaking, staining, and water-break-free conditions. There is the assumption that these physical methods will evaluate all surfaces all the time for all operations. We have found that these physical methods are lacking in sensitivity and selectivity with regard to surface residues and subsequent process performance. We will report several conditions where evaluations using visual physical properties are lacking. We will identify possible alternative methods and future needs for surface evaluations.
Author
Cleaning; Visual Observation; Quality Control

20010067315 Thiokol Propulsion, Brigham City, UT USA
Use of GC/MS and Microtome Techniques as Methods to Evaluate ODC Free Cleaner Diffusion and Evaporation in Insulation and Phenolic Case Material
Biegert, L. L., Thiokol Propulsion, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 11p; In English; See also 20010067226
Contract(s)/Grant(s): NAS8-38100; Copyright; Avail: Issuing Activity

Because of the 1990 Clean Air Act Amendment (CAAA) many chlorinated solvents used in the aerospace industry are being phased out. Replacement of the ODC (ozone-depleting chemicals) with less volatile, non-ozone depleting cleaners has been extensively studied over the past seven years at Thiokol Propulsion, a Division of Cordant Technologies, Inc. The down selection of ODC replacement cleaners has been based on several factors including the diffusion evaporation of the cleaners in selected substrates. Methodologies were developed to evaluate the cleaner content in substrates. Methods of cutting thin slices of material (microtoming) were combined with GC/MS (gas chromatography/mass spectroscopy) analysis. Substrates evaluated in this study include potential solid rocket motor materials: ASNBR (asbestos-filled nitrile butadiene rubber) and CFEPDM (carbon-filled ethylene propylene dimonomer) insulation and glass (GCP), carbon (CCP) and silica (SCP) cloth phenolic substrates with fibers either parallel (0 deg) or perpendicular (90 deg) to the surface. Residue profiles indicate both cleaner and substrate composition affect the diffusion and subsequent evaporation of the cleaner from the substrate surface.
Author
Cleaners; Substrates; Diffusion; Evaporation

20010067316 NASA Langley Research Center, Hampton, VA USA
Electron Beam-Cure Polymer Matrix Composites: Processing and Properties
Wrenn, G., Oak Ridge National Lab., USA; Frame, B., Oak Ridge National Lab., USA; Jensen, B., NASA Langley Research Center, USA; Nettles, A., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Researchers from NASA and Oak Ridge National Laboratory are evaluating a series of electron beam curable composites for application in reusable launch vehicle airframe and propulsion systems. Objectives are to develop electron beam curable composites that are useful at cryogenic to elevated temperatures (-217 C to 200 C), validate key mechanical properties of these composites, and demonstrate cost-saving fabrication methods at the subcomponent level. Electron beam curing of polymer matrix composites is an enabling capability for production of aerospace structures in a non-autoclave process. Payoffs of this technology will be fabrication of composite structures at room temperature, reduced tooling cost and cure time, and improvements in component durability. This presentation covers the results of material property evaluations for electron beam-cured composites made with either unidirectional tape or woven fabric architectures. Resin systems have been evaluated for performance in ambient, cryogenic, and elevated temperature conditions. Results for electron beam composites and similar composites cured in conventional processes are reviewed for comparison. Fabrication demonstrations were also performed for electron beam-cured composite airframe and propulsion piping subcomponents. These parts have been built to validate manufacturing methods with electron beam composite materials, to evaluate electron beam curing processing parameters, and to demonstrate lightweight, low-cost tooling options.
Author
Curing; Electron Beams; Polymer Matrix Composites

20010067319 Lockheed Martin Manned Space Systems, Huntsville, AL USA
Update: HFC 245fa Blown Foam Development with External Tank Spray Foams
Davis, S., Lockheed Martin Manned Space Systems, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The Marshall Space Flight Center (MSFC) Thermal Protection Systems (TPS) Materials Research Laboratory is currently investigating environmentally friendly blowing agents for use in the insulations of the Space Shuttle's External Tank. The original TPS foam materials of the External Tank were blown with chlorofluorocarbon 11, which is now regulated because of its high Ozone Depletion Potential (ODP). Hydrochlorofluorocarbons (HCFCs), with an ODP that is one tenth that of CFCs, have been widely adopted as an interim blowing agent in urethane insulations. In FY96, Lockheed Martin completed the production qualification and validation of HCFC 141b blown insulations. Because of the expected limited commercial lifetime of HCFC 141b, research efforts are underway to identify and develop alternatives with zero ODP. HFC245fa (1,1,1,3,3-pentaflouropropane) has been chosen by the manufacturer as a third-generation blowing agent to be marketed commercially. Preliminary work evaluating this third-generation candidate has demonstrated promising material mechanical property data. Favorable results from small-scale spray activities have justified evaluations using production foam processing spray parameters. With the scale-up of the spray equipment, however, additional processing issues have been identified. This paper will present data collected to date regarding the use of this blowing agent in External Tank spray foams.
Author
Foams; External Tanks; Chlorofluorocarbons; Thermal Insulation; Environment Protection

20010067323 Technology Partnership, Gross Ile, MI USA

Polymer Matrix Composites (PMCs) Cryopipe for Rocket Engine Lines and Ducts

Bettinger, D., Technology Partnership, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Alloy rocket engine ducts and lines have been targeted for conversion to lighter, polymer composites. The concern with polymer composites is assured performance for multiple reuse. The need is for stress control and polymer protection from LOX and LH2. A suite of seven polymer composite technologies is presented that make the component fabrication, assembly, and performance of polymer cryopipe practical and economical. Flanges are eliminated and expensive expansion alloy bellows are replaced by more efficient and lightweight components. These technologies use stress design to configure superior performance composites with existing space-qualified materials.

Author

Polymer Matrix Composites; Ducts; Rocket Engines

20010067327 Touchstone Research Lab. Ltd., Triadelphia, WV USA

Polymer Matrix Composite (PMC) Analog Processes for Lightweight Aluminum Matrix Composite (AMC) Structures

Gordon, B., Touchstone Research Lab. Ltd., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Next-generation hypersonic aircraft, reusable launch vehicles, and low-cost spacecraft require new materials to meet decreasing vehicle weights, increasing payload capacity, and dramatically lower operating costs. Materials that have improved specific strength and specific stiffness, especially at cryogenic and elevated temperatures, enable commercial and Government customers to meet these aggressive program goals by supporting development of stronger, lighter, and more thermally stable integrated components. Touchstone's Brazed Aluminum Matrix Composite (AMC) material has nearly twice the specific strength and specific stiffness of structural aluminum alloys and maintains these properties at higher temperatures than current aerospace alloys. When in situ brazed from thin tape, the manufacturing of large highly integrated structures is possible with minimal tooling. As such, this material and associated manufacturing process can serve as an enabling technology for many aircraft and spacecraft applications, including engine and thrust structures, feed lines and ducts, propellant tanks, and thermally stable satellite structures. This poster presentation discusses a new material and, more specifically, a new manufacturing system that enables development of high-performance aircraft and spacecraft components.

Author

Composite Structures; Polymer Matrix Composites; Aluminum Alloys; Manufacturing

20010067331 NASA Glenn Research Center, Cleveland, OH USA

Characterization of Ceramic Matrix Composite Combustor Components: Pre and Post Exposure

Ojard, G., United Technologies Research Center, USA; Linsey, G., United Technologies Research Center, USA; Brennan, J., United Technologies Research Center, USA; Naik, R., Pratt and Whitney Aircraft Group, USA; Cairo, R., Pratt and Whitney Aircraft Group, USA; Stephan, R., Pratt and Whitney Aircraft Group, USA; Hornick, J., Pratt and Whitney Aircraft Group, USA; Brewer, D., NASA Glenn Research Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The pursuit of lower emissions and higher performance from gas turbine engines requires the development of innovative concepts and the use of advanced materials for key engine components. One key engine component is the combustor, where innovative design and material improvements have the potential to lower emissions. Efforts to develop a High Speed Civil Transport with low emissions were focused on the evaluation of combustor concepts with liners fabricated from a ceramic matrix composite of silicon carbide fibers in a silicon carbide matrix (SiC/SiC). The evaluation of SiC/SiC composites progressed from simple coupons (to establish a first-order database and identify operant failure mechanisms and damage accumulation processes), to feature-based subelements (to assess fabricability and in situ material response), to actual components (to assess structural integrity, dimensional, and compositional fidelity) tested under simulated engine conditions. As in the case of all evolutionary material and process work, a key element to resolving fabrication issues is the evaluation of witness areas taken from fabricated components before testing the actual component. The witness material from these components allowed microstructural and mechanical testing to be performed and compared to the ideal, flat panel, conditions and data that are typical of basic characterization. This also allowed samples of similar design to be taken from components after 115 hours of combustion exposure. Testing consisted of tensile, double notch shear, ring burst, and thermal conductivity that sampled various regions of

the components. The evaluation of the witness material allowed an understanding of the fabrication process, highlighting critical issues, in an early phase of the learning curve development of these configuration and material unique parts. Residual property testing, after exposure, showed if degradation of the material under actual service conditions was occurring. This paper will present the results of this critical testing. Evaluations that consider the degree of complexity of the fabricated part were established to relate in situ performance to that of flat panel based coupons. Nondestructive evaluation was used throughout the evaluation process. These results will also be discussed as an aid in understanding the test results.
Author
Exposure; Ceramic Matrix Composites; Silicon Carbides; Performance Tests

20010067337 NASA Marshall Space Flight Center, Huntsville, AL USA
Polymer Matrix Composite Material Oxygen Compatibility
Owens, Tom, NASA Marshall Space Flight Center, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 18p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Carbon fiber/polymer matrix composite materials look promising as a material to construct liquid oxygen (LOX) tanks. Based on mechanical impact tests the risk will be greater than aluminum, however, the risk can probably be managed to an acceptable level. Proper tank design and operation can minimize risk. A risk assessment (hazard analysis) will be used to determine the overall acceptability for using polymer matrix composite materials.
CASI
Polymer Matrix Composites; Risk; Performance Tests; Chemical Compatibility

20010067338 Inland Technology, Inc., Tacoma, WA USA
Elimination of MEK and Lacquer Thinner in Department of Defense Painting Operations
Lucas, Joseph, Inland Technology, Inc., USA; Lethe, Eric, Inland Technology, Inc., USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 4p; In English; See also 20010067226; No Copyright; Avail: CASI; A01, Hardcopy; A10, Microfiche

Painting operations at aerospace and Department of Defense facilities create large and problematic waste streams as well as major emissions of hazardous air pollutants and volatile organic compounds (VOCs). Some of these emissions are a result of the composition of the paints used, and as a result, create a waste stream that can only be addressed by a reformulation of the specific paints and coatings. However, the greatest percentage of waste and emissions generated by painting operations is a result of the use of methyl ethyl ketones (MEKs) and lacquer thinner in clean up and surface preparation activities. Usage of these hazardous materials account for an excess of 50% of the overall waste generated by a painting facility. The successful elimination of MEK and lacquer thinner for these painting activities would clearly assist these facilities in meeting the requirements of the Aerospace NESHAPS and Executive Order #12856, and would facilitate a considerable reduction in the overall generation of hazardous waste. This presentation is an exemplary representation of successful replacement projects that have taken place at civilian manufacturers, aerospace, and Department of Defense installations. It will detail the substitution process from a chemical development standpoint, and will discuss the equipment validation procedures, work practice changes, and training required to make the substitution process successful. In each case study, the end result was a replacement process and chemistry that was more environmentally responsible and less regulated than the original process. In addition, each substitution project resulted in demonstrable cost savings.
Author
Waste Management; Environment Effects; Ketones; Methyl Compounds; Solvents

20010067446 North Carolina Univ., Chapel Hill, NC USA
Synthesis of High Molecular Weight Polycarbonates Using Supercritical CO2 ***Final Report, 10 Sep. 1998 - 31 Mar. 2001***
DeSimone, Joseph; Kiserow, Douglas; Feb. 23, 2001; 10p; In English
Contract(s)/Grant(s): DAAG55-98-D-0001
Report No.(s): AD-A388744; ARO-38693.1-CH-SR; No Copyright; Avail: CASI; A01, Microfiche; A02, Hardcopy

The research reported herein describes the first use of supercritical CO2 with solid state polymerization to produce high molecular weight polycarbonate. It was found that the increase in molecular weight is a strong function of CO2 pressure and temperature. Further, the solid state polymerization of polycarbonate in the presence of supercritical CO2 can be accomplished at temperatures as low as 90 C. This suppresses side reactions that lead to color body formation and produces polycarbonate with excellent optical clarity and color. This synthesis can be scaled-up to industrial levels and could completely eliminate the use and

production of toxic chemicals, significantly reduces the reaction temperature, and generates high-quality polycarbonate for use as transparent armor and numerous other commercial applications.
DTIC
Molecular Weight; Polycarbonates; Carbon Dioxide; Polymerization; Solid State

20010067494 Rutgers - The State Univ., Center for Advanced Infrastructure and Transportation, Piscataway, NJ USA
Recycled Materials in Portland Cement Concrete ***Final Report***
Ansari, F.; Maher, A.; Luke, A.; Zhang, G. Y.; Szary, P.; Jun. 2000; 48p; In English
Report No.(s): PB2001-106377; FHWA-2000-03; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This report pertains to a comprehensive study involving the use of recycled materials in Portland cement concrete. Three different materials were studied including crushed glass (CG), street sweepings (SS), and recycled concrete (RC). Blast furnace slag was also considered as a cementitious additive for enhancing the durability characteristics of the mixture. This research was performed and completed earlier. Four reports were submitted covering literature survey, mix details and experimental results for the recycled materials in the study. However, in these studies, the NJDOT class A concrete was substantially modified in order to establish an optimized mixture. The optimized mixture was used in conjunction with the recycled materials.
NTIS
Cements; Concretes; Recycling

20010067601 Army Research Lab., Weapons and Materials Research Directorate, Aberdeen Proving Ground, MD USA
Effects of Processing Conditions on Vacuum Assisted Resin Transfer Molding Process (VARTM)
Rigas, Elias J.; Mulkern, Thomas J.; Walsh, Sawn M.; Nguyen, Steven P.; May 2001; 54p; In English; Original contains color plates
Report No.(s): AD-A390744; ARL-TR-2480; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy
The continued growth of vacuum-based processes has warranted the development of both models and experimental studies designed to capture the unique aspects associated with this manufacturing technique. to that end, this report summarizes an initial set of experiments that characterize both the process and the resulting mechanical properties of components fabricated under a variety of process conditions. Specifically resin flow studies are presented in part to demonstrate the relative influence of key parameters on the flow front developed during impregnation. The effect of the distribution medium, which is used in a commercial version of VARTM known as Seeman's Composite Resin Infusion Molding Process (SCRIMP), is explicitly characterized. In addition, the variation of part thickness is also examined, and potential mechanisms responsible for these variations are presented. A battery of mechanical tests designed to correlate the effect of various processing conditions are also presented. A major finding is that thickness variation can be significant and, to some degree, random; also, precompaction of the preform significantly influences the amount of consolidation pressure needed during impregnation. Dimensional variations due to gradients in the pressure distribution of the vacuum affect permeability (and hence resin flow), as well as dimensional tolerances in manufactured parts.
DTIC
Resin Transfer Molding; Mechanical Properties; Vacuum

20010067602 Delaware Univ., Dept. of Chemical Engineering, Newark, DE USA
AASERT: Microphase Separation, Viscoelastic Properties and Aging of Amorphous Polyurethane Elastomers ***Final Report, 1 Apr. 1998 - 31 Mar. 2001***
Cooper, Stuart L.; Velankar, Sachin; Mar. 15, 2001; 12p; In English
Contract(s)/Grant(s): DAAG55-98-1-0190
Report No.(s): AD-A391011; ARO-38473.1-CH-AAS; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy
Thermally stable polynrethanes with low flow temperatures were synthesized at fixed soft segment content (50%), and the relationship between their microstructure and linear viscoelastic properties were studied as a function of block length and block incompatibility. It was found that the materials changed from homogeneous to microphase-separated as segment length and incompatibility increased. Dynamic mechanical experiments demonstrated that unlike most di-and triblock copolymers, polyurethanes are incapable of developing long-range order due to large polydispersity in their segment length. A separate part of this report involves synthesizing novel biocidal dendrimers by converting the end groups of poly(propylene imine) dendrimers to quaternary ammonium salts. The antibacterial properties of these dendritic biocides against Escherichia coli were evaluated using a bioluminescence method. Bioluminescence studies showed that novel dendritic architecture improved the potency of quaternary ammonium compounds over 100 times against E. coli. The activity of these biocidal dendrimers against Staphylococcus aureus was characterized by suspension tests. The effectiveness of these series of dendritic biocides depended

on the length of alkyl chains used in the quaternization and dendrimer size (generations). Biocides from PPI dendrimers were also shown to be more effective than those derived from Perstop hyperbranched polymers.
DTIC
Viscoelasticity; Aging (Materials); Amorphous Materials; Polyurethane Resins; Elastomers; Separation

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.

20010066250 FROM, Gulf of Mexico OCS Region
Promise of Deep Gas in the Gulf of Mexico
2001; 12p; In English; Original contains color illustrations
Report No.(s): PB2001-105770; OCS-MMS-2001-037; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

As the Nation continues to face increased demand for environmentally safe, clean energy resources, there are increasing calls to look for resources in places that have not been as economic or as attractive in the past. One of these areas is the potential for deep gas on the Gulf of Mexico continental shelf. This offshore province has been rigorously explored, especially the shallow-water area. However, sediments located at depths greater than 15,000 feet below sea level (subsea) and in less than 200 meters (656 feet) water depth on the Gulf of Mexico Outer Continental Shelf (OCS) are relatively unexplored. Only 5 percent of all wells drilled on the OCS have penetrated sediments below 15,000 feet subsea. Yet, the Minerals Management Service (MMS) estimates there could be 5 to 20 Tcf, with the most likely value at 10.5 Tcf of deep gas recoverable resources below this depth. to get at these resources successfully will require some special resources. In order to achieve economic success, deep wells require larger structures (which means higher resources)and there must be the potential for higher flow rates to compensate for higher drilling costs. The MMS is committed to working with offshore operators to explore and develop the undiscovered, recoverable deep gas resources on the OCS.MMS has already offered incentives in the form of royalty relief on deep gas production from new OCS leases issued in Sale 178 (March 2001),and is considering various options for offering incentives to explore and produce deep gas from OCS blocks that have been leased in previous sales. New discoveries of deep gas on the OCS offer the best short-term opportunity for achieving the large reserve additions and necessary high flow rates to offset declining gas production, which has been falling since 1997. Recent deep gas discoveries on the OCS have shown these new completions can produce as much 20 to 80 million cubic feet per day (MMcfpd). The abundance of platforms, producing facilities, and pipelines on the shelf will allow new deep gas production to flow quickly to the market to help meet increasing U.S. demand for gas.
NTIS
Clean Energy; Drilling; Natural Gas Exploration; Continental Shelves

20010066251 FROM, Gulf of Mexico OCS Region
Gulf of Mexico Outer Continental Shelf Daily Oil and Gas Production Rate Projections from 2001 through 2005
Melancon, J. M.; Bongiovanni, R.; Baud, R. D.; May 2001; 28p
Report No.(s): PB2001-105772; OCS/MMS-2001-044; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This paper provides daily oil and gas production rate projections for the Gulf of Mexico (GOM) Outer Continental Shelf (OCS) for the years 2001 through 2005. These projections represent average daily oil and gas production estimates for each calendar year. In this report, daily oil production rates include both oil and condensate production, and daily gas production rates include both associated and nonassociated gas production. Deepwater fields are defined as those with an average water depth greater than or equal to 1,000 feet. Our previous reports used December average daily production rates for historical and projected figures. In this report, however, we use calendar year averages for both historical and projected rates. This method is consistent with other Minerals Management Service reports, reduces the historical year-to-year variance, and reduces the error bars on our future projections. In addition to providing daily oil and gas production rate projections, we include one figure and one table pertaining to leasing history and one table concerning exploration and development plan approvals. These are provided as supportive background information for our projections as well as information indicative of current interest and activity in the GOM.
NTIS
Production; Gulf of Mexico; Oils; Gas Recovery; Resources

20010066304 FROM, Gulf of Mexico OCS Region

Outer Continental Shelf Estimated Oil and Gas Reserves, Gulf of Mexico, December 31, 1998

Crawford, T. G.; Bascle, B. J.; Kinler, C. J.; Prendergast, M. T.; Ross, K. M.; Sep. 2000; 18p; In English

Report No.(s): PB2001-105925; OCS/MMS-2000-069; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Remaining proved reserved in the Gulf of Mexico Outer Continental Shelf (OCS) as of December 31, 1998, have been estimated to be 3.36 billion barrels of oil and 30.0 trillion cubic feet of gas. These reserves are recoverable from 790 proved active fields. Unproved reserves as of December 31, 1998, have been estimated to be 1.00 billion barrels of oil and 5.1 trillion cubic feet of gas. These reserves are associated with 58 unproved active fields. There are 3 unproved active fields not studied. In total, there are 851 active fields located in Federal waters.

NTIS

Oil Fields; Reserves; Natural Gas Exploration; Resource Allocation; Deposits; Crude Oil

20010066327 Armstrong Lab., Occupation and Environmental Health Directorate, Wright-Patterson AFB, OH USA

Developmental Toxicity of JP-8 Jet Fuel in the Rat, *Jun. 1995 - Jan. 1996*

Cooper, James R., Armstrong Lab., USA; Mattie, David R., Armstrong Lab., USA; Journal of Applied Toxicology; 1996; Volume 16, No. 3, pp. 197-200; In English

Report No.(s): AD-A387377; AFRL-HE-WP-TR-2001-0021; Copyright; Avail: Defense Technical Information Center (DTIC)

JP-8 aviation fuel is being phased in as a replacement for both JP-4 and JP-5 jet fuels presently in use by the Air Force and Navy, respectively. At the present time, 11% of active-duty Air Force personnel are women of child-bearing age. This study was undertaken to determine the threat posed to the unborn fetus should a female active-duty personnel come in contact with JP-8 while pregnant. Time-mated Sprague-Dawley rates were dosed orally with JP-8 at 0, 500, 1000, 1500, and 2000 mg/kg/day on days 6-15 of pregnancy. The number and type of fetal malformations and variations observed did not differ significantly between does groups. Dams in the 1000, 1500, and 2000 mg/day group gained significantly less weight during pregnancy than did control dams. Embryo toxicity was indicated by a significant reduction in fetal body weight in the 1500 and 2000 mg/kg/day dose groups.

Author

Fetuses; JP-8 Jet Fuel; Pregnancy; Toxicity

20010066607 Oklahoma State Univ., Dept. of Zoology, Stillwater, OK USA

Development and Evaluation of Reproductive and Developmental Toxicity Tests for Assessing the Hazards of Environmental Contaminants *Final Report, Sep. 1993 - Nov. 1996*

Bantle, John A.; Aug. 1997; 225p; In English

Contract(s)/Grant(s): DAAL03-91-C-0034

Report No.(s): AD-A345948; AL/EQ-TR-1997-0050; No Copyright; Avail: Defense Technical Information Center (DTIC)

A subsurface spill of WA jet fuel at Eglin Air Force Base (AFB), FL, was remediated using nitrate application. The Frog Embryo Teratogenesis Assay-Xenopus (FETAX) was used before, during, and after remediation to detect whether toxicity had been altered. Reproductive toxicity tests were also performed using adult male and female Xenopus laevis on soil samples. FETAX endpoints were the 96-hour LC50 and 96-hour EC50 (malformation) and growth. Male endpoints were sperm number, morphology, percent motile, and sperm speed. Female endpoints were egg weight, percent normal, percent fertilized, and percent normally cleaving. Offspring from matings of treated animals were reared for 96 hour and the mortality, malformation, and growth of the embryos were assessed. The developmental toxicity of WA using FETAX was also established. Results from the Eglin AFB site suggested that WA was developmentally toxic. The direct exposure method was a superior method to aqueous extraction or supercritical fluid extraction for embryos. Relatively high levels of developmental toxicity and some reproductive toxicity were present in pre-remediation soil samples. Post-remediation data suggested that toxicity was probably reduced in both the nitrate and control cells.

DTIC

Toxicity; Contaminants; Hazards; Jet Engine Fuels; Reproduction

20010066768 NASA Johnson Space Center, Houston, TX USA

Effects of Gas-Phase Radiation and Detailed Kinetics on the Burning and Extinction of a Solid Fuel

Rhatigan, Jennifer L., NASA Johnson Space Center, USA; June 2001; 156p; In English

Report No.(s): NASA/TP-2001-210770; NAS 1.60:210770; S-879; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

This is the first attempt to analyze both radiation and detailed kinetics on the burning and extinction of a solid fuel in a stagnation-point diffusion flame. We present a detailed and comparatively accurate computational model of a solid fuel flame

along with a quantitative study of the kinetics mechanism, radiation interactions, and the extinction limits of the flame. A detailed kinetics model for the burning of solid trioxane (a trimer of formaldehyde) is coupled with a narrowband radiation model, with carbon dioxide, carbon monoxide, and water vapor as the gas-phase participating media. The solution of the solid trioxane diffusion flame over the flammable regime is presented in some detail, as this is the first solution of a heterogeneous trioxane flame. We identify high-temperature and low-temperature reaction paths for the heterogeneous trioxane flame. We then compare the adiabatic solution to solutions that include Surface radiation only and gas-phase and surface radiation using a black surface model. The analysis includes discussion of detailed flame chemistry over the flammable regime and, in particular, at the low stretch extinction limit. We emphasize the low stretch regime of the radiatively participating flame, since this is the region representative of microgravity flames. When only surface radiation is included, two extinction limits exist (the blow-off limit, and the low stretch radiative limit), and the burning rate and maximum flame temperatures are lower, as expected. With the inclusion of surface and gas-phase radiation, results show that, while flame temperatures are lower, the burning rate of the trioxane diffusion flame may actually increase at low stretch rate due to radiative feedback from the flame to the surface.
Author
Diffusion Flames; Extinction; Vapor Phases; Burning Rate; Kinetics; Stagnation Point

20010067435 NASA Marshall Space Flight Center, Huntsville, AL USA
Thermophysics Characterization of Kerosene Combustion
Wang, Ten-See, NASA Marshall Space Flight Center, USA; Journal of Thermophysics and Heat Transfer; April-June 2001; Volume 15, No. 2, pp. 140-147; In English; AIAA 34th Thermophysics Conference, 19-22 Jun. 2000, Denver, CO, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA; Original contains color illustrations
Report No.(s): AIAA Paper 2000-2511; Copyright Waived; Avail: CASI; A02, Hardcopy; A01, Microfiche

A one-formula surrogate fuel formulation and its quasi-global combustion kinetics model are developed to support the design of injectors and thrust chambers of kerosene-fueled rocket engines. This surrogate fuel model depicts a fuel blend that properly represents the general physical and chemical properties of kerosene. The accompanying gaseous-phase thermodynamics of the surrogate fuel is anchored with the heat of formation of kerosene and verified by comparing a series of one-dimensional rocket thrust chamber calculations. The quasi-global combustion kinetics model consists of several global steps for parent fuel decomposition, soot formation, and soot oxidation and a detailed wet-CO mechanism to complete the combustion process. The final thermophysics formulations are incorporated with a computational fluid dynamics model for prediction of the combustion efficiency of an unielement, tripropellant combustor and the radiation of a kerosene-fueled thruster plume. The model predictions agreed reasonably well with those of the tests.
Author
Thermodynamics; Kerosene; Combustion Chambers; Combustion Efficiency; Combustion Physics; Reaction Kinetics

29
SPACE PROCESSING

Includes space-based development of materials, compounds, and processes for research or commercial application. Also includes the development of materials and compounds in simulated reduced-gravity environments. For legal aspects of space commercialization see 84 Law, Political Science and Space Policy.

20010067174 NASA Marshall Space Flight Center, Huntsville, AL USA
Survey of Active Vibration Isolation Systems for Microgravity Applications
Grodsinsky, Carlos M., Bicron Corp., USA; Whorton, Mark S., NASA Marshall Space Flight Center, USA; Journal of Spacecraft and Rockets; October 2000; Volume 37, No. 5, pp. 586-596; In English; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

In view of the utility of space vehicles as orbiting science laboratories, the need for vibration isolation systems for acceleration-sensitive experiments has gained increasing visibility. to date, three active microgravity vibration isolation systems have successfully been demonstrated in flight. A tutorial discussion of the microgravity vibration isolation problem, including a description of the acceleration environment of the International Space Station and attenuation requirements, as well as a comparison or the dynamics of passive isolation, active rack-level isolation, and active payload-level isolation is provided. The flight test results of the three demonstrated systems: suppression of transient accelerations by levitation, the microgravity vibration isolation mount, and the active rack isolation system are surveyed.
Author
Vibration Isolators; Isolation; Microgravity

31
ENGINEERING (GENERAL)

Includes general research topics 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.

20010066082 Photonic Sensor Systems, Inc., Atlanta, GA USA
An Integrated Optic Chemical Sensor for Cone Penetrometers ***Final Report***
Hartman, Nile F.; Mar. 31, 1998; 15p; In English
Contract(s)/Grant(s): DAAG55-97-C-0006
Report No.(s): AD-A344526; ARO-36333.1-RT-ST; No Copyright; Avail: Defense Technical Information Center (DTIC)

This is the final report for the first year of Phase II efforts to develop an integrated optic chemical sensor for cone penetrometers. It covers the performance period from Feb. 10, 1997 through Feb. 9, 1998. Activities were in four principal areas: (1) development of a BTEX-selective sensing chemistry, (2) definition of the overall sensor system configuration, including detailed component designs, (3) development of a signal processing algorithm, and (4) design and fabrication of a laboratory test chamber to allow dynamic testing (i.e.; simulated cone pushes) of the prototype chemical sensor module.
DTIC
Dynamic Tests; Fabrication; Optical Measuring Instruments

20010066567 Naval Air Warfare Center, Weapons Div., China Lake, CA USA
Aircraft Carrier Hangar Bay Smoke Removal Tests Conducted Onboard the USS Eisenhower ***Final Report***
Parker, Arthur J., Hughes Associates, Inc., USA; Peatross, Michelle J., Hughes Associates, Inc., USA; Darwin, Robert L., Hughes Associates, Inc., USA; Risley, Glenn E., Naval Air Warfare Center, USA; Bowman, Howard L., Naval Air Warfare Center, USA; Davidson, Ross A., Naval Air Warfare Center, USA; Leach, William B., Naval Air Warfare Center, USA; Williams, Frederick W., Naval Research Lab., USA; September 2000; 26p; In English
Report No.(s): AD-A386425; NAWCWD-TP-8475; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

The objective of this test program was to conduct preliminary scoping tests onboard the U.S.S. Eisenhower for the purpose of providing guidance on changes to the smoke removal procedures described in the current fire fighting doctrine. During these preliminary scoping tests, existing smoke generators onboard the U.S.S. Eisenhower were used to determine the smoke filling time and removal performance from the hangar bay under various door configurations, with visibility within the hangar bay used as the measure of performance. The effect of door status and wind direction was evaluated during these tests. Doors used included elevator doors and other doors opening to weather (i.e., sponson doors). The effect of crosswinds and headwinds was evaluated for the different door configurations.
Author
Aircraft Carriers; Fire Fighting; Smoke; Visibility; Wind Effects

20010066633 TriData Corp., Arlington, VA USA
Compressed Air Foam for Structural Fire Fighting: A Field Test, Boston, Massachusetts
Routley, J. G.; 2001; 30p; In English
Contract(s)/Grant(s): EMW-90-C-3338
Report No.(s): PB2001-106076; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

The overall objective of the test program was to evaluate the effectiveness and suitability of compressed air foam system (CAFS) as a fire fighting agent in an urban environment. The analysis was intended to weigh the costs and benefits of installing CAFS on urban apparatus, the relative effectiveness of CAFS versus water for interior and urban fire suppression, and the positive and negative operational characteristics of CAFS that would influence a decision on whether or not to install CAFS on new vehicles. An important consideration of the study was to identify any critical deficiencies or potential hazards that would cause CAFS to be considered unsuitable for urban use or that would require special precautions.
NTIS
Accident Prevention; Fire Fighting; Compressed Air; Foams; Field Tests; Fire Prevention

20010066712 Cybersonics, Inc., Erie, PA USA
Rock Driller ***Final Report, 16 Mar. 1999 - 16 Mar. 2001***
Peterson, Thomas M., Cybersonics, Inc., USA; Jul. 11, 2001; 21p; In English; Original contains color illustrations
Contract(s)/Grant(s): NAS3-99122; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The next series of planetary exploration missions require a method of extracting rock and soil core samples. Therefore a prototype ultrasonic core driller (UTCD) was developed to meet the constraints of Small Bodies Exploration and Mars Sample Return Missions. The constraints in the design are size, weight, power, and axial loading. The ultrasonic transducer requires a relatively low axial load, which is one of the reasons this technology was chosen. The ultrasonic generator breadboard section can be contained within the 5x5x3 limits and weighs less than two pounds. Based on results attained the objectives for the first phase were achieved. A number of transducer probes were made and tested. One version only drills, and the other will actually provide a small core from a rock. Because of a more efficient transducer/probe, it will run at very low power (less than 5 Watts) and still drill/core. The prototype generator was built to allow for variation of all the performance-effecting elements of the transducer/probe/end effector, i.e., pulse, duty cycle, frequency, etc. The heart of the circuitry is what will be converted to a surface mounted board for the next phase, after all the parameters have been optimized and the microprocessor feedback can be installed.
Author
Prototypes; Transducers; Core Sampling; Drilling

20010067235 NASA Marshall Space Flight Center, Huntsville, AL USA
National Center for Advanced Manufacturing Overview
Vickers, J., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 16p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

The National Center for Advanced Manufacturing (NCAM) is a strategy, organization, and partnership focused on long-term technology development. The NCAM initially will be a regional partnership, however the intent is national in scope. Benchmarking is needed to follow the concept to the finished project, not using trial and error. Significant progress has been made to date, and NCAM is setting the vision for the future.
Derived from text
Manufacturing; Technology Utilization; Research and Development; Aerospace Industry

20010067236 NASA Marshall Space Flight Center, Huntsville, AL USA
Advanced Engineering Environments: Implications for Aerospace Manufacturing
Thomas, D., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 9p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

There are significant challenges facing today's aerospace industry. Global competition, more complex products, geographically-distributed design teams, demands for lower cost, higher reliability and safer vehicles, and the need to incorporate the latest technologies quicker all face the developer of aerospace systems. New information technologies offer promising opportunities to develop advanced engineering environments (AEEs) to meet these challenges. Significant advances in the state-of-the-art of aerospace engineering practice are envisioned in the areas of engineering design and analytical tools, cost and risk tools, collaborative engineering, and high-fidelity simulations early in the development cycle. These advances will enable modeling and simulation of manufacturing methods, which will in turn allow manufacturing considerations to be included much earlier in the system development cycle. Significant cost savings, increased quality, and decreased manufacturing cycle time are expected to result. This paper will give an overview of the NASA's Intelligent Synthesis Environment, the agency initiative to develop an AEE, with a focus on the anticipated benefits in aerospace manufacturing.
Author
Aerospace Industry; Aerospace Systems; Manufacturing; Systems Engineering

20010067266 Environmental Technology and Education Center, Albuquerque, NM USA
Identification of High Performance, Low Environmental Impact Materials and Processes Using Systematic Substitution (SyS)
Dhooge, P. M., Environmental Technology and Education Center, USA; Nimitz, J. S., Environmental Technology and Education Center, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 9p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Process analysis can identify opportunities for efficiency improvement including cost reduction, increased safety, improved quality, and decreased environmental impact. A thorough, systematic approach to materials and process selection is valuable in any analysis. New operations and facilities design offer the best opportunities for proactive cost reduction and environmental improvement, but existing operations and facilities can also benefit greatly. Materials and processes that have been used for many years may be sources of excessive resource use, waste generation, pollution, and cost burden that should be replaced. Operational

and purchasing personnel may not recognize some materials and processes as problems. Reasons for materials or process replacement may include quality and efficiency improvements, excessive resource use and waste generation, materials and operational costs, safety (flammability or toxicity), pollution prevention, compatibility with new processes or materials, and new or anticipated regulations.
Derived from text
Substitutes; Materials; Process Control (Industry)

20010067267 Inland Technology, Inc., Tacoma, WA USA
Selection Criteria for Alternate Technologies, as a Method of Hazardous Waste Minimization
Lethe, E., Inland Technology, Inc., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 4p; In English; See also 20010067226; No Copyright; Avail: CASI; A01, Hardcopy; A10, Microfiche

The need for environmentally compliant processes and materials in the Aerospace Industry grows more pressing every day. As the need for these processes grows, so grows the confusion regarding the selection and implementation of these new methods and materials. In the past, price and traditional procedure were the only criteria by which a material was procured. Speed and compliance with OEM specification governed how things were done on the shop floor. With the advent of the environmental regulations, processes are being examined all across the globe. In many of the larger Aerospace companies, the chief environmental officer has as important a role as the comptroller or CFO. Environmental managers are often not chemists or aerospace line mechanics, as typically. the environmental manager is skilled in the policies of waste disposal, spill clean up, or remediation. This paper will suggest methods for selection of alternative products and processes in a clear and organized manner. Salient points will be: (1) Process Examination; (2) Material Selection; (3) Steps for Successful Implementation; (4) Possible Impediments; and (5) How to Avoid Risky Alternatives. It will focus on procedures that will assist in the decision making process, and hopefully be of use in the choosing of environmentally sound equipment, chemicals, and methodologies.
Derived from text
Waste Management; Process Control (Industry); Hazardous Wastes

20010067269 BFK Solutions, Pacific Palisades, CA USA
Liquid Filtration for Component Reliability and Waste Minimization
Kanegsberg, E., BFK Solutions, USA; Kanegsberg, B., BFK Solutions, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 7p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Liquid filtration is an important tool for the component manufacturer for increasing the performance of the component, to reduce manufacturing costs, and to minimize waste streams. The type of filter to be used depends on its function and degree of effectiveness required. Using a filter not matched to the requirement can, at the least, increase costs and, at the worst, result in component failure. The principles of liquid filtration are applicable to both aqueous and non-aqueous solvent cleaning but much of the terminology is grounded in aqueous cleaning
Author
Filtration; Requirements; Design Analysis; Pollution Control

20010067292 NASA Marshall Space Flight Center, Huntsville, AL USA
Cryogenic Tank Technology Program (CTTP)
Vaughn, T. P., NASA Marshall Space Flight Center, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 5p; In English; See also 20010067226; No Copyright; Avail: CASI; A01, Hardcopy; A10, Microfiche

The objectives of the Cryogenic Tank Technology Program were to: (1) determine the feasibility and cost effectiveness of near net shape hardware; (2) demonstrate near net shape processes by fabricating large scale-flight quality hardware; and (3) advance state of current weld processing technologies for aluminum lithium alloys.
Derived from text
Cost Effectiveness; Fabrication; Aluminum-Lithium Alloys; Cryogenic Equipment; Tanks (Containers)

20010067318 Nu-Cast, Inc., Londonderry, NH USA
Aluminum Investment Cast Spacecraft and Aerospace Structures
Bowkett, J., Nu-Cast, Inc., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The mandate for 'better, faster, cheaper' has had a profound effect on aerospace projects. Project personnel, budgets, and development time have been compressed. Coupled with this mandate has been the threat to cancel projects that exceed their budgets. Projects perceived to be grandiose or padding their cost estimates are eliminated or not even considered for selection, regardless of their technical or scientific merit. There is no single solution for this situation. to work effectively in this environment requires an end-to-end approach that reduces project engineering, analysis, drafting, checking, manufacturing, testing, and integration. This approach, above all, must include the desire to depart from standard aerospace engineering practices. Engineers at Goddard Space Flight Center addressed this changing environment with investment casting technology. Previously, casting had been used for electronic enclosures and some secondary structures; it required production rates of 100 units before being considered. Expanding the technology to primary load path spacecraft structures had been perceived to be costly and of marginal benefit. NASA engineers designed and successfully flew a low-risk investment cast spacecraft and then progressed to a larger, complex monolithic spacecraft for Pegasus-class expendable launch vehicles and primary load path payload structures for the Space Shuttle. Significant and surprising cost savings have been realized end to end on projects employing this technology. The presentation will showcase advanced applications with aluminum investment casting, the evolutionary approach taken, cost savings realized, technical and political complications encountered, lessons learned, and future work.
Author
Aluminum; Investment Casting; Technology Utilization; Spacecraft Structures

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.

20010066083 Minnesota Univ., Dept. of Electrical Engineering, Rochester, MN USA
Concurrent Architecture for VLSI Signal and Image Processing ***Final Report, 30 Sep. 1994 - 29 Mar. 1998***
Parhi, K. K.; Apr. 23, 1998; 7p; In English
Contract(s)/Grant(s): DAAH04-94-G-0405
Report No.(s): AD-A344563; ARO-31080.24-EL; No Copyright; Avail: Defense Technical Information Center (DTIC)
In this project we addressed high speed and low power implementations of various recursive and adaptive digital filters, finite field arithmetic and error control coders, and developed design methodologies for design of folded or time multiplexed architectures for multi-dimensional and multirate systems.
DTIC
Adaptive Filters; Arithmetic; Coders; Errors; Multiplexing

20010066121 Naval Postgraduate School, Monterey, CA USA
A Business Process Review of the Satellite Access Request, Gateway Access Request, and Request for Services Processes at USA Transportation Command
Bramble, Michael L.; Mar. 2001; 80p; In English
Report No.(s): AD-A389577; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
The current emphasis on the implementation of e-business and automated solutions in the quest for increased efficiency accentuates the importance of Business Process Reengineering. The existing method for processing Satellite Access Requests (SAR), Gateway Access Requests (GAR) and Requests for Services (RFS) at USTRANSCOM is an ideal candidate for review and innovation. The premise of this thesis is that Business Process Reengineering, using information technology and other enablers of change, may produce quantum performance gains in these processes, particularly in terms of cycle time. Three redesign alternatives to the current process are developed using the Nissen methodology in conjunction with computer modeling and simulation tools. All three processes have tremendous potential to demonstrate dramatic reductions in cycle time, resulting in more efficient, streamlined satellite communications access request procedures at USTRANSCOM. The redesigns are based on delegation of authority, reducing the length of the process, and the introduction of an automated, web-based solution to streamline workflow and increase productivity. The research concludes that the SAR, GAR, and RFS processes can be dramatically improved through the application of an automated, information technology solution.
DTIC
Satellite Communication; Access Time; Transportation; Information Systems

20010066174 Sandia National Labs., Albuquerque, NM USA

Performance Limits for Synthetic Aperture Radar

Doerry, A. W.; Jan. 2001; 42p; In English

Report No.(s): PB2001-106098; SAND2001-0044; No Copyright; Avail: National Technical Information Service (NTIS)

The performance of a Synthetic Aperture Radar (SAR) system depends on a variety of factors, many which are interdependent in some manner. It is often difficult to get your arms around the problem of ascertaining achievable performance limits, and yet those limits exist and are dictated by physics, no matter how bright the engineer tasked to generate a system design. This report identifies and explores those limits, and how they depend on hardware system parameters and environmental conditions. Ultimately, this leads to a characterization of parameters that offer optimum performance for the overall SAR system. For example, there are definite optimum frequency bands that depend on weather conditions and range, and minimum radar PRF for a fixed real antenna aperture dimension is independent of frequency.

NTIS

Systems Engineering; Synthetic Aperture Radar; Design Analysis

20010066214 Army War Coll., Carlisle Barracks, PA USA

What Will Commercial Satellite Communications do For the Military After Next?

Petersen, Gregg E.; May 13, 1998; 50p; In English

Report No.(s): AD-A345570; No Copyright; Avail: Defense Technical Information Center (DTIC)

In the eight years from 1995 to 2003, over 890 commercial communications satellites comprising 34 new system constellations will be placed into service orbiting our planet. Many recent studies of the future USA military have identified satellite communications as key to the of the future force. The military's requirement for command and control on the move (C2OTM) and its penchant for often deploying to areas where little or no infrastructure exists further validate this satellite communication requirement. Although the military has its own satellite communications systems in use now and planned for the future, those systems have relatively low throughput and therefore do not satisfy the gross future requirements. As military budgets shrink and military constellations wear out without our ability to replace but a very few justified hardened systems, DoD must acquire the best possible mix of satellite communications support for the warfighter via commercial means. The three keys to military success for the force after next in this dual use area of technology will be: (1) knowledge of our own requirements, (2) knowledge of the technology's limitations, and (3) close cooperation with industry to insure our service specific requirements are met.

DTIC

Command and Control; Commercial Spacecraft; Communication Satellites; Satellite Communication

20010066222 Army Research Lab., Adelphi, MD USA

A Technique for Calibrating the Phase Detector of Wideband Radars Using a Phase Modulation and Demodulation Scheme ***Final Report, Jan. 1997 - Sep. 1997***

Pizzillo, Thomas J.; Wallace, H. B.; May 1998; 17p; In English

Contract(s)/Grant(s): Proj. PE62120A

Report No.(s): AD-A346080; ARL-TR-1567; No Copyright; Avail: Defense Technical Information Center (DTIC)

A signal processing method is presented for correcting imbalances in the phase-detection channels of a coherent, wideband radar. Several papers have addressed this problem by the use of the fast Fourier transform (FFT) as a narrowband filter (see F. E. Churchill, G. W. Ogar, and B. J. Thompson, The Correction of I and Q Errors in a Coherent Processor, IEEE Trans. Aerosp. and Electron. Syst., AES-17 (January 1981), pp 131-137, and H. Bruce Wallace and Thomas J. Pizzillo, A Technique for Calibrating the Phase Detector of a Wideband Radar Using an External Target, Army Research Laboratory, ARL-TR-1521 (March 1998)). The present technique relies upon phase modulation of the transmitted waveform, then demodulation of the phase of the received waveform, and finally the integration and normalization of the waveform. There is one constraint; the number of phase-modulation/demodulation steps is restricted to 4 k, where k is an integer greater than 0. The technique is not dependent upon the target or the phase and gain flatness of the radar waveform. Errors remaining after application of this technique depend on the signal-to-noise ratio and errors in the phase modulator.

DTIC

Fast Fourier Transformations; Phase Detectors; Phase Modulation; Signal Processing; Calibrating; Coherent Radar

20010066295 General Accounting Office, Washington, DC USA

Testimony Before the Subcommittee on Technology and Procurement Policy, Committee on Government Reform, House of Representatives. FTS2001: Contract Transition Delays and Their Impact on Program Goals

Koontz, Linda D.; Apr. 26, 2001; 14p; In English

Report No.(s): AD-A389364; GAO-01-544T; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Mr. Chairman and Members of the Subcommittee: Thank you for inviting us to participate in today's hearing on the FTS2001 long distance telecommunications program. As you know, telecommunications services are increasingly critical in transforming the way the federal government conducts business, allowing us to streamline our processes, reduce paperwork and delays, increase efficiency, and improve our interaction with the public. It is therefore important that a far-reaching program like FTS2001 be successfully implemented in order to maximize benefits to the taxpayers. Although GSA planned to complete the transition from FTS 2000 to the FTS2001 contracts by December 6, 2000, this date was not met. We discuss in our report, released today, several factors that contributed to transition delays. At this point, progress has been made in resolving the problems described, and most remaining transition requirements are scheduled for completion by the end of June 2001. Nevertheless, the collective effect of delays encountered during this complex transition has jeopardized the timely achievement of FTS2001's two program goals: ensuring best service and price to the government and maximizing competition. My testimony to you this afternoon will address the status of the transition from FTS 2000 to FTS2001, reasons for delays and the steps taken to eliminate transition impediments, the effects of the delays on meeting the FTS2001 program goals, including the effects on maximizing competition, and the steps being taken by GSA to address our recommended actions for positioning the FTS2001 program for greater success.

DTIC

Contracts; Congressional Reports; Hearing; Policies; Technologies; Telecommunication

20010066503 Information Assurance Technology Analysis Center, Falls Church, VA USA

ECM Techniques Generation

Geise, John E., Information Assurance Technology Analysis Center, USA; Apr. 01, 1997; 77p; In English

Report No.(s): AD-A390666; No Copyright; Avail: CASI; A01, Microfiche; A05, Hardcopy

The goal of this session is to provide a comprehensive look at functional areas of ECM system and trade-off considerations, i.e. apertures, receivers/processors, counter/measurer techniques generators, and high power sources. Also to a provide comprehensive look at techniques, i.e. generators, system architectures, interaction between jamming and radar processing, trades and drivers, and processes/tools.

DTIC

Electronic Countermeasures; Signal Processing; Optical Countermeasures

20010066537 Arcon Corp., Waltham, MA USA

Novel Space-Time Adaptive Processing Methods for Gaussian and Non-Gaussian Radar Clutter ***Final Report, Dec. 1998-Oct. 2000***

Rangaswamy, Muralidhar; May 2001; 38p; In English

Contract(s)/Grant(s): F30602-98-C-0283; AF Proj. 2304

Report No.(s): AD-A390662; AFRL-SN-RS-TR-2001-78; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Our work on this contract has four main thrusts. We addressed (1) the problem of optimal target detection of a rank one signal in additive non-Gaussian clutter modeled as a spherically invariant random process. Performance analysis of the optimal signal processor was carried out. However, practical implementation of the optimal processor requires know- ledge of the probability density function underlying the clutter, which is often unavailable. Hence, (2) we considered the performance of sub-optimum as well as ad-hoc approximations to the optimal processor. Next, (3) we concerned ourselves with the performance of parametric space-time adaptive processing methods in Gaussian interference and addressed issues of detection probability. constant false alarm rate and reduced training data support. Finally, (4) we provided a rigorous statistical analysis of the recently proposed non-homogeneity detector, which is useful for training data selection in STAP applications.

DTIC

Signal Processing; Matched Filters; Clutter; Target Acquisition

20010066576 Naval Postgraduate School, Monterey, CA USA
Semantic Interoperability in AD Hoc Wireless Military Networks
Hafsia, Raouf; Mar. 2001; 114p; In English
Report No.(s): AD-A390328; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Ad hoc wireless networks are decentralized networks whose members join and leave the network in an asynchronous manner and for short periods of time. Each node participating in the network acts both as host and a router. Ad hoc networks in theory, support missions of the Armed Forces in situations in which the infrastructure for wire-bound networks is not dependable, it is impractical to build and maintain the infrastructure, or the missions requires that the nodes have a high-degree of mobility. Ad hoc wireless networks require some level of semantic interoperability so that nodes in the network can 'understand' each other. In this thesis we discuss requirements for semantic interoperability in ad hoc wireless networks, and present a case study of how such requirements could be applied. We realized during our study that semantic interoperability components and functions are developed mostly for wired networks, and not taking in consideration the wireless issues such as processing, power, and networking limitations. In this thesis we discuss wireless user infrastructure, mobile middleware, and wireless application protocols as a solution to realize semantic interoperability in wireless ad hoc networks.
DTIC
Semantics; Telecommunication; Radiotelephones

20010066619 Stanford Univ., Dept. of Computer Science, Stanford, CA USA
Combinatorial Optimization with Applications to Resource Management in Communications Networks ***Final Report, 12 Mar. 1995 - 28 Feb. 1998***
Plotkin, Serge; Feb. 1998; 11p; In English
Contract(s)/Grant(s): DAAH04-95-1-0121
Report No.(s): AD-A389177; ARO-32360.1-MA; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The main goal of this project is to develop fundamental algorithmic techniques that can be applied to problems that arise in the context of high speed communications networks. The emphasis is on efficient algorithms for resource management. This research project has two main components The first is development of well founded algorithmic techniques for online resource allocation where one needs to make decisions based on partial data and without knowledge of the future. The main goal is to develop techniques that lead to provable guarantees on worst case performance and ensures good performance on average. Research on these problems consists of both theoretical analysis and simulation based studies. The second component is design of efficient offline resource allocation algorithms based on multi commodity flow techniques. The difference between this work and existing efforts is that we are designing and tuning the algorithms to produce approximate solutions instead of designing algorithms to produce exact solutions in theory. The result is code that is orders of magnitude faster than existing code and which achieves a precision of better than 1.
DTIC
Algorithms; Communication Networks; Combinatorial Analysis; Resource Allocation; Optimization

20010066786 Naval Postgraduate School, Monterey, CA USA
A Hierarchical Approach to the Classification of Digital Modulation Types in Multipath Environments ***Final Report, Sep. 1999-Dec. 2000***
Fargues, M. P., Naval Postgraduate School, USA; Hatzichristos, G., Naval Postgraduate School, USA; May 01, 2001; 181p; In English
Report No.(s): AD-A390409; NPS-EC-01-004; No Copyright; Avail: CASI; A02, Microfiche; A09, Hardcopy

This study presents a hierarchical classification approach to the classification of digital modulation schemes of types 2,4,8-PSK, 2,4,8-FSK and 16,64,256-QAM in low SNR levels and multipath propagation channel conditions. A hierarchical tree-based classification approach is selected as it leads to a relatively simple overall scheme with few parameters needed to differentiate between the various modulation types. Back-propagation neural network units are adopted at each tree node because they offer the flexibility needed to cope with varying propagation environments, as is the case in real-world communications. The selection of robust and well-defined higher-order statistics-based class features is considered and a small number of cumulates and moments chosen to differentiate between all various types of modulation types, except for specific M-QAM types. Simulations show that M-QAM types may be so affected by multipath and fading that higher-order statistic parameters become of very limited use. While being part of the hierarchical procedure, the identification of specific M-QAM types is conducted via equalization algorithms. Extensive simulations show overall classification performances to be strongly affected by the amount

of multipath distortion and noise in the transmission channels. Results also show a much higher sensitivity of high-order M-QAM types to fading and multipath propagation distortions than other modulation types.
DTIC
Hierarchies; Statistical Analysis; Digital Systems; Quadrature Amplitude Modulation; Radio Communication

20010067079 Naval Postgraduate School, Monterey, CA USA
An Architecture for Analysis and Collection of RF Signals Used by Hand-Held Devices in Computer Communications
Hwa, Chua G.; Mar. 2001; 108p; In English
Report No.(s): AD-A390417; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This thesis studies the wireless communications aspects of an Internet-connected hand-held device. It reviews the multipath effects of RF propagation and provides a detailed analysis of the Mobitex network protocols. Field experiments were conducted to measure the signal strength of indoor and outdoor reception. A framework for using real-time wireless communications analysis equipment for the collection of this RF signal is designed and discussed. Expected results from the collection of this signal data are presented.
DTIC
Radio Frequencies; Interprocessor Communication; Wireless Communication; Communication Equipment; Protocol (Computers); Multipath Transmission

20010067152 NASA Marshall Space Flight Center, Huntsville, AL USA
A ”Kane’s Dynamics” Model for the Active Rack Isolation System
Hampton, R. D., Alabama Univ., USA; Beech, G. S., NASA Marshall Space Flight Center, USA; Rao, N. N. S., Alabama Univ., USA; Rupert, J. K., Alabama Univ., USA; Kim, Y. K., NASA Marshall Space Flight Center, USA; May 2001; 49p; In English
Report No.(s): NASA/TM-2001-211063; M-1019; NAS 1.15:211063; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Many microgravity space science experiments require vibratory acceleration levels unachievable without active isolation. The Boeing Corporation’s Active Rack Isolation System (ARIS) employs a novel combination of magnetic actuation and mechanical linkages to address these isolation requirements on the International Space Station (ISS). ARIS provides isolation at the rack (International Standard Payload Rack (ISPR)) level. Effective model-based vibration isolation requires: (1) an appropriate isolation device, (2) an adequate dynamic (i.e., mathematical) model of that isolator, and (3) a suitable, corresponding controller. ARIS provides the ISS response to the first requirement. This paper presents one response to the second, in a state space framework intended to facilitate an optimal-controls approach to the third. The authors use ”Kane’s Dynamics” to develop a state-space, analytical (algebraic) set of linearized equations of motion for ARIS.
Author
Mathematical Models; Microgravity; Vibration Isolators; Spaceborne Experiments; Isolation

20010067307 Control Vision, Inc., Idaho Falls, ID USA
Real Time Video Recording of Extremely High Temperature Processes
Hoffman, T., Control Vision, Inc., USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 5p; In English; See also 20010067226; No Copyright; Avail: CASI; A01, Hardcopy; A10, Microfiche

Surface details of materials at extremely high temperatures are quite difficult to monitor with the human eye or with standard video and photographic cameras. Details such as the behaviors of the solid or molten material, surface contaminants or cracks are obscured by the incandescence coming from the surface itself. Additionally, when attempting to view processes with relatively small areas of overwhelming brightness, such as laser welding, the image is additionally degraded by the extreme brightness variation across the image area, making it impossible to achieve proper exposure throughout the scene. The key to obtaining an image that is property exposed and shows surface detail lies in using reflected illumination. Reflected illumination provides the basis for almost all of our natural viewing capabilities relying on either natural or artificial lighting to see almost everything in our daily lives. A good example of the principle of reflected illumination can be found in the difference of appearance when viewing the Sun versus the moon. Viewing the sun directly, even with heavy attenuating filters, tells us nothing about the surface since the sun radiates intensely across the visible spectrum. The moon, however, does not radiate in the visible spectrum. Our image of the moon is created by reflected light from the sun. Using the sun’s illumination, we are able to see a tremendous amount of surface detail such as craters, valleys and peaks. Recent electro-optical innovations in charged coupled device (CCD) chip technology and various efficient light sources have provided the basis for implementation of real-time videographic techniques

for viewing and recording surface conditions of high temperature processes. This paper describes a basic system design and the implementation of these techniques to a variety of high temperature industrial processes.
Derived from text
Real Time Operation; Viewing; Brightness; Reflectance

20010067404 Michigan Univ., Dept. of Electrical Engineering and Computer Science, Ann Arbor, MI USA
Reconfigurable Low Energy Multiplier for Multimedia System Design
Kim, Suhwan; Papaefthymiou, Marios C.; Jan. 2000; 7p; In English
Contract(s)/Grant(s): DAAD19-99-1-0304
Report No.(s): AD-A389526; ARO-39863.1-CI; No Copyright; Avail: CASI; A01, Microfiche; A02, Hardcopy

This paper proposes a reconfigurable pipelined multiplier architecture that achieves high performance and very low energy dissipation by adapting its structure to computational requirements over time. In this reconfigurable multiplier, energy is saved by disabling and bypassing an appropriate number of pipeline stages whenever input data rates are low. to evaluate the efficiency of our multiplier architecture, we have designed a multiplier-based inverse quantizer (IQ) for MPEG-2 MP@ML. Pipelines are dynamically reconfigured according to the size of the picture and the number of nonzero quantized DCT coefficients per block. In comparison with corresponding multiplier implementations that use conventional pipelines, our reconfigurable multipliers dissipate about 31-58% less energy. Relative energy savings increase with decreasing data rates, since our reconfigurable structures stay in a low energy' configuration for proportionately longer time.
DTIC
Video Signals; Multipliers; Signal Processing; Multimedia

20010067436 Research Associates for Defense Conversion, Inc., Marcy, NY USA
Bistatic Denial Using Spatial-Temporal Coding ***Final Report, Aug. 1998-Jul. 2000***
Griffiths, Hugh, Research Associates for Defense Conversion, Inc., USA; Mar. 2001; 29p; In English
Contract(s)/Grant(s): F30602-98-C-0275; AF Proj. 4113
Report No.(s): AD-A389603; AFRL-SN-RS-TR-2001-28; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

This report describes work performed on the design of waveforms emitted by an airborne radar, such that the radar cannot be used by an adversary as a coherent reference for a bistatic radar system. This is accomplished by radiating, in addition to the conventional radar signal, another signal or set of signals, coded so as to be distinguishable from the conventional radar signal, and radiated via different radiation pattern(s) to the conventional radar signal. Thus, in the direction in which the radar operates the masking signal will be suppressed both by the radiation pattern with which it is radiated in that direction, though an adversary will detect a combination of the radar signal and the masking signal, such that he cannot correctly distinguish the radar signal. The investigation included a spatial coding technique based on orthogonal beams from a linear antenna array fed by a Butler Matrix. A simulation code was developed to calculate and plot the auto- and cross-ambiguity functions of arbitrary signals. The results indicate that the level of the masking signal received outside the main beam of the radar signal pattern should be adequate to deny a coherent reference.
DTIC
Antenna Radiation Patterns; Linear Arrays; Multistatic Radar; Radar Data

20010067603 Naval Postgraduate School, Monterey, CA USA
Realistic Traffic Generation Capability for SAAM Testbed
Turksoyu, Fatih; Mar. 2001; 168p; In English
Report No.(s): AD-A390418; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

Traffic modeling is an important component of the design of any communication network. This is even more crucial emerging networks, which are expected to operate in high speed and high bandwidth environments. As the design of a network depends to a great extent on the types of traffic it is expected to carry, it is essential to characterize the traffic that a network expected to carry. This is where traffic models are very important. They can be used to produce artificial traffic input that exhibits essential characteristics of real network loads. This thesis describes a design and implementation of a general-purpose traffic generator for a test bed of the Server a Agent Based Active Network Management (SAAM) architecture. The traffic generator is easy to use and implements the four most important traffic models (Constant Bit Rate (CBR), Poisson, Packet-Train, and Self-Similar). With this traffic generator, SAAM project now has the capability of simulating and testing the system components in more accurate and more realistic environments.
DTIC
Communication Networks; Data Management

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.

20010066070 National Central Univ., Dept. of Electrical Engineering, Chung-Li, Taiwan, Province of China
An Improved Levelized Incomplete LU Method and Its Application to 2D Semiconductor Device Simulation
Tsai, Yao-Tsung, National Central Univ., Taiwan, Province of China; Dai, Jing-Fu, National Central Univ., Taiwan, Province of China; Tsai, Mu-Kai, National Central Univ., Taiwan, Province of China; Journal of the Chinese Institute of Engineers; May 2001; ISSN 0253-3839; Volume 24, No. 3, pp. 389-396; In English
Contract(s)/Grant(s): NSC-89-2213-E-008-043; Copyright; Avail: Issuing Activity

Numerical simulation of semiconductor devices plays a very important role in the design and development of integrated circuits. We will present a new circuit simulator with an improved Levelized Incomplete LU method to perform such simulations. to have an environment for evaluating the interaction between a semiconductor device and a circuit, we use the equivalent circuit approach. This approach allows for simple representation carrier transport models of devices through equivalent circuit elements such as voltage controlled current sources and capacitors. Therefore, we can perform mixed-level simulation in general circuit simulators. We will take a PN diode switching circuit and MOSFET as examples to test our equivalent circuit model and the improved circuit simulator. The comparison between improved matrix solution method and the conventional method will be demonstrated, too. We will also show our method yields better matrix solutions than conventional methods.
Author
Integrated Circuits; Semiconductor Devices; Numerical Analysis

20010066080 University of Southern California, Los Angeles, CA USA
Atoms for Logic ***Final Report, 12 Apr. 1993 - 15 Jul. 1997***
Knize, Randall J.; Dec. 13, 1997; 7p; In English
Contract(s)/Grant(s): DAAH04-93-G-0148
Report No.(s): AD-A344508; Rept-53-4869-1846; ARO-30201.14-PH; No Copyright; Avail: Defense Technical Information Center (DTIC)

This project examined the use of atomic vapors in an optical correlator for pattern recognition. The nonlinear optics of very thin atomic vapors was studied. This work allowed the demonstration of an optical correlator in a thin cesium vapor. This correlator was able to compare patterns of letters as well as random patterns. The patterns can contain up to 10 to the 5th power pixel/sq cm and the correlation is obtained in 10 microseconds. In addition, methods to improve the performance of the optical correlator were investigated. Experiments showed that motion of the atoms during the excited state lifetime of 30 nsec limited the smallest pixel size to about 30 microns. Two methods that were investigated to improve this resolution were the use of buffer gasses to confine the atoms and laser cooling the atoms to reduce their speed. One set of experiments showed that buffer gasses can either quench the excited state lifetime or limited diffusion of the excited state atoms. Another set of experiments began investigation of laser cooling techniques to slow the atomic motion.
DTIC
Optical Correlators; Pattern Recognition

20010066125 Michigan Univ., Dept. of Electrical Engineering and Computer Science, Ann Arbor, MI USA
NDR Devices and their Digital Applications ***Final Report, 1 Jul. 1997-31 Aug. 2000***
Mazumder, Pinaki; Haddad, George I.; East, Jack R.; Aug. 31, 2000; 21p; In English
Contract(s)/Grant(s): F49620-97-1-0504
Report No.(s): AD-A389622; AFRL-SR-BL-TR-01-0315; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The objective of this project carried out under the ULTRA program of DARPA, was to validate the potential of ultrafast quantum-effect tunneling devices for the design of ultra-dense circuits and systems. The first part of the research effort involved the design, fabrication, and characterization of RTDs and HBTs. Information about device performance was then used to design and fabricate RTD-HBT circuits for a variety of unique low power high speed digital and analog applications. to facilitate the design and characterization of RTD-based circuits, a new simulator was developed that included physics-based device models for various tunneling devices as well as convergence routines to alleviate problems associated with the negative differential

resistance characteristics of RTDs. The report also presents circuit and system design activities that sought to co-integrate RTDs and MOS devices to develop a viable circuit technology for the post-shrinking VLSI era.
DTIC
Digital Systems; Fabrication; Heterojunction Devices; Bipolar Transistors

20010066171 Sandia National Labs., Albuquerque, NM USA
AlGaN Materials Engineering for Integrated Multi-Function Systems
Han, J.; Guilinger, T. R.; Kelly, M. J.; Flemming, J. G.; Tsao, S. S.; Jan. 2001; 28p; In English; Original contains color illustrations
Report No.(s): PB2001-106102; SAND(2001)-0133; No Copyright; Avail: National Technical Information Service (NTIS)

This LDRD is aimed to place Sandia at the forefront of GaN-based technologies. Two important themes of this LDRD are: (1) The demonstration of novel GaN-based devices which have not yet been much explored and yet are coherent with Sandia's and DOE's mission objectives. Ultraviolet (UV) optoelectronic and piezoelectric devices are just two examples. (2) To demonstrate front-end monolithic integration of GaN with Si-based microelectronics. Key issues pertinent to the successful completion of this LDRD have been identified to be (1) The growth and defect control of AlGaN and GaN, and (2) strain relief during/after the heteroepitaxy of GaN on Si and the separation/transfer of GaN layers to different wafer templates.
NTIS
Optoelectronic Devices; Aluminum Nitrides; Gallium Nitrides

20010066201 Virginia Polytechnic Inst. and State Univ., Dept. of Engineering Science and Mechanics, Blacksburg, VA USA
Global/Local Design Optimization of a Power Distribution System ***Final Report***
Gurdal, Zafer, Virginia Polytechnic Inst. and State Univ., USA; Ragon, Scott, Virginia Polytechnic Inst. and State Univ., USA; Lindner, Douglas, Virginia Polytechnic Inst. and State Univ., USA; Sep. 04, 2000; 14p; In English
Contract(s)/Grant(s): F49620-00-1-0056
Report No.(s): AD-A389362; AFRL-SR-BL-TR-01-0292; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

The MATLAB/Simulink analysis tools developed and upgraded by the electrical engineering team were successfully incorporated into the optimization environment. A well posed optimization problem was formulated for a sample system consisting of a filter and converter. It was shown that the solution of the optimzation problem yielded realistic parameter values. Also the existence of suboptimal solutions was investigated. These results are the core results for developing an optimization methodology for the full power distribution system. The optimization methodology is being reworked into a global/local formulation. This formulation allows us to define an optimization problem for the entire power distribution system. A preliminary framework for the sample system has been developed, and the appropriate software is being generated. The global/local formulation has also been applied to the design filters components with the inductors as their local level subcomponents. Preliminary results indicate a significant decrease in computational time while retaining the accuracy of the full problem.
DTIC
Electrical Engineering; Electric Power; Design Optimization; Inductors

20010066219 Widegap Technology, Westlake Village, CA USA
Low Power GaAs Enhancement: Depletion Technology using Native Al2O3 as an Insulator ***Final Report, 1 Jul. 1997 - 31 Mar. 1998***
Thibeault, Brian; May 11, 1998; 16p; In English
Contract(s)/Grant(s): F49620-97-C-0038; AF Proj. 3005
Report No.(s): AD-A345649; AFRL-SR-BL-TR-98-0463; No Copyright; Avail: Defense Technical Information Center (DTIC)

The WiTech phase I objectives were to explore the feasibility of Al2O3 as a buffer layer insulator for GaAs-on-insulator (GOI) technology and as a gate insulator for GaAs-based MISFETs. specifically, we have: (1) investigated the oxidation process and its effect on active device layers, showing the very little or no detrimental effect of the oxidation on the active region can be achieved by using LT-AlGaAs buffer layers; (2) fabricated an measured the performance of GaAs MESFETs with Al2O3 as a buffer layer insulator demonstrating nearly 50% RF (3 GHz) power added efficiency at low operating bias; and (3) fabricated and characterized MIS structures using Al2O3 as the insulator, showing the challenges and problems associated with using lateral steam-oxidation for producing a gate insulator.
DTIC
Aluminum Gallium Arsenides; Aluminum Oxides; Augmentation; Fabrication; Field Effect Transistors; Gallium Arsenides; Insulators

20010066297 Stevens Inst. of Tech., Dept. of Physics and Engineering Physics, Hoboken, NJ USA
Power Semiconductor Simulation ***Final Report, 1 Aug. 1997 - 31 Dec. 2000***
Cui, Hong-Liang; Mar. 30, 2001; 10p; In English
Contract(s)/Grant(s): DAAG55-97-1-0355
Report No.(s): AD-A389579; ARO-37540.1-EL; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This document describes the development of the Hydrodynamic Power Semiconductor Device Simulator (HPSDS), which solves the quantum mechanical hydrodynamic balance equations for the electrons and holes along with the Poisson equation, for a LW dimensional device. The program will compute the electrostatic potential, electron and hole densities, recombination rate, electron and hole velocities, current densities, electron and hole temperatures, and other quantities of interest as functions of applied bias. The program allows extensive analysis of unipolar, bipolar, and heterostructure devices. Power devices such as thyristor and other four or five terminal devices are treated under all possible operating conditions. Both steady state and transient operating conditions can be considered. Because of the inclusion of energy balance equations and heat diffusion equation, accurate high-field characteristics can be obtained with this program. Silicon and Gallium Arsenide are the primary materials considered here, although other materials can be included if the user supplies the necessary material data file. In particular, wide bandgap materials such as Silicon Carbide and Gallium Nitride are included also. In addition to the high-power aspects, high-frequency devices are also simulated. These include superlattice based negative differential resistance devices and resonant tunneling diodes.
DTIC
Computerized Simulation; Semiconductor Devices

20010066459 Materials Research Society, Warrendale, PA USA
Electron-Emissive Materials, Vacuum Microelectronics and Flat-Panel Displays, Volume 621
Jensen, Kevin L., Editor; Nemanich, Robert J., Editor; Holloway, Paul, Editor; Trottier, Troy, Editor; Mackie, William, Editor; Apr. 27, 2000; 531p; In English, 25-27 Apr. 2000, San Francisco, CA, USA
Contract(s)/Grant(s): N00014-00-1-0251
Report No.(s): AD-A390361; No Copyright; Avail: CASI; A23, Hardcopy; A04, Microfiche

This document is a record of the symposium held in San Francisco, California on April 25-27, 2000 on Electron-Emissive Materials, Vacuum Microelectronics and Flat-Panel Displays.
CASI
Vacuum; Microelectronics; Flat Panel Displays; Conferences

20010066479 Aerospace Corp., Technology Operations, El Segundo, CA USA
Low Dose Rate Proton Irradiation of Quartz Crystal Resonators
Koga, R.; Looper, M. D.; Pinkerton, S. D.; Stapor, W. J.; Jan. 15, 1998; 12p; In English
Contract(s)/Grant(s): F04701-93-C-0094
Report No.(s): AD-A345740; TR-96(8570)-3; SMC-TR-98-14; No Copyright; Avail: Defense Technical Information Center (DTIC)

Quartz crystal resonators were systematically irradiated with 65 MeV protons to characterize low dose rate radiation-induced degradation. Results indicate: (1) test samples that exhibit large frequency shifts during testing tend to show large frequency shifts prior to irradiation, or during off-irradiation periods; (2) for radiation-sensitive samples, short-term effects seem to decrease after each irradiation on/off cycle (moreover, those devices in which radiation effects do not decrease after a few cycles are not very sensitive); (3) the fabrication process may be an important determinant of susceptibility to low dose radiation-induced degradation; and (4) total-dose effects may be sublinear.
DTIC
Proton Irradiation; Resonators; Quartz Crystals; Determinants; Cycles

20010066480 Aerospace Corp., Technology Operations, El Segundo, CA USA
Overview of Device SEE Susceptibility from Heavy Ions
Nichols, D. K.; Coss, J. R.; McCarthy, K. P.; Schwartz, H. R.; Smith, L. S.; Jan. 15, 1998; 16p; In English
Report No.(s): AD-A345739; TR-93(3940)-4; SMC-TR-98-16; No Copyright; Avail: Defense Technical Information Center (DTIC)

A fifth set of heavy ion single event effects (SEE) test data have been collected since the last IEEE publications (1,2,3,4) in December issues for 1985, 1987, 1989, and 1991. Trends in SEE susceptibility (including soft errors and latchup) for state-of-the-art parts are evaluated.
DTIC
Heavy Ions; Trends

20010066481 SY Technology, Inc., Huntsville, AL USA
Dry-Etching Continuous Surface Profiles Into Infrared Semiconductor Materials ***Final Report, 18 Nov. 1997 - 18 May 1998***
Lindsey, Randall L.; May 1998; 18p; In English
Contract(s)/Grant(s): DAAB07-98-C-J404
Report No.(s): AD-A345298; No Copyright; Avail: Defense Technical Information Center (DTIC)
In this contract, SY Technology, Inc. has demonstrated and answered all of the technical objectives presented in the original proposal. First, we have shown that using MHA reactive ion etching to transfer continuous surface profiles into InSb substrates was not feasible using current production processing methods. This was the first technical objective. Second, we developed a precise photoresist exposure and development process to accurately replicate gray scale mask features. The photoresist which showed the most promise was the Shipley STR 1000 series photoresists. This was the second technical objective. Third, we were able to develop a process to successfully transfer continuous gray scale mask patterns into photoresist, a cmcial link in successfully making continuous surface profiles in any material. This was accomplished by means of an ion mill with oxygen. and finally, we were able to successfully etch continuous surface profiles into InAs and InSb This was the main goal of this SBJR research. As extra effort, beyond the requirements of this contract, we made a continuous gray scale mask of an operational off-axis field grating lens, transferred this pattern into photoresist, and etched the pattern into both InAs and InSb. At the end of this contract, SY Technology, Inc. will deliver not only a final report detailing the results of this research, but will also deliver an off-axis field grating lens in InSb, thus exceeding the goals of this contract This lens will be used by NVL in field equipment tests.
DTIC
Etching; Semiconductors (Materials); Production Engineering; Infrared Radiation; Optical Materials

20010066496 Portland State Univ., Dept. of Physics, OR USA
Heat Produced During the Electrolysis of D2O With Titanium Cathodes
Warner, J., Portland State Univ., USA; Dash, J., Portland State Univ., USA; Conference Proceedings: Heat Produced During the Electrolysis of D20 with Titanium Cathodes; Jan. 2000; Volume 70, pp. 161-167; In English; ICCF8, 2000, USA
Contract(s)/Grant(s): DAAG55-97-1-0357
Report No.(s): AD-A390194; ARO-37386.5-MB; No Copyright; Avail: CASI; A01, Microfiche; A02, Hardcopy
Cold rolling 20% appears to increase both the amounts of excess heat and reproducibility obtained by electrolysis of acidified D(2)O with titanium cathodes. Unexpected elements such as chromium and iron were detected on the surfaces of cathodes after electrolysis. The presence of chromium was confirmed by neutron activation analysis.
DTIC
Cathodes; Electrolysis; Titanium; Heavy Water; Heat

20010066543 Army Communications-Electronics Command, Night Vision and Electronic Sensors Directorate, Fort Belvoir, VA USA
Sensor Grand Challenges: An NVESD Perspective
Howe, James D.; Feb. 23, 1999; 21p; In English
Report No.(s): AD-A390613; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This report presents challenges for future sensor development from the perspective of the Night Vision and Electronics Sensor Directorate.
DTIC
Detectors; Night Vision

20010066550 Geospace Research, Inc., El Segundo, CA USA
MEMS RF Switches with Ultra-High Switching Speeds ***Final Report, 1 Jun. 2000-1 Feb. 2001***
May 25, 2001; 57p; In English; Original contains color plates
Contract(s)/Grant(s): DAAH01-00-C-R146
Report No.(s): AD-A390496; GRI-SB-01-7510; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The objective of this program was to validate a new actuator for high-speed, radio-frequency (RF) switches and to develop methodologies for its fabrication. Special attention is placed on switch performance at frequencies between 12-18 GHz. The switch is predicated on thin-film microelectromechanical systems (MEMS) technology with piezoelectric actuation. In general, piezoelectric materials develop strain when an electric field is present, which allows mechanical expansion and contraction of the material to be controlled by an applied voltage. Unlike traditional electrostatic MEMS switches, the closing force between the metal-to-metal contacts can be significantly improved by increasing the bias voltage (electric field strength) across the piezoelectric material. Because the switch restoring force is large, in-use stiction is greatly mitigated with this architecture. The piezoelectric material lead zirconate titanate (PZT) proved to be a viable actuator for high-speed switches. Three strategies are suggested for lowering the switch time constant into the tens of nanoseconds range while preserving other important characteristics of the switch (e.g., high isolation, low resistive losses). These include a bimorph design, piezoelectric extensional bars, and flextensional actuators. Combinations of these strategies are likely to yield a high-performance switch.
DTIC
Switches; Radio Frequencies; Microelectromechanical Systems

20010066573 Rockwell International Science Center, Thousand Oaks, CA USA
Device Characteristics of VLWIR MCT Photodiodes
DeWames, R. E.; Wijewarnasuriya, P. S.; McLevige, W.; Edwall, D.; Hildebrandt, G.; Aug. 1999; 9p; In English; Original contains color plates; Sponsored in part by Boeing Sensor Products
Report No.(s): AD-A390338; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We have characterized the current-voltage characteristics, spectral response and quantum efficiencies of Hg(1-x)Cd(x)Te photodiodes with x values equal to 0.209 and 0.194. The devices studied are double layer planar heterojunctions (DLPHJ) photodiodes fabricated by MBE. Arsenic ion implantation is used to form the heavily doped p-side. The base is indium-doped at carrier density levels of 5x10(exp 14)/cu cm. For x - 0.194 at T = 30K, the bandgap wavelength, lamba(g) is 22 micrometers. The reported IV's characteristics mostly deal with the behavior of small diodes, whereas the spectral response and quantity efficiencies are obtained from measurements on large diodes. Model calculations of the spectral response and quantity efficiencies are found to be in good agreement. For the device architecture with x = 0.209, a good fit to the zero-bias impedance area product R(O)A is obtained using current expressions for diodes of small geometries. From this analysis, we obtained for the hole minority carrier mobility a value of 610 sq cm/v-sec at T = 78K. This result is considered to be an independent measurement of micro(h). For the case with x = 0.194, we observe significant deviation in the current-density-temperature characteristics from these expected from ideal diode model calculations. Specifically, the optical bandgap obtained from the spectral response is significantly different from the electrical bandgap obtained from the temperature dependence of dark currents. This is in contrast with prior reported work for material with x = 0.194, where good agreement was observed between measured and calculated characteristics. Some of the I-V features of the recent devices support that the p-n junction is situated in the graded region and this could account for some of the observed electrical behavior. For devices of excellent quality, we observe temperature-assisted tunneling current mechanisms at T = 5K, i.e., bumps in the relatively low forward bias region.
DTIC
Infrared Detectors; Photodiodes; Mercury Cadmium Tellurides; Thermodynamic Properties; Optical Properties

20010066604 Naval Postgraduate School, Monterey, CA USA
The VLSI Implementation of a GIC Switched Capacitor Filter
Wilbur, Mickey Joe D.; Mar. 1998; 153p; In English; Original contains color plates
Report No.(s): AD-A346083; No Copyright; Avail: Defense Technical Information Center (DTIC)

In this research, the design and VLSI implementation of a digitally programmable active analog filter, based on the Generalized Immittance Converter (GIC) circuit, are presented. The programmable features include the filter type (bandpass, high pass, low pass or notch), the center or cut off frequency, and the quality factor. Switched capacitor networks are used to implement resistances. The design was first simulated and then implemented on a wire wrap board and tested. The circuit was then modeled and re-simulated using the Cadence Design Tools software package. Once the modeled circuit passes all design rule checks the final chip design was then submitted for fabrication. This research project will help provide a knowledge base for using Cadence software for VLSI CMOS design. Once the chip has been fabricated and tested it will provide a base for further development of stray insensitive VLSI design of analog circuits.
DTIC
Applications Programs (Computers); Very Large Scale Integration

20010066610 Naval Surface Warfare Center, Carderock Div., Bethesda, MD USA

Dependence of the Induced Loss Factor on the Coupling Forms and Coupling Strengths: Linear Analysis ***Final Report***

Maidanik, G., Naval Surface Warfare Center, USA; Becker, K. J., Naval Surface Warfare Center, USA; Apr. 20, 2001; 63p; In English; Original contains color plates

Report No.(s): AD-A389815; NSWCCD-70-TR-2001/055; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The influence of a set of satellite oscillators on the response behavior of a master oscillator, to which the set is coupled, is of fundamental significance to structural acoustics and beyond. The focus is largely on the induced loss factor that the satellite oscillators generate in the impedance of the master oscillator. Much of the research work performed on behalf of this investigation employed basically sprung-masses for the satellite oscillators. A sprung-mass is a primitive type of satellite oscillator and, as such, limitations are imposed on the range of applicability of these research works. In this paper more elaborate satellite oscillators are introduced; and, especially, a wider range of coupling forms and strengths are investigated. A number of new insights are, thereby, obtained. In particular, this paper is to facilitate further studies of the relationships among the linear impedance (LIA), the energy analysis (EA) and the statistical energy analysis (SEA). These studies are in progress and are to be reported subsequently.

DTIC

Oscillators; Acoustics; Impedance; Coupling; Statistical Analysis; Linear Systems; Satellites

20010066623 Maryland Univ., Dept. of Materials and Nuclear Engineering, College Park, MD USA

Direct Integration of Ferroelectric LSCO/PNZT Capacitors on Si with Conducting Barrier Layers ***Final Report, 1 Jun. 1996 - 31 May 1999***

Ramesh, R.; Apr. 30, 2001; 21p; In English

Contract(s)/Grant(s): DAAH04-96-1-0248

Report No.(s): AD-A390234; ARO-35845.11-RT-AAS; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The students (graduate and undergraduate) who were funded by this program, participated in a comprehensive research program that is addressing the materials science issues relevant to the integration of ferroelectric perovskite thin films on silicon substrates for nonvolatile memory applications. These students collaborated with other students, postdocs and guest researchers funded by other sources (both federal as well as industrial) in a TEAM' environment to address many of the complex issues and in parallel, leveraging the resources invested by the AASERT program. The AASERT funded students worked on two key aspects of the integration problem: (1) growth of ferroelectric PZT (and other derivatives) thin films on poly-Si/Si surfaces using conducting perovskite electrodes: this problem was focused mainly on the materials science of conducting barrier layers; and (2) reliability studies of the test capacitors fabricated on the aforementioned surfaces.

DTIC

Ferroelectric Materials; Barrier Layers; Perovskites; Thin Films; Capacitors; Fabrication

20010066720 Rockwell International Corp., Science Center, Thousand Oaks, CA USA

2048X2048 Visible/Infrared HgCdTe Focal Plane Arrays (FPAs)

Haas, A. K.; Cabelli, C.; Kozlowski, L. J.; Tennant, W. E.; Montroy, J. T.; Aug. 1999; 16p; In English; Prepared in cooperation with the Univ. of Hawaii, Inst. for Astronomy, Honolulu, HI; Valley Oak Semiconductor, Westlake Village, CA; Conexant Systems Inc. Newport Beach, CA.

Report No.(s): AD-A390403; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Rockwell has developed the world's largest multiplexer for use with infrared HgCdTe and visible silicon detector arrays. The resulting FPAs are to be proposed for the Next Generation Space Telescope (NGST) program, ground-based astronomy, and other low background applications. The 2048x2048 multiplexer's unit cell size is 18 micrometers x 18 micrometers with source follower per detector input (SFD) and 4 and 32 output amplifier selections. SWIR detectors with a spectral response of 0.85 micrometers to 2.5 micrometers have been processed on liquid phase epitaxy (LPE) HgCdTe on sapphire substrates. MWIR detectors (0.85-5.0 micrometers) will be processed on molecular beam epitaxy (MBE) HgCdTe on CdZnTe substrates. Response to wavelengths as low as 0.4 micrometer is possible with the substrate removal process and an example of this will be given. The multiplexer's has been designed and fabricated at Conexant (formerly Rockwell Semiconductor Systems). Room temperature probing shows that the device is functional with excellent yield 20%. Novel hybrid fabrication techniques have been used to construct the first engineering grade FPA, currently being tested. This HAWAII-2 device is based on the highly successful HAWAII 1024x1024 device and the performance will be similar.

DTIC

Infrared Detectors; Mercury Cadmium Tellurides; Arrays; Cadmium Tellurides; Focal Plane Devices; Zinc

20010066727 Georgia Inst. of Tech., School of Materials Science and Engineering, Atlanta, GA USA

Evaluating the Effect of Conformal Coatings in Reducing the Rate of Conductive Anodic Filament Formation ***Final Report, 4 Jan. 1998-4 Jan. 2001***

Turbini, Laura J., Georgia Inst. of Tech., USA; Stock, Stuart R., Georgia Inst. of Tech., USA; May 2001; 11p; In English; Prepared in cooperation with Centre for Microelectronics Assembly and Packaging, University of Toronto, Canada.

Contract(s)/Grant(s): N00014-98-1-0417

Report No.(s): AD-A390331; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Conductive anodic filament (CAF) formation is a failure mode in printed wiring boards (PWB) which occurs when the circuit is operated under a high voltage gradient. Humidity also plays a factor since the boards must be stored, or operated in a humid environment. This failure mode is enhanced by certain water soluble fluxes or hot air solder leveling (HASL) fluids. The objective of this research was to examine the effect of three different conformal coatings in reducing the incidence of CAF associated with a variety of water-soluble flux formulations. to achieve this, a series of fluxes were evaluated for their propensity to enhance CAF. Several of these were chosen for further examination with acrylic, silicone and parylene C conformal coatings. of the three conformal coatings tested only parylene C was effective in preventing CAF and dendrite formation in all cases. Silicone coatings showed bubbles present on some of the samples aged at 85 deg C for the 28-day test. Localized debonding occurred on some of the acrylic and the parylene C boards. Also, some boards exhibited localized debonding of epoxy/glass after during aging of the coating, suggested chemical interactions with flux residues creating mechanical stresses. One set of boards was subjected to higher processing temperatures similar to those that would be associated with lead-free soldering. When compared to boards processed with the same fluxes using the lower processing temperatures, the high temperature boards showed significant increase in CAF formation.

DTIC

Printed Circuits; Anodic Coatings; Glass Fiber Reinforced Plastics; Solders; Failure Modes

20010066780 Advanced Fuel Research, Inc., East Hartford, CT USA

HTS Josephson Technology on Silicon With Application to High Speed Microelectronics ***Final Report, 3 Mar. 1997 - 31 Jan. 2000***

Hamblen, David G.; Cosgrove, Joseph; May 16, 2001; 50p; In English

Contract(s)/Grant(s): N00014-97-C-0058

Report No.(s): AD-A390317; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Superconducting electronics have long been regarded as having the potential for superior switching speeds and reduced power consumption compared to semiconducting devices. High temperature superconducting materials, such as YBa2Cu3O7, present many new opportunities. Because many targeted applications of superconducting electronics rely on the high switching speeds attainable by Josephson junctions, however, rf properties have played a significant role in the search for practical substrates. The overall goal of this Phase II STTR program, a collaboration between Advanced Fuel Research, Inc. and the State University of New York at Stony Brook, was to develop an ultrahigh-speed superconducting electronics technology using electron beam modified high temperature superconducting Josephson junctions on silicon and other rf compatible substrates. Considerable success was achieved towards the development of a compliant substrate technology that could potentially enable growth of low-stress YBa2Cu3O7 on silicon. Also, a model was developed describing the formation and degradation properties of electron beam modified junctions, thus serving as a reliable basis for the description of the junctions and allowing for better control of the process and better reproducibility of the devices. Unfortunately, however, the program was unsuccessful in demonstrating working junctions and junction-based devices due to equipment problems and loss of key technical personnel.

DTIC

Josephson Junctions; Microelectronics; Silicon; YBCO Superconductors

20010066790 Air Force Research Lab., Rome, NY USA

Optical Neural Network Classifier Architectures, ***Oct. 1996 - Sep. 1997***

Getbehead, Mark A.; Rosetti, James B.; Foor, Wesley E.; Kozaitis, Samuel P.; Apr. 1998; 51p; In English

Contract(s)/Grant(s): Proj-4600

Report No.(s): AD-A345879; RL-TR-97-255; No Copyright; Avail: Defense Technical Information Center (DTIC)

We present an adaptive opto-electronic neural network hardware architecture capable of exploiting parallel optics to realize real-time processing and classification of high-dimensional data for Air Force Hostile Target Identification (HTI). This architecture utilizes a grayscale-input radial basis function neural network based on a previously demonstrated binary-input version. The greyscale-input capability broadens the range of applications for the classifier by allowing it to handle 8 bit input data. We characterized a key component of this system, a variable phase retarder, and found that the phase uniformity changed

less than 7% with applied voltage. An optical wavelet transform preprocessor is also discussed. The preprocessor produces a reduced feature set of multiwavelet images to improve training times and discrimination capability of the neural network. The design uses a joint transform correlator (JTC) to provide cross correlations of multiple input images. We present experimental results for a JTC which used four input images generated with a spatial light modulator. We then propose using wavelet functions as input images to perform a multiwavelet feature extraction. The results from the retarder characterization and optical wavelet transform work were to be used in a software simulation of the neural network system to determine its feasibility. However, this work remains unfinished as this project was canceled due to budget cuts.
DTIC
Characterization; Classifications; Classifiers; Computerized Simulation; Correlators; Cross Correlation

20010066904 Vigyan Research Associates, Inc., Hampton, VA USA
Personal Electronic Devices and Their Interference with Aircraft Systems
Ross, Elden, Vigyan Research Associates, Inc., USA; June 2001; 28p; In English
Contract(s)/Grant(s): NAS1-96014; RTOP 706-62-11-01
Report No.(s): NASA/CR-2001-210866; NAS 1.26:210866; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
A compilation of data on personal electronic devices (PEDs) attributed to having created anomalies with aircraft systems. Charts and tables display 14 years of incidents reported by pilots to the Aviation Safety Reporting System (ASRS). Affected systems, incident severity, sources of anomaly detection, and the most frequently identified PEDs are some of the more significant data. Several reports contain incidents of aircraft off course when all systems indicated on course and of critical events that occurred during landings and takeoffs. Additionally, PEDs that should receive priority in testing are identified.
Author
Electronic Equipment; Anomalies; Electromagnetic Interference; Aircraft Safety

20010067054 Oak Ridge National Lab., TN USA
Optimization of the Ion-Cut Process in Si and SiC
Holland, O. W.; Thomas, D. K.; Gregory, R. B.; 2001; 14p; In English
Report No.(s): PB2001-106110; No Copyright; Avail: National Technical Information Service (NTIS)
H +/- implantation is the basis for an ion-cut process, which combines hydrophilic wafer bonding, to produce heterostructures over a wide range of materials. This process has been successfully applied in Si to produce a commercial silicon-on-insulator material. The efficacy of implantation to produce thin-film separation was studied by investigation of H +/- induced exfoliation in Si and SiC. Experiments were done to isolate the effects of the hydrogen chemistry from that of implant damage. Damage is manipulated independently of H + dosage by a variety of techniques ranging from elevated temperature irradiation to a two-step implantation scheme in Si, and the use of channeled-ion implantation in SiC. The results will demonstrate that such schemes can significantly reduce the critical dose for exfoliation.
NTIS
Ion Implantation; Silicon; Silicon Carbides; Optimization

20010067107 Ulm Univ., Germany
European Heterstructure Technology Workshop *Final Report*
Sep. 2000; 98p; In English; 10th, 18-19 Sep. 2000, Guenzburg, Germany
Contract(s)/Grant(s): F61775-00-W-F067
Report No.(s): AD-A389321; EOARD-CSP00-5067; No Copyright; Avail: CASI; A02, Microfiche; A05, Hardcopy
The Final Proceedings for 10th European Heterostructure Technology Workshop, 17 September 2000 - 19 September 2000. This conference will cover the following topics: heterojunction technologies and novel materials with applications to environmental sensing, biomedical and electrochemical applications, and micro-systems for use in non-traditional applications. Specifically, technologies of advanced materials like GaN, diamond and SiC, micro-electromechanical systems; and related semiconductor devices and applications.
DTIC
Conferences; Electromechanics; Heterojunctions; Semiconductor Devices; Magnetic Fields

20010067604 Naval Postgraduate School, Monterey, CA USA
Web-Based Teaching and Learning of Electrical Engineering Courses
Tam, Wvi H.; Mar. 2001; 119p; In English
Report No.(s): AD-A390419; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This thesis describes the design of an interactive Web-based course, namely EC4810 Fault Tolerant Computing, taught in the Department of Electrical and Computer Engineering (ECE), at the Naval Postgraduate School. It is part of the ECE Department's Distributed Learning program in which students will use multimedia enhanced online courses through the Web. A major accomplishment of this thesis is the development of a template for other courses A step-by-step guide has been developed that outlines the process of online course maintenance and procedures for producing other courses.
DTIC
Computer Systems Design; Electrical Engineering; Computer Programs; Education

20010067606 Defence Science and Technology Organisation, Electronics and Surveillance Research Lab., Salisbury, Australia
Purpose and Scope for a Multi Configurable Active Phased Array Test-Bed
Jakobsson, Asa; Capon, Scott; Mar. 2001; 30p; In English
Report No.(s): AD-A390506; DSTO-GD-0268; DODA-AR-011-700; Copyright; Avail: Issuing Activity
It has been proposed that SSD develop a multi-configurable experimental active phased-array microwave radar for carrying out research on advanced architecture and signal processing concepts. This document defines the purpose and the scope of a Multi-Configurable Active Phased Array Test-bed (MCAPA). A number of system and software concepts are discussed, their merits are evaluated and rated against each other. Finally, the way ahead for the development of the MCAPA test-bed is proposed based on the trade-off discussions.
DTIC
Phased Arrays; Microwaves; Test Stands

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.

20010066150 Daresbury Nuclear Physics Lab., Computational Science and Engineering Dept., UK
Numerical Study of Low Reynolds Number Slip Flow in the Hydrodynamic Development Region of Circular and Parallel Plate Ducts
Barber, R. W.; Emerson, D. R.; Dec. 2000; ISSN 1362-0207; 50p; In English
Report No.(s): PB2001-105882; DL-TR-00-002; Copyright; Avail: National Technical Information Service (NTIS)
The present investigation examines the effects of the Reynolds number and the Knudsen number on the hydrodynamic development lengths in circular and parallel plate ducts. The study was conducted using THOR-2S - a two-dimensional finite-volume Navier-Stokes solver developed by the Computational Engineering Group at CLRC Daresbury Laboratory. The solver was specifically adapted for the simulation of non-continuum flows by the inclusion of appropriate tangential slip-velocity boundary conditions at the solid perimeter walls.
NTIS
Low Reynolds Number; Ducts; Circular Plates; Slip Flow; Knudsen Flow; Hydrodynamics; Computational Fluid Dynamics

20010066215 Pennsylvania State Univ., University Park, PA USA
Reducing Electroosmotic Flow Enables DNA Separations in Ultrathin Channels, *Sep. 1996 - Aug. 1998*
Bibeau, David R.; August 1998; 92p; In English
Report No.(s): AD-A345610; No Copyright; Avail: Defense Technical Information Center (DTIC)
Research focused on the development of a procedure to reduce or eliminate electroosmotic flow (EOF) in 25 microns i.d. fused silica capillaries. An emphasis has been made on devising a procedure to coat 25 microns i.d. fused silica capillaries with a polymer that will enable DNA to migrate through the capillary, against electroosmotic flow, and continuously separate in ultrathin channels. Chapter 2 focuses on solving the problem of analytes adsorbing on the surface of the capillaries and its effect on reproducibility and efficiency of separations. This problem is especially significant when large molecule (DNA) separations are being studied. to overcome the problem of solute-wall interaction, a procedure for modifying the surface of fused silica capillaries with acrylamide and for measuring the rate of electroosmotic flow (EOF) in capillary electrophoresis (CE) is reviewed. Chapter 3 combines CE with ultrathin channels enabling the ability to evaluate individual and multiple plugs of double stranded DNA (dsDNA) that are detected by laser induced fluorescence (LIF). This technique combines the parallel processing capabilities of channel electrophoresis with the advantages of sample introduction with a single capillary. Ultrathin channels using 25 microns

spacers between quartz plates allow for the efficient dissipation of Joule heat and decreased separation time. This technique demonstrates that the coated 25 microns i.d. capillaries can be used as a transfer device to smaller ultrathin channels.
DTIC
Boundary Layer Separation; Acrylic Resins; Capillary Flow; Deoxyribonucleic Acid

20010066248 Los Alamos National Lab., NM USA
Integrating a Bilinear Interpolation Function Across Quadrilateral Cell Boundaries
Brock, J. S.; Aug. 2000; 46p; In English
Report No.(s): PB2001-106097; LA-UR-00-3329; No Copyright; Avail: National Technical Information Service (NTIS)

Computational models of particle dynamics often exchange solution data with discretized continuum-fields using interpolation functions. These particle methods require a series expansion of the interpolation function for two purposes: numerical analyses used to establish the models consistency and accuracy, and logical-coordinate evaluation used to locate particles within a grid. This report presents a new method of developing discrete-expansions for interpolation; they are similar to multi-variable expansions but, unlike a Taylors series, discrete-expansions are valid throughout a discretized domain. Discrete-expansions are developed herein by parametrically integrating the interpolation functions total-differential between two particles located within separate, non-contiguous cells. Discrete-expansions are valid for numerical analyses since they acknowledge the functional dependence of interpolation and account for mapping discontinuities across cell boundaries. The use of discrete-expansions for logical-coordinate evaluation provides an algorithmically robust and computationally efficient particle localization method. Verification of this new method is demonstrated herein on a simple test problem.
NTIS
Interpolation; Mathematical Models

20010066313 NASA Ames Research Center, Moffett Field, CA USA
Overset Grid Methods Applied to Nonlinear Potential Flows
Holst, Terry, NASA Ames Research Center, USA; [2000]; 22p; In English; European Congress on Computational Methods in Applied Sciences and Engineering, 11-14 Sep. 2000, Barcelona, Spain
Contract(s)/Grant(s): RTOP 509-10-11; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The objectives of this viewgraph presentation are to develop Chimera-based potential methodology which is compatible with overflow and overflow infrastructure, creating options for an advanced problem solving environment and to significantly reduce turnaround time for aerodynamic analysis and design (primarily cruise conditions).
Derived from text
Computational Grids; Design Analysis; Potential Flow; Algorithms; Computerized Simulation

20010066439 Southampton Univ., Fluid Dynamics and Acoustics Group, UK
Luminescence from Hydrodynamic Cavitation: Method and Preliminary Analysis
Leighton, T. G., Cambridge Univ., UK; Farhat, M., Ecole Polytechnique Federale de Lausanne, Switzerland; Field, J. E., Cambridge Univ., UK; Avellan, F., Ecole Polytechnique Federale de Lausanne, Switzerland; July 2001; 38p; In English
Report No.(s): ISVR-TR-294; Copyright; Avail: Issuing Activity

This report describes a photon-counting study of the cavitation luminescence produced by flow over a hydrofoil. The object was to obtain quantitative data on the number of photons emitted for various flow conditions and to study the link between the light output and the potential for cavitation damage. The flow experiments were performed in a cavitation tunnel capable of achieving flow velocities of up to around 50 m/s in the test sections. The experimental hydrofoil was a NACA 009 blade. Parameters varied were the flow velocity, the incident angle of the hydrofoil, and the cavitation index. The results show that significant photon counts are recorded when leading edge cavitation takes place and U-shaped vortices (cavities) shed from the main cavity. The photon count increases dramatically as the flow velocity increases or the cavitation index is reduced. Departure from a Poisson distribution in the arrival times of photons at the detector may be related to the way vortices shed from the main cavity. Finally, there is a clear correlation between light output and the conditions which could cause cavitation damage.
Author
Cavitation Flow; Luminescence; Photons

20010066492 NASA Ames Research Center, Moffett Field, CA USA

Roughness-Dominated Transition on Nosetips, Attachment Lines and Lifting-Entry Vehicles

Reda, Daniel C., NASA Ames Research Center, USA; [2001]; 8p; In English; AIAA 39th Aerospace Sciences Meeting, 8-11 Jan. 2001, Reno, NV, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA

Contract(s)/Grant(s): RTOP 242-90-00; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Modeling of roughness-dominated transition is a critical design issue for both ablating and non-ablating thermal protection systems (TPS). Ablating TPS, used for planetary-entry and earth-return missions, first experience recession under high-altitude, low-Reynolds-number conditions. Such laminar-flow ablation causes the formation of a surface microroughness pattern characteristic of the TPS material composition and fabrication process. For non-ablating TPS, such as the overlapping-tile, metallic heatshields proposed for future reusable launch vehicles, the surface roughness pattern is established a priori by the engineering design and assembly procedure. In both cases, these distributed surface roughness patterns create disturbances within, and alter the mean velocity profile of, the laminar boundary layer flowing over the surface. As altitude decreases, Reynolds number increases, and flow field conditions capable of amplifying these roughness-induced perturbations are eventually achieved, i.e., transition onset occurs. Boundary layer transition to turbulence results in more severe heat-transfer rates. Ablating TPS experience increased recession rates, leading to potential bum-through, while non-ablating TPS experience accelerated temperature rise, leading to potential melting of key components.

Derived from text

Ablation; Thermal Protection; Surface Roughness

20010066832 California Univ., Civil and Engineering Dept., Los Angeles, CA USA

A Finite Cell Method for Simulating the Mass Transport Process in Porous Media

Sun, Ne-Zheng, California Univ., USA; Water Resources Research; December 1999; ISSN 0043-1397; Volume 35, No. 12, pp. 3649-3662; In English

Contract(s)/Grant(s): NSF EAR-95-26645; DAAG55-97-1-0351

Report No.(s): AD-A387186; ARO-36433.6-EV; Paper-1999WR900187; Copyright; Avail: Defense Technical Information Center (DTIC)

This paper presents a new numerical method, the finite cell method (FCM), for simulating complex biological and chemical transport phenomena in porous media. It has the same advantages as the random walk method (RWM): there is no advection-dispersion equation to be solved, it is unnecessary to calculate the concentration distribution in each time step, and there is numerical dispersion for the case of high Peclet number. The concept of FCM, however, is different from the RWM in several aspects. The minimum unit in the FCM is a cell that has a certain volume and carries variable mass, while in the RWM the minimum unit is a particle that has no volume but carries a certain mass. In the FCM we use multiple sets of cells to represent different phases in a porous medium. A mobile or an immobile cell may carry multiple biological and/or chemical components. Mass exchanges may occur not only between cells but also within cells. These mass exchanges can be described by different rules: equilibrium or nonequilibrium, linear or nonlinear. In this paper, a one-dimensional FCM code is developed and used to simulate the solute transport with nonequilibrium adsorption, colloid transport with kinetic deposition and release, and colloid facilitated transport with kinetic mass exchanges. The FCM solutions have been compared with available analytical solution and the solutions obtained by the finite difference method (FDM). Results show that both FCM and FDM solutions match analytical solutions quite well when the concentration front is flat. When the concentration front is sharp, however, the FDM solutions become inaccurate because of numerical dispersion, but the FCM can still produce very accurate peak ad tailing concentrations. From the example of colloid-facilitated transport, we can see how a complex chemical and biological transport procedure in porous media can be simulated directly by the FCM without solving an advection-dispersion equation.

Author

Advection; Colloids; Mass Transfer; Random Walk; Numerical Analysis

20010066853 Instituto Nacional de Pesquisas Espacias, Sao Jose dos Campos, Brazil

Cleaning and Filling Procedures for Heating Pipes of Variable Conductance With an External Gas Holder *Procedimentos de Limpeza e Preenchimento Para Tubos de Calor de Condutancia Variavel com Reservatorio de Gas Externo*

Edom, Andreas, Instituto Nacional de Pesquisas Espacias, Brazil; 2001; 20p; In Portuguese; Translated into English by SCITRAN, Inc.

Report No.(s): INPE-8201-NTC/344; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Heating pipes, whose heat conductance is controlled by a certain amount of non-condensable and built-in gas, are employed in space technology as efficient and self-regulating elements in the heat control. During the normal operation of the pipe, the gas fills a portion of the condenser on the cold side of the heating pipe, thus adjusting the heat transfer area at the exit of the heat flow.

In this manner, the temperature at the entrance of the flow is kept within range of a few degrees, even if the heat flow changes up to one order of magnitude.
Author
Pipes (Tubes); Gas Heating; Heat Transmission

20010066914 NASA Langley Research Center, Hampton, VA USA
Time Integration Schemes for the Unsteady Navier-Stokes Equations
Bijl, Hester, Technische Univ., Netherlands; Carpenter, Mark H., NASA Langley Research Center, USA; Vatsa, Veer N., NASA Langley Research Center, USA; [2001]; 13p; In English; 15th Computational Fluid Dynamics Conference, 11-14 Jun. 2001, Anaheim, CA, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Report No.(s): AIAA Paper 2001-2612; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

The efficiency and accuracy of several time integration schemes are investigated for the unsteady Navier-Stokes equations. This study focuses on the efficiency of higher-order Runge-Kutta schemes in comparison with the popular Backward Differencing Formulations. For this comparison an unsteady two-dimensional laminar flow problem is chosen, i.e., flow around a circular cylinder at Re = 1200. It is concluded that for realistic error tolerances (smaller than 10(exp -1)) fourth-and fifth-order Runge-Kutta schemes are the most efficient. For reasons of robustness and computer storage, the fourth-order Runge-Kutta method is recommended. The efficiency of the fourth-order Runge-Kutta scheme exceeds that of second-order Backward Difference Formula by a factor of 2.5 at engineering error tolerance levels (10(exp -1) to 10(exp -2)). Efficiency gains are more dramatic at smaller tolerances.
Author
Backward Differencing; Navier-Stokes Equation; Runge-Kutta Method; Unsteady Flow; Laminar Flow

20010066918 NASA Langley Research Center, Hampton, VA USA
2-D/Axisymmetric Formulation of Multi-dimensional Upwind Scheme
Wood, William A., NASA Langley Research Center, USA; Kleb, William L., NASA Langley Research Center, USA; [2001]; 18p; In English; 15th AIAA Computational Fluid Dynamics Conference, 11-14 Jun. 2001, Anaheim, CA, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Report No.(s): AIAA Paper 2001-2630; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

A multi-dimensional upwind discretization of the two-dimensional/axisymmetric Navier-Stokes equations is detailed for unstructured meshes. The algorithm is an extension of the fluctuation splitting scheme of Sidilkover. Boundary conditions are implemented weakly so that all nodes are updated using the base scheme, and eigen-value limiting is incorporated to suppress expansion shocks. Test cases for Mach numbers ranging from 0.1-17 are considered, with results compared against an unstructured upwind finite volume scheme. The fluctuation splitting inviscid distribution requires fewer operations than the finite volume routine, and is seen to produce less artificial dissipation, leading to generally improved solution accuracy.
Author
Algorithms; Navier-Stokes Equation; Unstructured Grids (Mathematics); Upwind Schemes (Mathematics)

20010067106 Academy of Sciences of the Ukraine, Ukrainekiev Research and Development Center of Fluid Mechanics, Kiev, Ukraine
Organized Vortical Motion as a Basis for Boundary Layer Control International Workshop *Final Report*
Sep. 2000; 61p; In English, 20-22 Sep. 2000, Kiev, Ukraine
Contract(s)/Grant(s): F61775-00-W-F041
Report No.(s): AD-A389323; EOARD-CSP00-5041; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

The Final Proceedings for Organized Vortical Motion as a basis for Boundary-Layer Control, 20 September 2000- 22 September 2000. This is an interdisciplinary conference. Topics include 1) Analogies between laminar-turbulent transition and turbulence development applicable to flow control; 2) Application of stability theory approaches to turbulence investigation and control; 3) Receptivity of turbulent boundary layers to induced organized motion; 4) Deterministic elements in methods of turbulent boundary-layer description and control.
DTIC
Vortices; Boundary Layer Control; Analogies; Boundary Layer Transition; Laminar Flow; Stability

20010067402 Cornell Univ., Sibley School of Mechanical and Aerospace Engineering, Ithaca, NY USA
Interaction Between Near-Wall Turbulent Flows and Compliant Surfaces ***Final Report, 1 Nov. 1999 - 31 Oct. 2000***
Lumley, John; Rempfer, Dietmar; Apr. 23, 2001; 29p; In English
Contract(s)/Grant(s): F49620-00-1-0029
Report No.(s): AD-A389429; AFRL-SR-BL-TR-01-0316; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

The general aim of this project is to get an improved understanding of the interaction between wall-generated turbulence and compliant surface coatings using analysis and direct numerical simulation in an integrated approach, with a view towards the reduction of turbulent sound production and turbulent drag. For this purpose, in a first step that is targeted at identifying interesting domains in the space of parameters describing properties of a compliant wall coating, we are developing low-dimensional models based on Galerkin projection of the Navier-Stokes equations onto systems of eigenfunctions obtained via Proper Orthogonal Decomposition. Because of the relatively small effort involved in simulating and analyzing such models. this will allow us to scan large regions of parameter space, allowing us to find regions that lead to a reduction of turbulent drag and turbulent sound production. Among the ultimate goals of this project are thus, first, to obtain a fundamental understanding of flow-structure interaction phenomena for the case of the compliant- wall/turbulence interaction, and second, to use this understanding to enhance the flight performance of air vehicles by increasing their lift-to-drag ratio.
DTIC
Navier-Stokes Equation; Turbulent Flow; Walls; Direct Numerical Simulation; Flight Characteristics; Galerkin Method; Wall Flow

20010067588 Institute for Computer Applications in Science and Engineering, Hampton, VA USA
Thermodynamic Behavior of Nano-sized Gold Clusters on the (001) Surface ***Final Report***
Paik, Sun M., Institute for Computer Applications in Science and Engineering, USA; Yoo, Sung M., Christopher Newport Univ., USA; Namkung, Min, NASA Langley Research Center, USA; Wincheski, Russell A., NASA Langley Research Center, USA; June 2001; 10p; In English; ICCN 2001 Conference, 2001, USA
Contract(s)/Grant(s): NAS1-97046; RTOP 505-90-52-01
Report No.(s): NASA/CR-2001-211014; NAS 1.26:211014; ICASE-2001-17; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We have studied thermal expansion of the surface layers of the hexagonally reconstructed Au (001) surface using a classical Molecular Dynamics (MD) simulation technique with an Embedded Atomic Method (EAM) type many-body potential. We find that the top-most hexagonal layer contracts as temperature increases, whereas the second layer expands or contracts depending on the system size. The magnitude of expansion coefficient of the top layer is much larger than that of the other layers. The calculated thermal expansion coefficients of the top-most layer are about -4.93 x 10(exp -5)Angstroms/Kelvin for the (262 x 227)Angstrom cluster and -3.05 x 10(exp -5)Angstroms/Kelvin for (101 x 87)Angstrom cluster. The Fast Fourier Transform (FFT) image of the atomic density shows that there exists a rotated domain of the top-most hexagonal cluster with rotation angle close to 1 degree at temperature T less than 1000Kelvin. As the temperature increases this domain undergoes a surface orientational phase transition. These predictions are in good agreement with previous phenomenological theories and experimental studies.
Author
Thermodynamics; Nanotechnology; Molecular Dynamics; Surface Layers; Gold

20010067589 Institute for Computer Applications in Science and Engineering, Hampton, VA USA
Ranges of Applicability for the Continuum-beam Model in the Constitutive Analysis of Carbon Nanotubes: Nanotubes or Nano-beams? ***Final Report***
Harik, Vasyl Michael, Institute for Computer Applications in Science and Engineering, USA; May 2001; 25p; In English
Contract(s)/Grant(s): NAS1-97046; RTOP 505-90-52-01
Report No.(s): NASA/CR-2001-211013; NAS 1.26:211013; ICASE-2001-16; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Ranges of validity for the continuum-beam model, the length-scale effects and continuum assumptions are analyzed in the framework of scaling analysis of NT structure. Two coupled criteria for the applicability of the continuum model are presented. Scaling analysis of NT buckling and geometric parameters (e.g., diameter and length) is carried out to determine the key non-dimensional parameters that control the buckling strains and modes of NT buckling. A model applicability map, which represents two classes of NTs, is constructed in the space of non-dimensional parameters. In an analogy with continuum mechanics, a mechanical law of geometric similitude is presented for two classes of beam-like NTs having different geometries. Expressions for the critical buckling loads and strains are tailored for the distinct groups of NTs and compared with the data

provided by the molecular dynamics simulations. Implications for molecular dynamics simulations and the NT-based scanning probes are discussed.
Author
Nanotubes; Beams (Radiation); Molecular Dynamics; Continuum Modeling; Mechanical Properties

20010067607 Naval Postgraduate School, Monterey, CA USA
Vortex Ripple Morphology Using DUNE2D Model
Martin, Stephen D.; Mar. 2001; 80p; In English
Report No.(s): AD-A390508; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The DUNE2D boundary layer model for small-scale morphology (Andersen, 1999) is compared with bedform morphology measured on the inner shelf in 11 m water depth during the SHOWEX experiment at Duck. N.C. The model consists of inter-linked modules for flow sediment transport and morphology. The flow module is based on solving the Reynold's averaged Navier-Stokes equations in the vertical plane with k-omega turbulence closure. The model has been extended to accept a general (but periodic) bottom boundary to be able to compare with field data. Boundary layer velocity profiles were measured using a Bistatic Coherent Doppler Velocity profiler (BCDV). A two-axis scanning sonar altimeter measured small-scale morphology over a 1 by 1.5 m area with 4 cm horizontal and 0.23 cm vertical resolutions. Bottom maps of small-scale morphology were obtained continuously every 20 minutes. A relatively simple data sequence was selected for model comparison, during which time the wave forcing evolved abruptly from H(sub sig) = 0.3 m to H(sub sig) = 3.0 m (bed velocity is less than 1 m/s), and the bed evolved from no motion (relic) to actively migrating vortex ripples. SHOWEX bedform changes under low wave plus collinear current conditions resulted in minor changes of the vortex ripple fields. Bedform migration rates of the model were similar to the field migration rates. Like the field data, the modeled data under strong forcing removed smaller scale vortex ripples and redistributed the sediment into a larger scale ripple with a large portion of sediments in suspension above the bed. Limitations of the model owing to the 2-D assumption, periodic boundaries and monochromatic wave forcing constraints are discussed.
DTIC
Morphology; Boundary Layers; Models

35
INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gauges; 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.

20010066069 NASA Marshall Space Flight Center, Huntsville, AL USA
High-Speed Observer: Automated Streak Detection for the Aerospike Engine
Rieckhoff, T. J., NASA Marshall Space Flight Center, USA; Covan, M. A., United Space Alliance, USA; OFarrell, J. M., United Space Alliance, USA; June 2001; 32p; In English
Report No.(s): NASA/TM-2001-210879; M-1005; NAS 1.15:210879; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A high-frame-rate digital video camera, installed on test stands at Stennis Space Center (SSC), has been used to capture images of the aerospike engine plume during test. These plume images are processed in real time to detect and differentiate anomalous plume events. Results indicate that the High-Speed Observer (HSO) system can detect anomalous plume streaking events that are indicative of aerospike engine malfunction.
Author
Aerospike Engines; Digital Cameras; Plumes; Malfunctions; Real Time Operation; Digital Television

20010066296 Saint Mary's Univ., San Antonio, TX USA
Laboratory Computer and Lecture Demonstration Instrumentation ***Final Report, 1 Jun. 1998 - 31 May 1999***
Karshner, Gary; May 1999; 3p; In English
Contract(s)/Grant(s): F49620-98-1-0473; AF Proj. 4276
Report No.(s): AD-A389366; DUNS-078500725; AFRL-SR-BL-TR-01-0296; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

This project sought to improve hands-on access to modern instrumentation and enhancement of students classroom learning experiences in two physics courses. The outcomes of this instrumentation award have been to double the capacity of the

introductory laboratory course and expand the number and variety of physics demonstrations and lab experiments. One unanticipated outcome has been the flexibility to expand course offerings to a second sequence of calculus-based physics. This addition has allowed students who enter the university unprepared for the regular calculus course to keep up the physics sequences so that they are not a year behind of others in their major field. This project has affected over 140 students per year. Students have increased their use of computers to solve problems, analyze results of experiments, and are transferring these skills across courses and majors on a routine basis. Faculty have increased the number and variety of both demonstrations of physics principles and in the experiments they design for student exercises. All goals and objectives for this project have been met or exceeded.
DTIC
Calculus; Computers; Students

20010066457 Raytheon Missile Systems Co., Tucson, AZ USA
Free Gyro Imaging IR Sensor in Rolling Airframe Missile Application
Walter, R. F.; Oct. 1999; 16p; In English; Original contains color plates
Report No.(s): AD-A390349; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Rolling Airframe Missile (RAM) provides the US and German Navies with a quick reaction, high firepower defense against Anti-Ship Missiles (ASM) such as the Exocet and SSN-22. RAM incorporates passive RF and IR sensors allowing track and guidance against both radiating and non-radiating threats. The 'fire and forget' feature coupled with RAMs quick reaction protects ships against dense raids of ASMs. RAM has achieved exceptional accuracy and reliability during firings against simulated and real ASMs in both single and multiple threat scenarios. RAM incorporates several unique design features. RAM incorporates a statically controlled rolling airframe during flight with full maneuverability obtained by a single plane of control surfaces and a closed loop autopilot. A body fixed RF interferometer incorporates only two forward facing antennas, obtaining two planes of target information over the roll cycle. The IR sensor is mounted to a free gyro seeker, which also serves as the inertial reference for body decoupling. The IR sensor incorporates 80-element linear array which uses the free gyro spin and missile roll to provide an accurate initially referenced IR image. This allows real time acquisition and discrimination of targets in a variety of maritime backgrounds. The IR sensor and signal processing will be the focus of this paper.
DTIC
Infrared Imagery; Antiship Missiles; Infrared Detectors; Gyroscopes

20010066568 Michigan Univ., Dept. of Electrical Engineering and Computer Science, Ann Arbor, MI USA
Volume Reflection Holographic Confocal Imaging
Yang, G. G., Michigan Univ., USA; Chen, H. S., Michigan Univ., USA; Leith, E. N., Michigan Univ., USA; Applied Optics; Aug. 10, 2000; ISSN 0003-6935; Volume 39, No. 23, pp. 4076-4079; In English
Contract(s)/Grant(s): DAAH04-96-1-0254
Report No.(s): AD-A386734; ARO-335056.19-PH; Copyright; Avail: Defense Technical Information Center (DTIC)

The spatial and spectral coherence requirements for recording a hologram depend on the distance between object and hologram recording plane. This is obviously true for the original Gabor in-line holography. With diffraction gratings as beam splitters, it can be shown that the same is true for off-axis holography, which has exactly the same source coherence requirements as in-line holography. A corollary is that as the object-hologram distance decreases to zero, i.e., for image-plane holography, the spatial and temporal coherence requirements become zero. Thus a hologram can be made in light that is completely spatially and temporally incoherent. Such a hologram perfectly preserves both the phase and the amplitude of the object signal. This statement is completely true for spatially incoherent, monochromatic light. For temporally incoherent light there is a qualification: The phase of the object may have some wavelength dependence, which would limit the allowable source spectral width.
Derived from text
Holography; Imaging Techniques; Spatial Distribution; Temporal Distribution; Coherent Light

20010066612 Los Alamos National Lab., NM USA
Field Imaging Radar/Lidar Through Fourier Transform Heterodyne
Cook, Bradly J.; Galbraith, Amy E.; Laubscher, Bryan E.; Olivas, Nicholas L.; Grubler, Andrew C.; Jan. 1999; 21p; In English
Report No.(s): AD-A390323; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We present a detection process capable of directly imaging the transverse amplitude, phase, and Doppler shift of coherent electromagnetic fields. Based on coherent detection principles governing conventional heterodyned RADAR/LIDAR systems, Fourier Transform Heterodyne incorporates transverse spatial encoding of the reference local oscillator for image capture. Appropriate selection of spatial encoding functions allows image retrieval by way of classic Fourier manipulations. of practical interest: (i) imaging may be accomplished with a single element detector/sensor requiring no additional scanning or moving

components, (ii) as detection is governed by heterodyne principles, near quantum limited performance is achievable, (iii) a wide variety of appropriate spatial encoding functions exist that may be adaptively configured in real-time for applications requiring optimal detection, and (iv) the concept is general with the applicable electromagnetic spectrum encompassing the RF through optical.
DTIC
Fourier Transformation; Imaging Techniques; Optical Heterodyning; Optical Radar

20010066777 Naval Air Warfare Center, Weapons Div., China Lake, CA USA
Laboratory Evaluations of Competing Uncooled FPA Technologies
Ogloza, Albert A.; Ferda, Leo; OConnor, David; Feb. 1999; 24p; In English
Report No.(s): AD-A390307; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Comparison of performance requirements are presented for a Raytheon (Amber) Sentinal Uncooled Micro-Bolometer Focal Plane Array (UMFPA) camera and a Raytheon (formerly Texas Instruments Defense Systems and Electronics Group) Technology Reinvestment Project (TRP) Ferroelectric Uncooled Focal Plane Array (UFFPA) camera. The two cameras were tested for numerous performance-related issues involving time, temperature, FPA region and image translation related dependencies. The performance parameters of interest were 1) nonuniformity versus environmental temperature 2) Changes in non-uniformity with time since power up and as a function of time since non-uniformity collection update, 3) Noise Equivalent Temperature Difference (NETD), 4) V-curves, 5) Minimum Resolvable Temperature Difference (MRTD), 6) response linearity, 7) power consumption and readiness time as a function of system soak temperature, and 8) image smear distortion characteristics.
DTIC
Focal Plane Devices; Cooling; Cameras; Ferroelectricity

20010066778 Army Research Lab., Sensors Directorate, Adelphi, MD USA
A New Two-Color Infrared Photodetector Design Using INGAAS/INALAS Coupled Quantum Wells
Little, J. W.; Kennedy, S. W.; Leavitt, R. P.; Lucas, M. L.; Olver, K. A.; Aug. 1999; 16p; In English
Report No.(s): AD-A390308; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The U. S. Army Research Laboratory (ARL) in collaboration with a number of industry and university partners is developing a new generation of sensors that can perform advanced signal processing functions over a very wide range of wavelengths (e.g. from the ultraviolet to the millimeter-wave region of the spectrum).
DTIC
Indium Aluminum Arsenides; Indium Gallium Arsenides; Photometers; Quantum Wells; Infrared Radiation

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.

20010066478 Sverdrup Technology, Inc., Arnold AFB, TN USA
Application of Laser-Induced Fluorescence (LIF) to Liquid-Propellant Rocket Engine Testing
Brasier, C. W.; Drakes, J. A.; Simmons, M. A.; Oct. 1997; 12p; In English
Report No.(s): AD-A345761; No Copyright; Avail: Defense Technical Information Center (DTIC)
Combustion exhausts present a challenging problem for researchers due to the extremely harsh environment, and nonintrusive diagnostics are often sought to provide flow property information. Laser induced fluorescence (LIF) is one technique in which a chosen flow molecule or marker is probed to yield gross flow properties, such as static temperature and flow velocities. The work presented herein describes the application of LIF to the combustion exhausts of several full-scale liquid-propellant rocket engines spanning a wide range of operational parameters. The method is based upon the use of CW ring-dye lasers which scan in frequency over either the Na D1 or D2 line at 5896 and 5890 A. Na is used as a basis for this approach since it occurs as a trace element in both hydrogen and amine rocket fuels. The generic apparatus is described, including a discussion of the collection and interpretation of the LIF signal to yield radial and temporal profiles of radial flow velocity, static temperature, and fuel distribution. It was found that the LIF technique provides quality data in most cases. Certain stressing situations were also found in which data on the flow properties were not obtainable. Also, computational fluid dynamics (CFD) modeling of the plumes

was used to provide baseline estimates of the exhaust flow properties. The model reasonably predicted the gross behavior of the flow as determined by the LIF technique, although some items of fine spatial structure were not reproduced very well.
DTIC
Amines; Combustion; Computational Fluid Dynamics; Continuous Wave Lasers

20010066534 California Univ., Santa Barbara, CA USA
Thermal Strain-Induced Temperature Compensation of Diode Lasers ***Final Report, 15 Dec. 1997-15 Dec. 2000***
Coldren, L. A., California Univ., USA; Dec. 15, 2000; 21p; In English
Contract(s)/Grant(s): F49620-98-1-0065
Report No.(s): AD-A390668; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

We have explored both monolithic and hybrid assembly techniques, with miniaturization the main goal in either case. The hybrid approach that we will describe makes use of a submount of dimensions comparable to those used on standard laser manufacturing, but made from a material chosen for a specific thermal expansion coefficient, either high or low compared to Inp, to obtain either enhanced or reduced temperature tuning. to increase the effectiveness of the differential expansion, we also developed a strain magnifying structure based on a deep crystallographic etch from the back of the substrate. One appeal of this hybrid technique is that the same basic technology can be applied to either tuning enhancement or reduction, by simply using a different submount. However, the ultimate in cost reduction and reliability would be obtained with a truly monolithic approach, and toward this end, we studied the properties of a high-expansion electroplated manganese film to serve as a stress inducing layer.
DTIC
Miniaturization; Thermal Expansion; Manufacturing; Semiconductor Lasers

20010066613 State Univ. of New York, Dept. of Physics and Astronomy, Stony Brook, NY USA
Experimental Study of the Effect of Electron Beam Quality on Free-Electron Laser Gain ***Final Report, Jun. 1997-Jan. 2001***
BenZvi, Ilan, State Univ. of New York, USA; May 03, 2001; 4p; In English
Contract(s)/Grant(s): N0001-49-71-0845
Report No.(s): AD-A390334; No Copyright; Avail: CASI; A01, Microfiche; A01, Hardcopy

The objective was the measurement of the single pass FEL known as the High-Gain, Harmonic Generation FEL. The HGHG approach utilizes a laser-seeded FEL to produce amplified, longitudinally coherent, Fourier-transform-limited output at a harmonic of the seed laser. In the experiment performed at the Accelerator Test Facility at Brookhaven National Laboratory, a seed CO2 laser at a wavelength of 1O.6mm produced saturated, amplified FEL output at the second-harmonic wavelength, 5.3mm. The HGHG FEL was demonstrated successfully. The duration of the output pulse was measured using a second-harmonic intensity autocorrelator, and the coherence length was measured using an interferometer. We also measured the energy distribution of the electron beam after ft exited the second undulatory, observing behavior consistent with that is expected at saturation. The intensity of the harmonic components of the output at 2.65 mm and 1.77 mm were determined relative to that of the 5.3-mm fundamental. Finally, using a corrector magnet upstream of the radiator, steering effects on the trajectories of the electron and light beams were studied.
DTIC
Carbon Dioxide Lasers; Electron Beams; Free Electron Lasers; Harmonic Generations; Fourier Transformation; High Gain

20010066626 Schafer Corp., Chelmsford, MA USA
Three-Dimensional Template Correlations for Direct-Detection Laser-Radar Target Recognition
Youmans, Douglas G.; Hart, George A.; Jan. 1999; 17p; In English
Contract(s)/Grant(s): N00014-97-D-2014
Report No.(s): AD-A390244; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Direct-detection laser radars can measure the range and the intensity returns from a target, with or without clutter, for each part of the target resolved in angle by the optical system. Because the ladar's angular resolution is in micro-radians, there are generally at least a few angular pixels "on target." In addition, for narrow pulse ladar systems, there may be ten or so sequential intensity measurements in range per pixel as the laser pulse propagates down the target's surface. The output image is, therefore, potentially a truce dimensional "cube" of intensity measurements and quantized in the range axis by the range-bin size or "voxel." This is known as "range resolved angle-angle-intensity" ladar, and one such system is being built by BMDO under the DITP effort.
DTIC
Optical Radar; Target Recognition; Laser Beams; Laser Range Finders; Radar Targets

20010066773 Textron Systems Corp., Wilmington, MA USA

Hardware Description and Performance Capabilities of a Pulsed Kilowatt-Class Coherent CO2 Laser Radar Sensor

Hasson, V.; Kovacs, M.; Corbett, F.; Dryden, G.; Riley, M.; Jan. 1999; 16p; In English

Contract(s)/Grant(s): DASG60-97-C-0030; DASG60-90-C-0117

Report No.(s): AD-A390250; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A kilowatt-class pulsed carbon dioxide laser radar system was recently installed at the top of Mount Haleakala at the Maui Space Surveillance Site (MSSS). The monostatic shared-aperture system was integrated with an existing 0.6M Laser Beam Director (LBD) telescope and designed to use existing pointing and tracking capabilities at MSSS. The system has a dual Ladar/Lidar capability and currently represents the state-of-the-art (SOA) in both modes of operation. The key Ladar features include a real-time capability to provide precision tracking and high-resolution (range-Doppler and range-amplitude) imaging of orbiting targets at ranges of up to 1500km and at data collection rates of up to 30 Hz. A wavelength agile differential absorption Lidar (DIAL) capability at repetition rates of up to 30 Hz and associated (pre-programmed) wavelength selection from 9-11 micrometers within the (12)C(16)O2 and (13)C(16)O2 bands. The laser transmitter has a room temperature catalyst and can operate sealed-off with either of these gases.

DTIC

Carbon Dioxide Lasers; Radar Tracking; Laser Beams; Radar Targets; Coherent Radar; Differential Absorption Lidar; Laser Range Finders; Radar Detection; Real Time Operation

20010067053 Brookhaven National Lab., Upton, NY USA

VISA Undulator Re-Alignment Using An Optical Monitoring System

Tremaine, A.; Murokh, A.; Wang, X. J.; Jan. 2001; 12p; In English; Original contains color illustrations

Report No.(s): PB2001-106111; BNL-68170; No Copyright; Avail: National Technical Information Service (NTIS)

The VISA experiment is designed to reach and study saturation in a high gain 800 nm SASE FEL at the Brookhaven Accelerator Test Facility (ATF). to do this, the undulator must be aligned at first to within 20 micrometers with use of a laser interferometric system. Once aligned, any small movements from the aligned position will greatly detriment the SASE FEL performance thus making continuous monitoring of the undulator position necessary. This is quite a complicated task since the 4 m undulator is made up of four 1 m sections enclosed in a vacuum chamber. We have developed an in situ optical system to monitor the undulator position with an accuracy better than 10 micrometers.

NTIS

Free Electron Lasers; Saturation; Laser Interferometry

20010067239 Anteon Corp., Dayton, OH USA

Laser Cladding/Glazing as a Surface Coating Alternative

Hull, R., Anteon Corp., USA; Firsich, D., Inorganic Specialists, Inc., USA; Woods, C., Global Manufacturing Solutions, USA; Eric, J., Air Force Research Lab., USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 8p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Increasing environmental regulations and rising waste disposal costs are driving the need for economic chrome plating replacement technologies. This paper summarizes one of several chrome replacement research and development programs funded by the Air Force Pollution Prevention office. This work focuses on two laser-based coating processes - laser cladding and laser glazing - for the application of a thick (5-25 mils) uniform coating with similar if not superior mechanical performance to that of hard (wet) chrome plating. All experiments were performed using a flattop continuous wave carbon dioxide laser, operating at 10.6 microns. This paper describes the laser cladding and glazing techniques, the processing parameters developed and the mechanical performance of the resultant coatings. Emphasis will be placed on the laser glazing technique developed under this effort. The technique uses the laser's rapid surface heating effect to melt, re-flow, and consolidate protective coatings deposited using any type of thermal spray technique - in this case, a flame-spray coating system. Post flame-spray treatment using laser glazing transformed an economical but porous coating into a uniform, pore-free coating with superior performance characteristics to that of chrome. Materials characterization and mechanical property test results are discussed.

Author

Cladding; Laser Applications; Flame Spraying; Protective Coatings; Plating

20010067245 Anteon Corp., Dayton, OH USA

High Temperature Material Performance Testing Using Continuous Wave Carbon Dioxide Lasers

Johnson, T. N., Anteon Corp., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental

Technology; February 2001; 13p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

A key aspect of material development is the ability to simulate the anticipated real world application in a controlled laboratory environment. The use of continuous wave carbon dioxide lasers to simulate anticipated heat loads on high temperature materials is an efficient and cost effective tool for evaluating the performance of aerospace materials. This paper describes the use of lasers to simulate heat loads in the evaluation of aerospace material performance. Test methodology and diagnostics are described with representative data presented. The use of continuous wave lasers as radiant heating sources have many advantages in the evaluation of high temperature materials. Thousands of material performance tests have been conducted at the Laser Hardened Material Evaluation Laboratory (LHMEL) on many of the internal ablative insulation materials used in solid rocket motors. The testing has encompassed incident heat flux rates from 25 W/sq cm to 5000 W/sq cm and a maximum measured surface temperature greater than 7000 F. Analytical modeling benefits greatly from data gathered during laser material testing by correlating the transient response of mathematical material models against the high fidelity test data acquired. The lasers at the LHMEL facility can deliver up to 100 kW of power on target with a uniform spatial distribution. by providing a flat heat flux profile, simple geometric models can be used to ensure the proper physics of material response are being modeling. Historical material response data collected for modeling support includes, but is not limited to, temperature profiles, density profiles, pressure profiles, surface temperature response, and mass loss measurements. Specimens have been tested in environmental conditions ranging from a high vacuum (1x10(exp -6) Torr) to high velocity flow (up to Mach 2.2) in either oxidizing or inert atmospheres.

Author

Continuous Wave Lasers; Performance Tests; Carbon Dioxide Lasers; Refractory Materials; High Temperature Tests

20010067477 New Mexico Univ., Center for High Technology Materials, Albuquerque, NM USA

Network Analyzer for Carrier Lifetime Measurements in Mid-IR Semiconductor Lasers ***Final Report, 17 Apr. 2000 - 16 Apr. 2001***

Lester, Luke F.; May 18, 2001; 4p; In English

Contract(s)/Grant(s): DAAD19-00-1-0139

Report No.(s): AD-A391061; 3-16651-FT; ARO-40879.1-EL-RIP; No Copyright; Avail: CASI; A01, Microfiche; A01, Hardcopy

The Hewlett-Packard 8722D microwave network analyzer and cables that were obtained under the Grant have been used to perform the first electrical measurements of the carrier lifetime, Tau(sub d), and radiative recombination in quantum dot LEDs. Our analysis shows that the ground and excited quantum dot energy states exhibit significantly different radiative recombination rates. We have measured Tau(sub d) as a function of current density for quantum dot LED samples using the microwave equipment and used this data to calculate the functional relationship between the carrier lifetime, carrier density, and radiative efficiency. The results indicate that carrier filling on the different dot energy levels has a strong influence on the radiative behavior of the devices and that the radiative rate coefficient, B, for different QD levels can vary considerably.

DTIC

Carrier Lifetime; Infrared Radiation; Microwave Equipment; Semiconductor Lasers

20010067478 New Mexico Univ., Center for High Technology Materials, Albuquerque, NM USA

Network Analyzer for Carrier Lifetime Measurements in Mid-IR Semiconductor Lasers ***Final Report, 1 Mar. 1999 - 29 Feb. 2000***

Lester, Luke F.; May 18, 2001; 4p; In English

Contract(s)/Grant(s): DAAD19-99-1-0064

Report No.(s): AD-A391062; 3-13381-FT; ARO-39396.1-EL-RIP; No Copyright; Avail: CASI; A01, Microfiche; A01, Hardcopy

The Hewlett-Packard 8722D microwave network analyzer and cables that were obtained under the Grant have been used to perform the first electrical measurements of the carrier lifetime, Tau(sub d), and radiative recombination in quantum dot LEDs. Our analysis shows that the ground and excited quantum dot energy states exhibit significantly different radiative recombination rates. We have measured Tau(sub d) as a function of current density for quantum dot LED samples using the microwave equipment and used this data to calculate the functional relationship between the carrier lifetime, carrier density, and radiative efficiency. The results indicate that carrier filling on the different dot energy levels has a strong influence on the radiative behavior of the devices and that the radiative rate coefficient, B, for different QD levels can vary considerably.

DTIC

Semiconductor Lasers; Infrared Radiation; Microwave Equipment; Carrier Lifetime

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.

20010066356 Carnegie-Mellon Univ., Dept. of Chemical Engineering, Pittsburgh, PA USA
Fundamentals of High Temperature Lubrication ***Final Report, 1 Feb. 1998 - 30 Nov. 2000***
Gellman, Andrew J.; Mar. 31, 2001; 12p; In English
Contract(s)/Grant(s): F49620-98-1-0218
Report No.(s): AD-A389303; AFRL-SR-BL-TR-01-0256; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A program of research has been conducted into the fundamentals of vapor phase lubrication for use in high temperature applications. The focus of the effort has been on the reaction mechanisms by which phosphates and phosphites decompose on metal surfaces to form thin lubricating films of polyphosphate glass. The results have explained the origins of the superior performance of aryl phosphates over alkylphosphates as vapor phase lubricants. In addition experiments have been conducted to probe the fundamentals of friction between single crystalline surfaces. These have revealed that friction anisotropy between crystalline metal surfaces is due to anisotropy in the work of bulk plastic deformation that occurs during sliding. They have also revealed effects of adsorbate layering at metal surfaces during sliding. Finally, study of the frictional properties of quasicrystals has revealed the role of surface oxides films in lowering the friction between quasicrystalline surfaces.
DTIC
Vapor Phase Lubrication; Lubricants; Sliding Friction; Lubrication Systems; Metal Surfaces

20010066563 Illinois Univ., Gear Research Lab., Chicago, IL USA
Asymmetric Modified Spur Gear Drives: Reduction of Noise, Localization of Contact, Simulation of Meshing and Stress Analysis
Litvin, Faydor L., Illinois Univ., USA; Lian, Qiming, Illinois Univ., USA; Kapelevich, Alexander L., Graci, Inc., USA; Computer Methods in Applied Mechanics and Engineering; 2000; ISSN 0045-7825; Volume 188, pp. 363-390; In English
Contract(s)/Grant(s): DAAD19-99-1-0168
Report No.(s): AD-A386713; ARO-38852.3-EG; Copyright; Avail: Defense Technical Information Center (DTIC)

An asymmetric spur gear is considered. The asymmetry means that larger and smaller pressure angles are applied for the driving and coast sides, respectively. The conventional design of such a drive is based on application of involute profiles. The authors propose a modified geometry of an asymmetric spur gear drive designed as a combination of an involute gear and a double crowned pinion that enable to localize and stabilize the bearing contact and obtain a favorable shape of transmission errors of reduced magnitude. Computerized design of spur gears of proposed geometry and simulation of their meshing and contact have been developed. A method of generation of a double-crowned pinion has been developed as well as stress analysis of symmetric and asymmetric spur gears have been accomplished, that confirm reduction of contact and bending stresses for an asymmetric spur gear drive. The developed theory is illustrated with numerical examples.
Author
Asymmetry; Gears; Mechanical Drives; Stress Analysis

20010066615 Hughes Associates, Inc., Baltimore, MD USA
Water Spray Protection of Machinery Spaces ***Final Report***
Back, Gerard G.; Beyler, Craig L.; DiNenno, Philip J.; Hansen, Richard; Mar. 2001; 83p; In English
Contract(s)/Grant(s): DTCG39-97-F-E00150; DTCG39-00-F-E00015
Report No.(s): AD-A390343; CG-D-04-01; No Copyright; Avail: CASI; A01, Microfiche; A05, Hardcopy

This report provides an evaluation of the firefighting capabilities of fixed pressure water spray systems for machinery spaces as described in Regulation 10 of Safety of Life at Sea (SOLAS). The objective of this evaluation was to determine if a system meeting the minimum SOLAS requirement can provide adequate protection of shipboard machinery spaces. to meet this objective, the capabilities and limitations of twelve water spray systems were determined using the International Maritime Organization (IMO) test protocol for water mist systems (MSC 668 and 728) as the basis for this analysis. The tests were conducted in a simulated 500 m to the third power machinery space onboard the U.S. Coast Guard's test vessel STATE OF MAINE. Generally speaking, the trends in performance of water spmy systems were similar to those observed for water mist systems. All systems were capable of extinguishing larger fires (4 kW/m3 and greater) with variations in system capabilities becoming apparent as the fire size was reduced (2 kW/m3 and below). Only about half of the systems were capable of extinguishing the 1.0 MW obstructed

spray fire located on the side of the engine mockup (similar to IMO-6). Water mist systems typically exhibit slightly better capabilities primarily against the smaller fires. It was concluded that the capabilities of these systems cannot be associated with a single parameter such as application rate and must be determined empirically. As a result, the approval of these systems needs to be performance based as with all other fire suppression systems required by SOLAS. It was recommended that SOLAS Regulation 10 be re-written to cover all water based machinery space systems with the caveat that they pass a modified IMO test protocol based on the one currently used for approving water mist systems MSC 668 and 7281.
DTIC
Mist; Sprayers; Fire Fighting; Extinguishing; Water

20010067200 NASA Marshall Space Flight Center, Huntsville, AL USA
Experimental Investigation of Composite Pressure Vessel Performance and Joint Stiffness for Pyramid and Inverted Pyramid Joints
Verhage, Joseph M., NASA Marshall Space Flight Center, USA; Bower, Mark V., Alabama Univ., USA; [2001]; 59p; In English; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The focus of this study is on the suitability in the application of classical laminate theory analysis tools for filament wound pressure vessels with adhesive laminated joints in particular: pressure vessel wall performance, joint stiffness and failure prediction. Two 18-inch diameter 12-ply filament wound pressure vessels were fabricated. One vessel was fabricated with a 24-ply pyramid laminated adhesive double strap butt joint. The second vessel was fabricated with the same number of plies in an inverted pyramid joint. Results from hydrostatic tests are presented. Experimental results were used as input to the computer programs GENLAM and Laminate, and the output compared to test. By using the axial stress resultant, the classical laminate theory results show a correlation within 1% to the experimental results in predicting the pressure vessel wall pressure performance. The prediction of joint stiffness for the two adhesive joints in the axial direction is within 1% of the experimental results. The calculated hoop direction joint stress resultant is 25% less than the measured resultant for both joint configurations. A correction factor is derived and used in the joint analysis. The correction factor is derived from the hoop stress resultant from the tank wall performance investigation. The vessel with the pyramid joint is determined to have failed in the joint area at a hydrostatic pressure 33% value below predicted failure. The vessel with the inverted pyramid joint failed in the wall acreage at a hydrostatic pressure within 10% of the actual failure pressure.
Author
Axial Stress; Computer Programs; Fabrication; Failure Analysis; Hydrostatic Pressure; Pressure Vessels; Pyramids; Wall Pressure

20010067247 NASA Marshall Space Flight Center, Huntsville, AL USA
Friction Stir Welding at MSFC: Kinematics
Numes, A. C., Jr., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 7p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

In 1991 The Welding Institute of the UK patented the Friction Stir Welding (FSW) process. In FSW a rotating pin-tool is inserted into a weld seam and literally stirs the faying surfaces together as it moves up the seam. By April 2000 the American Welding Society International Welding and Fabricating Exposition featured several exhibits of commercial FSW processes and the 81st Annual Convention devoted a technical session to the process. The FSW process is of interest to Marshall Space Flight Center (MSFC) as a means of avoiding hot-cracking problems presented by the 2195 aluminum-lithium alloy, which is the primary constituent of the Lightweight Space Shuttle External Tank. The process has been under development at MSFC for External Tank applications since the early 1990's. Early development of the FSW process proceeded by cut-and-try empirical methods. A substantial and complex body of data resulted. A theoretical model was wanted to deal with the complexity and reduce the data to concepts serviceable for process diagnostics, optimization, parameter selection, etc. A first step in understanding the FSW process is to determine the kinematics, i.e., the flow field in the metal in the vicinity of the pin-tool. Given the kinematics, the dynamics, i.e., the forces, can be targeted. Given a completed model of the FSW process, attempts at rational design of tools and selection of process parameters can be made.
Author
Friction Welding; Kinematics; Loads (Forces); Flow Distribution

20010067248 NASA Marshall Space Flight Center, Huntsville, AL USA

Aluminum Lithium Alloy 2195 Fusion Welding Improvements with New Filler Wire

Russell, C., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 23p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

The objective of this research was to assess the B218 weld filler wire for Super Lightweight External Tank production, which could improve current production welding and repair productivity. We took the following approaches: (1) Perform a repair weld quick look evaluation between 4043/B218 and B218/B218 weld filler wire combinations and evaluation tensile properties for planished and unplanished conditions; and (2) Perform repair weld evaluation on structural simulation panel using 4043-B218 and B218/B218 weld filler wire combinations and evaluation tensile and simulated service fracture properties for planished and unplanished conditions.

Derived from text

Fillers; Fusion Welding; Tensile Properties; External Tanks

20010067255 NASA Marshall Space Flight Center, Huntsville, AL USA

Evaluation of Forces on the Welding Probe of the Automated Retractable Pin-Tool (RPT)

Ding, R. J., NASA Marshall Space Flight Center, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The NASA invention entitled 'The Hydraulic Controlled Auto-Adjustable Pin Tool for Friction Stir Welding' (US Patent 5,893,507), better known as the Retractable Pin-Tool (RPT), has been instrumented with a load-detecting device allowing the forces placed on the welding probe to be measured. As the welding probe is plunged into the material, the forces placed on the probe can now be characterized. of particular interest are those forces experienced as the welding probe comes within close proximity to the back-up anvil. For a given material, it is believed that unique forces are generated relative to the distance between the welding probe and the anvil. The forces have been measured and characterized for several materials, and correlations have been made between these forces and the pin's position relative to the backside of the weld material.

Author

Pins; Retractable Equipment; Loads (Forces); Friction Welding

20010067291 NASA Marshall Space Flight Center, Huntsville, AL USA

Manufacturing Challenges Implementing Material Changes for the Super Light Weight External Tank: A Welding Process Perspective

Lawless, K., NASA Marshall Space Flight Center, USA; Jones, C., NASA Marshall Space Flight Center, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 26p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

A viewgraph presentation gives an overview of the manufacturing challenges in implementing welding material changes for the super lightweight external tank. Details are given on the external tank configuration, the weld purging equipment used, planning the selection of weld filler wire alloy, the initial weld microstructure, the wide panel tensile testing, and the dome cap welding.

CASI

Welding; Tensile Tests; External Tanks; Light Alloys

20010067313 Air Force Research Lab., USA

Challenges for Aerospace Materials & Processes

Browning, C. E., Air Force Research Lab., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 32p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

A viewgraph presentation gives an outline of the challenges for aerospace materials and processes, including information on a material life cycle, aerospace material life cycle, trends in impacting the aerospace materials and processes (M&P) life cycle, key aerospace M&P challenges, and revolutionary opportunity areas. The following conclusions are reached: (1) the life cycle of a material can be charted in terms of stages and transitions; (2) understanding this life cycle can be used to manage M&P

strategies and investments; (3) key trends will impact this cycle; (4) greatest challenges in revolutionary and emerging stages; and (5) new partnerships, tools, and M&P processes will be key to meeting the challenges.
Derived from text
Life (Durability); Trends; Aerospace Engineering; Spacecraft Construction Materials

20010067504 Ohio State Univ., Dept. of Mechanical Engineering, Columbus, OH USA
Modeling, Modal Properties, and Mesh Stiffness Variation Instabilities of Planetary Gears ***Final Report***
Parker, Robert G., Ohio State Univ., USA; Lin, Jian, Ohio State Univ., USA; May 2001; 126p; In English
Contract(s)/Grant(s): NAG3-1979; RTOP 712-20-13; DA Proj. 1L1-61102-AH-45
Report No.(s): NASA/CR-2001-210939; E-12792; NAS 1.26:210939; ARL-CR-462; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

Planetary gear noise and vibration are primary concerns in their applications in helicopters, automobiles, aircraft engines, heavy machinery and marine vehicles. Dynamic analysis is essential to the noise and vibration reduction. This work analytically investigates some critical issues and advances the understanding of planetary gear dynamics. A lumped-parameter model is built for the dynamic analysis of general planetary gears. The unique properties of the natural frequency spectra and vibration modes are rigorously characterized. These special structures apply for general planetary gears with cyclic symmetry and, in practically important case, systems with diametrically opposed planets. The special vibration properties are useful for subsequent research. Taking advantage of the derived modal properties, the natural frequency and vibration mode sensitivities to design parameters are investigated. The key parameters include mesh stiffnesses, support/bearing stiffnesses, component masses, moments of inertia, and operating speed. The eigen-sensitivities are expressed in simple, closed-form formulae associated with modal strain and kinetic energies. As disorders (e.g., mesh stiffness variation. manufacturing and assembling errors) disturb the cyclic symmetry of planetary gears, their effects on the free vibration properties are quantitatively examined. Well-defined veering rules are derived to identify dramatic changes of natural frequencies and vibration modes under parameter variations. The knowledge of free vibration properties, eigen-sensitivities, and veering rules provide important information to effectively tune the natural frequencies and optimize structural design to minimize noise and vibration. Parametric instabilities excited by mesh stiffness variations are analytically studied for multi-mesh gear systems. The discrepancies of previous studies on parametric instability of two-stage gear chains are clarified using perturbation and numerical methods. The operating conditions causing parametric instabilities are expressed in closed-form suitable for design guidance. Using the well-defined modal properties of planetary gears, the effects of mesh parameters on parametric instability are analytically identified. Simple formulae are obtained to suppress particular instabilities by adjusting contact ratios and mesh phasing.
Author
Models; Design Analysis; Gears; Manufacturing; Numerical Analysis; Structural Design

38
QUALITY ASSURANCE AND RELIABILITY

Includes approaches to, and methods for reliability analysis and control, inspection, maintainability, and standardization.

20010066158 National Inst. of Standards and Technology, Gaithersburg, MD USA
Journal of Research of the National Institute of Standards and Technology, January/February 2001. Volume 106, Number 1. Centennial Issue: NBS/NIST--100 Years of Measurement
Taylor, B. N.; 2001; 388p; In English
Report No.(s): PB2001-106288; No Copyright; Avail: CASI; A17, Hardcopy; A04, Microfiche

Contents include the following: Length and Dimensional Measurements at NIST; The Kilogram and Measurements of Mass and Force; Primary Atomic Frequency Standards at NIST; the Ampere and Electrical Standards; the Kelvin and Temperature Measurements; the Candela and Photometric and Radiometric Measurements; Materials Research with Neutrons at NIST; In Situ Burning of Oil Spills; Statistics and Measurements; Mathematics and Measurement; NIST Mechanisms for Disseminating Measurements; and Information Technology Measurement and Testing Activities at NIST.
NTIS
Standards; Dimensional Measurement; Information Systems; Measuring Instruments

20010066719 Savannah River Ecology Lab., Aiken, SC USA
Optimal Blending Quality
Harris, S. P.; Jul. 1986; 20p; In English
Report No.(s): PB2001-106017; DPST-86-553; No Copyright; Avail: National Technical Information Service (NTIS)

The purpose of blending is to form an optimum quality lot from components with known quality attributes. In this application, the components are of the same material but may vary in quality because of process variability. The authors have developed a functional program for product blending. The program is installed at an SRP production site on their VAX computer. A wide range of blending choices is available. The program can be easily changed or expanded. The technology can be applied at other areas where mixing or blending is done.
NTIS
Mixtures; Quality Control; Computer Programs

20010066845 National Inst. of Standards and Technology, National Voluntary Lab. Accreditation Program, Gaithersburg, MD USA
National Voluntary Laboratory Accreditation Program (NVLAP): 2001 Directory ***Final Report***
White, V. R.; Mar. 2001; 450p; In English
Report No.(s): PB2001-104046; NIST/SP-810-ED-2001; Copyright; Avail: National Technical Information Service (NTIS)

The National Institute of Standards and Technology (NIST) administers the National Voluntary Laboratory Accreditation Program (NVLAP), NVLAP is comprised of a series of laboratory accreditation programs (LAPs) which are established on the basis of requests and demonstrated need. Each LAP includes specific calibration and/or test standards and related methods and protocols assembled to satisfy the unique needs for accreditation in a field of testing or calibration. NVLAP accredits public and private laboratories based on evaluation of their technical qualifications and competence to carry out specific calibrations or tests. This Directory of laboratories is published annually and lists the name, address, contact person, phone and fax numbers, e-mail and URL addresses (if available), accreditation renewal date, and scope of accreditation for each laboratory.
NTIS
Laboratories; Licensing; Quality Control

20010066846 Marley Organization, Inc., Ridgefield, CT USA
Directory of U.S. Private Sector Product Certification Programs ***Final Report***
Hyer, C. W.; Apr. 2001; 364p; In English
Report No.(s): PB2001-102896; NIST/SP-903-ED-2001; No Copyright; Avail: National Technical Information Service (NTIS)

This directory includes 122 entries on organizations engaging in product certification activities. Entries describe: the type and purpose of each organization, the nature of the activity, products certified, standards used, certification requirements, any accreditation or recognition by a U.S. or foreign government agency or by the private sector, availability of services, methods of cost determination, and other relevant details. Where available, a representation of the organization's mark is included with its entry, as well as a pictorial index of all such marks.
NTIS
Directories; Certification; Organizations; USA; Quality Control

20010067055 Oak Ridge National Lab., TN USA
In-Process Detection of Weld Defects Using Laser-Based Ultrasonic Lamb Waves
Kercel, S. W.; Klein, M. B.; Pouet, B.; Nov. 2000; 76p; In English; Original contains color illustrations
Report No.(s): PB2001-106109; ORNL/TM-2000/346; No Copyright; Avail: National Technical Information Service (NTIS)

Laser-based ultrasonic (LBU) measurement shows great promise for on-line monitoring of weld quality in tailor-welded blanks. Tailor-welded blanks are steel blanks made from plates of differing thickness and/or properties butt-welded together; they are used in automobile manufacturing to produce body, frame, and closure panels. The authors have used laser-generated plate (Lamb) waves to propagate from one plate into the weld nugget as a means of detecting defects. This report recounts an investigation of a number of inspection architectures based on processing of signals from selected plate waves, which are either reflected from or transmitted through the weld zone.
NTIS
Welding; Detection; Defects; Ultrasonic Radiation; Lamb Waves; Weld Strength; Ultrasonic Tests

20010067227 Laser Technology, Inc., Norristown, PA USA

Verification of Shearography NDE Methods on Space Shuttle, X-33, and Delta IV Launch Vehicles

Newman, J. W., Laser Technology, Inc., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Laser shearography nondestructive evaluation (NDE) was first implemented in aerospace production of the USAF B-2 program in the 1980s. Since then, it has become widely accepted for the inspection of metal engine components, composites, honeycomb structures, and thermal protection material on launch vehicle systems. Shearography NDE images surface strain caused by the presence of subsurface anomalies when a repetitive load is applied to the structure. Very successful, high-speed inspection techniques have been developed using shearography with acoustic stress to image disbonds under sprayed-on foam insulation (SOFI) applied to aluminum cryogenic fuel tanks. Typically, 6-8 sq ft of surface area are inspected in less than 1 s. This paper will discuss the technology and quality and cost benefits of shearography NDE as applied to rapid launch vehicle NDE and health monitoring. It will also provide specific examples of NDE verification on three programs. Additional information is contained in the original extended abstract.

Author

Nondestructive Tests; Shearography; Laser Applications; Quality Control

20010067336 Nu-Cast, Inc., Londonderry, NH USA

High-Efficiency Monolithic Lightweight Aluminum Cast Structure

Bowkett, J., Nu-Cast, Inc., USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Nu-Cast, Inc., is manufacturing highly efficient, low-cost truss-like platforms/structures using the investment casting process developed at Nu-Cast, Inc., and the current rapid prototyping capabilities of stereolithography (SLA). This integrated production process allows for direct transfer for the computer design into hardware with a minimum of compromising fabrication restrictions. In the monolithic 3-D-truss approach, control of structural integrity and thermal homogeneity is significantly improved over conventional multipart assemblies because of the elimination of most joint problems and their analytical uncertainties. For example, preliminary analysis of a typical 3-D-truss-based platform indicates a potential increase in stiffness up to 130 times when compared to a plate of equal mass and area. Localized high-stress areas can be eliminated easily using this approach; additional material can be added locally during normal detailed design to satisfy the part's system requirement and to allow an efficient structural design to become a reality. Additionally, there can be a significant cost reduction for this monolith, compared to multipart assemblies, especially where tight tolerances are not system-functional but are only required for individual piece-part assembly/interface. The improved component performance achievable at a given weight with reduced resource expenditure will clearly support the NASA mandate to 'do more with less'.

Author

Investment Casting; Lithography; Manufacturing; Trusses

20010067653 General Accounting Office, Washington, DC USA

Quality Assurance: The Fastener Quality Act's Small-Lot Exemption

Jun. 2001; 24p; In English

Report No.(s): PB2001-106670; GAO-01-719; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

To prevent substandard fasteners (threaded metallic screws, nuts, and bolts) from being used in products where safety is critical, Congress enacted the Fastener Quality Act (FQA) in 1990. The law required persons who manufacture and sell high-strength fasteners to ensure that the fasteners meet applicable standards and specifications through laboratory testing and recordkeeping. Companies became concerned that under the act, fastener manufacturers' costs for laboratory testing and recordkeeping could make fasteners purchased in small packages for service repairs and assembly kits prohibitively expensive. As a result of these concerns, Congress amended FQA in 1999 to exempt from testing and recordkeeping those fasteners that are (1) ordered for use as a spare, substitute, service, or replacement part in packages containing 75 or fewer items or (2) contained in an assembly kit. We refer to both exemptions as the small-lot exemption, and it applies to fasteners manufactured on or after December 6, 1999. However, Congress was also concerned that this exemption could allow manufacturers to sell substandard, untested fasteners in packages of 75 or fewer or as parts in assembly kits. This concern led Congress to include a provision in the

1999 FQA amendments requiring us to prepare a report not later than 2 years after its enactment, describing any changes in fastener industry practice 'resulting from or apparently resulting from' the small-lot exemption. This report satisfies that requirement.
NTIS
Fasteners; Quality Control

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 structure. For applications see 05 Aircraft Design, Testing and Performance and 18 Spacecraft Design, Testing and Performance.

20010066061 National Chiao Tung Univ., Dept. of Civil Engineering, Hsinchu, Taiwan, Province of China
Application of 2-D Random Generators to the Study of Solute Transport in Fractures
Su, Hui-Chen, National Chiao Tung Univ., Taiwan, Province of China; Kinzelbach, Wolfgang, Eidgenoessische Technische Hochschule, Switzerland; Journal of the Chinese Institute of Engineers; May 2001; ISSN 0253-3839; Volume 24, No. 3, pp. 397-402; In English; Copyright; Avail: Issuing Activity

Two fields with random aperture distribution and different spatial structures are taken as models to study solute transport in fractures. One network has non-vanishing long range correlations and represents a fractal pattern. The other one has a finite correlation length and an exponential covariance function. Based on these fields, two physical fracture models were produced and used to record the movement of a colored solute by means of a CCD camera. The pictures obtained were analyzed with image processing methods. A front tracking algorithm shows that the growth law of the frontal variance is a power law of time with the exponent depending on the Hurst coefficient of the aperture distribution in the case of the fractal pattern, while it is a linear function of time for the case of the finite correlation length.
Author
Statistical Distributions; Fractures (Materials); Brownian Movements

20010066062 National Taiwan Univ., Dept. of Civil Engineering, Taipei, Taiwan, Province of China
A Study of the Modal Strain Energy Method for Viscoelastically Damped Structures
Tsai, Meng-Hao, National Taiwan Univ., Taiwan, Province of China; Chang, Kuo-Chun, National Taiwan Univ., Taiwan, Province of China; Transactions of the Chinese Institute of Engineers; May 2001; ISSN 0253-3839; Volume 24, No. 3, pp. 311-320; In English; Copyright; Avail: Issuing Activity

The modal strain energy (MSE) method has been proposed to estimate the modal loss factors or modal damping ratios of structures with viscoelastic dampers. There are certain assumptions made in deriving the MSE method, such as the computation of the modal loss factor directly from the ratios of the imaginary and real parts of the eigenvalues, and the neglect of the influence of the imaginary mode shapes, etc. These assumptions may result in overestimating the modal damping ratios of viscoelastically damped structures when the added damping is high. In this study, the effect of the assumptions made by the MSE method is investigated, and modified formulations of the MSE method are derived. The modified MSE method removes the assumptions made in the original MSE method. Furthermore, earthquake responses of a complex stiffness system and a linear viscous sampling system, of which the modal damping ratios are estimated by the MSE method, are compared. Study results indicate that the difference arising from the assumptions becomes significant when the damping ratio is larger than 20%. For the illustrated non-proportionally damped system, the effect of imaginary mode shapes on the MSE method can be neglected when the damping ratio is smaller than 20%. It is then concluded that, for most engineering applications with design damping ratios smaller than 20%, the conventional linear viscous damping model with the MSE method may result in solutions in good agreement with those obtained by the more rigorous complex stiffness model.
Author
Strain Energy Methods; Viscoelastic Damping; Assumptions

20010066063 Tamkang Univ., Dept. of Civil Engineering, Taipei, Taiwan, Province of China
Performance of Multiple Tuned Mass Dampers for Suppressing Buffeting Response and Increasing Flutter Speed of Long-S-Pan Bridges
Lin,Yuh-Yi, Tamkang Univ., Taiwan, Province of China; Cheng, Chii-Ming, Tamkang Univ., Taiwan, Province of China; Journal of the Chinese Institute of Engineers; May 2001; ISSN 0253-3839; Volume 24, No. 3, pp. 273-288; In English
Contract(s)/Grant(s): NSC-88-2211-E-032-003; Copyright; Avail: Issuing Activity

Performance of multiple tuned mass dampers (MTMDs) for suppressing buffeting response and increasing the critical wind speed of long-span bridges is examined. In this model, each damper is positioned at a distance from the deck center, and corresponding to it, there is an identical damper in the opposite direction to make this system balance. The vertical and torsional dampers are tuned at the frequencies of the first vertical and torsional structural modes, respectively. The performance of vertical dampers is not related to their locations. However, the performance of torsional dampers is strongly dependent upon their lever arms to provide torsional damping and stiffness. Using both vertical and torsional dampers, the vertical and torsional buffeting responses can be reduced and the stability of the bridge can be increased for either single-degree-freedom flutter or coupled flutter. A parametric analysis is used to study the performance and characteristics of the MTMDs, and based on these results, the design parameters including mass, damping, frequency bandwidth, lever arm, and total number of TMDs are proposed. The results also indicate that the MTMDs, designed with the recommended parameters, are not only more effective but also more robust than the usual single TMD against wind-induced vibration.
Author
Buffeting; Flutter; Vibration Damping; Design Analysis

20010066216 California Univ., San Diego, Dept. of Applied Mechanics and Engineering Sciences, La Jolla, CA USA
A New Approach to Structural Reliability in Fatigue Failure ***Interim Report, 1 Apr. 1997 - 31 Mar. 1998***
Nemat-Nasser, Sia; Zarka, Joseph; Mar. 1998; 9p; In English
Contract(s)/Grant(s): N00014-96-1-0631
Report No.(s): AD-A345639; Rept-97PRO1513-00; No Copyright; Avail: Defense Technical Information Center (DTIC)
The project objective is to develop formalism for assessing fatigue fracture of welded parts of ship structures based on a newly developed automatic Learning Expert System (LES), using extensive knowledge of material characteristics, experimental results, and results obtained through computational simulations. Any study of the welds on a ship structure must take into account the uncertainties and random characteristics of the loading, as well as the fatigue lifetime of the welds. Due to the stochastic nature of the loads, the available deterministic approaches are not sufficient to give a reliable evaluation of the structural safety. Although there has been some effort to fill this gap by probabilistic approaches, these are yet of limited usefulness because of the limited available databases. The research project will ultimately demonstrate the applicability and effectiveness of LES to this class of engineering mechanics problems. A special procedure to produce the intelligent descriptors has been developed. These descriptors are then used to represent the important scalar fields at the critical points of the structure. Two commercial Finite Element codes, NISA and ALGOR, are used in this procedure. After the FEM model is generated, fixed size windows are set up to cover the hot points in the specimen. Inside each window, the maximal, minimal and average values of the important scalar fields, such as I1 and J2, are calculated. To reduce the influence of mesh density, five intervals between the minimum and maximum values of each scalar field have been set up and the percentage of the area under the scalar value within each of the five intervals is calculated to express the distribution of the scalar field in the window.
DTIC
Computational Grids; Critical Point; Data Bases; Expert Systems; Failure; Finite Element Method

20010066426 Air Force Inst. of Tech., School of Engineering, Wright-Patterson AFB, OH USA
The Development of a Finite Element Program to Model High Cycle Fatigue in Isotropic Plates
Shipman, William C.; Mar. 20, 2001; 110p; In English
Report No.(s): AD-A390211; AFIT/GAE/ENY/01M-08; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche
As part of a joint AFRL/DAGSI turbine blade research effort, a computer program has been developed that uses a von Karman large-deflection two-dimensional finite element approximation to determine stress levels and patterns in isotropic thin plates. The dynamic loading of various plates has been carried out in order to model a high cycle fatigue situation. The research considered the various effects of mode shapes, resident frequency, non-linear cyclic effect, endurance limits, and stress variations within a high cycle fatigue environment. Two main initiatives were taken. First, a transient analysis tool was developed that calculates stress and displacement patterns over a period of time. This analysis also included the effects of damping. The second initiative developed a tool to calculate the eigenvalues (natural frequencies) and eigenvectors of a plate with a given geometry. The results indicated that it is possible to model fatigue at high frequencies using FE analysis and compare these findings with experimentation incorporating a shaker table. In this research, different geometries of plates were investigated to represent turbine blade configurations. One square plate and three trapezoidal plates were investigated. It was found that a linear relationship could be found between the loading amplitude and the resulting maximum stress. This relationship allows for the prediction of the needed

loading amplitude to cause high cycle fatigue. It was also determined that by altering the geometry of the plate, the needed loading frequency or loading amplitude to reach a stress level that would initiate cracks could be minimized.
DTIC
Stresses; Computer Programs; Software Engineering; Isotropism; Thin Plates

20010066622 Washington Univ., Saint Louis, MO USA
Research on the P- and HP-Versions of the Finite Element Method ***Final Report, 1 Apr. 1998-30 Nov. 2000***
Szabo, Barna A., Washington Univ., USA; Nov. 30, 2000; 19p; In English
Contract(s)/Grant(s): F49620-98-1-0408
Report No.(s): AD-A390229; AFRL-SR-BL-TR-01-0250; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Research was performed on the p- and hp-versions of the finite element method with focus on reliable determination of margins of safety for structural components of aircraft. The investigation focused on structural failure by loss of stability and time dependent effects that can be modeled with linear viscoelastic constitutive laws. The main results of the project were: (a) The formulation of the problem of stability in a fully three-dimensional setting; implementation in a research code, and application to problems of substantial complexity. (b) The formulation and analysis of small-strain viscoelasticity in the context of the mixed p-version of the finite element method. It was shown that p-extensions provide a basis for the implementation of efficient and reliable quality assurance procedures. A summary of the project is presented in this document with minimal technical details. The technical details can be found in the referenced publications.
DTIC
Finite Element Method; Structural Analysis; Viscoelasticity; Airframes; Failure; Computer Programs; Composite Structures

20010067305 Third Wave Systems, Inc., Minneapolis, MN USA
Residual Stress Prediction in Machined Workpiece Surfaces
Marusich, T. D., Third Wave Systems, Inc., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 5p; In English; See also 20010067226; No Copyright; Avail: CASI; A01, Hardcopy; A10, Microfiche

The increasing drive for productivity improvements and consistent part dimensionality in aerospace structures has lead to the advent of machined monolithic parts. High speed machining technology employed affords the manufacture of thin-walled parts from single billets of material, resulting in the removal of approximately 85% of the initial workpiece material. With thin-walled monolithic parts come the increased propensity for workpiece distortion and few arresting mechanisms for crack propagation, largely due to potentially unfavorable residual stress states. These imposed states of stress can be a result of the machining conditions used (e.g., feeds, speeds, and cutter geometry). A general method is presented to model the residual stress state induced by metal cutting operations which takes into account workpiece thermo-mechanical properties, cutter geometry and process parameters. In this paper the model is specifically applied to Al7050. Results indicate the magnitude and sign of the state of stress is shown to have no intuitive correlation to machining process parameters such as speed and chip load. Similar results are shown for stress-induced bending moments, a potential strong contributor to part distortion. In addition, the machining-affected layer is shown to be on the order of 1 mm, easily on the same length scale as the wall thickness of aerospace structures.
Author
Residual Stress; Thin Walls; Computerized Simulation

20010067335 Thiokol Propulsion, Brigham City, UT USA
Quadruple Lap Shear Processing Evaluation
Thornton, T. N., Thiokol Propulsion, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 7p; In English; See also 20010067226; Copyright; Avail: Issuing Activity

The Thiokol, Science and Engineering Huntsville Operations (SEHO) Laboratory has previously experienced significant levels of variation in testing Quadruple Lap Shear (QLS) specimens. The QLS test is used at Thiokol/Utah for the qualification of Reusable Solid Rocket Motor (RSRM) nozzle flex bearing materials. A test was conducted to verify that process changes instituted by SEHO personnel effectively reduced variability, even with normal processing variables introduced. A test matrix was designed to progress in a series of steps; the first establishing a baseline, then introducing additional solvents or other variables. Variables included normal test plan delay times, pre-bond solvent hand-wipes and contaminants. Each condition tested

utilized standard QLS hardware bonded with natural rubber, two separate technicians and three replicates. This paper will report the results and conclusions of this investigation.
Author
Variability; Performance Tests; Contamination

20010067557 California Univ., Dept. of Mechanical and Aeronautical Engineering, Davis, CA USA
Material Characterization for Ductile Fracture Prediction ***Final Report***
Hill, Michael R., California Univ., USA; December 2000; 47p; In English
Contract(s)/Grant(s): NCC2-5214; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The research summarized in this document provides valuable information for structural health evaluation of NASA infrastructure. Specifically, material properties are reported which will enable calibration of ductile fracture prediction methods for three high-toughness metallic materials and one aluminum alloy which can be found in various NASA facilities. The task of investigating these materials has also served to validate an overall methodology for ductile fracture prediction is currently being employed at NASA. In facilitating the ability to incorporate various materials into the prediction scheme, we have provided data to enable demonstration of the overall generality of the approach.
Author
Ductility; Fracturing; Prediction Analysis Techniques; Toughness; Aluminum Alloys

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 41 through 48.

20010066160 Forest Service, International Inst. of Tropical Forestry, Rio Piedras Puerto Rico
Annual Letter 1998-99
Jul. 2000; 160p
Report No.(s): PB2001-106215; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

Contents include the following: Ecological Research; Historical Perspective; Restoration of Atlantic Forests in Sao Paulo State; Special Studies; Research in Puerto Rico's Natural Forests; Wildlife Research; Soil Disturbance by Uprooted Trees Following Hurricane Georges; Watershed Research; Comparison of Storm Damage Caused by Hurricane Georges to 24 Species of Trees; Long-term Avian Research; Genetic Resources in Mahogany and Spanish Cedar; Ecology and Growth of Big-leaf Mohogany (Swietenia macrophylla King) across Climatic and Edaphic Gradients Throughout its Native Range; State and Private Forestry Accomplishments; Forest canopy Damage and Recovery Compared in Reduced-Impact versus Conventional Selective Logging in Eastern Para, Brazil; and Appendix
NTIS
Canopies (Vegetation); Ecology

20010066769 University Corp. for Atmospheric Research, Boulder, CO USA
National Ice Center Visiting Scientist Program ***Final Report, 1 Mar. 1997 - 28 Feb. 2001***
Austin, Meg, University Corp. for Atmospheric Research, USA; [2001]; 2p; In English
Contract(s)/Grant(s): NAG5-3734; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The objectives of the work done by Dr. Kim Partington were to manage NASA's polar research program, including its strategic direction, research funding and interagency and international collaborations. The objectives of the UCAR Visiting Scientist Program at the National Ice Center (NIC) are to: (1) Manage a visiting scientist program for the NIC Science Center in support of the mission of the NIC; (2) Provide a pool of researchers who will share expertise with the NIC and the science community; (3) Facilitate communications between the research and operational communities for the purpose of identifying work ready for validation and transition to an operational environment; and (4) Act as a focus for interagency cooperation. The NIC mission is to provide worldwide operational sea ice analyses and forecasts for the armed forces of the US and allied nations, the Departments of Commerce and Transportation, and other US Government and international agencies, and the civil sector. The NIC produces these analyses and forecasts of Arctic, Antarctic, Great Lakes, and Chesapeake Bay ice conditions to support customers with global, regional, and tactical scale interests. The NIC regularly deploys Naval Ice Center NAVICECEN Ice

Reconnaissance personnel to the Arctic and Antarctica in order to perform aerial ice observation and analysis in support of NIC customers. NIC ice data are a key part of the US contribution to international global climate and ocean observing systems.
Author
Forecasting; Bay Ice; Observation; Sea Ice; Lake Ice

20010066847 Interior Dept., National Irrigation Water Quality Program, Washington, DC USA
Protocol for Conducting Remedial Planning, Phase 4
Sep. 1995; 64p; In English
Report No.(s): PB2001-105907; Information-Rept-3; Copyright; Avail: National Technical Information Service (NTIS)
This report presents a summary of activities under Phase 4 (Planning for Remediations) of the National Irrigation Water Quality Program (NIWQP) begun in fiscal year 1991 at four sites in the Western USA.
NTIS
Protocol (Computers); Water Quality; Water Resources; Water Treatment

20010067456 Geological Survey, Water Resources Div., West Trenton, NJ USA
Water Resources Data: New Jersey, Water Year 2000, Volume 3, Water-Quality Data ***Annual Report, 1 Oct. - 30 Sep. 2000***
DeLuca, M. J.; Mattes, G. L.; Burns, H. L.; Thomas, A. M.; Gray, B. J.; May 2000; 642p; In English
Report No.(s): PB2001-106516; USGS/WDR/NJ-00/3; No Copyright; Avail: CASI; A99, Hardcopy; A06, Microfiche
Water-resources data for the 2000 water year for New Jersey are presented in three volumes, and consists of records of stage, discharge, and quality of streams; stage and contents of lakes and reservoirs; and levels and quality of ground water. Volume 3 contains a summary of surface and ground water hydrologic conditions for the 2000 water year, a listing of current water-resource projects in New Jersey, a bibliography of water-related reports, articles, and facts sheets for New Jersey completed by the Geological Survey in recent years, water-quality records of chemical analyses from 125 continuing-record surface-water stations, 62 miscellaneous surface-water sites, 73 ground-water sites, and records of daily statistics of temperature and other physical measurements from 45 continuous-recording stations.
NTIS
Water Quality; Water Resources; Chemical Analysis

20010067558 Michigan Technological Univ., Houghton, MI USA
Fossil Energy: Advanced Characterization of Fractured Reservoirs in Carbonate Rocks: The Michigan Basin ***Semiannual Report, Apr. 1 - Sep. 31, 1999***
Wood, J. R.; Harrison, W. B.; Jan. 2001; 32p; In English
Report No.(s): PB2001-106437; DOE/BC/15100-2; No Copyright; Avail: National Technical Information Service (NTIS)
The main objective of this project is for a university-industry consortium to develop a comprehensive model for fractured carbonate reservoirs based on the 'data cube' concept using the Michigan Basin as a prototype. This project will combine traditional historical data with 2D and 3D seismic data as well as data from modern logging tools in a novel way to produce a new methodology for characterizing fractured reservoirs in carbonate rocks. Advanced visualization software will be used to fuse the data and to image it on a variety of scales, ranging from basin-scale to well-scales.
NTIS
Fossils; Reservoirs; Carbonaceous Rocks

20010067569 Geological Survey, Water Resources Div., Columbus, OH USA
Water Resources Data for Ohio, Water Year 2000, Volume 2, St. Lawrence River Basin and Statewide Project Data ***Annual Report, 1 Oct. 1999 - 30 Sep. 2000***
Shindel, H. L.; Mangus, J. P.; Trimble, L. E.; May 2001; 462p; In English
Report No.(s): PB2001-106542; USGS/WDR/OH-00/2; No Copyright; Avail: CASI; A20, Hardcopy; A04, Microfiche
Water-resources data for the 2000 water year for Ohio consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of ground-water wells. This report, in two volumes, contains records for water discharge at 122 gaging stations and 65 partial-record sites; water levels at 65 observation wells and 23 crest-stage gages; and water quality at 36 gaging stations, 69 observation wells, and 35 partial-record sites. Also included are data from miscellaneous and synoptic sites. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements and analyses. These data represent that part of the

National Water Information System collected by the U.S. Geological Survey and cooperating Federal, State, and local agencies in Ohio.
NTIS
Ohio; Water Resources; Data Acquisition; Geological Surveys; Water Quality; Hydrology

20010067649 Geological Survey, Water Resources Div., Columbus, OH USA
Water Resources Data for Ohio Water Year 2000. Volume 1. Ohio River Basin Excluding Project Data ***Annual Report, (Annual) 1 Oct. 1999 - 30 Sep. 00***
Shindel, H. L.; Mangus, J. P.; Trimble, L. E.; May 2001; 360p; In English
Report No.(s): PB2001-106547; USGS-WDR-OH-00-1; No Copyright; Avail: CASI; A16, Hardcopy; A03, Microfiche

Water-resources data for the 2000 water year for Ohio consist of records of stage, discharge, and water quality of streams; stage and contents of lakes and reservoirs; and water levels and water quality of ground-water wells. This report, in two volumes, contains records for water discharge at 122 gaging stations and 65 partial-record sites; water levels at 65 observation wells and 23 crest-stage gages; and water quality at 36 gaging stations, 69 observation wells, and 35 partial-record sites. Also included are data from miscellaneous and synoptic sites. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Information System collected by the U.S. Geological Survey and cooperating Federal, State, and local agencies in Ohio.
NTIS
Data Acquisition; Hydrological Cycle; Information Systems; Measuring Instruments; Water Resources; Geological Surveys

43
EARTH RESOURCES AND REMOTE SENSING

Includes remote sensing of earth features, phenomena and resources by aircraft, balloon, rocket, and spacecraft; analysis or remote sensing data and imagery; development of remote sensing products; photogrammetry; and aerial photographs. For instrumentation see 35 Instrumentation and Photography.

20010066068 Ohio State Univ., Byrd Polar Research Center, Columbus, OH USA
Determining Greenland Ice Sheet Accumulation Rates from Radar Remote Sensing ***Final Report***
Jezek, Kenneth C., Ohio State Univ., USA; Jul. 03, 2001; 16p; In English
Contract(s)/Grant(s): NAG5-6818; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

An important component of NASA's Program for Arctic Regional Climate Assessment (PARCA) is a mass balance investigation of the Greenland Ice Sheet. The mass balance is calculated by taking the difference between the snow accumulation and the ice discharge of the ice sheet. Uncertainties in this calculation include the snow accumulation rate, which has traditionally been determined by interpolating data from ice core samples taken throughout the ice sheet. The sparse data associated with ice cores, coupled with the high spatial and temporal resolution provided by remote sensing, have motivated scientists to investigate relationships between accumulation rate and microwave observations.
Derived from text
Remote Sensing; Ice; Mass Distribution; Core Sampling

20010066072 Mohammed V Univ., Mohammadia School for Engineers, Rabat, Morocco
Monitoring Desertification in Morocco using NOAA AVHRR Images ***Suivi de la Desertification au Maroc a Partir d'Images AVHRR de NOAA***
Lemsanni, Abdellah, Mohammed V Univ., Morocco; Belaid, Mohamed Ait, Centre Royal de Teledetection Spatiale, Morocco; Smiej, Mohammed-Faouzi, Centre Royal de Teledetection Spatiale, Morocco; Yamine, Nasser El, Mohammed V Univ., Morocco; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 171-176; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The objective of our article is to report on a methodology adapted for the study and evaluation of the phenomenon of desertification on a national level using low resolution geometric sensors such as NOAA AVHRR. Certain geophysical parameters (albedo, vegetation index and surface temperature) are produced regularly and cover the period from 1987 to 1996 at a rate of one image a month. The study of the image differences based on the use of a single parameter, especially the vegetation index, allowed us to characterize the spatio-temporal dynamic of the status of the vegetation. The combination of these parameters by

twos, particularly AL-TS and NDVI-TS, allows us respectively to characterize the water status and the status of the vegetation. The synthesis of all the results in a geographic information system (GIS), as well as their comparison with other types of data, allowed us to map the state of desertification according to five degrees (very high, high, moderate, low and stable), as well as its spatio-temporal dynamic. These results are indispensable for identifying areas at risk and for developing monitoring plans and plans to combat desertification.
Author
Desertification; Morocco; Vegetation; Image Processing

20010066073 Sherbrooke Univ., CARTEL, Quebec Canada
The Use of Indexes Describing the Shape of Spectra to Evaluate Soil Deterioration in a Semi-Arid Environment in Southeastern Spain ***Utilisation des Indices Decrivant la Forme des Spectres pour l'Evaluation de la Degradation des Sols d'un Milieu Semi-Aride au Sud-est de l'Espagne***
Haboudane, Driss, Sherbrooke Univ., Canada; Bonn, Ferdinand, Sherbrooke Univ., Canada; Royer, Alain, Sherbrooke Univ., Canada; Sommer, Stefan, Joint Research Centre of the European Communities, Italy; Mehl, Wolfgang, Joint Research Centre of the European Communities, Italy; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 153-161; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

In and and semi-arid environments where green vegetation is sparse, bare soil occupies the major portion of the space and its spectral properties dominate the remotely sensed signal. The variation of these properties expresses the major changes affecting the soil at the time of deterioration phenomena, which led to this research study in which we aim to use remote sensing techniques to characterize soil deterioration according to two approaches: the use of indexes describing the shape of the spectra and analysis via spectral deconvolution. The results obtained show that the use of spectral indexes incorporating bands of the mid infrared range (TM5 and TM7) make it possible to better discriminate the different levels of soil deterioration and that spectral deconvolution has high potential for characterizing soil deterioration and identifying land units susceptible to deterioration. The approach used allowed us to reach the following conclusions: (1) the optical properties of the soil surface can be used as indicators of the state of deterioration of semi-arid environments, (2) the incorporation of bands of the mid infrared range into the description of the shape of the spectra allows improved characterization of the conditions of soils, and (3) the results must be interpreted by specialists with a good knowledge of the environment studied.
Author
Arid Lands; Deterioration; Remote Sensing; Soils; Spain

20010066074 Antananarivo Univ., Antananarivo Inst. and Geophysical Observatory, Antananarivo, Madagascar
Merging of Remote Sensing Images Using Multiresolution Wavelet Analysis ***Fusion d'Images de Teledetection a l'Aide de l'Analyse Multiresolutions par Ondelettes***
Rakotoniaina, Solofoarisoa, Antananarivo Univ., Madagascar; Collet, Claude, Fribourg Univ., Switzerland; Ratsimbazafy, Jean Bruno, Antananarivo Univ., Madagascar; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 85-94; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, France; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

In the field of remote sensing image processing, image merging is a current research topic. The goal is to combine a high spatial resolution image with multiband images in order to obtain images that are both richer in spectral information and that have greater geometric precision. We considered the case of merging SPOT HRV images: the panchromatic image with spatial resolution of 10 m and the XS images that are available with three spectral bands and with a spatial resolution of 20 m. The method presented is the transformation into wavelets used in a multi-resolution analysis. The images produced using this method were compared with those obtained using standard merger methods: the IHS method (Intensity Hue Saturation), the PCA method (principal component analysis) and the HPF method (High Pass Filter). The comparisons were made both for the spectral information and the spatial information contained in the images. The comparisons showed the superiority of the wavelet method. We used the filters produced by orthogonal wavelets in a size 4 Daubechies compact medium. The results obtained using the same filters, based on two approaches, the Garguet approach and the Ranchin approach, that we experimented with are very similar. We also experimented with another approach, the Zhou approach, which produced good results. At the end of this study, we note that the major potential of image merging resides, above all in the computer-assisted image interpretation (CAII) approach.
Author
Computer Techniques; Image Processing; Remote Sensing; Spatial Resolution; Multisensor Fusion; Imaging Techniques; Terrain Analysis; Wavelet Analysis

20010066076 Universite du Havre, Environment and Estuary Group, Le Havre, France

Apprehension of Land Movements via Spaceborne Remote Sensing in the Seine Estuary (Normandy, France): Contribution to the National Research Program Concerning Wetlands ***Apprehension de la Cinematique Paysagere par Teledetection Spatiale en Estuaire de Seine (Normandie, France): Contribution au Programme National de Recherche sur les Zones Humides***

Bourcier, Alban, Universite du Havre, France; Bourcier, Jean-Come, Universite du Havre, France; Pouchin, Thomas, Universite du Havre, France; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 215-223; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

A large sector of the Seine estuary (Normandy, France) is covered with wetlands. Their specificity, their great richness and their rarity have led to the establishment of a multi-disciplinary scientific team working under the national wetlands research program (PNRZH). The ”Environment and Estuary” team of the Interdisciplinary Center for transport and international affairs research is one of nine scientific components used in connection with the program and it works primarily by means of aerospatial imagery to study land dynamics and, more particularly transformations related to wetlands. The satellite image is an effective means for observing and characterizing land entities while facilitating the recognition and identification of the principal changes in status. A geographic database was therefore set up using a chronological series comprising recordings over a ten-year period. The different procedures used allowed us to better describe the spatial structures and to convert the data contained in the image into geolocalized information that can be used directly through satellite image maps. The best results were obtained from multi-date combinations selected on the basis of their ability to reveal a type of evolution.

Author

Estuaries; Remote Sensing; Satellite Imagery; Wetlands; Satellite Observation

20010066077 Mohammed V Univ., School of Sciences, Rabat, Morocco

The Contribution of Remote Sensing and GISs to Hydrogeological Research in the Central Sahel Region of the Doukkala (Western Morocco) ***Apport de la Teledetection et des SIG pour la Recherche Hydrogeologique dans la Region du Sahel Central des Doukkala (Maroc Occidental)***

Bouaouda, Hafida, Mohammed V Univ., Morocco; Timoulali, Youssef, National Center for the Coordination and Planning of Scientific and Technical Research, Morocco; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 205-213; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The Sahel region of the Doukkala located in western Morocco has recently experienced tricky problems concerning water supply. Thus, several hydrogeological research studies proved to be necessary in order to ensure sufficient water supply for the local populations. In this article, we propose to show the contribution of remote sensing techniques and GISs for hydrogeological prospecting. The different digital image processing methods were used with the Erdas software program, while the GIS used was Are/Info. From a LANDSAT high spatial resolution TM image recorded during the dry season and covering the study area, we were able to extract the information concerning soil moisture by applying the tasseled cap transformation and the relationship of the TM5/7 bands. We also used the Moore directional filter operation to develop a drainage density map. The different maps obtained were then integrated into a GIS in order to delimit the most favorable areas for drilling. The comparison of the result with the existing piezometric map of the region studied clearly showed the presence of two water table recharge areas that will be the subject of hydrogeological drilling.

Author

Deserts; Image Processing; Morocco; Remote Sensing; Water; Hydrogeology

20010066078 Liege Univ., Lab. de Geomorphologie et de Teledetection, Belgium

The Contribution of Remote Sensing to the Study of the Transformation of Agriculture and the Environment in the Department of Bignona (Southern Senegal) ***Apport de la Teledetection a l'Etude de la Transformation de l'Agriculture et de l'Environnement dans le Departement de Bignona (Senegal Meridional)***

Gueye, Mamadou, Liege Univ., Belgium; Ozer, Andre, Liege Univ., Belgium; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 141-151; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

To study the spatial mutations that affect the systems of agricultural production and the environment, traditional research methods are often very limited. So remote sensing reveals itself to be a very precious tool, allowing us a synthetic reading and very precise spatialized measurements. In this study, focused on the department of Bignona (southern Senegal), the use of the options offered by remote sensing allowed us, thanks to the diachronic analogic analysis of photographs from 1954 and of

LANDSAT TM images from 1990, to reveal the profound transformation of the traditional system of production. This is marked by the development of dry crops (+137%) and the agricultural colonization of the plateaus up to now occupied by forest. The investigations carried out in the field, in addition to the interpretation of images, showed that, concomitant with the spatial recomposition of agricultural areas, new ways of farming and new strategies are being promoted by the populations. Thus, the corruption of the subsistence model is accompanied by a deterioration of the natural agricultural resources. In the three village areas targeted by this study, we measured an average reduction in forest area of 66%. This significant depletion of plant coverage and the promotion of practices that are increasingly ill-suited accelerate the deterioration of pedological resources and place the region in an unprecedented ecological crisis.
Author
Agriculture; Remote Sensing; Senegal; Image Analysis; Vegetation Growth; Rural Land Use

20010066079 Quebec Univ., Dept. of Geography, Montreal, Quebec Canada
Concerning the Sanding-up of Palm Stands: The Contribution of Digital Remote Sensing in a Threatened Area of Southeastern Morocco ***Sur l'Ensablement des Palmeraies: Apport de la Teledetection Numerique dans un Secteur Manace du Sud-est du Maroc***
Desjardins, Robert, Quebec Univ., Canada; Alem, El Mehdi, Mohammed V Univ., Morocco; Rognon, Pierre, Paris VI Univ., France; Maupin, Patrick, School of Advanced Technology, Canada; Ndiaye, Ibrahima, Senghor Univ., Egypt; Benalla, Mansour, Mohammed V Univ., Morocco; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 127-139; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The southeastern part of Morocco is grappling with a phenomenon that is very widespread in the bordering countries with Saharan and Sahelian environments. This involves desertification and sanding up. The constant threat of the advance of sand over human structures in this sector is quite present if we take into account, for example, the destruction of 60% of one village by a storm at the end of the 1970s. Faced with this phenomenon, we must find operational means for identifying and tracking the dynamic and for evaluating its impact on the habitat. In this article, we present an approach centered on remote sensing data that make it possible to see the spatio-temporal evolution of sand build-up. Airborne and satellite information, as well as ground data, are used. to accomplish this study, we explored images of difference for the main components as well as visual data resulting from mathematical morphology. This approach allowed us to deduce that a field of crescent dunes is moving toward the northeast at an average speed of 10 m/year. Furthermore, for a given sector, it was possible to estimate the sanded-up surface area of a palm stand over a period of 37 years at more than 20%. This study leads us to believe that a 10-year frequency of information gathering and finer spatial resolution are the basic elements for extracting useful information in order to track and search for solutions for minimizing the impact of sanding-up.
Author
Desertification; Dunes; Morocco; Remote Sensing; Sands; Sahara Desert (Africa)

20010066087 Cocody Univ., Inst. of Tropical Geography, Abidjan, Ivory Coast
Attempted Correlation, Via Processing of a SPOT HRV (XS) Image, Between the Deterioration of Natural Environments and Population Densities Around Mount Peko National Park in a Forested Area of the Ivory Coast ***Essai de Correlation, par Traitement d'une Image HRV (XS) de SPOT, Entre la Degradation des Milieux Naturels et les Densites de Population Autour du Parc National du Mont Peko en Cote d'Ivoire Forestiere***
Kouadio, Yao Bertin, Cocody Univ., Ivory Coast; Toure, Augustin Tiyegbo, Cocody Univ., Ivory Coast; Koli, Bi Zueli, Cocody Univ., Ivory Coast; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 163-169; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The study presented here has to do with the debate concerning the relationship between population density and the deterioration of natural environments. It starts from hypothesis that the expansion of farmland is linked to demographic growth and that it is thus possible to establish a direct link between population density and the level of deforestation. The SPOT HRV(XS) (1994) image used covers the Mount Peko National Park in a densely forested area subjected to strong human pressure. Following supervised classification and Laplacian filtering on five by five pixel windows equivalent to 100 m sided parcels, the image shows the level of forestation and, conversely, the level of deforestation from 1973 to 1994. Its superimposition onto a map showing the evolution of population densities reveals that beyond 30 inhabitants/square km, clearing eliminates the strata of forest regrowth. The vegetation is a mosaic dominated by Chromolaena odorata and Guinean savanna grasses. Its spectral signature does not allow

us to isolate variants in the image. There is therefore a relation of effect between density and the status of the vegetation, and it can help in validating the interpretation of images.
Author
Cote D'Ivoire; Deforestation; Vegetation; Image Analysis; Remote Sensing; Satellite Imagery; Satellite Observation

20010066104 National Advanced Polytechnic School, Lab. of Electronics and Signal Processing, Yaounde, Cameroon
Extraction of the Road System in an ERS-2 SAR Image and in a SPOT HRV (XS) Image by Texture Analysis and Mathematical Morphology: Application to the City of Yaounde (Cameroon) ***Extraction du Reseau Routier sur une Image RSO de ERS-2 et sur une Image HRV (XS) de SPOT par Analyse de Texture et Morphologie Mathematique: Application a la Ville de Yaounde (Cameroun)***
Tonye, Emmanuel, National Advanced Polytechnic School, Cameroon; Akono, Alain, National Advanced Polytechnic School, Cameroon; Nyoungui, Andre Ndi, Ngaoundere Univ., Cameroon; Assako, Joly Assako, Douala Univ., Cameroon; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 95-103; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, France; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

Thanks to their any-time characteristic, radar images are increasingly useful in the equatorial zones where there is a quasi-permanent cloud cover. In this period when large African cities are experiencing rapid expansion, it is necessary to use radar image automatic mapping methods thereby allowing urban communities to conduct, within suitable time frames, studies related to the evolution of cities that are part of their territorial jurisdiction. We propose in this study a method for extracting the urban perimeter in an ERS-2 SAR radar image of the city of Yaounde, Cameroon, by emphasizing the road system. An application is simultaneously carried out on a SPOT HRV (XS) image for the purposes of comparison. The method proposed consists in combining mathematical morphology and texture analysis to extract the road system targeted in the radar image. Skeletonization is used to reduce the thickness of the contours representing the road network to the size of a pixel, which then makes it possible to evaluate the length of this system. The minimum length of the road system in the south-north direction was evaluated at 10 km and the maximum length at 15 km. In the east-west direction, the minimum length of the system was estimated at 7 km and the maximum length at 10 km. The methods used reveal the distinction between the urban and non-urban so that the perimeter of the metropolitan area can be plotted.
Author
Cameroon; Cities; Mapping; Radar Imagery; Roads; Image Analysis; Imaging Techniques; Remote Sensing

20010066105 Liege Univ., Service Universitaire de Recherche Fondamentales et Appliquees en Cartographie et en Etudes Spatiales, Belgium
Use of Satellite Data For The Decadal Update of The Partition of The Territory of Belgium Into Statistical Areas ***Utilisation de Donnees Satellitaires pour l'Actualisation Decennale du Decoupage en Secteurs Statistiques du Territoire de la Belgique***
Binnard, Marc, Liege Univ., Belgium; Jamagne, Pierre, Institut National de Statistique, Belgium; Muller, Fabrice, Liege Univ., Belgium; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 23-31; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, France; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

At the end of the 1960s, in order to respond to the needs of local jurisdictions, the National Institute of Statistics (I.N.S.) took the initiative of dividing the communal territory of Belgium into some twenty thousand statistical areas. In view of the 2001 census, the I.N.S. decided to update the boundaries of the areas. to this end, a two-year pilot project was designed. Its objective was to develop a vertical method making it possible : (1) to identify, on satellite images, rural areas with residential cores (use of 59 SPOT HRV images from 1995 and 1996) and (2) to update the statistical areas via computer-aided photo interpretation CAPI) using orthophotoplans. The methodology used includes, more particularly: (1) the division of the project into homogeneous work areas; (2) the production of the built-up mask via non-supervised classification; (3) the detection of built-up cores; (4) the development of the fist of areas whose division must be verified; (5) the creation of new residential statistical areas grouped by CAPI. Some 7,467 cores were detected in 3,673 areas that were candidates for updating. These areas are generally located on the periphery of cities and often correspond to new subdivisions or to an increase in movement out of old residential areas. In the future, the new division will allow the I.N.S. to itemize its statistics concerning territorial units most closely following the limits of urban areas.
Author
Cities; Residential Areas; Rural Areas; Satellite Imagery; Imaging Techniques; Satellite Observation; Image Analysis

20010066131 SACLANT Undersea Research Centre, La Spezia, Italy

An Automatic Approach to Ship Detection in Spaceborne Synthetic Aperture Radar Imagery: An Assessment of Ship Detection Capability Using RADARSAT

Askari, Farid, SACLANT Undersea Research Centre, Italy; Zerr, Benoit, SACLANT Undersea Research Centre, Italy; Dec. 2000; 38p; In English; Original contains color plates

Contract(s)/Grant(s): Proj-01-B

Report No.(s): AD-A389954; SACLANTCEN-SR-338; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

This report describes a methodology for automated ship and wake detection in space-based synthetic aperture radar (SAR) imagery. The methodology incorporates a multistage approach involving several algorithms which can be applied according to requirements, computational resources, and scene composition. We suggest that the localized K-distribution be used for scene segmentation and identification of regions containing probable targets. For a more detailed quantitative scene analysis and accountability for probabilities of occurrence of targets in conjunction with other oceanic features, a coupled neural-networks/Dempster-Shafer detection system is used. The mathematical morphology algorithm is better suited for SAR imagery with low signal-to-clutter ratios, as it incorporates neighbouring information and signal amplitudes for target detection. The methods are tested on several RADARSAT images with different imaging geometry and beam modes. On the basis of our findings, concerning the use of different RADARSAT imaging modes, we demonstrate conclusively that the STANDARD beam is far superior to SCANS AR-NARROW beam for automatic ship detection.

DTIC

Ships; Space Based Radar; Synthetic Aperture Radar; Radar Imagery; Radar Detection; Target Recognition

20010066139 Army War Coll., Carlisle Barracks, PA USA

Strategic Model for Future Geospatial Education

Hacker, Gary A.; May 18, 1998; 43p; In English

Report No.(s): AD-A345640; No Copyright; Avail: Defense Technical Information Center (DTIC)

Geospatial information is the hydrographic, topographic, and aeronautical foundation of battlefield visualization and global command and control systems. Increases in computing technology combined with unclassified access to high resolution satellite imagery, geospatial information, and positioning accuracy provided by the Global Positioning System (GPS) will allow users in the field to create their own geographic decision aids and reference graphics. Joint doctrine currently under final stages of review clearly places the burden on the military services and intelligence agencies to create Geospatial Information Specialists at all levels from tactical to strategic. Implementation of this new doctrine will create a huge training void that cannot be satisfied by existing Department of Defense (DoD) and Intelligence agency training outlets. This research paper provides evidence that this training void can be overcome by adapting the Global University model for engineering education to the US Government's existing military and civilian geospatial information training infrastructure.

DTIC

Command and Control; Computation; Computers; Decision Support Systems; Global Positioning System; Satellite Imagery

20010066161 Sherbrooke Univ., Center for Remote Sensing Research and Applications, Quebec Canada

Remote Sensing in North America from 1985 to 1999: A Regional Assessment ***La Teledetection en Amerique du Nord de 1985 a 1999: Un Bilan Regional***

Bonn, Ferdinand, Sherbrooke Univ., Canada; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 429-438; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

In 1985, civil satellite remote sensing had just entered its second generation, the one that was dominated by the use of SPOT HRV satellite sensors and LANDSAT TM satellite sensors. The first generation had motivated the community to discover the Earth observation images supplied by LANDSAT MSS and the meteorological satellites. It had accustomed the public to considering as normal the fact that one could observe the Earth from above routinely and repeatedly. The data were then often analyzed only visually, because the image processing tools were still reserved for a few privileged laboratories due to their cumbersomeness and their high cost. This was expressed by the establishment of national and regional centers almost everywhere throughout the world, with both a coordination mandate and a technical support mandate.

Author

North America; Remote Sensing; Satellite Observation; Histories

20010066162 Toulouse Univ., Ecology Center for Continental Aquatic Systems, France

Attempt to Establish a Standard Database of Spectral Signatures: Application to the Garonne Valley (France) ***Essai de Mise en Place d'une Base de Donnees de Signatures Spectrales Standard: Application a la Vallee de la Garonne (France)***

Muller, Etienne, Toulouse Univ., France; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 413-419; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The objective of this study is to show, in the specific case of the Garonne valley in France, the constraints linked to the establishment of a database of spectral signatures (calibration, atmospheric and geometric corrections, integration of temporal dimensions and data multisensor). The method consisted in using a temporal series of 20 SPOT HRV and LANDSAT TM images and in proposing a simple and robust solution for standardizing these data. The definition of standard spectral signatures concerned soils and forested areas. For the soils, the model is based on four major texture categories (sandy, loamy, clay-loam and clay), identifiable in the images and each the subject of a specific modeling of the moisture-reflectance relationship. For the wooded areas, the phenological rhythm of 9 categories (ripisylve, poplars, oaks, blue-beech, pines, etc.) was incorporated into the model, all being managed in the environment of the ACCESS software program. This type of database could be incorporated into image processing systems and help in the specific interpretation of an image element or in the classification of the entire image. We also see interesting prospects for inter-regional comparisons and for the establishment of a vaster database with updates via the Internet. Author

Data Bases; Image Processing; Spectral Signatures; Image Analysis; Imaging Techniques; Satellite Observation

20010066164 Universite des Sciences et de la Technologie Houari Boumediene, Image Processing Lab., Algiers, Algeria

A New Algorithm for Calculating Texture Parameters Applied to the Classification of Satellite Images ***Nouvel Algorithm de Calcul des Parametres de Texture Applique a la Classification d'Images Satellitaires***

Kourgli, Assia, Universite des Sciences et de la Technologie Houari Boumediene, Algeria; Belhadj-Aissa, Aichouche, Universite des Sciences et de la Technologie Houari Boumediene, Algeria; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 385-394; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

We present a new algorithm for calculating texture parameters from gray-level co-occurrence matrices (GLCM) that make it possible to reduce the calculation time and the memory space to be allocated for the different programs. This algorithm is based on the calculation of the frequencies of gray level occurrence by equivalent histograms. The elements calculated by these equivalent histograms are: the average, the variance, the energy, the inertia, the correlation, the cluster shade and the cluster prominence). to evaluate this method, we estimated these parameters using symmetrical matrices and using the new formulation for an image containing 256 levels of gray with a 5 x 5 analysis window. The gains in memory space are around 1/256 for the average, variance and correlation parameters and around 1/128 for the inertia and cluster shade parameters. For a Pentium II 350 Mhz computer, the gain in calculation time is around 1/20. As an application we used the new formulations of texture parameters in a textural classification process.

Author

Algorithms; Satellite Imagery; Textures; Image Classification; Satellite Observation

20010066165 University Center Mustapha Stambouli, Biological and Geomatic Systems Analysis Lab., Mascara, Algeria

The Use of LANDSAT TM Data for Monitoring the Plant Water Status of the Vegetation Cover in Algeria ***Utilisation des Donnees TM de LANDSAT pour le Suivi de l'Etat Hydrique du Couvert Vegetal en Algerie***

Hamimed, Abderrahmane, University Center Mustapha Stambouli, Algeria; Mederbal, Khalladi, University Center Mustapha Stambouli, Algeria; Khaldi, Abdelkader, University Center Mustapha Stambouli, Algeria; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 369-377; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The objective of this work is to develop a methodology based on the use of LANDSAT TM satellite data for monitoring vegetation cover. This involves estimating its real evapotranspiration and diagnosing its plant water status by resolving the equation for the surface energy balance using the SEBAL (Surface Energy Balance for Land), model. The algorithm brings into play the NDVI, the surface temperature and the albedo. The data set consists of seven TM bands and agrometerological field measurements. to estimate the sensible heat flux, we opted for a method based on the use of profiles in the surface layer, with the coupling that takes place at the level of the flow at the base of the convecting limit layer. It is then possible to calculate the density of the sensible heat flux and to estimate the real evapotranspiration by resolving the equation for the energy balance. Finally, different moisture indexes, derived from evapotranspiration, have been calculated: the CWSI index, the Priestley and Taylor

parameter and the surface resistance to evaporation. These indexes allow the quantitative diagnosis of the status of plant water stress of the pixel. To conclude, the results obtained are promising for using the SEBAL model via remote sensing.
Author
Estimating; Plant Stress; Remote Sensing; Satellite Imagery; Vegetation; Water; Vegetation Growth; Moisture Content

20010066166 City of Geneva, Botanical Conservatory and Garden, Geneva, Switzerland
Spectral Signatures and Deterioration of Dense Moist Forest in the Ivory Coast ***Signatures Spectrales et Degradation du Couvert de Foret Dense Humide de Cote d'Ivoire***
Chatelain, Cyrille, City of Geneva, Switzerland; Spichiger, Rodolphe, City of Geneva, Switzerland; Gautier, Laurent, City of Geneva, Switzerland; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 349-355; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

In order to define the limits of interpretation of LANDSAT TM images and to better describe the heterogeneity of forests, we studied the direct correlations between the digital numbers of the images and the traditional vegetation descriptors, such as the wood biomass or the base area. These correlations are not significant in tropical forest areas; conversely, the coverage measurements of the vegetation cover show a much higher correlation. The quantitative vegetation maps that can be obtained through modeling do not, according to this study, provide any more information than the maps resulting from supervised classification.
Author
Tropical Regions; Vegetation; Rain Forests; Satellite Observation

20010066167 Universite Nationale de Cote d'Ivoire, Center for Ecological Research, Abidjan, Ivory Coast
Mapping Fissure Aquifers in a Crystalline Environment in the Northwest Part of the Ivory Coast by Remote Sensing ***Cartographie des Aquiferes de Fissures en Milieu Cristallin du Nord-Ouest de la Cote d'Ivoire par Teledetection***
Savane, Issiaka, Universite Nationale de Cote d'Ivoire, Ivory Coast; Biemi, Jean, Cocody Univ., Ivory Coast; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 279-288; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

In the northwestern section of the Ivory Cost, the use of remote sensing techniques to study fissure aquifers and interpret, in a geographic information system (GIS), the permeabilities induced by fractures shows that 36% of lineaments are oriented N60 deg. and 32% N130 deg. In 29% of cases, heavy output well holes are established in relation to the NE-SW fractures compared to 22% in relation to the N-S fractures, the least used for village waterworks. Within the GIS, the principal megafractures corresponding to the underground water circulation corridors in the fissures have been identified. Superimposing the map of induced permeabilities over the drainage density map reveals the relation that exists between the surface water and the underground water opposite the megafractures.. The accessibility, exploitability and productivity index maps for the aquifers of the region, prepared using a combination of several factors (probability of success of the wells, extraction depth, piezometric level and operating flow) reveal the areas favorable to drilling for water in the basement thanks to the introduction of geophysics prospecting. Geophysics campaigns, targeting certain megafractures detected by remote sensing, have allowed the installation of several well bores whose rates vary from 3 to 10 cubic meter/hr; this is the case for locations like Neniesso (12 cubic meter/hr), Tougousso (6 cubic meter/hr) and Kabala (3 cubic meter/hr).
Author
Aquifers; Cote D'Ivoire; Mapping; Remote Sensing; Structural Properties (Geology)

20010066179 Centre d'Etudes Spatiales de la Biosphere, Toulouse, France
Space-Borne Observation of Surface Parameters ***Observation Spatiale des Parametres de Surface***
Gastellu-Etchegorry, Jean-Philippe, Centre d'Etudes Spatiales de la Biosphere, France; Adragna, Frederic, Centre National d'Etudes Spatiales, France; Kerr, Yann, Centre d'Etudes Spatiales de la Biosphere, France; Lagouarde, Jean-Pierre, Institut National de la Recherche Agronomique, France; LeToan, Thuy, Centre d'Etudes Spatiales de la Biosphere, France; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 299-317; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

Modeling of the functioning of vegetation and of surface processes (mass and energy flow) relies on the use of parameters (temperature, LAI, moisture, etc.). that are characteristic of land surfaces. In this article, we present the principal surface parameters that can be estimated using visible, infrared and hyperfrequency remote sensing. Their estimation is generally based

on the semi-empirical calibrated relationships with ground measurements. The lack of robustness of these relationships, as a result of numerous biophysical variables and the complexity of the electromagnetic interactions at the source of satellite measurements, explains the current work to replace them through the inversion of precise and robust remote sensing models.
Author
Remote Sensing; Satellite Observation; Surface Properties; Earth Surface; Signature Analysis

20010066180 Ministry of Higher Education and Scientific Research, National Research Support Center, N'Djamena, Chad
The Use of Airborne and Satellite Images to Analyze the Mutation of Rural Spaces: The Case of The Subprefecture of Mandelia in the Department of Hadjer Lamis in Chad ***Utilisation de l'Imagerie Aerienne et Satellitale pour l'Analyse de la Mutation des Espaces Ruraux: Cas de la Sous-Prefecture de Mandelia dans le Departement de Hadjer Lamis ai Tchad***
Ouaga, Hubert NDjafa, Ministry of Higher Education and Scientific Research, Chad; Courel, Marie-Francoise, Centre National de la Recherche Scientifique, France; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 177-185; In French; Trseau Teldetection, 22-25 Nov. 1999, Lausanne, Switzerland; Original contains color illustrations; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

With over two-thirds of its territory established as wildlife preserve by presidential decree in 1967, the subprefecture of Mandelia is, in principle, a protected area. The harmful effects of drought (1973-1974 and 1983-1984), aggravated by a high population influx during this period, along with the country's civil war have upset the fragile balance of the ecosystems of this space. Since then, the environment has undergone a veritable mutation. In effect, according to the data from the demographic census, the population of the canton grew more than 340% between 1968 and 1993. This growth placed strong pressure on the environment with, as a consequence, the fight for access to land and natural resources. Once a closed space protected by the law of the Republic, the canton is now open with a return to traditional management. The use of airborne imagery from 1974 and satellite imagery from 1994 for a diachronic: study allowed us to evaluate and track the changes in this space. We succeeded in showing the status of ground occupation for each of these year, the levels of evolution in terms of differential use of the space, of soil deterioration, of environmental regeneration and, finally, the segmentation of the area. In short, with this study, we reveal that in reality the Mandelia wildlife preserve is merely a figment of the imagination today. It disappeared following the massive arrival of migrants established by the State and Catholic Support for Development (SECADEV), a catholic NGO, following the great drought of 1983-1984. It is in a context marked by the breakdown in the social fabric, land speculation and integration into the market economy that rural populations must adapt their system of production to satisfy their needs in an increasingly monetarist world.
Author
Chad; Satellite Imagery; Rural Areas; Satellite Observation; Rural Land Use; Ecosystems

20010066181 Bucharest Technical Univ. of Construction, School of Geodesics, Bucharest, Romania
The Incorporation of the Data Supplied by Remote Sensing and Photogrammetry into a Territorial Information System in Order to Study and Evaluate Natural Catastrophes in an Urban Environment: The Example of Bucharest ***Integration des Donnees Fournies par la Teledetection et la Photogrammetrie dans un Systeme d'Information du Territoire en vue d'Etudier et d'Evaluer les Catastrophes Naturelles en Milieu Urbain: Exemple de Bucarest***
Zavoianu, Florea, Bucharest Technical Univ. of Construction, Romania; Dinulescu, Liviu, Bucharest Technical Univ. of Construction, Romania; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 105-110; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

We present the basic principles and the preliminary results obtained by processing the data supplied by satellite remote sensing of airborne photographs, videographic recordings and ground data. They were analyzed in connection with a territory information system (TIS) for an urban area in order to survey the natural catastrophes (earthquakes, floods, land slides, fires, etc.) and to evaluate their effects using these data. Through photo interpretation of the stereograms collected before the catastrophe, we constructed a three-dimensional (313) reference model for the entire area of the city of Bucharest concerned. This model was constructed on the basis of 1:6,000-scale photographs and was completed with data obtained by digitizing 1:2,000-scale field maps and field surveys. For each building, we established a technical information system used for the detailed evaluation of the effects of the catastrophe. After the catastrophe, through analysis of the high resolutions satellite images, we established the areas affected by the catastrophe and for which we constructed a 3D model according to the catastrophe. For the creation of this model, we used the SVHS videographic images taken from a helicopter at an altitude of 80 m., 350 m and 500 m. Through comparative analysis

of the two 3D models established before and after the catastrophe, we evaluate the effects of this catastrophe on the urban area considered.
Author
Cities; Remote Sensing; Satellite Imagery; Satellite Observation; Multisensor Fusion; Disasters

20010066182 Ouagadougou Univ., Hydrogeology Lab., Ouagadougou , Burkina Faso
The Different Signatures of Crystalline Basement Fractures in the Sahelo-Sudan Region of Burkina Faso: The Case of the Bidi Watershed (Province of Yatenga) ***Les Differentes Signatures des Fractures de Socle Cristallin en Zone Sahelo-Soudanienne du Burkina Faso: Cas du Bassin Versant de Bidi (Province du Yatenga)***
Koussoube, Youssouf, Ouagadougou Univ., Burkina Faso; Savadogo, Alain Nindaoua, Ouagadougou Univ., Burkina Faso; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 263-270; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

In the Sahelo-Sudan area of Bidi, the use of remote sensing data and resetting via ground data has allowed us to characterize fractures. SPOT HRV images in digital and analog formats, as well as panchromatic airborne photographs, have allowed us to identify and characterize lineaments. These lineaments were confirmed in the field by appropriate geophysical measuring devices (electrical and electromagnetic) and by field observations (in hydrogeology, microtectonics, geomorphology and botany). This working methodology allowed us to delimit and differentiate three signatures of fractures buried under alterites with thicknesses ranging from 10 to 50 m: 1) fractures signaled by vegetation alignments (type A) are the most numerous in Bidi's syntectonic granite massif (80% of the watershed area); certain hydrophilic plant species emphasize these open fractures; 2) the fractures indicated by contrasts in tone and texture (type B) correspond to rifts illustrated by degrees of apparent resistivity; 3) the fractures indicated by rectilinear ledges of lateritic hardpan (type C) correspond to late rifts that imposed their direction in preferred alteration areas. With regard to crystalline basement hydrogeology, the chances of successful water drilling are greater if one focuses, preferentially in the following order, on lineaments of type B, type A and type C.
Author
Geological Faults; Geophysics; Hydrogeology; Remote Sensing; Water; Watersheds

20010066183 Cocody Univ., University Center for Remote Sensing Research and Application, Abidjan, Ivory Coast
Application of Remote Sensing and a Fluid Flow Simulation Model for the Identification of Potential Circulation Corridors for Underground Water in Crystallophylian Environment in the Semi-Mountainous Region of Man-Danane (Western Ivory Coast) ***Application de la Teledetection et d'un Modele de Simulation d'Ecoulement des Fluides pour l'Identification de Couloirs de Circulation Potentielle des Eaux Souterraines en Milieu Cristallophyllien dans la Region Semi-Montagneuse de Man-Danane***
Kouame, Fernand Koffi, Cocody Univ., Ivory Coast; Gioan, Pierre, Cocody Univ., Ivory Coast; Biemi, Jean, Cocody Univ., Ivory Coast; Affian, Kouadio, Cocody Univ., Ivory Coast; Coulibaly, Kapo, Cocody Univ., Ivory Coast; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 241-249; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

Identifying potential circulation corridors for underground water is indispensable for better apprehending the method of functioning of the water systems of the semi-mountainous western portion of the Ivory Coast. In this environment of essentially crystallophyllian rock, remote sensing provides a good quantitative approach for brittle structures with a water function. The structural data were extracted from LANDSAT TM and SPOT HRV (P) satellite images, then analyzed according to statistical and fractal methods in order to define the quantitative geometric parameters. The FRANCISS model, designed to illustrate the flow of fluids in a fissured medium, is suited to calculating the permeabilities induced by the fractures based on the following parameters: total number of fractures, length and orientation of each fracture, opening, density and water conductivity of the fractures. A multi-criteria analysis combining different thematic maps: induced permeability maps, structural domain maps, lithologic, hydrographic and structural data maps, allows us to map the various potential underground corridors using surface data alone. Two high-permeability corridors combined with secondary axes and underground water concentration basins were revealed. We note the existence of a strong correlation between the drainage pattern and the underground water tables suspected. However, application of the FRANCISS model cannot be extended to the entire mountain arm In this case, the use of the digital altitude model is recommended for verifying the relevance of these corridors.
Author
Fluid Flow; Hydrography; Remote Sensing; Satellite Imagery; Water Tables; Aquifers; Ground Water

20010066184 Liege Univ., Dept. of Physical Geography, Belgium

Monitoring Rainfall Anomalies in Equatorial and Tropical Africa using Meteosat VISSR Images: Selected Research Results Concerning the Basin of the Congo River ***Suivi des Anomalies Pluviometriques en Afrique Equatoriale et Tropicale a l'Aide d'Images VISSR de Meteosat: Quelques Resultats de Recherche sur le Bassin du Fleuve Congo***

Kalombo, Kamutanda, Liege Univ., Belgium; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 233-239; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The results we present are from a series of research projects concerning the relationship that exists between ground-measured rain and the Meteosat VISSR indications, more particularly the occurrences of cumulo-nimbus clouds: "Cub") in Equatorial Africa. These results show that the rainfall deficits observed during the 1991-1992 rainy season over most of Equatorial Africa and the contrasted pluviometry observed during the months of March 1993 and 1994 in southeastern Congo are confirmed by analysis of "Cubs." This analysis is performed in reference to their average change over the 1986-1992 period. Additionally, the study shows that the spatial and temporal relations between rainfall and the standardized vegetation index (SVI) are good overall from a qualitative standpoint. However, improvements could be made from a quantitative standpoint by taking several types of clouds into account and by strengthening the ground pluviometry system.

Author

Anomalies; Rain; Tropical Regions; Africa

20010066194 Ecole Polytechnique Federale de Lausanne, Spatial Reference Information System, Switzerland

Multivariate and Multi-Date Display Methods for Spectral Data for the Characterization of Agricultural Areas ***Methodes de Visualization Multivariee et Multidate de Donnees Spectrales pour la Caracterisation des Surfaces Agricoles***

Blumer, Christian, Ecole Polytechnique Federale de Lausanne, Switzerland; Caloz, Regis, Ecole Polytechnique Federale de Lausanne, Switzerland; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 343-348; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

Protecting soil from erosion in a temperate area requires monitoring of its seasonal and perennial plant cover. In this context, a multivariate and multi-date study was conducted using LANDSAT TM images in order to track the soil protection index (farming factor C). An interpretive method for classifying satellite images using a single-date approach making it possible to forego ground data is proposed. It is based on the representation of the space of the attributes in two dimensions constructed by a TSAVI bivariate histogram and the TM5 band. This type of graph is completed by introducing color information coming directly from the image. These display methods constitute an invaluable decision base for categorization based on three main groups of farmland: grassland, grains and row crops. Observing this decision base on different dates from June to September gave us the possibility of translating the temporal evolution of the spectral characteristics under the effect of phenological and human factors. It also made it possible to produce a satisfactory classification with an overall quality of 80% to 90% depending on the year. These different methods for viewing multivariate and multi-date data ultimately proved to be an effective interpretation base for separation the different types of farming.

Author

Protection; Soils; Image Classification; Rural Areas; Rural Land Use; Image Processing; Remote Sensing

20010066195 Antananarivo Univ., Dept. of Geology, Antananarivo, Madagascar

Remote Sensing Applied to the Study of Water Induced Erosion and Silting of Rice Fields in the Southern Region of Lake Alaotra (Madagascar) ***Teledetection Appliquee a l'Etude de l'Erosion Hydrique et de l'Ensablement des Rizieres dans la Region sud du lac Alaotra (Madagascar)***

Raharison, Lea Jacqueline Rahaijaona, Antananarivo Univ., Madagascar; Ramierson, Tokinomena Aimbelontsiry, Antananarivo Univ., Madagascar; Andrianlaina, Rafonomezantosoa Manuel, Antananarivo Univ., Madagascar; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 271-277; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

LANDSAT TM data for the southern region of Lake Alaotra (Madagascar) have been digitally processed to evaluate surface statuses confronted with water-induced erosion and the silting of rice fields. The surface status was characterized in terms of soil types, hydrology and vegetation cover. The soil coverage map obtained is the result of supervised classification by maximum likelihood. Two test sites were chosen to evaluate the capacity of TM imagery for identification, classification and mapping. The first site used is the rice producing plane of SASomangana for the identification of silted areas in the rice fields. For the study of water-induced erosion, we used as second site the SASomangana watershed, due to the diversity of its soils. The hydrologic class

of soils is established using the SCS (Soil Conservation Service) method. The combination of soil slope and occupation classes allowed us to classify the soils into four hydrologic groups: A, B, C and D. The combined use of the GIS and remote sensing allowed us to determine the areas sensitive to erosion with a view toward improved risk prevention.
Author
Erosion; Hydrology; Remote Sensing; Satellite Imagery; Soil Mapping; Soils; Water Erosion

20010066196 Cocody Univ., University Center for Remote Sensing Research and Application, Abidjan, Ivory Coast
Approach to the Geometry of Aquifers in a Fissured Crystallophyllian Environment via Statistical and Fractal Analysis of the Linear Data Extracted from Satellite Images: The Case of the Semi-Mountainous Region of the Ivory Coast ***Approche de la Geometrie des Aquiferes en Milieu Cristallophyllien Fissure par les Analyses Statistique et Fractale des Donnees Lineamentaires Extraites des Images Satellitales: Cas de la Region Semi-Montagneuse de la Cote d'Ivoire***
Kouame, Fernand Koffi, Cocody Univ., Ivory Coast; Gioan, Pierre, Cocody Univ., Ivory Coast; Biemi, Jean, Cocody Univ., Ivory Coast; Lasm, Theophile, Poitiers Univ., France; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 251-262; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The evaluation of the water potential of the semi-mountainous region in the western part of the Ivory Coast relies on a better comprehension of the geometry of fissured basement aquifers. An original approach is proposed that combines statistical methods, on the one hand, (distribution of the orientations, lengths, densities and the statistical laws governing them) and fractal geometry, on the other hand, (box counting and mass spatial distribution methods), to characterize the linear field (evidence of fracturing). The representative grid for the data is 4 km and the size parameters (lengths and openings) of the fractures are distributed log-normally. The lineaments show a virtual lack of variance in shape at various scales and therefore correspond to fractal objects whose fractal dimensions vary between 1.6 and 1.8. We note a directional strain slip of the fractal dimensions, corroborating the directional peaks noted on the orientation rosettes. Using the geometric parameters obtained, a map of the structural domains, defining the sectors with an identical degree of fracturing, which is an indispensable tool for evaluating water potential, is drawn up. The two methods (statistical and fractal) equate well and prove to be complementary for defining the geometric properties and the scaling laws of the fissure reservoirs of the western part of the Ivory Coast. However, these results are still partial for describing the full complexity of the fracturing of the basement, and a field check of the linear chronology, combined with an analysis of their hydraulic behavior could facilitate the design of better-suited geometric models.
Author
Aquifers; Fractals; Satellite Observation; Structural Properties (Geology)

20010066197 Fes-Saiss School of Science and Technology, Lab. of Applied Geology, Fes-Saiss, Morocco
Methodological Test Using Spaceborne Images in a GIS for the Protection of Surface Water Resources in Morocco ***Essai Methodologique Exploitant les Images Spatiales dans un SIG pour la Protection des Ressources en eau de Surface au Maroc***
ElGarouani, Abdelkader, Fes-Saiss School of Science and Technology, Morocco; Jabrane, Raouf, Fes-Saiss School of Science and Technology, Morocco; Merzouk, Abdel Aziz, Universite Hassan II, Morocco; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 225-232; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

Confronted with the problems of the deterioration of the quality of the water resources in Morocco, it is necessary to establish mechanisms and actions that aim to preserve and safeguard these resources. The creation of protection zones is one of the most preventive and curative means for providing this protection. The study sector involves the April 9, 1947 dam located in the Western Rif of Morocco. to facilitate management, storage and analysis of the data necessary for delimiting protection zones, we used a geographic information system (GIS). This article demonstrates the opportunity to set up a GIS to define surface resource protection zones for a drinking water supply, namely the backwater of a dam. We also defined the various steps necessary for designing a prototype that incorporates remote sensing data into a GIS adapted to delimiting these zones. The satellite images allowed us to obtain precise thematic information (characterization of the surface status of the watershed) for a spaceborne extrapolation of information from the knowledge of a few bits of local data. Thanks to their repetition over time, these images also offer the possibility of tracking the change in the characteristics of the watershed.
Author
Remote Sensing; Satellite Imagery; Surface Water; Water Resources; Imaging Techniques; Satellite Observation

20010066206 Toulouse Univ., Lab. d'Ecologie Terrestre, France

Detection of Fires in the Amazon Forest Using SPOT-4 HRVIR and VEGETATION Data ***Detection des Feux en Foret Amazonienne a Partir des Donnees HRVIR et VEGETATION de SPOT-4***

Bellan, Marie-France, Toulouse Univ., France; Carayon, Jean-Luc, Toulouse Univ., France; Phulpin, Thierry, Centre National d'Etudes Spatiales, France; Lavenu, Francois, Centre d'Etudes Spatiales de la Biosphere, France; Blasco, Francois, Toulouse Univ., France; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 119-126; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

In 1997-1998, El Nino resulted in a very pronounced dry season in Amazonia, and particularly in the State of Roraima (Brazil). Numerous fires raged in the savanna and in the forest, immediately located by several satellites. Our article deals with the contribution of images supplied by high and low resolution SPOT-4 HRVIR and VEGETATION (VGT) sensors in evaluating the impact of these fires on tropical plant formations. Some of the first images from the SPOT-4 sensors over Foraima are analyzed and interpreted in order to delimit areas affected by the fires. The VGT data allow an initial estimate of the surface areas burned on a regional scale, and show the principal ecosystems affected. The HRVIR images are used to establish a much more precise classification of the various plant formations (dense, evergreen and seasonal forests, savannas, grazing lands and farm land) effectively burned or not. The surface areas calculated on the VGT images are corrected using HRVIR data. However, the estimate of surface areas may be made overall using VGT with a precision of around 15%.

Author

Amazon Region (South America); Brazil; Fires; Tropical Regions; Remote Sensing

20010066207 Quebec Univ., INRS, Sainte-Foy, Quebec Canada

Preliminary Analysis In View of a Modeling of Energy Losses For The City of Montreal: Use of the LANDSAT TM Thermal Band ***Analyse Preliminaire en vue d'une Modelisation des Pertes d'Energie de la Ville de Montreal: Utilisation de la Bande Thermique TM de LANDSAT***

Magagi, Ramata, Quebec Univ., Canada; Bernier, Monique, Quebec Univ., Canada; LaFrance, Gaetan, Quebec Univ., Canada; Gauthier, Yves, Quebec Univ., Canada; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 61-70; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, France; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The content of this article corresponds to the first stage of a research project focused on the quantitative analysis of the energy losses of an urban center through the use of LANDSAT TM thermal band (10.4-12.5 micron) data. From a theoretical standpoint, the feasibility of the study is demonstrated. The analysis of several transects plotted along the LANDSAT images indicates that the thermal infrared signal conforms to the ground occupation. However, it is influenced by meteorological conditions. The final product of this project is a statistical model of energy losses connecting the satellite observations to the corresponding land variables, on the one hand, to human activities, on the other hand, to natural heat input. In short, in this article, we show that the statistical approach merits testing. The bases for the model are presented, taking into account the information concerning the immediate surroundings, the use of urban targets and their thermal characteristic.

Author

Cities; Mathematical Models; Satellite Observation; Losses; Energy Dissipation

20010066208 Universite des Sciences et de la Technologie Houari Boumediene, Image Processing Lab., Algiers, Algeria

Determination of Textural Indexes for Classifying Urban Units Applied to the Area of the City of Algiers (Algeria) ***Determination d'Indices Texturaux pour la Classification des Unites Urbaines Appliquee a la Region est de la Ville d'Alger (Algerie)***

Belhadj-Aissa, Aichouche, Universite des Sciences et de la Technologie Houari Boumediene, Algeria; Belhadj-Aissa, Mostefa, Universite des Sciences et de la Technologie Houari Boumediene, Algeria; Smara, Youcef, Universite des Sciences et de la Technologie Houari Boumediene, Algeria; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 333-341; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The objective of this article is to present a methodology for generating textural indexes followed by supervised classification using an optimal subset of resulting texture images. The methodology proposed makes it possible to identify urban units based on their textural signature. We were interested in extracting textural information in the field of spatial frequencies. Textural images are produced on a 2 in. x 2 in. window. The size of the window is chosen according to the primitives of the textures to be classified. The method for selecting a subset of images is based on the calculation for the Wilks test, which expresses the maximum separability of the themes through the combination of textural indexes. In the classification procedure, the input images are the

optimal subset of textural index images. We tested this methodology on the image of albedo extracted from a 1996 LANDSAT TM image of the area east of the city of Algiers (Algeria). The results are texture images, the Wilks statistics for each subset, as well as the images resulting from the textural classification. The results of the textural classification were evaluated on the basis of representative samples of pre-defined texture classes.
Author
Cities; Image Classification; Buildings; Textures; Satellite Observation; Satellite Imagery; Image Analysis; Remote Sensing

20010066209 Ottawa Univ., Remote Sensing and Geomatics Lab., Ontario Canada
The Interest of the Mid Infrared Range for Mapping Crop Residue: The Case of the LANDSAT-7 ETM+ Sensor ***Interet du Moyen Infrarouge pour la Cartographie des Residus de Cultures: Cas du Capteur ETM+ LANDSAT-7***
Bannari, Abderrazak, Ottawa Univ., Canada; Havoudane, Driss, Sherbrooke Univ., Canada; Bonn, Ferdinand, Sherbrooke Univ., Canada; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 319-332; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

Crop residue plays an important role in protecting the soil surface against water-induced and wind-induced erosion. Its conservation on farm land after the harvest was considered to be an effective anti-erosion practice. Certain researchers have demonstrated that a minimum of 15% of crop residue cover can reduce erosion by 75% versus bare soil. This study concerns analyzes the potential and the interest in the mid infrared range for detecting and mapping crop residue. This spectral range has proven to be of great interest both for the study of live vegetation and for the characterization of senescent or try vegetation and for identifying soils and rocks. In this study, we used spectroradiometric measurements from several bare soils with different moisture levels and different optical properties, and soybean and barley residue with different coverages.
Author
Erosion; Mapping; Residues; Thematic Mapping; Vegetation; Wastes

20010066229 Liege Univ., Lab. Service Universitaire de Recherches Fondamentales et Appliquees en Cartographie et en Etudes Spatiales en Cartographie et en Etudes Spatiales, Belgium
Influence of the Absolute Precision of Sea-mark Points on the Georeferentiation Quality of Very High Resolution Images ***Influence de la Precision Absolue des Points d'Amer sur la Qualite de la Georeferenciation des Images a Tres Haute Resolution***
Billen, Roland, Liege Univ., Belgium; Cornelis, Bernard, Liege Univ., Belgium; Sheeren, David, Liege Univ., Belgium; Donnay, Jean-Paul, Liege Univ., Belgium; Pantazis, Dimos, Liege Univ., Belgium; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 15-22; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, France; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

To study the urban environment, remote sensors have images and very high resolution geometric satellites. The geometric correction process that results in the georeferentiation of these data includes several errors. Some are inherent to the starting data, others are introduced during processing. This second type of error can come from the algorithms for correcting geometric deformations, the external data necessary for corrections or resampling algorithms. The purpose of this study is to analyze the impact of the absolute precision of sea-mark points on the geometric quality of the georeferenced image. Two tests were performed using the same image (KVR-1000) over different areas. Polynomial transformations were applied from sea-mark points of different absolute precision. These points were excerpted from topographic maps, from a topographic database and from a GPS reading. It appears that to obtain georeferentiation of approximately the geometric resolution of the image, the sea-mark points must have a lower order of absolute precision. The use of more precise points does not result in enhanced georeferentiation. This shows that beyond a certain absolute resolution, there is no further gain possible in terms of the geometric quality of the georeferencing. We are confronted with the identification limits of the points imposed by the resolution of the image to be corrected. Research prospects rely on taking the problem into account in its inclusiveness and also playing on the distribution and the number of points and using different correction algorithms.
Author
Cities; High Resolution; Topography; Image Processing; Remote Sensing; Precision

20010066230 Ecole Polytechnique de Yaounde, Electronics and Signal Processing Lab., Yaounde, Cameroon

Regional Assessment of Remote Sensing in Sub-Saharan Africa ***Bilan Regional de la Teledetection en Afrique Subsaharienne***

Tonye, Emmanuel, Ecole Polytechnique de Yaounde, Cameroon; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 439-456; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The regional assessment ”sub-Saharan Africa” concerning the development of remote sensing during the last decade was done and the following findings were noted: 1) the development of laboratories and of university training, of government agencies and private enterprises is timid 2) national cartography institutes display a conscious policy of modernizing their map production equipment turning to the remote sensing tool; 3) the increased capacities of microcomputing since 1995 allow the use of sophisticated techniques and digital image processing methods; some teams are developing their own image processing tool or are adapting those on the market to their national processing concern; outside micro-computers, very little field and printing equipment, particularly for maps, is available; 4) the development outlook can be identified as follows: (a) the need for images, particularly multisource, multidate and high resolution images, remains crucial; (b) the need for training, both initial and continuing, must be based on remote learning possibilities, particularly via the Internet, and must result in actions to implement remote sensing curricula within the framework of the virtual French-speaking world university; this appears to be a major objective; (c) the need for techniques, methods and application for users is passing through an awareness-raising campaign, more particularly the routine planning of seminars, science days and other information campaigns.

Author

Africa; Remote Sensing; Requirements; Assessments

20010066231 Universite des Sciences et de la Technologie Houari Boumediene, Image and Remote Sensing Lab., Algiers, Algeria

Atmospheric and Topographic Corrections using the Enhanced Black Dot Method and Through Integration of a Digital Altitude Model: Application to the Region of Florence (Italy) ***Corrections Atmospherique et Topographique par la Methode des Points Noirs Amelioree et par Integration d'un Modele Numerique d'Altitude: Application a la Region de Florence (Italie)***

Quarzeddine, Mountra, Universite des Sciences et de la Technologie Houari Boumediene, Algeria; Belhadj-Aissa, Aichouche, Universite des Sciences et de la Technologie Houari Boumediene, Algeria; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 421-426; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

Radiometric deteriorations of satellite images due to atmospheric and topographic effects have been the subject of many projects. In this context, we present in this article the improved black dot method (IBDM), which allows the radiometric correction of images representing mountainous regions. The radiometric correction of these images requires the integration of topographic descriptors. The general radiative transfer equation was established, thereby allowing the estimation of the effect of aerosols, as well as the calculation of irradiance. The results of the IBDM are given in comparison to the spectral signatures of conifer vegetation. These signatures are traced using luminance images corrected for the atmospheric effect by incorporating the atmospheric parameters calculated by the IBDM and those calculated by the 5S model. A visual evaluation of the topography is illustrated in the images obtained following topographic correction. We also evaluated the topographic correction by color composite. The color composite of the corrected images allowed us to discriminate the themes better.

Author

Atmospheric Effects; Correction; Image Processing; Mountains; Radiometric Correction; Satellite Imagery; Image Analysis; Imaging Techniques; Image Enhancement; Satellite Observation

20010066232 Center for Ecological Monitoring, Dakar, Senegal

The Use of LANDSAT TM Images to Estimate the Spatial Variability of Soil Moisture Intended for Spatialized Hydrologic Models: Application to the Senegal Delta ***Utilisation des Images TM de LANDSAT pour Estimer la Variabilite Spatiale de l'Humidite du Sol Destinee aux Modeles Hydrologiques Spatialises: Application au Delta du Senegal***

Lo, Medou, Center for Ecological Monitoring, Senegal; Sandholt, Inge, Copenhagen Univ., Denmark; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 395-403; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The initial results of the estimation of the spatial variability of a dryness index (TVDI: Temperature-vegetation-dryness index) based on a relation between surface temperature (Ts) and a Normalized difference vegetation index (NDVT) are presented. The TVDI refers to the moisture conditions of the soil and the information used for its estimation are obtained solely via remote

sensing. The spatial evolution of this index is analyzed by using a LANDSAT TM image from April 4, 1994 covering a portion of the delta of the Senegal River and its environs in the semi-arid northern area of Senegal. The duality between the delta strictly speaking and its edges is clearly evident from the results of the analysis. In the sandy soil that borders the delta, the TVDI values are high with a very low spatial variation. Conversely, in the delta strictly speaking, these values are relatively low with relatively important variation. The method used is very simple and seems promising in light of the relevant information it provides. This information will be used in the MIKE SHE spatialized hydrologic model (European hydrologic system). The TVDI can also be used in biomass estimation models or as a parameter in early alert systems.
Author
Moisture Content; Remote Sensing; Soil Moisture; Vegetation; Satellite Observation; Satellite Imagery; Image Analysis

20010066233 Saint-Etienne Univ., Research Center for Planning and the Environment, France
Characterization of Mountain Heaths in the French Massif Central Using SPOT HRV Satellite Information ***Caracterisation des Landes Montagnardes dans le Massif Central Francais a l'Aide de l'Information Satellitale de HRV de SPOT***
Jacqueminet, Christine, Saint-Etienne Univ., France; Thebaud, Gilles, Clermont-Ferrand Univ., France; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 379-384; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The purpose of this study is to analyze the contribution of spectral data in characterizing plant formations in a mountain heath area. Situated above the edge of the forest, the Hautes-Chaumes of the Forez mountains are a mosaic of heaths, meadows and bogs. Traditionally used for summer grazing, they are experiencing an agricultural withdrawal expressed by the colonization of woody species. Two objectives were pursued: the inventory of plant formations and the identification of the sectors affected by the expansion of woody perennials. The recognition of the different plant communities was accomplished using multiband classifications applied to a SPOT HRV image. Due to the great floristic and physiognomic heterogeneity of the vegetation cover, an unsupervised classification approach was chosen. The comparison of the classification results with the land allowed us to draw up a typology of the plant formations revealing their makeup of herbaceous crops and woody perennials. This classification resulting from the processing of satellite data shows the different statuses of these heath formations that are more or less dominated by woody species. It also accounts for current grazing land use, since under-use encourages the regrowth of woody species, among others.
Author
Classifications; Land Use; Vegetation; Massifs; Trees (Plants); Earth Observations (From Space)

20010066234 Universite des Sciences et de la Technologie Houari Boumediene, Image Processing Lab., Algiers, Algeria
Improvement and Comparison of Adaptive Filters for Reducing Speckle Effect in ERS-1 SAR Radar Images ***Amelioration et Comparaison de Filtres Adaptatifs pour la Reduction du Chatoiement dans les Images Radar RSO de ERS-1***
Cherifi, Dalila, Universite des Sciences et de la Technologie Houari Boumediene, Algeria; Smara, Youcef, Universite des Sciences et de la Technologie Houari Boumediene, Algeria; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 357-367; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

Radar images have a speckle effect that is translated by a strong dispersion of the radiometry values observed on natural surfaces. This phenomenon is common to all images produced by coherent systems. The user of a synthetic aperture radar (SAR) image most often seeks to facilitate the interpretation of images through a drastic reduction of the speckle effect. Thus, numerous methods for filtering the speckle effect in SAR images have been studied. The problem consists in estimating the noise and in eliminating it while preserving the radiometry and the textural information of the image. In this article, we present an algorithm that improves the adaptive filter defined by LOPES in 1991. This filter was implemented on the basis of a modified version of the FROST filter. It allows filtering of homogeneous areas while preserving the structures and textures. A comparative study as well as the evaluation of the performance of the different filters were performed using the contour detection algorithm proposed by TOUZI in 1988 and a set of objective evaluation criteria that can be directly measured in the image: preservation of the average radiometry, speckle effect reduction rate in the homogenous areas, preservation of the contrast close to contours, lines and strong reflectors. The tests were performed on SAR radar images from the ERS-1 satellite over the region of Laghouat (Southern Algeria).
Author
Radar Imagery; Imaging Techniques; Image Analysis; Satellite Imagery; Satellite Observation; Speckle Patterns

20010066235 Saint Joseph Univ., Dept. of Geography, Beirut, Lebanon

The Use of a SPOT HRV(P) Image to Study Coastal Current and Eddies Near the Lebanese Coast ***Utilisation d'une Image HRV(P) de SPOT pour l'Etude de Courants Cotiers et de Mouvements Tourbillonnaires Pres des Cotes du Liban***

Somma, Janine, Saint Joseph Univ., Lebanon; Badaro-Saliba, Nada, Saint Joseph Univ., Lebanon; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 289-296; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

Large coastal currents and eddies appear very clearly on a SPOT HRV(P) image dated June 14, 1994 for the coastal area of Lebanon. In a country where household waste is piled in coastal landfills and where the sewers are discharged onto the shoreline without any sanitation process, their study would allow us to know which sites are the most vulnerable to the coastal drift of garbage and waste water. The image is a level 1 A image to prevent to the maximum extent possible any smoothing that might adversely affect the distinction of the slightest effects. Its segmentation by digital count thresholds makes it possible to distinguish the imbrication of two large masses of water with reverse motion: north-south and south-north. Fourrier transforms applied in different sectors of the apparent currents indicate that the coastal drift is linked to the winds of the day and the day before. As the dominant winds are generally south-west north east, the waste is driven northward.

Author

Coastal Currents; Shorelines; Vortices; Mapping; Oceanography; Remote Sensing

20010066236 Centre d'Etudes Spatiales de la Biosphere, Toulouse, France

The Role of Satellite Sensor Observations in Estimating and Regionalizing Water Resources ***La Place des Observations par Capteur Satellitaire dans l'Estimation et la Regionalisation des Ressources en Eau***

Flouzat, Guy, Centre d'Etudes Spatiales de la Biosphere, France; Amram, Olivier, Centre d'Etudes Spatiales de la Biosphere, France; Fortin, Jean-Pierre, Institut National de la Recherche Scientifique, Canada; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 189-203; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

In many regions, knowledge of water resources is a major problem for economic development. When this knowledge is necessary over large areas, spot measurements, even if they are very precise, cannot produce the overview that scientists, managers and planners need. Thus, the growing social demand makes it necessary to elucidate the major questions raised for researchers and for managers in order to better understand the mechanisms that determine the availability and the distribution of this resource. In particular, the nature of the exchanges between watersheds and the atmosphere, as well as the spatial and temporal characteristics of surface and deep water flows are still not sufficiently known. These different processes of the continental phase of the water cycle correspond to characteristic variables: precipitation, runoff, infiltration, deep drainage toward water tables, capillary rise, evaporation of mineral surfaces, transpiration of plant cover, soil moisture (on the surface and in the unsaturated area), and, in related fashion, radiation balance and meteorology. These flows determine the balances and the reserves and, given their diversity and their complexity, we currently concede that the regionalization of these moisture balances can be achieved only by modeling the coupling of these vertical and horizontal transfers.

Author

Moisture; Satellite Observation; Water; Water Flow; Water Resources

20010066237 Paris Univ., PRODIG, France

The Contribution of Remote Sensing to the Study of Desertification: Selected Examples in West Africa ***Contribution de la Teledetection a l'Etude de la Desertification: Exemples Choisis en Afrique de l'Ouest***

Courel, Marie-Francoise, Paris Univ., France; Bicheron, Patrice, Center for Spaceborne Studies of the Biosphere, France; Mougin, Eric, Center for Spaceborne Studies of the Biosphere, France; Jarlan, Lionel, Center for Spaceborne Studies of the Biosphere, France; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 113-118; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The study of desertification from space was made possible a quarter century ago by the launch of the first Earth observation satellites. In this field, the essential involves being able to identify in the landscape marks whose presence or appearance provide evidence of the establishment of desert conditions. Just as important for approaching the phenomenon is being able to verify its dynamic characteristic through the temporary or apparently stable nature of these imprints. In fact, we speak of desertification

when this processes is ongoing over large spaces. The effort of specialists who combine ”remote sensing and desertification” is therefore focused on revealing of indicators or revealers of the durable transformation of the environment.
Author
Desertification; Remote Sensing; Africa; Satellite Observation

20010066238 Geomatics Canada, Ottawa, Ontario Canada
Radar Remote Sensing and Delimitation of Urban Forms: Application to the City of Douala in Cameroon ***Teledetection Radar et Delimitation des Formes Urbaines: Application a la Ville de Douala au Cameroun***
Mouafo, Dieudonne, Geomatics Canada, Canada; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 71-84; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, France; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

This article concerns the delimitation of the urban envelope and the extraction of urban structures for the city of Douala using an ERS-1 SAR image dated 08/23/1994 (table 1). Still limited, the use of radar images for urban analysis generally involves filtering, inferometry and texture analysis. To recognize urban forms, one uses visual methods inspired by photo-interpretation and semi-automatic methods based on thresholding and vegetation indexes. The physical limits of metropolitan areas, as well as the urban structures, can, in fact, be derived from classification through the generalization of the urban mask using mathematical morphology techniques, which suggest an automatic extraction of the urban envelop. The method proposed here is a texture analysis involving a series of thresholding, dilation, erosion and classification operations via segmentation then filtering of the images. The goal is to extract fight structures and dark structures, the two main components of built-up space, from the rest of the urban ground use. Mathematical morphology has already been used to delimit the cities in northwest Europe. The method applied to the city of Douala is inspired by the TERRETTAZ method for Geneva, renamed TMM (texture through mathematical morphology). The image of the urban structures obtained for Douala emphasizes, in spite of several confusing aspects: the dense urban fabric, the infrastructures, as well as the current primary urban planning focuses of the city. Its validation using a vector file serving as ground data makes it possible to establish a plotting of around 60% of the urban envelop. This result is particularly interesting in fight of the complexity of the urban space of the humid tropical regions dominated by vegetation and the spectral poverty of radar images. The use of directional filters could even allow these images to serve as high tech channels for a potential classification, or to be combined with optical images.
Author
Cameroon; Cities; Remote Sensing; Image Analysis; Image Classification

20010066239 Fribourg Univ., Inst. de Geographie, Switzerland
Approaches For Recognizing Urban Forms and Methodological North-South (Europe-Africa) Transfer ***Demarches de Reconnaissance des Formes Urbaines et Transfert Methodologique Nord-Sud (Europe-Afrique)***
Collet, Claude, Fribourg Univ., Switzerland; Donnay, Jean-Paul, Liege Univ., Belgium; Weber, Christiane, Pasteur (Louis) Univ., France; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 41-48; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, France; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The work for this research project shared with the AUF involved the development of approaches for delimiting and segmenting the urban envelope using remote detection images. They were evaluated in very different contexts both from the standpoint of organization and the dynamic of the urban spaces and from the standpoint of the information available. Whether the analysis is focused on computer-assisted image interpretation (CAII) or on a directed digital processing chain, the incorporation of remote detection images into a geographic database is a necessity both for calibrating and validating the methods and for using non-spectral information. As part of a visual approach, the merger of a high spatial resolution panchromatic image with multispectral images combined with the production of a vegetation index offers the interpreter information suited to the tasks of delimiting and segmenting the urban envelop. In a directed digital processing context, the delimitation and segmentation processes must incorporate the spatial dimension of the information. The approaches developed and used call on contextual analysis tools like mathematical morphology operators. This article presents a synthetic and structured view of the processes tested as part of this research and applied to urban areas in Europe and Africa.
Author
Cities; Remote Sensing; Africa; Europe; Image Analysis

20010066240 Universite des Sciences et de la Technologie Houari Boumediene, Lab. de Traitement d'Images, Algiers, Algeria
Mapping Urban Density Via Mathematical Morphology: Application In The Regions of Paris and Tashkent ***Cartographie de la Densite Urbaine par la Morphologie Mathematique: Application dans les Regions de Paris et Tachkent***
Chelabi-Kemmouche, Akila, Universite des Sciences et de la Technologie Houari Boumediene, Algeria; Mering, Catherine, Paris VII Univ., France; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 33-40; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, France; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The purpose of our study is to quantify urban density using satellite images. The approach we adopted was inspired by the quantitative analysis of soil samples by screening items of different sizes and weighing them. This is called granulometry. to describe the macrotexture around a point inside a window, we used the values obtained by calculating the granulometric density on the binary image considered. Computer implementation consists in creating the descriptive variables for each pixel like gray-scale images. Each image corresponds to the result of the calculation of granulometric density for an aperture size. In this image, each pixel is assigned the granulometric density resulting from the granulometric analysis on the corresponding window. We thus obtain as many images as non-nil values of granulometric density calculated over all of the sliding windows on the binary image. The final step comes down to producing a multi-channel classification in these images. to obtain a map of the macrotexture of a set, we performed an automatic classification of the pixels using the dynamic cluster method. We analyzed and mapped the different types of macro-textures of a binary image obtained from a TM subimage over southeastern Paris. We can note on the macro-textures map that the boundary between Paris and the suburbs virtually follows the administrative boundaries. We also experimented with this method on the city of Tashkent (Uzbekistan) using SPOT HRV (XS) images.
Author
Cities; Mapping; Satellite Imagery; Image Analysis; Satellite Observation

20010066241 Liege Univ., Dept. of Geomatics, Belgium
Urban Remote Sensing at the Dawn of Very High Spatial Resolution ***La Teledetection Urbaine a l"Aube de la Tres Haute Resolution Spatiale***
Donnay, Jean-Paul, Liege Univ., Belgium; Collet, Claude, Fribourg Univ., Switzerland; Weber, Christiane, Pasteur (Louis) Univ., France; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 3-13; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, France; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The emergence and recognition of urban remote sensing appear tied to the continual improvement in spatial resolution offered by the successive generations of sensors. Here we recall the evolution of this discipline, underlining the methodological innovations and indicating their applications deemed operational at present. We thus record the results of some fifteen years of diversified scientific work, but also the contingent nature of remote sensing data in urban applications. Finally, the future of urban remote sensing is imagined through the use of a new generation of sensors.
Author
High Resolution; Remote Sensing; Spatial Resolution; Imaging Techniques; Cities

20010066242 Bucharest Technical Univ. of Construction, Bucharest, Romania
Current Situation and Outlook for the Development of Remote Sensing Laboratories in Central Europe and Eastern Europe ***Situation Actuelle et Perspectives de Developpement des Laboratoires de Teledetection de l'Europe Centrale et de l'Europe de l'Est***
Zavoianu, Florea, Bucharest Technical Univ. of Construction, Romania; Grama, Vasile, Technical Univ. of Moldova, Moldova; Barbaroussi, Vasso, Polytechnic School of Athens, Greece; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 457-463; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

In this assessment of the development of French-speaking laboratories during the last decade of their evolution, aspects are presented concerning: the growth in the capabilities of local laboratories regarding remote sensing image processing and analysis and in GIS techniques; the professional training of students by improving instructional programs and university courses; the real needs and problems of students concerning the assimilation of remote sensing technologies; the continuing training of engineers and technicians working in this field through short training courses, the priority topics approached by remote sensing at the national level; the directions and interests of the Government concerning technological development and remote sensing research programs. In its strategy for Central Europe and Eastern Europe, the Remote Sensing Network of the AUF must pursue the following objectives: promote and encourage the transfer of technologies among its laboratories; create a regional professional training center; strengthen the cooperation between its laboratories as a result of the budget difficulties the countries of this area

must deal with. EastWest cooperation within the framework of this Network can respond to the interests of all these laboratories and satisfy their requirements.
Author
Central Europe; Priorities; Remote Sensing; Laboratories

20010066334 Simpson Weather Associates, Inc., Charlottesville, VA USA
Remote Sensing of River and Ocean Surface Currents
Emmitt, G. D., Simpson Weather Associates, Inc., USA; [2001]; 7p; In English; SPIE Meeting, August 2001, San Diego, CA, USA; Sponsored by International Society for Optical Engineering, USA; Original contains color illustrations; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Vast amounts of energy (heat and momentum) and chemical constituents are moved about within ocean and river currents. In the case of deep ocean currents, some reasonable estimates of this transport can be derived from models and sea surface altimetry data. River flows can be estimated from river channel models and indirectly from stage/discharge relationships. However, much of what we know with some measure of accuracy about river and ocean currents is derived from in situ measurements. Current meters are the usual choice for obtaining direct observations of the current profiles with depth. Obtaining such profiles using some form of remote sensing is a technological challenge. Surface currents, on the other hand, are more attractive targets for non-contact monitoring. However, useful relationships between the surface motion and the deeper motions are problematic with confounders including wind stress and/or density stratification. In spite of these impediments, there may indeed be some useful information derivable from observations limited to the surface motions of the oceans or rivers, particularly if observations can be obtained with high spatial and temporal density. This paper looks at the possibility of measuring surface currents using airborne and space-based Doppler lidars.
Author
Ocean Currents; Optical Radar; Remote Sensing; Doppler Radar

20010066488 Higher Inst. of Training and Applied Research, Bamako, Mali
Impact of the Spatial Growth of Bamako on the Spatial Growth of Peri-Urban Locations: The Contribution of SPOT HRV Images for Tracking Their Comparative Dynamic ***Impact de la Croissance Spatiale de Bamako sur Celle des Localites Periurbaines: L'Apport des Images HRV de SPOT pour le Suivi de Leur Dynamique Comparee***
Diarra, Balla, Higher Inst. of Training and Applied Research, Mali; Champaud, Jacques, Population-Environment Lab., France; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 49-59; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, France; Translated into English bt SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

Beginning in 1945 and even more so after 1960, Bamako, the capital of Mali, experienced sharp spatial growth. This enormous expansion now raises crucial problems related to space control and planning. The rise in land prices pushed populations to establish themselves during a first phase in spontaneous areas. As these areas were all "absorbed" by the city and since it is impossible to create others, the populations headed to the land reserves of the neighboring villages that then experienced a spread that was all the more difficult to control since it took place so quickly. The objectives of this project are: 1) to show this increase in Bamako oil stains; 2) to measure its spatial growth and the growth of the surrounding villages since the ban, under risk of demolition, of spontaneous settlements at the beginning of the 1980s. to this end we used old maps of Bamako and two couples of HRV images (P and XS) taken in 1986 and 1996. These images were enhanced and cropped in order to obtain two good P+XS colored compositions (one for each year). These enhanced images were printed at a large scale, 1:25,000, and the contours of the built-up areas were visually interpreted on an overlay. The same was true for the maps. These different boundaries were then digitized and retrieved in an SIG software program in order to allow diachronic combinations. Analysis of the maps shows the change in oil stains for the Mali capital and its significant expansion between 1974 and 1986. The other essential result is that the peri-urban areas that are the most important today truly developed beginning in 1986.
Author
Cities; Mali; Urban Development; Satellite Imagery

20010066776 Colorado Univ., Inst. of Arctic and Alpine Research, Boulder, CO USA
Meltwater Flowthrough Snow from Plot to Basin Scales ***Final Report, 21 Sep. 1998 - 20 Sep. 2000***
Williams, Mark; Pfeffer, W. T.; Feb. 08, 2001; 28p; In English
Contract(s)/Grant(s): DAAG55-98-1-0505
Report No.(s): AD-A390293; Rept-153-0330; ARO-39177.1-EV-RI; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This supplement provided funds to purchase two pieces of equipment for research in snow hydrology: a high-precision temperature instrument suitable for snow and two Denoth snow-wetness meters.
DTIC
Moisture Content; Snow; Temperature Measuring Instruments; Hydrology

20010067391 Danish Defence Research Establishment, Copenhagen, Denmark
Exploitation of Polarimetric Target Decomposition for Coastal Remote Sensing ***Final Report, 30 Sep. 1997 - 30 Apr. 2001***
Korgager, Ernst; Apr. 30, 2001; 56p; In English
Contract(s)/Grant(s): N00014-97-C-0408
Report No.(s): AD-A390513; DDRE F-10/2001; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

Techniques for processing polarimetric SAR data have been considered in relation to applications in coastal and littoral environments. A comprehensive set of data from the Danish EMISAR has been acquired and exchanged with other NICOP partners. The two scenes covered by these datasets are the Great Belt Fixed Link (tunnel/bridge connection) in Denmark and the Oeresund tunnel/bridge connection between Copenhagen, Denmark, and Malmo, Sweden. Software for handling and analyzing the data has been developed. Notably, the sphere, diplane, helix decomposition has been applied in order to highlight the observed scattering mechanisms. The study has included collection of detailed and precision ground truth for supporting the analyses. This ground truth collection has been made by means of a digital camera and a differential GPS receiver capable of measuring position at a resolution of approximately 1 m. The scenarios and the techniques under consideration are illustrated by a number of examples of SAR images and digital photos.
DTIC
Exploitation; Polarimetry; Radar Imagery; Targets; Decomposition; Remote Sensing

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.

20010066186 Zernow Technical Services, Inc., San Dimas, CA USA
Final Report on Anomalous Energy Transfer From a Detonation ***Final Report***
Zernow, Louis, Zernow Technical Services, Inc., USA; Apr. 1998; 52p; In English
Contract(s)/Grant(s): DAAK-83-C-0033
Report No.(s): AD-A345311; ARL-CR-421; No Copyright; Avail: Issuing Activity

Early work (1974) by the Navy, which involved studies of the front portion of the detonation products from overdriven explosive cylinders of PETN, suggested two anomalous mechanisms of energy transfer in the forward direction. These included a ”prompt” (optical) mechanism and a ”detached plasma” mechanism. An independent study in 1983 by the present author indicated that the prompt mechanism could not be confirmed from the existing Navy data; neither could the single Navy experiment, which displayed the detached plasma phenomenon, be repeated. However, persistent ”hot” (bright) plasma regions, located at the front end of the detonation products, were shown to be present m virtually all cases. This present follow-on study, which was carried out in 1985 with the experimental assistance of Mr. George Hauver of the U.S. Army Ballistic Research Laboratory (BRL), clearly showed that the prompt (optical) energy-transport mechanism was not present However, time-resolved optical measurements of material removal from a thin, aluminum foil target on a transparent plastic substrate, located at a long distance forward of the charge, yielded extremely high, mass-removal rates and very high, deduced- energy-deposition rates, very early in the interaction between the hot front end of the detonation products and the aluminum target foil. More work remains to be done to explain these residual phenomena.
DTIC
Combustion Products; High Temperature Plasmas

20010066324 Army Construction Engineering Research Lab., Champaign, IL USA

Site Evaluation for Application of Fuel Cell Technology, Naval Hospital: Marine Corps Air Ground Combat Center Twentynine Palms, CA ***Final Report***

Binder, Michael J., Army Construction Engineering Research Lab., USA; Holcomb, Franklin H., Army Construction Engineering Research Lab., USA; Taylor, William R., Army Construction Engineering Research Lab., USA; Mar. 2001; 30p; In English

Contract(s)/Grant(s): 88-94-D-0020

Report No.(s): AD-A389308; ERDC/CERL-TR-01-32; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Fuel cells are an environmentally clean, quiet, and a highly efficient method for generating electricity and heat from natural gas and other fuels. Researchers at the U.S. Army Engineer Research and Development Center (ERDC), Construction Engineering Research Laboratory (CERL) have actively participated in the development and application of advanced fuel cell technology since fiscal year 1993 (FY93). CERL has selected and evaluated 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 manufacturers for 29 of 30 commercially available fuel cell power plants and their thermal interfaces installed at Department of Defense (DoD) locations. This report presents an overview of the information collected at the Naval Hospital at Twentynine Palms, CA, along with a conceptual fuel cell installation layout and description of potential benefits the technology can provide at that location. Similar summaries of the Site evaluation surveys for the remaining 28 sites where CERL has managed and continues to monitor fuel cell installation and operation are available in the companion volumes to this report.

DTIC

Energy Conservation; Fuel Cells; Natural Gas; Evaluation; Technology Assessment

20010066359 Army Construction Engineering Research Lab., Champaign, IL USA

Site Evaluation for Application of Fuel Cell Technology: Laughlin Air Force Base, TX ***Final Report***

Binder, Michael J.; Holcomb, Franklin H.; Taylor, William R.; Apr. 2001; 30p; In English

Contract(s)/Grant(s): DACA88-94-D-0020

Report No.(s): AD-A389307; ERDC/CERL-TR-01-41; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Fuel cells are an environmentally clean, quiet, and a highly efficient method for generating electricity and heat from natural gas and other fuels. Researchers at the U.S. Army Engineer Research and Development Center (ERDC), Construction Engineering Research Laboratory (CERL) have actively participated in the development and application of advanced fuel cell technology since fiscal year 1993 (FY93). CERL has selected and evaluated 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 manufacturers for 29 of 30 commercially available fuel cell power plants and their thermal interfaces installed at Department of Defense (DOD) locations. This report presents an overview of the information collected at the Laughlin Air Force Base, TX, along with a conceptual fuel cell installation layout and description of potential benefits the technology can provide at that location. Similar summaries of the site evaluation surveys for the remaining 28 sites where CERL has managed and continues to monitor fuel cell installation and operation are available in the companion volumes to this report.

DTIC

Fuel Cell Power Plants; Site Selection; Fuel Cells; Natural Gas; Military Air Facilities

20010066542 Army War Coll., Carlisle Barracks, PA USA

China’s Energy Equation: A Strategic Opportunity

Burke, James R.; Apr. 10, 2001; 31p; In English

Report No.(s): AD-A390646; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

China’s astounding economic growth of the past two decades has placed enormous strains on available energy supplies. Continued economic growth, which is the key to China’s future, is constrained by a skewed energy equation in which domestic and foreign energy supplies are far removed from China’s burgeoning population. The energy barriers are a combination of economic, natural, and political factors that afford the U.S. a unique opportunity to initiate bilateral relations with the People’s Republic of China. Engagement with China via an energy scheme sidesteps the issue of Taiwanese independence and will not negatively impact bilateral relations with our allies in the region who are even more dependent on the same supply of energy imports. The key is to initiate cooperation in areas in which there is common ground void of ideological conflict, which will provide mutual benefit to both the U.S. and China, and will not negatively impact security arrangements with our allies in the region. The purpose of this paper is to focus on China’s energy equation and examine energy-related opportunities the U.S. could exploit to initiate bilateral cooperation with China.

DTIC

International Relations; Energy Levels; China; USA; Domestic Energy; Economic Factors

20010066972 Army Construction Engineering Research Lab., Energy Branch, Champaign, IL USA
Site Evaluation for Application of Fuel Cell Technology: Little Rock Air Force Base, AR ***Final Report***
Binder, Michael J.; Holcomb, Franklin H.; Taylor, William R.; May 2001; 27p; In English
Contract(s)/Grant(s): DACA99-94-D-0020
Report No.(s): AD-A390094; ERDC/CERL-TR-01-47; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Fuel cells are an environmentally clean, quiet, and a highly efficient method for generating electricity and heat from natural gas and other fuels. Researchers at the U.S. Army Engineer Research and Development Center (ERDC), Construction Engineering Research Laboratory (CERL) have actively participated in the development and application of advanced fuel cell technology since fiscal year 1993 (FY93), and have selected and evaluated application sites, supervised the design and installation of fuel cells, actively monitored the operation and maintenance of fuel cells, and compiled
DTIC
Fuel Cells; Site Selection; Energy Conservation; Natural Gas; Fuel Cell Power Plants

20010067493 Rutgers - The State Univ., Center for Advanced Infrastructure and Transportation, Piscataway, NJ USA
Evaluation of Hydrogen Fuel Cell Power Source for Cathodic Bridge Protection System ***Final Report***
Mar. 2001; 58p; In English
Report No.(s): PB2001-106378; FHWA-2001-04; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report pertains to a preliminary study to test the feasibility of retrofitting an existing bridge cathodic protection system with an ammonia/hydrogen fuel cell power supply. The feasibility study includes the selection of an appropriate hydrogen fuel cell, the design and installation of a data logger and remote collection unit, and long term monitoring of fuel cell performance. A detailed specification for each unit was developed and described in a Request For Proposals (RFP) sent by the Center for Advanced Infrastructure and Transportation (CAIT) to perspective fuel cell manufacturers. Also, a bridge site was selected for the installation of and applying the most reliable fuel cell under closely controlled conditions. The data logger was designed to allow for remote monitoring and data collection of fuel cell performance data under field conditions. Based on the initial phase of the study, it is recommended that the hydrogen fuel cell system might not be the best alternative to supply power for the cathodic protection system, especially if electric power is available. Although, the project did not conclude by installing the fuel system and testing it under field conditions, it might be shown that technically it is feasible to use such technology, however, it is expected to be costly prohibitive in comparison with electric power or solar energy.
NTIS
Hydrogen Fuels; Cathodic Coatings; Power Supplies

45
ENVIRONMENT POLLUTION

Includes atmospheric, water, soil, noise, and thermal pollution.

20010066088 Engineering Technologies Associates, Inc., Aberdeen Proving Ground, MD USA
FY97 Environmental Technology Division Annual Report ***Annual Report, Sep. 1996 - Sep. 1997***
Buckley, Mike; Palsha, Andrea; Teefy, Dennis; December 1998; 190p; In English
Report No.(s): AD-A345653; SFIM-AEC-ET-CR-9802; No Copyright; Avail: Defense Technical Information Center (DTIC)

This report is the summary of environmental technology projects during the period of 1996 September, 1997 September by the U.S. Army Environmental Center's Environmental Technology Division. The report describes the project, participants, results, requirements, milestones, and end products. ETD conducts demonstrations of new and innovative environmental technologies, and transfers successful technologies to the field. Experienced scientists and engineers, with expertise in all environmental areas, are organized into functional teams, such as cleanup, conservation, compliance, and pollution prevention as well as specialized programs such as Range XXI, UXQ, and SCAPS. ETD provides the support necessary to transfer technology from the laboratory to the field.
DTIC
Cleaning; Conservation; Pollution Control

20010066118 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Optimization of Palladium-Catalyzed In Situ Destruction of Trichloroehtylene-Contaminated Groundwater Using a Genetic Algorithm

Fernandez, Manuel; Mar. 2001; 106p; In English

Report No.(s): AD-A389390; AFIT/GEE/ENV/01M-02; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Conventional technologies for the treatment of groundwater contaminated with chlorinated solvents have limitations that have motivated development of innovative technologies. One such technology currently under development involves using palladium-on-alumina (Pd/Al) as a catalyst to promote dechlorination. Pd/Al catalyst may be used in-well as part of a re-circulating horizontal flow treatment well (HFTW) system. An HFTW system involves two or more dual-screened wells, with in-well reactors, to capture and treat contaminated groundwater without the need to pump the water to the surface. In this study, objective and fitness functions, based on system costs and TCE concentration requirements, were developed to optimize a dual-well HFTW system with in-well Pd/Al reactors in a two-aquifer remediation scenario. A genetic algorithm (GA) was coupled with a three dimensional numerical model of contaminant fate and transport to determine optimized HFTW control parameters (well location, pumping rate, and reactor size). The GA obtained a solution within the specified constraints, but the solution was an artificial solution, as contaminated groundwater in one of the two aquifers received no treatment. Based on these results, new objective and fitness functions were developed in an effort to determine the most cost effective solution to remove contaminant mass from the aquifer. The solution arrived at using this approach, while resulting in minimized values of cost per contaminant mass destroyed, produced unacceptably high downgradient contaminant concentration levels. We conclude that by specifying that only two wells could be used in the HFTW system, we overconstrained the problem and that a multi-well HFTW solution is required.

DTIC

Catalysts; Genetic Algorithms; Ground Water; Palladium; Trichloroethylene; Aluminum Oxides

20010066176 Office of Air Quality Planning and Standards, Research Triangle Park, NC USA

Economic Impact Analysis of Proposed Reinforced Plastics NESHAP *Final Report*

May 2001; 130p; In English; Original contains color illustrations

Report No.(s): PB2001-106078; EPA/452/R-00/007; No Copyright; Avail: National Technical Information Service (NTIS)

The Clean Air Act's (CAA's) purpose is to protect and enhance the quality of the nation's air resources (Section 101(b)). Under the authority of Section 112 of the CAA as amended in 1990, the U.S. Environmental Protection Agency (EPA or the Agency) is currently developing a National Emission Standard for Hazardous Air Pollutants (NESHAP) to reduce emissions generated during the production of reinforced plastic composites (RPCs). This report evaluates the economic impacts of three regulatory alternatives that are designed to control these releases.

NTIS

Environment Protection; Air Quality; Air Pollution; Economic Impact; Reinforced Plastics; Pollution Control

20010066228 Armed Forces Radiobiology Research Inst., Bethesda, MD USA

Toxicological Evaluation of Depleted Uranium in Rats: Six-Month Evaluation Point

Pellmar, T. C.; Hogan, J. B.; Benson, K. A.; Landauer, M. R.; Feb. 1998; 29p; In English

Report No.(s): AD-A341263; AFRRI-SP98-1; No Copyright; Avail: Defense Technical Information Center (DTIC)

The use of depleted uranium (DU) munitions during Desert Storm resulted in a unique type of battlefield casualty, DU shrapnel wounds. The toxicity associated with embedded DU may differ significantly from other metals or other routes of uranium administration. This is a 6-month interim report of an 1 8-month study that is designed to assess the toxicity of implanted DU pellets. This study evaluates kidney, behavioral, and neural toxicity associated with intramuscularly implanted DU pellets (l-mm x 2-mm) and assesses tissues for histological changes and for uranium content.

DTIC

Histology; Toxicity; Uranium; Evaluation; Rats

20010066308 Pechan-Avanti Group, Durham, NC USA

Control Measure Evaluations: The Control Measure Data Base for the National Emissions Trends Inventory (ControlNET)

Sep. 1999; 154p; In English; Also pub. as Rept. No. 99.09.001/9004.112

Report No.(s): PB2001-105812; No Copyright; Avail: National Technical Information Service (NTIS)

The U.S. Environmental Protection Agency's (EPA's) Office of Air Quality Planning and Standards (OAQPS) established national ambient air quality standards (NAAQS) for criteria pollutants under section 110 of the Clean Air Act (CAA). to support

the development and implementation of the NAAQS and associated policies, EPA must develop and maintain data on emission sources and potential control measures. These databases assist EPA in analyzing the effects of different standards and/or control strategies. This report documents development of control measures for inclusion in a comprehensive control measure data base to support EPA analyses of policies and regulations. This data base is called ControlNET - the control measure data base for the National Emission Trends (NET) inventory. ControlNET will cover all criteria pollutants: oxides of nitrogen (NOx), sulfur dioxide (SO2), carbon monoxide (CO), volatile organic compounds (VOCs), primary PM10, primary PM2.5, and ammonia (NH3). The purpose of the ControlNET is to provide the data necessary for quick and comprehensive regulatory impact analyses. A memorandum documenting the ControlNET interface is provided separately. This report addresses the control measure research and evaluations conducted to provide the parameters necessary (control measure efficiency and cost) to model the impact of control measures using data from the NET inventory.
NTIS
Evaluation; Data Bases; Air Quality; Air Pollution; Pollution Control; Emission; Mathematical Models; Nitrogen Dioxide; Nitrogen Oxides; Carbon Monoxide

20010066352 FROM
National Emission Standards for Hazardous Air Pollutants (NESHAP): Publicly Owned Treatment Works - Background Information for Final Standards. Summary of Public Comments and Responses
Oct. 1999; 62p
Report No.(s): PB2001-105811; EPA/453/R-99/008; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche
The EPA proposed National Emission Standards for Hazardous Air Pollutants (NESHAP) from Publicly Owned Treatment Works (POTW) in 40 CFR Part 63, subpart VVV on December 1, 1998. The purpose of this document is to present a summary of the public comments received on the proposed NESHAP and the responses developed by the EPA. This summary of comments and responses serves as the basis for revisions made to the standards between proposal and promulgation. The EPA received 19 public comment letters on the proposed rule. The commenters represent the following affiliations: Federal government (1), State government (2), local government (counties, cities, and sanitary districts) (10), trade associations (3), universities (1), and private citizens (2). This document incorporates all the comments in the docket. Table 1-1 presents a listing of all persons submitting written comments, their affiliation, and their docket number. No public hearing was requested therefore no comments were received from a public hearing.
NTIS
Air Pollution; Standards; Water Treatment

20010066580 Army Engineer Research and Development Center, Vicksburg, MS USA
Effects of Bentonite Clay on Sediment Erosion Rates
Gailani, J. Z.; Jin, L.; McNeil, J.; Lick, W.; Apr. 2001; 25p; In English
Report No.(s): AD-A390214; ERDC-TN-DOER-N9; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This technical note (TN) details analysis of the effects of varying amounts of bentonite clay on the erosion rates of mud (topsoil), sand, and a mixture of both. The presence of clay, even in small amounts, can dramatically change the erosion properties of sediment. This work was performed as part of the DOER work unit Estimating Vertical Variation in Erodibility and Deposition Rates of Mixed Sediments in the Nearshore Placement focus area. The final goal of all research associated with this DOER work unit is to develop methods of associating sediment erosion rates to material bulk properties.
DTIC
Mud; Bentonite; Clays; Soil Erosion; Sediments

20010066794 Meteorological Satellite Center, Kiyose, Japan
Evaluation of NOAA/OLR Diurnal Variation by Using GMS/OLR
Owada, Hiromi, Meteorological Satellite Center, Japan; Meteorological Satellite Center Technical Note; 2001; ISSN 0388-9653, No. 39, pp. 39-46; In Japanese; Original contains color illustrations; Copyright; Avail: Issuing Activity
Outgoing Longwave Radiation (OLR) is available data as an index to activity of tropical convection for climate system. OLR which National Oceanic and Atmosphere Administration (NOAA) calculates from NOAA satellite data is utilized broadly because this observation covers global region, but it was reported that statistic value such as 5-day mean, 10-day mean and monthly mean was influenced by diurnal variation because this observation is only twice a day. OLR has been calculated by using IR1 and WV data of GMS-5 routinely in the Meteorological Satellite Center. In this report, for the simulation of the diurnal variation of NOAA/OLR by GMS/OLR, GMS/OLR was calculated by using only IR1 data and 06/18UTC monthly mean GMS/OLR which was calculated from only 06UTC and 18UTC GMS/OLR data, which time is the closest to the observation time of NOAA-14,

was compared with the 3 hourly monthly mean GMS/OLR which was calculated from 3 hourly GMS/OLR data, which was considered that the diurnal variation was removed. In comparison with 3 hourly monthly mean GMS/OLR, 06/18UTC monthly mean GMS/OLR was about 2-12(W/sq m) greater on the land for October 1999 and February 2000. It is considered that to calculate monthly mean by only 06UTC and 18UTC data is not sufficient for removal of the diurnal variation and on the land the effect of greater value at 06UTC is left.
Author
Convection; Diurnal Variations; Long Wave Radiation; Tropical Regions; Tropical Meteorology; Radiation

20010066833 Army Engineer Research and Development Center, Environmental Lab., Vicksburg, MS USA
RECOVERY: A Mathematical Model to Predict the Temporal Response of Surface Water to Contaminated Sediments, 2.0 ***Final Report***
Ruiz, Carlos E.; Gerald, Terry; Jan. 2001; 50p; In English
Report No.(s): AD-A390143; ERDC/EL-TR-01-3; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
RECOVERY is a PC-based screening-level model to assess the impact of contaminated bottom sediments on surface waters. The analysis is limited to organic contaminants with the assumption that the water column is well-mixed. The contaminant is assumed to follow linear, reversible, equilibrium sorption, and first-order decay kinetics. The physical representation of a system by RECOVERY consists of a well-mixed water column (i.e., zero-dimensional) underlain by a vertically stratified sediment column (i.e., one-dimensional). The sediment is well-mixed horizontally but segmented vertically into a well-mixed surface (active) layer and deep sediment. The deep sediment is segmented into contaminated and clean sediment regions. Pathways incorporated in the RECOVERY model, in addition to sorption and decay, are volatilization, burial, resuspension, settling, advection, and pore-water diffusion. RECOVERY is designed for interactive implementation via a personal computer. The program allows the user to rapidly generate and analyze recovery scenarios for contaminated sediments. The software includes graphical displays and is self-documented. A description of the mathematical description and computational algorithm of the model and a user's guide are included in this report.
DTIC
Computer Programs; Contaminants; Surface Water; Contamination; Mathematical Models; Sediments; Water Quality

20010066969 Eule and Partners International Consulting SPRL, Terveuren, Belgium
The Maritime Environment. International Conference and Exhibition: Treatment Technologies for Gaseous Emissions from Ships
Jan. 1999; 363p; In English, 18-19 Oct. 1999, Brussels, Belgium
Report No.(s): AD-A389416; No Copyright; Avail: CASI; A03, Microfiche; A16, Hardcopy
The conference objectives were the following: Provide a forum for discussion and information exchange on the latest technologies and alternatives for the reduction of air pollution from ships caused by exhaust gases, emissions from thermal waste treatment processes, ozone depleting substances and other greenhouse gases in the maritime environment. Discussion of national and international policies and regulations for IMO compliance and the implementation of the Montreal Protocol and the Kyoto Protocol on the Maritime Industry. Presentation of advanced gaseous waste treatment technologies.. The conference was divided into four session topics: Session 1 - Requirements and Policies for the Reduction of Air Pollution from Ships. Session 2 - Emissions from Thermal Waste Treatment Processes - Treatment Technologies and Alternatives. Session 3 - Reducing Ozone Depleting Substances and Other Greenhouse Gases - Impact of the Implementation of the Montreal Protocol and the Kyoto Protocol on the Maritime Industry. Session 4 - Exhaust Gases from Engines and Power Generators - Treatment Technologies and Alternatives.
DTIC
Air Pollution; Exhaust Emission; Environment Effects; Marine Environments; Ships; Conferences

20010067077 Texas Univ., Dept. of Chemical Engineering, Austin, TX USA
Air Pollutant Source Attribution for Southeast Texas Using C-14/C-12 Ratios
Lemire, Kenneth R.; May 2001; 186p; In English; Original contains color plates
Report No.(s): AD-A390413; No Copyright; Avail: CASI; A02, Microfiche; A09, Hardcopy
Both ambient air samples for VOC analysis and particulate matter samples were collected in the greater Houston area in an attempt to assess the biogenic contribution to the formation of ground-level ozone and particulate matter through the use of radiocarbon measurements. This effort was just a small portion of the many experiments conducted as a part of the Texas Air Quality Study (TEXAQS) 2000. In particular, this set of samples was collected in the time frame of early August 2000 to mid September 2000, when the TEXAQS program was at its most intensive point, with the intention of utilizing the many other sources of supporting and collaborative data that were created in that time period. Biogenic emissions play a substantial role as a source

of particulate matter for two sampling sites in particular. The results from eleven samples, taken from a suburban site (Aldine) in northwest Houston and a rural site (Conroe) approximately thirty miles north of Houston, provide strong evidence of a significant fraction of the particulate matter collected being biogenic in origin. Values reported from Aldine fall into two distinct ranges of 25-37% biogenic or 46-68% biogenic. One sample from Conroe, dated 13 August 2000, has a biogenic fraction of 72%. All eleven samples were taken prior to a forest fire event that occurred during the TEXAQS period. Very little evidence was found for vegetative detritus as a source of organic carbon in any of the samples for which trace metal data are available. Little evidence of cooking emissions is seen in the trace metal analyses for two samples at Aldine (18 and 19 August), and only small contributions from cooking are expected for a 25 August sample.
DTIC
Air Pollution; Contaminants; Carbon 14; Carbon 12; Air Quality

20010067268 NASA Kennedy Space Center, Cocoa Beach, FL USA
Joint Group on Pollution Prevention: Partnering for Progress
Hill, R., NASA Kennedy Space Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 15p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

This viewgraph presentation outlines the Joint Group on Pollution Prevention (JG-PP) partnership. Details are given on what groups comprise JG-PP, the proven methodology for what JG-PP can accomplish, the common problems, joint solutions, and shared efforts, and some of the JG-PP projects.
CASI
Pollution Control; Environment Protection; Project Management

20010067309 Lockheed Martin Corp., Bay Saint Louis, MS USA
Ambient Air Monitoring of Respirable Particulate Matter (PM10) and Total Suspended Particulate (TSP) from the RD180 Rocket Engine Tests at the NASA Marshall Space Flight Center
Hughes, J., Lockheed Martin Corp., USA; Lehr, K., Lockheed Martin Corp., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 10p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

The Sciences Laboratory operated by GB Tech was tasked by the Environmental Office at the NASA Marshall Space Flight Center (MSFC) to assess the impact of air particulate matter as a result of RD 180 engine testing. The method used for monitoring ambient air included measuring particles smaller than or equal to 10 microns (PM10), particles with diameters smaller than or equal to 2.5 microns (PM-2.5) and Total Suspended Particles (TSP) that have a diameter size of 25 to 50 microns. This particulate matter represents small 'dust like' particles of soot which are sufficiently small to disperse essentially like a permanent gas. Due to their small particle size, these particulates can be inhaled. The airborne concentrations are regulated and set by the EPA to prevent adverse effects associated with the inhalation of high levels of particulates. Dedicated samplers were used to collect the correct particle size from the ambient air. The samplers also maintained a controlled flow rate to determine the volume of air sampled. Particles were collected on microquartz or glass fiber filters that were equilibrated and weighed (tare) and after (gross) sampling to determine the weight (net mass) gain of the sample. The concentration of the particles captured from the air was then computed as the net mass collected by the volume of air sampled. This method provides a measurement of the mass concentration of airborne particulate matter for the determination of compliance with National Ambient Air Quality Standards.
Author
Particulates; Air Sampling; Weight (Mass); Environmental Monitoring

20010067314 NASA Marshall Space Flight Center, Huntsville, AL USA
Advanced Space Flight and Environmental Concerns
Whitaker, A., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 12p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

The aerospace industry has conquered numerous environmental challenges during the last decade. The aerospace industry of today has evolved due in part to the environmental challenges, becoming stronger, more robust, learning to push the limits of technology, materials and manufacturing, and performing cutting edge engineering.
Derived from text
Aerospace Industry; Environment Protection; Environmental Monitoring

20010067321 City of Huntsville, Div. of Natural Resources and Environmental Management, AL USA
Overview of the City of Huntsville Air Pollution Control Program
Shea, D., City of Huntsville, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The City of Huntsville implements one of the two local air pollution control programs in the State of Alabama. Program implementation responsibilities include monitoring of ambient air quality, issuance of pollution control permits, inspection of point sources of emissions, and enforcement of Federal, State, and local air pollution control regulations. This session provides a brief overview of the air pollution control program in Huntsville.
Author
Air Pollution; Air Quality; Pollution Control; Environmental Monitoring

20010067322 City of Huntsville, Div. of Natural Resources and Environmental Management, AL USA
Potential Effects on the Huntsville Ares of Revised National Ambient Air Quality Standards for Ozone and Fine Particulate Matter
Shea, D., City of Huntsville, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

In 1997, EPA promulgated a more stringent Federal ozone standard and a new standard for very small particulate matter (PM-2.5). Ozone concentrations in Huntsville over the past three years exceed the tighter ozone standard. Consequently, Huntsville and many other urban areas that are currently classified as ’attainment’ or ’clean air’ areas could be redesignated as ’non-attainment areas.’ (The US Supreme Court will hear the case challenging the standards in November 2000). The ramifications of non-attainment designation will be briefly discussed. Preliminary data on fine particulate concentrations in the Huntsville airshed will also be summarized.
Author
Air Quality; Atmospheric Composition; Particulates; Environmental Monitoring

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.

20010066103 Saint Louis Univ., Dept. of Earth and Atmospheric Sciences, MO USA
Propagation of Regional Phases and Their Codas in Southern Asia and the Middle East ***Final Report, 12 Jun. 1995 - 11 Jun 1997***
Cong, Lianli; Mitchell, Brian J.; Nov. 17, 1997; 64p; In English
Contract(s)/Grant(s): F19628-95-K-0004; AF Proj. DENN
Report No.(s): AD-A345543; PL-TR-97-2148; No Copyright; Avail: Defense Technical Information Center (DTIC)

Observed velocities and attenuation of fundamental-mode Rayleigh waves in the period range 7-82 sec were inverted for shear-wave velocity and shear-wave Q structure in the Middle East using a two-station method. Additional information on Q structure variation within each region was obtained by studying amplitude spectra of fundamental-mode and higher-mode Rayleigh waves. We obtained models for the Turkish and Iranian Plateaus (Region 1), areas surrounding and including the Black and Caspian - Seas (Region 2), and the Arabian Peninsula (Region 3). The effect of continent-ocean boundaries and mixed paths in Region 2 may lead to unrealistic features in the models obtained there. Shear velocities vary significantly in the uppermost 10 km of the crust, being 3.21, 2.85, and 3.39 km/s for Regions 1, 2, and 3, respectively. Q’s for the upper 10 km of the crust are 63, 71, and 201 for Regions 1, 2, and 3, respectively. Crustal Q’s at 30 km depth for the three regions are about 51, 71, and 134. The lower crustal Q values contrast sharply with results from stable continental regions where shear-wave Q may be as high as a thousand or more.
DTIC
Depth; Middle East; Plateaus; Rayleigh Waves; Seas

20010066163 Mentouri Univ., Constantine, Algeria

Using the Duration of Sunshine and METEOSAT VISSR Visible Images to Calculate the Ground Reflection Coefficient ***Utilisation de la Duree d'Ensoleillement et des Images Visibles du VISSR de Meteosat pour le Calcul du Coefficient de Reflexion du Sol***

Mokhnache, Ammar, Mentouri Univ., Algeria; Remote Sensing in the French Speaking Countries of the World: Critical Analysis and Outlook; 2000, pp. 405-411; In French; Reseau Teledetection, 22-25 Nov. 1999, Lausanne, Switzerland; Translated into English by SCITRAN, Inc.; ISBN 2-920021-92-3; Copyright; Avail: Issuing Activity

The signal measured by the METEOSAT VISSR visible sensor is disturbed by the presence of the atmosphere; it is attenuated either by absorption or by diffusion. The ground reflection coefficient is important for calculating the radiation balance at the ground-atmosphere interface and for studying changes in the status of the surface: desertification, for example. Aerosol scattering is characterized by Angstrom's Beta atmospheric disturbance coefficient. In this article, I propose a method for estimating Beta using the length of sunshine measured by the Campbell-Stokes sunshine recorder. We know that when the sky is clear, the decoloration of the card begins when the intensity of the sunlight reaches 120 w/sq.m, which corresponds to an angular Sun height of 5 deg. above the horizon. Knowing the time of sunrise measured by the sunshine recorder, we can calculate the optical thickness of the aerosols and then deduce the coefficient Beta. We used a series of images from the METEOSAT VISSR visible sensor to calculate the ground reflection coefficient corresponding to the three times 8:30 a.m., 11:30 a.m. and 2:30 p.m. UT for the months of May, June, August and September 1986. The test site is the region of Constantine (eastern Algeria) where we have a meteorological station. We obtained a Beta that varies from 0.04 for days of good visibility during the spring to 0.39 for hazy days in August. The ground reflection coefficient varies between 0.2 (covered ground) to 0.3 (bare ground). We also compared the optical thickness of aerosols calculated with the measurements of the meteorological station of Tamanraset.

Author

Aerosols; Reflectance; Sunlight; Attenuation Coefficients; Surface Properties; Earth Surface

20010066173 Sandia National Labs., Albuquerque, NM USA

Tectonic Setting and Characteristics of Natural Fractures in Mesaverde and Dakota Reservoirs of the San Juan Basin, New Mexico and Colorado

Lorenz, J. C.; Cooper, S. P.; Jan. 2001; 82p; In English; Original contains color illustrations

Report No.(s): PB2001-106100; SAND2001-0054; No Copyright; Avail: National Technical Information Service (NTIS)

A set of vertical extension fractures, striking N-S to NNE-SSW but with local variations, is present in both the outcrop and subsurface in both Mesaverde and Dakota sandstones. Additional sets of conjugate shear fractures have been recognized in outcrops of Dakota strata and may be present in the subsurface. However, the deformation bands prevalent locally in outcrops in parts of the basin as yet have no documented subsurface equivalent. The immature Mesaverde sandstones typically contain relatively long, irregular extension fractures, whereas the quartzitic Dakota sandstones contain short, sub-parallel, closely spaced, extension fractures, and locally conjugate shear planes as well. Outcrops typically display secondary cross fractures which are rare in the subsurface, although oblique fractures associated with local structures such as the Hogback monocline may be present in similar subsurface structures.

NTIS

Tectonics; Reservoirs; Fractures (Materials)

20010066190 Lamont-Doherty Geological Observatory, Palisades, NY USA

Seismic Sources in China and Korea ***Final Report***

Richards, Paul G.; Kim, Won-Yong; Feb. 1998; 71p; In English

Contract(s)/Grant(s): F49620-94-1-0057

Report No.(s): AD-A345547; AFRL-SR-BL-TR-98-0454; No Copyright; Avail: Defense Technical Information Center (DTIC)

This final report is in four parts, consisting of: (1) a five-page summary of Ph. D. thesis of Jinghua Shi entitled "Quantification of Earthquakes based on Improved Estimates of Energy using Regional Waves"; (2) an application of methods developed by this thesis, to estimate the spatial variability of seismic wave attenuation in Western China; (3) a description of an unusual swarm of seismic activity in Western China; and (4) a stand-alone paper entitled "Upper Mantle Structure beneath Western China studied with the Cross-Array in Kazakhstan".

DTIC

Earthquakes; Seismic Waves; Wave Attenuation

20010066199 Army Engineer Research and Development Center, Cold Regions Research and Engineering Lab., Hanover, NH USA

Delineating Playas in the Arid Southwest: A Literature Review

Brostoff, William, Army Engineer Research and Development Center, USA; Lichvar, Robert, Army Engineer Research and Development Center, USA; Sprecher, Steven, Army Engineer Research and Development Center, USA; Apr. 2001; 32p; In English

Report No.(s): AD-A389351; ERDC-TR-01-4; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Playas of the arid Southwest can be unambiguously identified in a geologic context. However, identifying those portions of playas that are defined as Waters of the USA (WoUS) in the Clean Water Act (CWA) and thus under the jurisdiction of the Corps of Engineers (Corps) and other Federal agencies charged with enforcing the CWA is sometimes problematic. While the WoUS definition specifically includes playas, the guidance for playa delineation is not as highly developed as for wetlands. Delineating WoUS, as per-formed by the Corps or by others to comply with Corps regulations, involves determining Ordinary High Water (OHW). However, under certain circumstances, the indicators provided in Federal regulations and available technical information for determining OHW have been found to be insufficient when applied to playas. Consequently, some delineations performed to date have involved the development of local indicators by integrating observational data obtained during cyclical inundation, information available for delineating wetlands, and inference based on technical knowledge. Examples of local indicators include small-scale cracks in the soil surface, soil algal crusts, and phreatophyte mounds. This report summarizes the pertinent literature and provides examples of case studies in delineating playas.

DTIC

Water; Deserts; Playas; Structural Basins

20010066362 Pennsylvania State Univ., Dept. of Geosciences, University Park, PA USA

Seismic Acoustic Ratio Estimates Using a Moving Vehicle Source

Greenfield, Roy; Moran, Mark; Aug. 1999; 14p; In English; Sponsored in part by Army Office for Mines, Countermines and Demolitions

Contract(s)/Grant(s): CEP97-511-1; PE62784/AT42; DACA989-98-K-0004

Report No.(s): AD-A389945; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Seismic and acoustic noise from moving tracked vehicles was used to determine the seismic to acoustic signal coupling ratio (SAR) in the ground. The seismic signal received on a geophone contains some energy that has propagated as seismic waves and some energy that couples from acoustic waves to seismic waves in the vicinity of the geophone. We use the frequency domain coherence between the microphone and geophone signals to determine when the seismic signal is predominantly due to acoustic to seismic wave coupling. In frequency bands where the microphone and geophone coherence is above 0.8 the ratio of the seismic ground particle velocity to sound pressure, SAR, can be determined with less than 2 dB of error. The method is applied to data from a summer experiment with grass ground cover and at two winter experiments with snow covered ground. At 100 Hz, the summer analysis yields a SAR of 1x10(exp -5) (M/S)/Pa. Also at 100 Hz, the two winter analyses yield SAR values of 0.1 and 1.0x10(exp -5) (M/S)/Pa. In the later result the SAR using blank pistol shots gives very close values. These results can be used to remove acoustic contamination from seismic signals. We also show a loose correlation between the SAR values and the shear strength of the ground.

DTIC

Seismology; Tracked Vehicles; Signal Transmission; Sound Waves; Acoustic Coupling

20010066589 Army Research Lab., Adelphi, MD USA

Performance of Classifier Architectures With the RNADS Feature Space

Wellman, Mark, Army Research Lab., USA; Jan. 1999; 11p; In English

Report No.(s): AD-A390190; No Copyright; Avail: Defense Technical Information Center (DTIC)

To evaluate the efficiency of the remote netted acoustic/seismic sensor array (RNADS) for classification, we must investigate the performance of various classification algorithms. Currently, the U.S. Army Research Laboratory (ARL) is developing an acoustic/seismic target classifier using a backpropagation neural network (BPNN) algorithm. Various techniques for extracting features have been evaluated to improve the confidence level and probability of correct identification (ID). For any given feature space, the BPNN creates complex boundaries in the hyperspace occupied by the feature vectors and only one hidden layer is required to create hyperplanes as decision boundaries; this, however, may not be the ideal classifier. Alternately, nonparametric and parametric classifier architectures are being investigated, since it is the mutual relationship between features and classifiers that allows the maximum recognition performance. Intuitively, we expect the BPNN to perform well, based on results from k-means analysis techniques. Using a hierarchical k-means analysis tool, we determined that only a few feature data clusters exist

for each class. These 'feature pockets' may comprise about 40 percent of the training data in some instances and, in fact, have been suggested to be useful in a minimum distance classifier or beneficial in learning vector quantization. The nonparametric classifier architectures make no assumption about the statistics of the feature space distribution and instead, rely on the data to estimate classification parameters. They have advantages when the features are created using nonlinear processes with highly non-Gaussian statistics and allow flexibility in the tradeoff of computation, memory, training, and testing.
DTIC
Neural Nets; Seismology; Algorithms; Acoustics

20010066659 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0199
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(04)-224-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on "Geospace". The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066660 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0193
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(03)-203-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on "Geospace". The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user

interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066661 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0189
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-176-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066662 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0176
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-113-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user

interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066663 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0172
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-110-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066664 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0192
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-166-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066665 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0188
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(12)-147-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066669 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0208
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(04)-233-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066670 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0207
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(04)-232-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066671 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0205
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(04)-230-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066672 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0204
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(04)-229-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066673 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0202
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(04)-227-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066674 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0200
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(04)-225-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066675 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0198
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(03)-208-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user

interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066676 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0197
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(03)-207-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066677 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0196
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(03)-206-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user

interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066678 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0195
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(03)-205-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066679 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0194
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(03)-204-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066680 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0192
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(03)-188-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066681 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0190
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-178-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066682 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0188
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-175-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066683 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0187
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-160-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user

interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066684 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0186
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-159-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066685 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0185
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-171-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066686 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0183
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-169-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066687 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0182
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-168-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066688 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0181
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-163-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066689 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0180
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(12)-149-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user

interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066690 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0179
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(11)-138-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066691 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0178
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(10)-124-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user

interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066692 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0177
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(10)-118-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066693 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0174
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-111-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066694 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0173
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(10)-119-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066695 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0200
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(03)-202-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066696 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0199
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(03)-201-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066697 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0198
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(03)-189-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066698 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0197
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-181-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066699 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0196
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-180-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066700 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0195
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-177-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066701 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0193
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-167-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066702 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0191
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-165-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066703 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0190
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-164-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066704 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0189
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(12)-148-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066705 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0186
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(12)-145-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066706 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0185
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(11)-137-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066707 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0184
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(10)-120-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066708 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0183
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-109-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066709 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0182
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(10)-117-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066718 NASA Goddard Space Flight Center, Greenbelt, MD USA
The Magnetospheric Constellation Mission Dynamic Response and Coupling Observatory (DRACO): Understanding the Global Dynamics of the Structured Magnetotail
May 2001; 52p; In English
Contract(s)/Grant(s): RTOP 460-00-00
Report No.(s): NASA/TM-2001-209985; Rept-2001-00790-0; NAS 1.15:209985; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Magnetospheric Constellation Dynamic Response and Coupling Observatory (DRACO) is the Solar Terrestrial Probe (STP) designed to understand the nonlinear dynamics, responses, and connections within the Earth's structured magnetotail, using a constellation of approximately 50 to 100 distributed vector measurement spacecraft. DRACO will reveal magnetotail processes operating within a domain extending 20 Earth radii (R(sub E)) across the tail and 40 R(sub E)down the tail, on spatial and time scales accessible to global circulation models, i.e., approximately 2 R(sub E) and 10 seconds.
Author
Geomagnetic Tail; Nanosatellites; Spacecraft Configurations

20010066722 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA USA
Trajectory Hunting: A Case Study of Rapid Chlorine Activation in December 1992 as Seen by UARS
Danilin, M. Y., Atmospheric and Environmental Research, Inc., USA; Santee, M. L., Jet Propulsion Lab., California Inst. of Tech., USA; Rodriguez, J. M., Miami Univ., USA; Ko, M. K. W., Atmospheric and Environmental Research, Inc., USA; Mergenthaler, J. M., Lockheed Martin Palo Alto Research Lab., USA; Kumer, J. B., Lockheed Martin Palo Alto Research Lab., USA; Tabazadeh, A., NASA Ames Research Center, USA; Livesey, N. J., Jet Propulsion Lab., California Inst. of Tech., USA; Journal of Geophysical Research; Feb. 16, 2000; ISSN 0148-0227; Volume 105, No. D3, pp. 4003-4018; In English; Original contains color illustrations
Contract(s)/Grant(s): NAS5-32844; NAS5-98131; NAS5-97039
Report No.(s): Paper-1999JD901054; Copyright; Avail: Issuing Activity

Trajectory hunting (i.e., a technique to find air parcels sampled at least twice over the course of a few days) is applied to analyze Upper Atmosphere Research Satellite (UARS) measurements in conjunction with the Atmospheric and Environmental Research, Inc. (AER) photochemical box model. As a case study, we investigate rapid chlorine activation in the Arctic lower stratosphere on December 29, 1992 associated with a polar stratospheric cloud (PSC) event. Eleven air parcels that have been sampled several times along five-day trajectories at the 465 K (approx. 46 hPa), 520 K (approx. 31 hPa), and 585 K (approx. 22 hPa) levels were investigated. For the first time, the latest versions of the Cryogenic Limb Array Etalon Spectrometer (CLAES, version 9) and Microwave Limb Sounder (MLS, version 5) data sets are analyzed, and their consistency is assessed. A detailed sensitivity study with the AER photochemical box model along these trajectories leads to the conclusion that for the December 24-29, 1992 episode: (1) the individual CLAES ClONO2 and MLS ClO measurements are self-consistent within their uncertainties; and (2) most of the time, UARS measurements of ClO, ClONO2, HNO3, and aerosol extinction at 780 cm(exp -1) agree within the range of their uncertainties with the model calculations. It appears that the HNO3 and aerosol extinction measurements for four parcels at 520 K look more supportive for the nitric acid trihydrate (NAT) scheme, However, the uncertainties in the individual UARS measurements and UK Meteorological Office temperature do not allow a definite discrimination between the NAT and supercooled ternary solution (STS) PSC schemes for this chlorine activation episode in December 1992.
Author
Chlorine; Air Sampling; Trajectory Analysis; Atmospheric Composition; Aerosols; Atmospheric Models; Stratosphere; Activation

20010066723 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0206
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space

Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2001(04)-231-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066724 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0191

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2001(01)-179-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066725 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0201

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2001(04)-226-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066726 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0184

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2001(01)-170-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066728 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0175

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space

Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-112-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066729 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0194
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(01)-161-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066730 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0187
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2000; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The

CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(12)-146-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066732 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0203
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(04)-228-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20010066844 NASA Goddard Space Flight Center, Greenbelt, MD USA
Sensitivity of Age-of-Air Calculations to the Choice of Advection Scheme
Eluszkiewicz, Janusz, Atmospheric and Environmental Research, Inc., USA; Hemler, Richard S., National Oceanic and Atmospheric Administration, USA; Mahlman, Jerry D., National Oceanic and Atmospheric Administration, USA; Bruhwiler, Lori, National Oceanic and Atmospheric Administration, USA; Takacs, Lawrence L., NASA Goddard Space Flight Center, USA; Journal of the Atmospheric Sciences; Oct. 01, 2000; Volume 57, No. 19, pp. 3185-3201; In English; Original contains color illustrations
Contract(s)/Grant(s): NAS5-97039; NAS5-98131; NSF ATM-97-14384; Copyright; Avail: Issuing Activity

The age of air has recently emerged as a diagnostic of atmospheric transport unaffected by chemical parameterizations, and the features in the age distributions computed in models have been interpreted in terms of the models’ large-scale circulation field.

This study shows, however, that in addition to the simulated large-scale circulation, three-dimensional age calculations can also be affected by the choice of advection scheme employed in solving the tracer continuity equation, Specifically, using the 3.0deg latitude X 3.6deg longitude and 40 vertical level version of the Geophysical Fluid Dynamics Laboratory SKYHI GCM and six online transport schemes ranging from Eulerian through semi-Lagrangian to fully Lagrangian, it will be demonstrated that the oldest ages are obtained using the nondiffusive centered-difference schemes while the youngest ages are computed with a semi-Lagrangian transport (SLT) scheme. The centered- difference schemes are capable of producing ages older than 10 years in the mesosphere, thus eliminating the ”young bias” found in previous age-of-air calculations. At this stage, only limited intuitive explanations can be advanced for this sensitivity of age-of-air calculations to the choice of advection scheme, In particular, age distributions computed online with the National Center for Atmospheric Research Community Climate Model (MACCM3) using different varieties of the SLT scheme are substantially older than the SKYHI SLT distribution. The different varieties, including a noninterpolating-in-the-vertical version (which is essentially centered-difference in the vertical), also produce a narrower range of age distributions than the suite of advection schemes employed in the SKYHI model. While additional MACCM3 experiments with a wider range of schemes would be necessary to provide more definitive insights, the older and less variable MACCM3 age distributions can plausibly be interpreted as being due to the semi-implicit semi-Lagrangian dynamics employed in the MACCM3. This type of dynamical core (employed with a 60-min time step) is likely to reduce SLT’s interpolation errors that are compounded by the short-term variability characteristic of the explicit centered-difference dynamics employed in the SKYHI model (time step of 3 min). In the extreme case of a very slowly varying circulation, the choice of advection scheme has no effect on two-dimensional (latitude-height) age-of-air calculations, owing to the smooth nature of the transport circulation in 2D models. These results suggest that nondiffusive schemes may be the preferred choice for multiyear simulations of tracers not overly sensitive to the requirement of monotonicity (this category includes many greenhouse gases). At the same time, age-of-air calculations offer a simple quantitative diagnostic of a scheme’s long-term diffusive properties and may help in the evaluation of dynamical cores in multiyear integrations. On the other hand, the sensitivity of the computed ages to the model numerics calls for caution in using age of air as a diagnostic of a GCM’s large-scale circulation field.
Author
Atmospheric Circulation; Lagrangian Function; Greenhouse Effect; Two Dimensional Models; Advection; Geophysics

20010066879 Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette France
Comparison of Search Templates for Gravitational Waves from Binary Inspiral
Damour, T.; Iyer, B. R.; Sathyaprakash, B. S.; Oct. 03, 2000; 20p; In English
Report No.(s): PB2001-105138; IHES/P/00/67; Copyright; Avail: National Technical Information Service (NTIS)
The authors compare the performances of the templates defined by three different types of approaches: traditional post-Newtonian templates (Taylor-approximates) ’resummed’ post-Newtonian templates assuming the adiabatic approximation and stopping before the plunge (P-approximate), and further ’resummed’ post-Newtonian templates going beyond the adiabatic approximation and incorporating the plunge with its transition from the inspiral (Effective-one-body approximants). The signal to noise ratio is significantly enhanced (mainly because of the inclusion of the plunge signal) by using these new effective-one-body templates relative to the usual post-Newtonian ones for binary masses greater than 30 M, the most likely sources for initial laser interferometers. Independently of the question of the plunge signal, the comparison of the various templates confirms the usefulness of using resummation methods. The paper also summarizes the key elements of the construction of various templates and thus can serve as a resource for those involved in writing inspiral search software.
NTIS
Gravitational Waves; Templates

20010067036 Bolt, Beranek, and Newman, Inc., Cambridge, MA USA
Recent Advances in the Prediction of Tracked Vehicle Seismic Signatures
Galaitsis, Anthony G., Bolt, Beranek, and Newman, Inc., USA; Coney, William B., Bolt, Beranek, and Newman, Inc., USA; Sep. 1999; 15p; In English
Report No.(s): AD-A389963; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy
Under this program, sponsored by the National Ground Intelligence Center (NGIC), BBN Technologies continued the development of a model for the prediction of the seismic signatures of foreign tracked vehicles initiated during an earlier phase. The signatures are estimated by combining the ground excitation forces predicted by the tracked vehicle dynamics model TRAXION 1-4 with the propagation transfer functions obtained from a Rayleigh wave model.
DTIC
Tracked Vehicles; Target Thickness; Signatures; Seismograms

47
METEOROLOGY AND CLIMATOLOGY

Includes weather observation forecasting and modification

20010066111 Wisconsin Univ., Space Science and Engineering Center, Madison, WI USA
Documenting, Understanding, and Predicting the Aggregate Surface Radiation Fluxes for SHEBA ***Final Report, 15 Jun. 1997 - 15 Jun. 2001***
Key, Jeffrey R., Wisconsin Univ., USA; Curry, Judith, Colorado Univ., USA; Evans, Frank; Pinto, James; Maslanik, James; Steffen, Konrad; Jul. 05, 2001; 13p; In English; Original contains color illustrations
Contract(s)/Grant(s): NAG5-8625; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This document serves as a final report for NASA grant NAG5-8625 to the University of Wisconsin-Madison (UW). The report covers work done at Boston University for the first two years of the project (as NAG5-4903) and the third and final year of the project at the University of Wisconsin (NAG5-8625). In 1999 the third year's funding and tasks were transferred to UW where the Principal Investigator (J. Key) is now stationed. A no-cost extension period of the grant ended on June 15, 2001. This is a group project with the University of Colorado (CU) as the lead institution, where Judith Curry is the Principal Investigator. The overall project is jointly funded by NASA and NSF. The progress reported herein is specific to Boston University and the University of Wisconsin.
Derived from text
Aggregates; Costs; Predictions; Radiative Transfer; Surface Properties; Flux (Rate)

20010066192 North Carolina State Univ., Dept. of Marine Earth and Atmospheric Sciences, Raleigh, NC USA
A New Theory for Diabatically-Induced Along-Stream Jet/Front Formation and Its Role in Severe Weather ***Final Report, 1 Mar. 1995 - 30 Apr. 1998***
Lin, Yuh-Lang; Kaplan, Michael L.; Koch, Steven E.; Apr. 30, 1998; 30p; In English
Contract(s)/Grant(s): F49620-95-1-0226
Report No.(s): AD-A345552; AFRL-SR-BL-TR-98-0453; No Copyright; Avail: Issuing Activity

During the course of this contract, a great deal of analysis, synthesis, and writing was undertaken in an effort to construct a general theory of how along-stream frontogenetical/jetogenesis processes create an environment conductive to severe convection. After performing numerous mesoscale simulation experiments for three different case studies, i.e., the 27-29 March 1984, 11-12 July 1981, and 27-28 Match 1994 case studies the patterns are coalescing which are apparent in all three case studies. These patterns indicate how mesoscale mutual mass/momentum adjustment processes organize along-stream jet/front systems and how said systems produce the vertical wind shear and instability necessary for severe convection. These patterns can be employed to construct a paradigm of how a hydrostatic environment conducive to severe weather eventually evolves over the central and eastern U. S. when synoptic scale jet streaks are juxtaposed over the Rocky Mountain west particularly, exclusively, during the spring and summer months.
DTIC
Coalescing; Convection; Hydrostatics; Mesoscale Phenomena; Momentum; Mountains

20010066314 Simpson Weather Associates, Inc., Charlottesville, VA USA
A Geosynchronous Lidar System for Atmospheric Winds and Moisture Measurements
Emmitt, G. D., Simpson Weather Associates, Inc., USA; [2001]; 3p; In English; International Geoscience and Remote Sensing Symposium, July 2001, Sydney, Australia; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

An observing system comprised of two lidars in geosynchronous orbit would enable the synoptic and meso-scale measurement of atmospheric winds and moisture, both of which are key first-order variables of the Earth's weather equation. Simultaneous measurement of these parameters at fast revisit rates promises large advancements in our weather prediction skills. Such capabilities would be unprecedented and yield greatly improved and finer resolution initial conditions for models, make existing costly and cumbersome measurement approaches obsolete, and obviate the use of numerical techniques needed to correct data obtained using present observing systems. Additionally, simultaneous synoptic wind and moisture observations would lead to improvements in model parameterizations, and in our knowledge of small-scale weather processes. Technology and science data product assessments are ongoing. Results will be presented during the conference.
Author
Weather Forecasting; Optical Radar; Satellite Imagery

20010066354 Mission Research Corp., Huntsville, AL USA

Combat Weather System Model Selection, *25 Jul. 1994 - 24 Jul. 1997*

Bauer, Bruce L.; Tremback, Craig J.; Myers, Thomas M.; Campbell, Theresa; Shorter, Jeffrey A.; Jul. 2000; 267p; In English
Contract(s)/Grant(s): DNA001-94-C-0096
Report No.(s): AD-A389148; MRC-HSV-97-R-003; DSWA-TR-97-66; No Copyright; Avail: CASI; A12, Hardcopy; A03, Microfiche

This report documents the effort to identify a candidate numerical weather prediction model, suitable for theater use, from currently available off-the-shelf mesoscale models. The candidate models were the Mesoscale Model Version 5 (MM5), the Navy Operational Regional Atmospheric Prediction System Version 6 (NORAPS6), and the Regional Atmospheric Modeling System (RAMS). The Air Force (AF) regional forecast model, the Relocatable Window Model (RWM) was the baseline against which the other models were evaluated. Based on the model comparison, DSWA chose to use RAMS to provide high resolution meteorological forecasts for its transport and diffusion program. The report also describes the subsequent adaptation and application of this model to actual field tests. This report is divided into three parts to document this process. Part 1 describes the model comparison. Part 2 describes our efforts to reduce the execution time required for a given forecast and enhance the forecast accuracy in complex terrain. Part 3 documents the use of RAMS during numerous field tests at White Sands Missile Range in Support of the transport and diffusion tests.

DTIC

Mathematical Models; Weather Forecasting; Atmospheric Models

20010066762 Meteorological Satellite Center, System Engineering Div., Kiyose, Japan

Operational GMS-5 VISSR Calibration

Tokuno, M., Meteorological Satellite Center, Japan; Kurihara, S., Meteorological Satellite Center, Japan; Kaido, Y., Meteorological Satellite Center, Japan; Meteorological Satellite Center Technical Note; 2001; ISSN 0388-9653, No. 39, pp. 13-32; In English; Copyright; Avail: Issuing Activity

We rewrote the paper ”The Status of Calibration of VISSR on board GMS-5” in English for users of GMS data in foreign countries. In addition, we reported on the development of a new method without calibration shutter information against the mat-functioning of the calibration shutter system, which occurred irregularly, corresponding to the utilization of GMS-5 over its lifetime. This paper describes the status of the calibration of VISSR on board GMS-5 and matters requiring attention when using the calibration data on the following subjects: (1) Techniques for calibrating visible and infrared channel data, (2) Correction of previously observed calibration tables of infrared channel data, (3) Care required and problems encountered on applying infrared channel calibration tables (including observations for satellite wind estimation) and S-VISSR fixed calibration tables operationally, (4) Doubt regarding the response function of the water vapor channel, (5) Long term trends of visible channel data. Finally, this paper shows that the new method without calibration shutter information is complete and provides nearly same accurate calibration data as with calibration shutter information.

Author

Calibrating; Visible Infrared Spin Scan Radiometer; Satellite-Borne Instruments; Meteorological Satellites

20010066770 Meteorological Satellite Center, Analysis Div., Kiyose, Japan

Cloud Motion Winds in Typhoon Vicinity Using Workstation

Mikawa, Tetsuya, Meteorological Satellite Center, Japan; Hsaegawa, Yohei, Japan Meteorological Agency, Japan; Kajino, Yoshiki, Meteorological Satellite Center, Japan; Okazaki, Kenji, Meteorological Satellite Center, Japan; Meteorological Satellite Center Technical Note; 2001; ISSN 0388-9653, No. 39, pp. 47-52; In Japanese; Copyright; Avail: Issuing Activity

High density low-level cloud motion winds are derived from GMS short interval (15 minutes) images in vicinity of only one typhoon in fully automatic procedure and are reported to users operationally. We rewrote the program that derives the cloud motion winds in order to calculate on a workstation. As a result, the calculation on a workstation made it possible to derive the winds in the case of two or more typhoons and to calculate upper-level cloud motion winds and water vapor motion winds.

Author

Typhoons; Water Vapor; Marine Meteorology; Wind (Meteorology); Clouds (Meteorology)

20010066772 Meteorological Satellite Center, Kiyose, Japan

An Estimation of the Accuracy of Sea Surface Temperature Derived from MTSAT Imager by Using the Simulation Data

Yasuda, Hiroaki, Meteorological Satellite Center, Japan; Meteorological Satellite Center Technical Note; 2001; ISSN 0388-9653, No. 39, pp. 1-11; In Japanese; Copyright; Avail: Issuing Activity

Some improvements were made in the MTSAT-1 Imager including: (1) addition of the 3.7 micron channel sensor, (2) enhanced brightness resolution (10 bits) of the infrared channels, (3) improvements in characteristics of split window channels by removing overlap from response functions of those channels. To investigate an impact of these improvements on sea surface temperature (SST), accuracy of the SST derived from the MTSAT-1 Imager is estimated by using a simulation data set. The simulation data set is derived using a radiative transfer model and numerical weather prediction data of JMA. As a result, it is found that the root mean square error (RMS) of SST derived from the MTSAT-1 decreases about 0.1K, compared with that of the GMS-5, by the improvement in characteristics of the split window channels. And, by using the enhanced brightness resolution (10bits) data of the infrared channels in the MTSAT-1 Imager, it is found that the RMS of SST derived from the MTSAT-1 decreases about 0.5K, compared with that of the GMS-5 data with 8 bits of information. by using the 3.7 p m channel data, it is found that the RMS of SST decreases about 0.16K, compared with that of SST derived from only 11 micron and 12 micron channels data. Thresholds of the split window channels test of the cloud screening are also determined by using the above simulation data set. As a result, it is expected that accuracy of cloud detection of the split window channels test is improved in the MTSAT-1 Imager. This is brought about by the improvement in characteristics of the split window channels. In the successor meteorological satellite, MTSAT-1R, same improvements as in the MTSAT-1, namely, addition of the 3.7 micron channel sensor and enhanced brightness resolution (10 bits) of the infrared channels, will be included. It is expected that the results, derived in this report, are qualitatively applied to the SST estimated from the MTSAT-1R Imager.
Author
Estimating; Numerical Weather Forecasting; Radiative Transfer; Sea Surface Temperature; Simulation

20010066795 Meteorological Satellite Center, Analysis Div., Kiyose, Japan
Features of Wet Tongue Observed on Water Vapor Imagery
Kazufumi, Suzuki, Meteorological Satellite Center, Japan; Meteorological Satellite Center Technical Note; 2001; ISSN 0388-9653, No. 39, pp. 53-65; In Japanese; Copyright; Avail: Issuing Activity

”Wet Tongue” appeared when heavy rain is observed as a long and slender bright area on the water vapor imagery. The bright area changes the shape to tongue-like pattern by ”sandwich effect”, as dark areas that are positioned on both sides of the bright area move to narrow the width of the bright area. The dark area on the north corresponds to the westerly trough and the dark area on the south corresponds to subtropical high. Vertical transport of water vapor by convective activity and horizontal convergence of water vapor by the ”sandwich effect” of dark area is important for the formation of wet tongue.
Author
Imagery; Shapes; Water Vapor; Low Pressure

20010067144 Universities Space Research Association, Huntsville, AL USA
The Impact on Simulated Storm Structure and Intensity of Variations in the Lifted Condensation Level and the Level of Free Convection
McCaul, Eugene W., Jr., Institute for Global Change Research and Education, USA; Cohen, Charles, Universities Space Research Association, USA; [2001]; 9p; In English; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The sensitivities of convective storm structure and intensity to changes in the altitudes of the prestorm environmental lifted condensation level and level of free convection axe studied using a full-physics three-dimensional cloud model. Matrices of simulations are conducted for a range of LCL=LFC altitudes, using a single moderately-sheared curved hodograph trace in conjunction with 1 convective available potential energy values of either 800 or 2000 J/kg, with the matrices consisting of all four combinations of two distinct choices of buoyancy and shear profile shape. For each value of CAPE, the LCL=LFC altitudes are also allowed to vary in a series of simulations based on the most highly compressed buoyancy and shear profiles for that CAPE, with the environmental buoyancy profile shape, subcloud equivalent potential temperature, subcloud lapse rates of temperature and moisture, and wind profile held fixed. For each CAPE, one final simulation is conducted using a near optimal LFC, but a lowered LCL, with a neutrally buoyant environmental thermal profile specified in between. Results show that, for the buoyancy-starved small-CAPE environments, the simulated storms are supercells and are generally largest and most intense when LCL=LFC altitudes lie in the approximate range 1.5-2.5 km above the surface. The simulations show similar trends for the shear-starved large-CAPE environments, except that conversion from supercell to multicell morphology frequently occurs when the LCL is high. For choices of LCL=LFC height within the optimal 1.5-2.5 km range, peak storm updraft overturning efficiency may approaches unity relative to parcel theory, while for lower LCL=LFC heights, overturning efficiency is reduced significantly. The enhancements of overturning efficiency and updraft diameter with increasing LFC height are shown to be the result of systematic increases in the mean equivalent potential temperature of the updraft at cloud base. For the shear-starved environments, the tendency for outflow dominance is eliminated, but a large overturning efficiency maintained, when a low LCL is used in conjunction with a high LFC. The result regarding outflow dominance at high LCL is consistent with expectations, but the

beneficial effect of a high LFC on convective overturning efficiency has not previously been widely recognized. The simulation findings here also appear to be consistent with statistics from previous severe storm environment climatologies, but provide a new framework for interpreting those statistics.
Author
Atmospheric Temperature; Buoyancy; Climatology; Altitude; Storms; Wind Profiles; Three Dimensional Models

20010067475 Naval Postgraduate School, Monterey, CA USA
Numerical Prediction of Marine Fog Using the Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS)
Dumas, John L.; Mar. 2001; 179p; In English; Original contains color plates
Report No.(s): AD-A390963; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

The U.S. Navy's requirement for a computer prediction system for marine fog and stratus dates back to the 1970s when meteorological models were being introduced to the fleet. The Naval Research Laboratory's Coupled Ocean/Atmosphere Mesoscale Prediction System (COAMPS) is a leap forward in the Navy's numerical modeling ability but it still does not show great skill in fog forecasting. COAMPS has been 'tuned', or adjusted for certain constants and parameterizations, so that it has the minimum error for the maximum area. This tuning is a common practice for all numerical models. The objective of this thesis is to determine if changes can be made to the existing COAMPS code based on reasonable physical experiments for a specific location to help solve the numerical fog forecasting problem. The effectiveness of these experiments was first measured by comparing a modeled cloud edge to satellite imagery of Monterey, California taken during a week in August 2000 under a variety of foggy conditions. Comparisons were also made with observations taken from an aircraft, land stations and a vertical profiler. The experiments, specifically those regarding changes to the autoconversion and turbulent kinetic energy schemes, showed that while a perfect solution has not been found, it is possible to modify the model physics codes and optimize its performance in a specific region.
DTIC
Marine Meteorology; Fog; Weather Forecasting; Prediction Analysis Techniques; Mesoscale Phenomena; Mesometeorology

20010067479 Massachusetts Univ., Dept. of Environmental, Earth, and Atmospheric Sciences, Lowell, MA USA
Calculated Half-widths and Line Shifts of Water Vapor Transitions in the 0.7- Micron Region and a Comparison with Published Data
Gamache, Robert R., Massachusetts Univ., USA; Fischer, Jonathan, Massachusetts Univ., USA; Journal of Molecular Spetroscopy; 2001; ISSN 0022-2852; Volume 207, pp. 254-262; In English
Contract(s)/Grant(s): NAG5-9611; NSF ATM-94-15454; Copyright; Avail: Issuing Activity

Pressure-broadened half-widths and pressure-induced line shifts for the two most important bands of water vapor in the 0.7-micron region are determined using the complex Robert-Bonamy (CRB) formalism. The calculations are made with nitrogen and oxygen as the perturbing gas from which values for air as the perturbing gas are determined. The intermolecular potential is taken as a sum of electrostatic contributions and Lennard-Jones (6-12) atom-atom, and isotropic induction and dispersion components. The dynamics of the collision process are correct to second order in time. The calculated values are compared with published measurements and agreement is observed for both half-widths and line shifts. The temperature dependence of the half-width, which is necessary for reduction of remotely sensed data, is determined.
Author
Water Vapor; Temperature Dependence; Lennard-Jones Potential; Potential Energy; Intermolecular Forces

20010067485 NASA Marshall Space Flight Center, Huntsville, AL USA
A Diagnostic Analysis of the Kennedy Space Center LDAR Network 2. Cross-Sensor Studies
Boccippio, D. J., NASA Marshall Space Flight Center, USA; Heckman, S., Universities Space Research Association, USA; Goodman, S. J., NASA Marshall Space Flight Center, USA; Journal of Geophysical Research; Mar. 16, 2001; ISSN 0148-0227; Volume 106, No. D5, pp. 4787-4796; In English
Contract(s)/Grant(s): NRA 97-MTPE-03
Report No.(s): Paper-2000JD900688; Copyright; Avail: Issuing Activity

Range dependencies in total (intracloud and cloud to ground) lightning observed by the Kennedy Space Center Lightning Detection and Ranging (LDAR) network are established through cross comparison with other lightning sensors. Using total lightning observed from space by the Lightning Imaging Sensor (LIS), MAR flash detection efficiency is shown to remain above 90% out to 90-100 km range, and to be below 25% at 200 km range. MAR VHF source location error distributions are also determined as a function of range and are found to be asymmetric with standard deviation increasing roughly as r 2 . Range normalization schemes for total VHF source density are tested and shown to yield significant improvements in correlation with

National Lightning Detection Network (NLDN) ground flash density at hourly, daily, monthly, and climatological timescales (up to 50% over uncorrected source densities using an exponential-in-range correction factor with 40-50 km e-folding scale).
Author
Rangefinding; Cloud-to-Ground Discharges; Imaging Techniques; Climatology

20010067512 SACLANT Undersea Research Centre, La Spezia, Italy
Effects of the Atmosphere and Sea-Surface Waves on Current and Temperature/Salinity Variations in a Shallow Water Environment
Di Iorio, Daniela; Bergem, Oddbjorn; Pace, Nicholas; Oct. 2000; 40p; In English; Original contains color plates
Report No.(s): AD-A389977; SACLANTCEN-SR-322; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

A shallow water experiment (d 10 m) was carried out to measure the contribution of wind, precipitation and sea surface wave effects on current, pressure and temperature/salinity variations. It is found that during heavy rainfall (precipitation exceeding 5 mm), there is a corresponding salinity decrease of approximately 1 psu at 5.8 m depth. Analysis of wind data shows that the cross-shore winds exhibit 24 h periodicity associated with land/sea breezes as a result of land cooling and heating. The 24 h periodicity of cross-shore winds is reflected in temperature and salinity variations leading to the conclusion that advection by wind is the primary cause of low frequency variations. Sea surface wave data show predominantly Mediterranean swell (mean period 4 5 and significant wave heights less than 1 m). During the passage of a storm, significant wave heights exceeded 3 m and so the theory of Stokes finite amplitude waves in conjunction with linear theory is used to model particle motion, pressure, temperature/salinity and sound speed variations. Observations and models are compared for six different days and conditions: a local storm event, a calm period, during the peak of a major storm, the post-storm stage, during swell-dominated seas and finally when the sea was calm again. The velocity field shows current oscillations characteristic of a wave boundary layer. The temperature/salinity and hence sound speed variations show that when the orbital particle motions are strong, there is a low frequency spectral power law 0f-(5/3 to the left of the surface wave peak and a high frequency spectral power attenuation of approximately f-3.5 to the right.
DTIC
Surface Waves; Acoustic Velocity; Atmospheric Effects; Boundary Layers; Ocean Surface; Shallow Water; Velocity Distribution; Marine Environments

48
OCEANOGRAPHY

Includes the physical, chemical and biological aspects of oceans and seas; ocean dynamics, and marine resources. For related information see also 43 Earth Resources and Remote Sensing.

20010066187 Army Engineer Waterways Experiment Station, Coastal Hydraulics Lab., Vicksburg, MS USA
Joint Wind Wave Height-Frequency-Direction Statistics at Two Disparate Sites *Final Report*
Long, Charles E.; May 1998; 109p; In English
Report No.(s): AD-A345315; WES/TR/CHL-98-10; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Joint probability functions associating wind wave characteristics height, spectral peak frequency, and mean wave direction at the peak frequency are estimated based on observations at two sites with distinctively different wave climates. One of the data sources is a directional wave gauge in approximately 8-m water depth 900 m offshore of the U.S. Army Engineer Waterways Experiment Station Coastal and Hydraulics Laboratory Field Research Facility on the northern Outer Banks of North Carolin& The other data source is a directional wave gauge mounted on the Texaco Oil Company production facility known as Harvest Platform located in about 200 m of water approximately 20 km west of Point Conception, California The objective is to provide a simple three-parameter statistical characterization of these two sites so that meaningful combinations of these parameters can be used with conventional coastal engineering analysis tools. In addition to three-parameter joint statistics, marginal distributions with wave height-frequency, and joint height-direction are also presented.
DTIC
Air Water Interactions; Measuring Instruments

20010066549 Washington Univ., School of Oceanography, Seattle, WA USA
Arabian Sea Dynamics ***Final Report, Oct. 1993-Sep. 2000***
Eriksen, Charles; May 22, 2001; 5p; In English
Contract(s)/Grant(s): N00014-94-1-0247
Report No.(s): AD-A390497; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The goal of this work has been to identify and understand the mechanisms which determine features of stratification and motion in the upper 200 m or so of mid-latitude oceans, the depth range over which surface fluxes of momentum and buoyancy have direct influence. Our interest is in the processes by which shear and stratification interact to change upper ocean structure.
DTIC
Stratification; Hydrodynamics; Arabian Sea; Buoyancy

20010067035 SACLANT Undersea Research Centre, La Spezia, Italy
Fusion Centre Operations for Maritime Rapid Environmental Assessment
Sellschopp, J., SACLANT Undersea Research Centre, Italy; Dec. 2000; 36p; In English; Original contains color plates
Report No.(s): AD-A389956; SACLANTCEN-SR-336; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

A capability for data fusion in rapid environmental assessment (REA) operations has been developed and practiced. The concept and the steps for its realization are described in enough detail to he used as a guide to similar exercises in the future. Examples are taken from Linked Seas 2000 data fusion, the most recent, most advanced and most complex data fusion activity for military oceanography. All functions of a data fusion centre are described, from data collection over data base organization, administration, maintenance, conversion, visualization and search to placement on one or more networks. Platform independent Internet technology is used with standard software for servers and clients. An html-version of this report is included on the SACLANTCEN CD-40 with active links to the respective examples.
DTIC
Data Bases; Data Acquisition; Multisensor Fusion; Oceanography

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.

20010066122 Arizona Univ., Tucson, AZ USA
Transcriptional Repression as a Mechanism of BRCA-1 Inactivation ***Final Report, 1 Aug. 1998-31 Jul. 2000***
Futscher, Bernard; Aug. 2000; 41p; In English
Contract(s)/Grant(s): DAMD17-98-1-8279
Report No.(s): AD-A389578; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The basic hypothesis of this project is that aberrant cytosine methylation of the BRCA-1 CpG island promoter is a mechanism of BRCA-1 gene inactivation in sporadic human breast cancer. to test this hypothesis, archived frozen human breast cancer specimens were analyzed. Quantitative RT/PCR analysis was used to determine BRCA-1 gene expression levels in breast cancer specimens and cytosine methylation status of the BRCA-1 CpG island promoter was determined using the high resolution bisulfite sequencing technique. We have analyzed 21 axillary node negative breast cancer specimens. Results show a greater than 2-fold decrease in BRCA-l mRNA levels in 4 of 2l breast cancer specimens (19%). Of these samples, the three with the lowest levels of BRCA-l expression also showed aberrant methylation of the BRCA-l core promoter (CpG island). Aberrant methylation of BRCA-l core promoter was not detected in any breast cancer samples that had less than 2-fold decrease in BRCA 1 expression. These results suggest that aberrant methylation of the BRCA-1 CpG island promoter is associated with down regulation of BRCA-l gene in a subset of human breast cancers, and that BRCA-1 methylation patterns may be useful as a biomarker of disease.
DTIC
Deactivation; Gene Expression; Mammary Glands; Cancer

20010066124 Baylor Coll. of Medicine, Houston, TX USA

Activation of Estrogen Receptor-Beta-Dependent Transcription by Estrogen-Independent Pathways ***Annual Report, 1 Sep. 1999-31 Aug. 2000***

Smith, Carolyn L.; Sep. 2000; 51p; In English

Contract(s)/Grant(s): DAMD17-98-1-8282

Report No.(s): AD-A389598; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

There are two known receptors for estrogens, ER alpha and ER beta. The existence of ER beta was only recently appreciated, and little is understood about its ability to be activated by intracellular signaling pathways in the absence of estrogens. The purpose of this research program is to characterize the ability of ER beta to by activated by various ligand-independent signaling pathways, and to characterize the structural regions of ER beta, in comparison to ER alpha, that regulate how this receptor isotype responds to intracellular crosstalk. We have found that stimulation of He La cells with forskolin and IBMX results in the activation of ER alpha and ER beta dependent expression in a receptor-dependent and promoter context-dependent manner, and that protein kinase A mediates this response. Factors that interact with an AP-1 binding site contribute to forskoliiv IBMX activation of estrogen receptor-dependent gene expression, and do so in a manner that does not require the A/B domain of either receptor. ER alpha and ER beta differ in their requirement for interaction with the putative AP-1 binding site factor. ER(3-mediated transcription is dependent on this site suggesting that forskolin activation reflects the synergistic action between ER beta and other transcription factor, while ER alpha can activate gene expression in a AP-1- independent manner.

DTIC

Estrogens; Receptors (Physiology); Gene Expression; Cancer; Mammary Glands

20010066127 California Univ., Davis, CA USA

Computer Simulation of Breast Cancer Screening ***Annual Report, 1 Jul. 1999-30 Jun. 2000***

Boone, John, California Univ., USA; Jul. 2000; 107p; In English

Contract(s)/Grant(s): DAMD17-98-1-8176

Report No.(s): AD-A389633; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Breast cancer screening has been shown to reduce breast cancer mortality, however the current protocols for screening (annual screens after age 40) are not optimized and do not appropriately accommodate the spectrum of breast cancer risk present in the screening population. Optimization studies using clinical trials are unrealistic because of cost, time, and ethical concerns. In this investigation, we are developing a computer model which allows a wide variety of breast cancer screening protocols to be studied in the computer simulation environment. The computer model incorporates a variety of data into various modules, including demographic, incidence, growth rate, detection, survival, and other sources of data from the literature. Once the computer model is validated against published clinical trial data, it can be used to predict the most efficient screening schedules for women in various categories of risk. The model currently focuses on mammography for breast cancer screening, but other screening procedures including alternative imaging methods (e.g. MRI, ultrasound, computed tomography) or serum-based tumor marker testing could be incorporated into the model. Progress towards building all modules has proceeded well and after additional validation analyses, the methods used will be ready for reporting in the scientific literature.

DTIC

Cancer; Computerized Simulation; Mammary Glands; Imaging Techniques

20010066128 McGill Univ., Montreal, Quebec Canada

The Influence of BRCA1 and BRCA2 Mutations on Prognosis in Breast Cancer Occuring in Ashkenazi Women: A Historical Cohort Approach ***Final Report, 1 Aug. 1998-31 Jul. 2000***

Foulkes, William, McGill Univ., Canada; Aug. 2000; 69p; In English

Contract(s)/Grant(s): DAMD17-98-1-8112

Report No.(s): AD-A389641; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

Using a historical approach, we studied the clinicopathological features of hereditary breast cancer (BC) and related this to the outcome following the BC diagnosis. We ascertained all self-reporting Ashkenazi Jewish (AJ) women diagnosed with primary invasive BC from 1980 to 1995. Diagnostic, treatment and follow-up information was extracted from the medical chart and the pathology blocks (PB) were re-examined by one pathologist. Slides were prepared for immunohistochemistry (IHC) and DNA extracted from the PB was used to look for the recurrent Ad mutations L85DELAG, 53S2insC (BRCAl) and 6174de1T (BRGA2) j . Of the 202 PB, 32 carried a mutation in BRCAl (24) or BRCA2 (8) . BRCAl was associated with high grade, ER- BC (P <.001).BRCA2+BCwereusuallyR+. Neither ERCAl nor BRCA2 were correlated with tumor size. BRCAl/2+ status was also correlated with p53 over- expression and p27 (kipl) under-expression by IHC, but not with HER2 status. A positive BRCAlX2 status was an independent poor prognostic marker in BC. In conclusion, ER CAl /2 mutations confer a specific phenotype on the

BC that occur and when combined, are an independent adverse prognostic marker for breast cancer in Ad women. Larger studies in other populations will be required to confirm our findings.
DTIC
Mammary Glands; Mutations; Cancer; Prognosis; Pathology

20010066129 Colorado Univ., Health Sciences Center, Denver, CO USA
Use of Intraductal Adenovins Transduction to Assess the Mammary Tumorigenic Potential of a Constitutively Active Prolactin Receptor ***Annual Report, 15 Sep. 1999 - 14 Sep. 2000***
Oct. 2000; 11p; In English; Original contains color plates
Contract(s)/Grant(s): DAMD17-98-1-8296
Report No.(s): AD-A389838; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

We have made good progress in establishing adenovirus transduction as a method for the short term alteration of gene expression in the mammary epithelium. Thus, detailed conditions for reasonably efficient transduction of the mammary epithelium of the late pregnant mouse have been worked out, transduction with adenovirus and expression of green fluorescent protein, GFP, have been shown not to interfere with the function of the mammary cells in which they are expressed. Transgenic technology has been used to evaluate the effects of an activated prolactin receptor, aPRLR, and an activated member of the prolactin signal transduction pathway, Akt, on the mammary epithelium. The latter has been shown to prolong mammary involution and preliminary results suggest it may enhance tumorigenesis. Some changes in direction are warranted: A functional proof of principle experiment utilizing expression of the cytoplasmic tail of the tight junction protein, ocoludin, is in progress. Adenovirus expressing Akt will be used with a mouse model of tumorigenesis, a mouse overexpressing the neu oncogene, to examine the question of whether adenovirus can be used to express genes that promote tumorigenesis.
DTIC
Mammary Glands; Gene Expression; Adenoviruses; Tumors; Clinical Medicine

20010066130 Hutchinson (Fred) Cancer Research Center, Seattle, WA USA
The p27Kipl Tumor Suppressor and Multi-Step Tumorigenesis ***Annual Report, 1 Aug. 1999 - 31 Jul. 2000***
Clurman, Bruce; Aug. 2000; 8p; In English
Contract(s)/Grant(s): DAMD17-98-1-8308
Report No.(s): AD-A389840; No Copyright; Avail: CASI; A01, Microfiche; A02, Hardcopy

The most common genetic alterations found in tumor cells are mutations in genes that regulate cell proliferation. We have recently discovered that p27Kipl, a protein that negatively regulates cell division, is a tumor suppressor gene and that its level of expression in human breast cancer is a powerful predictor of tumor aggression and patient mortality. This research proposal is designed to understand the role of p27 in tumorigenesis by combination of mouse models and immunostaining primary human breast cancer specimens to assess the p27/p130 interaction.
DTIC
Mammary Glands; Tumors; Suppressors; Mutations; Proteins; Clinical Medicine

20010066132 Washington Univ., Seattle, WA USA
Preclinical Evaluation of a Targeted Alpha-Emitting Radionuclide in Radiotherapy of Breast Cancer ***Final Report, 15 Aug. 1998 - 14 Aug. 2000***
Wilbur, Scott D.; Sep. 2000; 33p; In English
Contract(s)/Grant(s): DAMD17-98-1-8258
Report No.(s): AD-A390095; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The research effort was directed at evaluating reagents and conditions for targeting the alpha-emitting radionuclide Bi-213 to breast cancer. Initial studies used human tumor xenografts (MCF-7) in athymic mice to demonstrate tumor targeting and blood/tissue clearance. Other studies evaluated placing MCF-7 cells in a renal capsule to mimic a metastatic site. Seven biotin derivatives designed to carry Bi-213 were synthesized. Four of the derivatives were radiolabeled with In-111, Y-90, and Bi-213. The In-111 labeled derivatives were tested in vivo (athymic mice) to evaluate biodistribution and to demonstrate stability of radiolabel. One of the biotin derivatives, biotin-lysine-benzyl-CHX-A" (DTPA) appears to have properties that will allow its use in vivo. Another reagent, Bi-2l3 labeled succinylated streptavidin appears to be stable to in vivo demetallation, but does not appear to have a distribution that favors use in vivo. The antibody to be used in the studies, BrE3, was not provided as promised, but two other antibodies, L6 (Seattle Genetics) and NR-LU-10 (NeoRx Corp.), were kindly provided for study. Other studies included evaluation of tumor targeting with NR-LU-10-SAv conjugate or biotinylated NR-LU-10, and blood clearance with

biotinylated/glycosylated BSA or Starburst (Trademark) Dendrimer. Additional studies are required to optimize the conditions for use of the new reagents.
DTIC
Mammary Glands; Radiation Therapy; Clinical Medicine; Radioactive Isotopes; Alpha Particles

20010066133 Minnesota Univ., Minneapolis, MN USA
Biotherapy of Breast Cancer with EGF-Genistein ***Final Report, 16 Sep. 1996 - 15 Sep. 2000***
Gunther, Roland; Oct. 2000; 290p; In English
Contract(s)/Grant(s): DAMD17-96-C-6064
Report No.(s): AD-A390099; No Copyright; Avail: CASI; A13, Hardcopy; A03, Microfiche

The major goal of this research project was to optimize the conjugation procedures used in the preparation of the EGF-Gen conjugates in order to overcome the major limitations of this technology, including (1) instability of the conjugates; (2) presence of Gen-free modified EGF in the conjugate preparations; (3) slow kinetics of cell kill; and (4) low yield of intact conjugate. The research did not lead to a solution for any of the above listed problems/limitations of the technology. It is therefore unlikely that the Genistein conjugates of EGF will be clinically useful. We have explored the potential of EGF conjugates containing other more active inhibitors of the EGF tyrosine kinase. While these conjugates have not been tested in animal models of breast cancer during the term of this grant, they are unlikely to offer significant advantages over the unconjugated small molecule tyrosine kinase inhibitors.
DTIC
Mammary Glands; Cancer; Clinical Medicine; Chemotherapy

20010066138 Georgetown Univ., Washington, DC USA
Early Detection Based on Angiogenic Growth Factors in Nipple Aspirate Fluid (97breast) ***Annual Report, 1 Jul. 1999 - 30 Jun. 2000***
Trock, Bruce J.; Jul. 2000; 13p; In English
Contract(s)/Grant(s): DAMD17-98-1-8097
Report No.(s): AD-A389839; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

The objective of this proposal is to develop new methods of early breast cancer detection by identifying increases in angiogenic growth factor secretion in nipple aspirate fluid (NAF). Specifically, the study is examining FGF-2 (basic fibroblast growth factor) and VEGF (vascular endothelial growth factor), two of the most potent angiogenic molecules whose expression is thought to increase as an early event in breast carcinogenesis. by comparing levels of these growth factors in NAF samples from women from three groups, i.e. those with normal breasts, DCIS (ductal carcinoma in situ), and early invasive breast cancer, we will determine whether increases in either of these molecules heralds the transition to the pre-invasive and/or invasive phenotype. This report covers primarily patient accrual activities during the second year of the project. These activities include finalizing the clinical protocol for identifying, enrolling, and obtaining samples from women in the three groups, and implementing regular enrollment of subjects, and initial analysis of samples.
DTIC
Mammary Glands; Fibroblasts; Cardiovascular System; Clinical Medicine

20010066204 Dana Farber Cancer Inst., Boston, MA USA
Inhibition of Estrogen Receptor Action by the Orphan Receptors, SHP and DAX-1 ***Annual Report, 1 Sep. 1999-31 Aug. 2000***
Direnzo, James; Sep. 2000; 11p; In English
Contract(s)/Grant(s): DAMD17-99-1-9163
Report No.(s): AD-A389382; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The estrogen receptor (ER) is a critical diagnostic marker and therapeutic target for a large number of breast cancers. The elucidation of the mechanisms by which ER controls the growth of certain breast cancers may provide new targets of intervention that would disrupt estrogen signaling in hormone-dependent breast cancers. SHP and Dax-l are members of the nuclear receptor superfamily of ligand activated transcription factors that have been shown to interact with other nuclear receptors in a hormone dependent manner. In support of grant number DAMD17-99-l-9l63 the findings presented here describe interactions between ER and DAX-l and also ER and SHP. These interactions have been determined to be both direct and hormone-dependent. Functional studies of this interaction indicate that both DAX-l and SHP act as negative regulators of ER signaling. Mutational analysis has identified regions in the amino-terminus of SHP and DAX-l that are required for the interaction with ER. These analyses have demonstrate that subtle variations of a leucine-rich motif LXXLL, found within SHP and DAX-1 mediate the interaction. These

studies suggest that SHP and DAX may act as negative regulators of ER signaling that may compete with the p160 coactivators and help to recruit co-repressors.
DTIC
Estrogens; Receptors (Physiology); Cancer; Mammary Glands

20010066211 Whitehead Inst. for Biomedical Research, Cambridge, MA USA
Regulation of TGF-Beta Signal Transduction Pathways in Breast Cancer Cells ***Annual Report, 4 May 1999 - 3 May 2000***
Liu, Xuedong, Whitehead Inst. for Biomedical Research, USA; Jun. 2000; 69p; In English; Original contains color plates
Contract(s)/Grant(s): DAMD17-98-1-8267
Report No.(s): AD-A389313; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

My research goal under BCRP fellowship was to address the fundamental mechanism of TGF-beta signaling both in normal cell and cancer cells and its possible relevance to breast cancer development. Seven papers have been published or submitted during the grant period including three first-author publications. I have been involved in characterizing key signaling components (Smad3 and TFE3) and studied their function in normal TGF-beta signaling in epithelial cells. Using various experimental approaches, I discovered two distinct mechanisms by which TGF-beta signaling is altered in cancer cells. Firs, I discovered a novel mechanism by which ski oncoprotein abrogates TGF-beta signaling. Second, I found activation of Ras oncogene could disrupt TGF-beta signaling by sequestration of tumor suppressor p27 in the cytoplasm preventing its association with cdk2/cyclin E complexes. Finally, I have developed very powerful expression cloning strategies for isolating novel intracellular signal transduction proteins that mediate the pathway(s) by which TGF-beta regulates cell growth and gene expression.
DTIC
Cancer; Cell Division; Genetics; Mammary Glands; Deoxyribonucleic Acid; Cells (Biology); Genetic Engineering

20010066293 Georgetown Univ., Washington, DC USA
Characterization of a B-Catenin-Associated Kinase ***Annual Report, 1 Aug. 1999 - 31 Jul. 2000***
Byers, Stephen; Orford, Keith; Aug. 2000; 20p; In English
Contract(s)/Grant(s): DAMD17-97-1-7327
Report No.(s): AD-A389329; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In the past 12 months we investigated the ability of IKK to regulate beta-catenin signaling activity. We found that IKK exists in a complex with beta-catenin and that expression of either IKK(alpha) or IKK(beta) can decrease Beta-catenin signaling. However, only a dominant negative (DN) IKK(alpha) mutant increased beta-catenin signaling as well as protein levels. In addition, DN IKK(alpha), but not DN IKK(beta), inhibited the ability of APC to decrease beta-catenin signaling. These results suggest that the IKK proteins are involved in beta-catenin regulation.
DTIC
Beta Particles; Proteins; Mutations; Amino Acids; Cells (Biology); Phosphorus

20010066298 Texas Univ., M. D. Anderson Cancer Center, Houston, TX USA
Treatment of Metastatic Breast Carcinoma Refractory to Doxorubicin with Liposomal-Annamycin ***Annual Report, 23 Sep. 1999 - 22 Sep. 2000***
Sahin, Aysegul A.; Oct. 2000; 6p; In English
Contract(s)/Grant(s): DAMD17-96-C-6105
Report No.(s): AD-A389581; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We studied the toxicity and antitumor activity of Liposomal/Annamycin in patients with metastatic breast carcinoma. Sixteen patients have been treated. Toxicity was mild and consisted mostly of bone marrow suppression, particularly granulocytopenia. Non hermatological toxicity was less than what is usually seen with other anthracyclines. No responses have been seen. The study is continuing accruing a total of 12 additional less heavily retreated patients
DTIC
Toxicity; Mammary Glands; Cancer; Tolerances (Physiology); Drugs

20010066300 American Type Culture Collection, Manassas, VA USA
Receptor Monoclonal Antibodies that Inhibit Tumor Angiogenesis ***Annual Report, 1 Aug. 1999 - 31 Jul. 2000***
Sato, J. D.; Aug. 2000; 30p; In English
Contract(s)/Grant(s): DAMD17-98-1-8348
Report No.(s): AD-A389599; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The survival and growth of solid tumors is dependent on the neo-vascularization of the growing tumor mass. Prior to the vascularization of a tumor, a subpopulation of tumor cells acquire an angiogenic phenotype characterized by the production of polypeptide growth factors that stimulate endothelial cell proliferation, migration and differentiation. by activating cell surface receptor molecules, these tumor-derived angiogenic factors induce the growth of blood vessels into the tumor from pre-existing blood vessels. Thus, the process of tumor angiogenesis represents an attractive target for the development of new cancer therapeutic agents. We are characterizing the signaling pathways utilized by vascular endothelial growth factor (VEGF), an angiogenic factor that is widely expressed by breast tumors, and we are generating neutralizing monoclonal antibodies to receptor molecules for VEGF. We will test the antibodies for the ability to block VEGF-induced endothelial cell proliferation and capillary growth in vitro.
DTIC
Cancer; Mammary Glands; Antibodies; Cells (Biology); Regeneration (Physiology); Tumors

20010066357 Stanford Univ., Stanford, CA USA
Identification of Estrogen Responsive Genes and Their Role in Breast Cancer ***Annual Report, 1 Oct. 1999 - 30 Sep. 2000***
Ghosh, Malavika G.; Oct. 2000; 54p; In English
Contract(s)/Grant(s): DAMD17-99-1-9384
Report No.(s): AD-A389304; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche
The research proposed in this grant proposal is based on the hypothesis that the involvement of estrogen in breast cancer proliferation and progression may be due to its selective regulation of a repertoire of genes by acting through ER and ER related factors. The experiments described and the results presented in this report address Task #1, Task #2a and Task #3a and 3b of this US Army Grant DAMD17-99-1-9384. Results from additional experiments performed in order to reinforce the hypotheses presented in the research proposal have also been included.
DTIC
Cancer; Estrogens; Mammary Glands

20010066360 Hutchinson (Fred) Cancer Research Center, Seattle, WA USA
The Regulation of Human Cyclin E Protein Levels by the Ubiquitin Proteolytic Pathway ***Annual Report, 1 Sep. 1999 - 31 Aug. 2000***
Stinger, Jeffrey D.; Roberta, James M.; Sep. 2000; 15p; In English
Contract(s)/Grant(s): DAMD17-98-1-8085
Report No.(s): AD-A389602; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Cyclins are proteins that both activate cyclin-dependent kinases, enzymes that put phosphate groups on proteins, and impart some degree of substrate specificity to these kinases. Although very little is known about what these substrates are, it is clear that the regulation of levels of cyclins is crucial for cell cycle progression, that is cell growth. The human cyclin E protein has been shown to be required for the O1/S transition, a crucial regulatory step in mammalian cells that determines if a tumor can form. Cyclin E protein levels have been shown to cycle as the cell cycle progresses. The goal of this work was to identify the components that are responsible for the regulation of the cyclin E protein levels. Such regulation has many important implications for the study of cell cycle progression and thus the onset of tumorigenesis which is an example of uncontrolled cell cycle progression. The result of this work was the identification of a protein in mammalian cells that is responsible for removing cyclin E from cells by directing its degradation. Thus understanding the regulation of this novel protein may lead to insights into how tumors can form in mammals.
DTIC
Cancer; Cell Division; Enzymes; Tumors

20010066497 Connecticut Univ., Dept. of Biochemistry, Farmington, CT USA
Characterization of Spores of Bacillus Subtilis Which Lack Dipicolinic Acid
Paidhungat, Madan, Connecticut Univ., USA; Setlow, Barbara, Connecticut Univ., USA; Driks, Adam, Loyola Univ. Chicago, USA; Setlow, Peter, Connecticut Univ., USA; Journal of Bacteriology; October 2000; ISSN 0021-9193, pp. 5505-5512; In English
Contract(s)/Grant(s): DAAD19-99-1-0327; NIH-GM-19698
Report No.(s): AD-A386701; ARO-40150.1-LS; Copyright; Avail: Defense Technical Information Center (DTIC)
Spores of Bacillus subtilis with a mutation in spoVF cannot synthesize dipicolinic acid (DPA) and are too unstable to be purified and studied in detail. However, the spores of a strain lacking the three major germinant receptors (termed delta-ger3), as well as spoVF, can be isolated, although they spontaneously germinate much more readily than delta-ger3 spores. The delta-ger3 spoVF spores lack DPA and have higher levels of core water than delta-ger3 spores, although sporulation with DPA

restores close to normal levels of DPA and core water to delta-ger3 spoVF spores. The DPA-less spores have normal cortical and coat layers, as observed with an electron microscope, but their core region appears to be more hydrated than that of spores with dPA. The delta-ger3 spoVF spores also contain minimal levels of the processed active form (termed P(sub 41)) of the germination protease, GPR, a finding consistent with the known requirement for DPA an dehydration for GPR autoprocessing. However, any P(sub 41) formed in delta-ger3 spoVF spores may at least transiently active on one of the protease's small acid-soluble spore protein (SASP) substrates, SASP-gamma. Analysis of the resistance of wild-type, delta-ger3, and delta-ger3 spoVF spores to various agents led to the following conclusions: (1) DPA and core water content play no role in spore resistance to dry heat, dessications, or glutaraldehyde; (2) an elevated core water content is associated with decreased spore resistance to wet heat, hydrogen peroxide, formaldehyde, and the iodine-based disinfectant Betadine; (3) the absence of DPA increases spore resistance to UV radiation; and (4) wild-type spores are more resistant than delta-ger3 spores to Betadine and glutaraldehyde. These results are discussed in view of current models of spore resistance and spore germination.
Author
Protease; Spores; Germination; Moisture Content

20010066536 Canadian Commercial Corp., Ottawa, Ontario Canada
Preparation of a Burkholderia Mallei Vaccine ***Final Report, 15 Dec. 1997-14 Dec. 2000***
Woods, Donald E., Canadian Commercial Corp., Canada; Jan. 2001; 57p; In English
Contract(s)/Grant(s): DAMD17-98-C-8003
Report No.(s): AD-A390664; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy
Glanders, caused by Burkholderia mallei, is a significant disease for humans due to the serious nature of the infection. It is recognized that B. mallei is an organism with tremendous infectivity that poses a significant hazard to humans exposed to aerosols containing this organism. Our knowledge of the pathogenesis of disease due to B. mallei is lacking. At present, no effective vaccines are available against this organism, and information on the treatment of this organism with antibiotic therapy is also not available. The basic studies that we are performing on the pathogenesis of disease due to B. mallei are acutely needed, and the information gained from these studies will provide a knowledge base that is required to rationally design new modes of therapy directed against this organism. The long-term objective of our research is to define at a molecular level the pathogenesis of disease due to B. mallei and to develop immunoprotective vaccines against these organisms for use in humans.
DTIC
Infectious Diseases; Vaccines; Diseases

20010066552 Georgetown Univ., Washington, DC USA
Molecular Epidemiology of Breast Cancer; Development and Validation of Acetylation Methods for Carcinogen-DNA Adduct Detection ***Annual Report, 30 Sep. 1999-29 Sep. 2000***
Shields, Peter G.; Oct. 2000; 31p; In English
Contract(s)/Grant(s): DAMD17-99-1-9309
Report No.(s): AD-A390380; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Molecular epidemiology can elucidate new breast cancer risk factors and gene environment interactions relating to both hormonal and non-hormonal carcinogenic mechanisms. Corroborative epidemiological studies of intermediate biomarkers of carcinogenesis and laboratory studies demonstrating functional importance of the epidemiology findings are needed. The study of carcinogen-DNA adducts can provide corroborative evidence for the importance of genetic susceptibilities in breast cancer risk. We are establishing new assays for the detection of carcinogen-DNA adducts, use it for the first time in humans, and rigorously validate it to prove its utility for human breast tissue analysis in epidemiological studies, and determine adduct levels in relation to metabolizing gene polymorphisms. The assays are novel because one uses a new chemical postlabeling method and quantitates adducts by accelerator mass spectroscopy (an ultrasensitive C14 detection unit). The second uses capillary HPLC and laser-induced fluorescence. Once validated, we will learn the variability for DNA adduct levels in the population as it relates to age, gender, race, and smoking in breast tissues from 235 donors (200 women, 35 men). We also will develop breast strains from normal donors, determine in vitro adduct formation levels and correlate these levels with p53 induction. Thus, this study will provide new information about genotype-phenotype relationships.
DTIC
Deoxyribonucleic Acid; Carcinogens; Chemical Analysis; Genetics; Epidemiology; Cancer

20010066562 Connecticut Univ., Dept. of Biochemistry, Farmington, CT USA
Effects of Major Spore-Specific DNA Binding Proteins on Bacillus subtilis Sporulation and Spore Properties
Setlow, Barbara, Connecticut Univ., USA; McGinnis, Kelly A., Connecticut Univ., USA; Ragkousi, Katerina, Connecticut Univ.,

USA; Setlow, Peter, Connecticut Univ., USA; Journal of Bacteriology; Dec. 2000; ISSN 0021-9193, pp. 6906-6912; In English
Contract(s)/Grant(s): DAAD19-99-1-0327; NIH-GM-19698
Report No.(s): AD-A386721; ARO-40150.3-LS; Copyright; Avail: Defense Technical Information Center (DTIC)

Sporulation of a Bacillus subtilis strain (termed alpha(-)beta(-)) lacking the majority of the alpha/beta-type small, acid-soluble spore proteins (SASP) that are synthesized in the developing forespore and saturate spore DNA exhibited a number of differences from that of the wild-type strain, including delayed forespore accumulation of dipicolinic acid, overexpression of forespore-specific genes, and delayed expression of at least one mother cell-specific gene turned on late in sporulation, although genes turned on earlier in the mother cell were expressed normally in alpha(-)beta(-) strains. The sporulation defects in alpha(-)beta(-) strains were corrected by synthesis of chromosome-saturating levels of either of two wild-type, alpha/beta-type SASP but not by a mutant SASP that binds DNA poorly. Spores from alpha(-)beta(-) strains also exhibited less glutaraldehyde resistance and slower outgrowth than did wild-type spores, but at least some of these defects in alpha(-)beta(-) spores were abolished by the synthesis of normal levels of alpha/beta-type SASP. These results indicate that alpha/beta-type SASP may well have global effects on gene expression during sporulation and spore outgrowth.
Author
Spores; Proteins; Bacteria; Defects

20010066564 Connecticut Univ., Dept. of Biochemistry, Farmington, CT USA
Resistance of Bacillus Endospores to Extreme Terrestrial and Extraterrestrial Environments
Nicholson, Wayne L., Arizona Univ., USA; Munakata, Nobuo, National Cancer Center Research Inst., Japan; Horneck, Gerda, Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Germany; Melosh, Henry J., Arizona Univ., USA; Setlow, Peter, Connecticut Univ., USA; Microbiology and Macrobiology Reviews; September 2000; ISSN 1092-2172, pp. 548-572; In English; Sponsored in part by American Cancer Society and Arizona Agricultural Experimental Station
Contract(s)/Grant(s): NIH-GM-47461; NIH-GM-19698; JFRA-410; DAAD19-99-1-0327
Report No.(s): AD-A386700; ARO-40150.2-LS; Copyright; Avail: Defense Technical Information Center (DTIC)

Because of their notorious resistance and longevity, bacterial spores have also been studied as possible candidates for transfer of life between the planets as a result of impact processes. The natural processes by which spores could be transported through interplanetary space would expose them to an entirely new set of environmental stresses, including extreme shock, acceleration, vacuum, and bombardment by UV and ionizing radiation as well as heavy high-energy atomic (HZE) particles. In this review, we will attempt for the first time to summarize recent advances in our understanding of how bacterial spores resist inactivation by stresses imposed by both terrestrial and extraterrestrial environments and to explore how the current laboratory models of spore resistance can serve as important intellectual scaffolds from which we can construct new environmental spore resistance models.
Derived from text
Interplanetary Space; Spores; Extraterrestrial Environments

20010066570 Mount Sinai Medical Center, New York, NY USA
Novel Technology for Cloning Prostate Cancer Cell Merkers ***Annual Report, 1 Aug. 1999-31 Jan. 2001***
Bancroft, F. C.; Feb. 2001; 12p; In English
Contract(s)/Grant(s): DAMD17-98-1-8531
Report No.(s): AD-A390379; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Purpose of project is to clone, isolate and characterize protein markers specifically expressed by advanced stage, androgen-independent prostate cancers. Two types of markers with this specificity are targeted: proteins secreted specifically by advanced stage prostate cancer cells, potentially useful in serum-based assays for these tumors; markers expressed specifically on the surface of these cells, potentially useful as advanced prostate cancer. Work during the period covered included: (1) Incorporation of the powerful new DNA Microarray Technology into the project, and its use to investigate differential gene expression in the LNCaP series of human cell lines, representing different stages of prostate cancer. (2) Studies demonstrating potential utility but insufficient purity of membrane fraction (MF) prepared from these cells; and use of an alternative fractionation scheme, successful only with the most advanced cells (C4-2B) . We plan to complete the studies under (1), to identify genes regulated during prostate cancer progression; and to use cDNA to the C4-2B MF RNA to probe DNA microarrays, to identify genes
DTIC
Ribonucleic Acids; Deoxyribonucleic Acid; Cells; Cloning (Biology); Prostate Gland; Gene Expression; Cancer

20010066574 Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM USA

Role of Respirable Saudi Arabian Sand and Pyridostigmine in the Gulf War Syndrome: An Autoimmune Adjuvant Disease? ***Annual Report, 10 Feb. 2000 - 10 Feb. 2001***

Sopori, Mohan L.; Mar. 2001; 10p; In English

Contract(s)/Grant(s): DAMD17-00-1-0073

Report No.(s): AD-A390337; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We postulated that the Gulf War syndrome (GWS) might result from an aberrant immunological response by susceptible individuals to the environmental factors in the Persian Gulf, i.e., inhalation of the sand rich in silica, exposure to mycobacterium, and response to the anti-nerve gas agent, pyridostigmine bromide (PB), leading to an autoimmune-like disease. to evaluate this possibility we proposed to develop a rat model for autoimmune adjuvant disease (AAD) using Mycobacterium Smegmatis (M. Smegmatis). The development of AAD was to be ascertained by the serum levels of alpha-2 macroglobulin and inflammation of paws. After establishing the dose of M. smegmatis sufficient to induce a moderate AAD response, the effects of silica inhalation +/- PB on AAD response were to be determined. So far, we have completed the following tasks: (1) grown M. smegmatis and extracted and its antigenic material; (2) standardized the assay for alpha-2-macroglobulin; and (3) determined that subcutaneously administered PB does not affect the immune response. Rats are scheduled for silica inhalation starting on March 19, 2001.

DTIC

Respiration; Exposure; Sands

20010066577 Naval Postgraduate School, Monterey, CA USA

Using On-Line Analytical Processing (OLAP) and Data Mining to Estimate Emergency Room Activity in DoD Medical Treatment Facilities in the Tricare Central Region

Ferguson, Cary V.; Mar. 2001; 118p; In English

Report No.(s): AD-A390326; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

On-line Analytical Processing (OLAP) and data mining can greatly enhance the ability of the Military Medical Treatment Facility (MTF) emergency room (ER) manager to improve ER staffing and utilization. MTF ER managers use statistical data analysis to help manage the efficient operation and use of ERs. As the size and complexity of databases increase, traditional statistical analysis becomes limited in the amount and type of information it can extract. OLAP tools enable the analysis of multi-dimensional data, which can give the user access to previously undiscovered information. Data mining has the capability to break large sets of data down into groups by classifications, associations, and clusterings to transform previously meaningless data into useful information. This research presents a brief overview of the DoD medical system, OLAP, and data mining. OLAP and data mining tools then analyze a data set containing two years of MTF ER data from the TRICARE Central Region. The results of these analyses provide insight on the predictive ca abilities, advantages, and disadvantages of applying OLAP and data mining to MTF ER data.

DTIC

Data Mining; Data Bases; Medical Services

20010066583 Spire Corp., Bedford, MA USA

Thin Film CdZnTe Detector Arrays for Digital Mammography ***Final Report, 26 Sep. 1996-25 Dec. 2000***

Kalkhoran, Nader M., Spire Corp., USA; Jan. 2001; 65p; In English

Contract(s)/Grant(s): DAMD17-96-C-6086

Report No.(s): AD-A390199; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

The objective of this program was to develop large-area, flat-panel detectors for digital mammography using CdTe or CdZnTe deposited by metalorganic chemical vapor deposition (MOCVD) directly on thin-film transistor (TFT) active matrix arrays for image readout. CdTe and CdZnTe have the potential to meet the requirements for digital mammography due to their high x-ray absorption, large bandgap and good carrier transport. After four years of intensive work, we were able to deposit the key detector film on crystalline silicon multiplexors and TFT arrays, maintaining the integrity of underlying electronics in both cases and proving the possibility of the proposed technology. Unfortunately, CdZnTe thin films were never realized with electrical properties equal to bulk grown CdZnTe, and functioning detectors could not be obtained.

DTIC

Cadmium Tellurides; Thin Films; Digital Techniques; Zinc Tellurides

20010066584 California Univ., San Francisco, CA USA

Real-Time Full Field Direct Digital Telemammography ***Final Report, 16 Sep. 1996-15 Sep. 2000***

Sickles, Edward A., California Univ., USA; Oct. 2000; 52p; In English

Contract(s)/Grant(s): DAMD17-96-C-6111

Report No.(s): AD-A390197; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

This research investigates an important application of full-field direct digital mammography (FFDDM): telemammography, the electronic transfer of digital mammography images to remote viewing sites. This should permit radiologists with great interpretive expertise to manage and read in real time all mammography examinations in a multiple-site practice, an approach that is theoretically superior to either deferred interpretation by expert readers or real-time interpretation by general radiologists. We have acquired a large data set of FFDDM cases, demonstrated that the time involved in data transmission and off-site image interpretation is shorter than the corresponding time for on-site image processing and interpretation of conventional film mammograms, and shown that remote interpretation of FFDDM images by expert mammographers is somewhat more effective than conventional film interpretation by general diagnostic radiologists (statistical significance demonstrated, but follow-up of non-biopsied cases not yet sufficiently long to reach a firm conclusion). By showing that telemammography technology can be developed for routine clinical operation, and that real-time off-site management and interpretation of a general-radiologist mammography practice by mammography specialists is feasible as standard operating procedure, we expect to establish telemammography applications of digital radiography as both valid and useful. The application of these procedures to routine mammographic examinations should bring to bear the expertise of mammography specialists at the community-practice general-radiologist level. This should benefit all women undergoing mammography in the future.

DTIC

Radiography; Image Processing; Digital Systems; Real Time Operation

20010066585 Vanderbilt Univ. Hospital, Nashville, TN USA

Temporal Control of Transforming Growth Factor (TGF): Beta1 Expression on Mammary Cell Multistep Transformation ***Annual Report, 1 Oct. 1999-30 Sep. 2000***

Dumont, Nancy, Vanderbilt Univ. Hospital, USA; Arteaga, C. L., Vanderbilt Univ. Hospital, USA; Oct. 2000; 39p; In English

Contract(s)/Grant(s): DAMD17-98-1-8263

Report No.(s): AD-A390196; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

The transforming growth factor (TGF) betas are multifunctional polypeptide growth factors which potently inhibit the proliferation of mammary epithelial cells. There is evidence that autocrine TGF-beta signaling promotes mammary carcinogenesis. There is also evidence that tumor cell TGF-betas are involved in tumor maintenance and progression by promoting epithelial to mesenchymal transition of epithelial cancer cells, and by modulating tumor-host interactions that are critical for cancer cell survival. The objective of this proposal is to generate a transgenic breast tumor model in which the mammary epithelial expression of TGF-beta 1 can be temporally regulated to understand the role of this molecule in progressive sequential stages of mammary neoplasia. In addition, by expressing a dominant negative type II TGF-beta (dnT-betaRII) in MDA-23l human breast cancer cells, we will determine whether blocking autocrine TGF-beta in these cells affects their invasive metastatic phenotype in vitro and in vivo. Results to date indicate that the basal migratory potential of dnT-betaRII expressing cells is impaired, suggesting that their invasive phenotype may indeed be affected by blocking autocrine TGF-beta signaling.

DTIC

Cells (Biology); Mammary Glands; Epithelium; Polypeptides

20010066586 Texas Univ., M. D. Anderson Cancer Center, Houston, TX USA

Tumor Specific Regulation of C-CAM Cell Adhesion Molecule in Prostate Cancer Carcinogenesis ***Annual Report, 1 Aug. 1999-31 Jul. 2000***

Lin, Sue-Hwa, Texas Univ., USA; Aug. 2000; 38p; In English

Contract(s)/Grant(s): DAMD17-98-1-8465

Report No.(s): AD-A390193; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

C-CAM is an epithelial cell adhesion molecule. We have shown that loss of C-CAM is an early event in prostate cancer development and re-introduction of C-CAM into prostate cancer cells could inhibit their tumorigenic potential. These results indicate that C-CAM is a tumor suppressor. The mechanism of C-CAM down-regulation in tumorigenesis is not clear. Our hypothesis is that transcriptional down-regulation instead of deletion of C-CAM gene is the major cause. We propose to identify mechanisms that regulate C-CAM gene expression in prostate carcinogenesis. We have identified that AP-2 is a transcriptional activator of C-CAM and thus is a potential regulator of C-CAM expression during tumorigenesis. In addition, we have developed a novel in vivo functional screening method to identify new transcription factors that regulate C-CAM gene expression during

prostate carcinogenesis. Preliminary study has identified several candidate genes and we are in the process of confirming their effects on C-CAM expression. Our reviewer suggested that we pursue regulation of C-CAM gene expression by steroid hormones. We have incorporated androgen regulation in our study and have made significant progress in this effort. A manuscript is under submission. Results from this study will allow us to understand C-CAM gene regulation during tumorigenesis.
DTIC
Carcinogens; Prostate Gland; Genetics; Cells (Biology)

20010066588 California Univ., San Francisco, CA USA
Improving the Specificity of High Resolution Breast MRI by Optimizing Data Acquisition and Diagnostic Models ***Annual Report, 1 Sep. 1998-31 Aug. 2000***
Partridge, Savannah C., California Univ., USA; Sep. 2000; 25p; In English
Contract(s)/Grant(s): DAMD17-98-1-8191
Report No.(s): AD-A390191; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Magnetic resonance imaging (MRI) techniques have the potential to greatly improve breast cancer detection, diagnosis, and treatment. The purpose of this study was to develop new diagnostic criteria for improved characterization of breast tissue using MRI. A high-resolution, three time-point, contrast-enhanced MR technique was optimized for image quality, breast coverage, and time efficiency, and over 200 patients were imaged prior to undergoing surgery. Several models incorporating the dynamic enhancement response of the breast tissue were proposed and the diagnostic value of each was tested against pathology results. One of the best performing models was the signal enhancement ratio (SER), which compared early to late enhancement behavior in the tissue. SER values successfully differentiated between benign and malignant tissue (p less than 0.05), and showed promising results for quantifying tumor aggressiveness. Additionally, the diagnostic value of diffusion-weighted MRI of the breast was investigated. Diffusion-weighted images were acquired using a newly developed technique, and apparent diffusion coefficients (ADC) were calculated in the breast tissue of volunteers. Mean ADC values were found to be significantly different (p less than 0.01) for tumor, normal tissue and cysts measured in the breast. The optimized models are now being evaluated for detecting neoadjuvant treatment response in breast tumors, and may be capable of detecting changes much earlier than current clinical methods.
DTIC
Diagnosis; High Resolution; Imaging Techniques; Magnetic Resonance

20010066779 Boston Univ., School of Medicine, Boston, MA USA
Alpha Synuclein Aggregation in a Neurotoxic Model of Parkinson's Disease ***Annual Report, 1 Aug. 1999 - 31 Jul. 2000***
Kowall, Neil W.; Aug. 2000; 20p; In English
Contract(s)/Grant(s): DAMD17-99-1-9540
Report No.(s): AD-A390311; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The cause of Parkinson's disease (PD) is not known but the pattern of neurodegeneration found in PD can be replicated in some animals species, including primates and mice, by the systemic administration of the neurotoxin 1-methyl-4-phenyl-tetrahydropyridine (MPTP) MPTP inhibits mitochondrial oxidative phosphorylation and causes oxidative injury leading to cell death. Neurons that degenerate in PD develop characteristic inclusions called Lewy bodies that are composed of aggregates of a synaptic protein, alpha synuclein. The purpose of this study is to determine how MPTP affects cytoskeletal and synaptic proteins and to study the relationship between oxidative damage and the formation of synuclein aggregates within neurons. In the first year of this three-year funding period, we have shown that MPTP treated primates and mice develop synuclein aggregates in neurons that are degenerating in the substantia nigra. Degenerating neurons were identified using tyrosine hydroxylase and dopamine transporter immunocytochemistry. The neurodegenerative process is associated with increased levels of oxidative markers for DNA, protein and lipids as indicated by immunocytochemistry for B-hydroxydeoxyguanosine, 3-nitrotyrosine and malondialdehyde respectively. Over the next 2 years, we plan to study the time course of these changes and precisely define the cytoskeletal and synaptic changes associated with synuclein aggregate formation.
DTIC
Aggregates; Parkinson Disease; Neurons; Toxicity

20010066781 University of Southern California, Los Angeles, CA USA
Assessment of mdm2 Alterations on p53 Expression in Breast Cancer ***Annual Report, 23 Mar. 1999-22 Sep. 2000***
Gao, Da-Qing; Press, Michael F.; Oct. 2000; 29p; In English
Contract(s)/Grant(s): DAMD17-98-1-8241
Report No.(s): AD-A390402; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Mdm2 is part of a complex mechanism that regulates the expression of p53 tumor suppressor. mdm2 mRNA expression was characterized in a cohort of invasive breast cancers and normal breast specimens. Mdm2 reverse-transcription polymerase chain reaction (RT-PCR) products included full-length mdm2 (1526 bp) as well as smaller products (653, 281, 254 and 219 bp). The 653 bp product was an alternatively spliced product, while the 281, 254, and 219-bp mdm2 products were aberrantly spliced. RT-PCR with normal breast RNA samples yielded only the 1526 bp product and a small amount of the 653 bp product. The 653 bp alternatively spliced product was expressed at increased levels in 21% of breast cancers and the smaller aberrantly spliced mRNA products (281 bp, 254 bp and/or 219 bp) were expressed in another 16% of breast cancers. The alternatively spliced mRNAs and aberrantly spliced mRNAs lacked either the entire binding domain for p53 or the majority of the binding domain. An association was demonstrated between expression of aberrantly and/or alternatively spliced mdm2 mRNAs and a lack of progesterone receptor, or the presence of p53 tumor suppressor gene mutations. The presence of aberrant expression products of mdm2 in breast cancer specimens was correlated with a shortened overall patient survival.
DTIC
Cancer; Mammary Glands; Females; Tumors

20010066782 California Univ., San Francisco, CA USA
Development of Anti-VEGF Receptor/Flk-1 Immunoliposomes for Cytotoxic Anti-Angiogenesis Therapy ***Annual Report, 1 Oct. 1999-30 Sep. 2000***
Park, John W., California Univ., USA; Oct. 2000; 28p; In English; Original contains color plates
Contract(s)/Grant(s): DAMD17-98-1-8288
Report No.(s): AD-A390405; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We hypothesized that tumor-associated endothelium can be targeted with chemotherapy-loaded immunoliposomes (ILs) directed against VEGF Receptor 2 (VEGFR2, F1K- 1, KDR). VEGFR2 is the primary receptor for VEGF-mediated tumor angiogenesis, and as a cell surface receptor on endothelial cells provides a highly accessible target for immunoliposome therapy. Accordingly, we have developed anti-VEGFR2 ILs to deliver highly potent chemotherapeutics to VEGFR2- expressing endothelial cells for cytotoxic antiangiogenic treatment. Cloned anti-VEGFR2 scFv 4G7 sequences were expressed in E. coli, and purified scFv containing a C-terminal cysteine residue were conjugated to liposomes using three different strategies.
DTIC
Cancer; Mammary Glands; Chemotherapy; Escherichia; Tumors

20010066784 Howard Univ., Washington, DC USA
Growth Inhibition of Breast Tumor Cells by Hypodense and Normodense EOSinophilic Cell Lines ***Annual Report, 15 Jun. 1999-14 Jun. 2000***
Furbert-Harris, Paulette, Howard Univ., USA; Jul. 2000; 47p; In English; Original contains color plates
Contract(s)/Grant(s): DAMD17-98-1-8107
Report No.(s): AD-A390407; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

These studies were based on the hypothesis that activated eosinophils release substances (mediators) that inhibit the growth of breast tumor cells in vitro. Cultured supernatants (24hr, 48hr and 72hr) from eosinophil cell lines were examined for growth inhibition of MCF-7 and MDA-MB- 231 breast tumor cell colony formation. Serial 2-fold dilutions (1:2, 1:4 and 1:8) inhibited both MCF-7 and MDA-MB-23 1 colony formation in vitro. The time of harvesting of the supernatants affected their inhibitory capacity 72hr> 48hr> 24hr. Prior testing of eosinophil conditioned media revealed the presence of IL-4, and current examination revealed the presence of TNF alpha(less than 40mig/ml). When exogenous cytokines were used, TNF alpha potently inhibited colony formation of MCF-7, while IL-3, IL-4, IL-S were marginal in their activity (10-35%) inhibitory activity.
DTIC
Cancer; Mammary Glands; Growth; Tumors; EOSinophils

20010066785 Utah Univ., Salt Lake City, UT USA
Individual Strategies for Breast Cancer Surveillance Based on Aggregated Familial Information ***Annual Report, 1 Jan. 2000-31 Dec. 2000***
Yakovlev, Andrei Y., Utah Univ., USA; Jan. 2001; 83p; In English
Contract(s)/Grant(s): DAMD17-98-1-8256
Report No.(s): AD-A390408; No Copyright; Avail: CASI; A01, Microfiche; A05, Hardcopy

The problem of optimal cancer surveillance is set up as a search for optimal scheduling of medical examinations throughout the lifetime of an individual. Optimal surveillance scheduling strategies allowing for risk variables may be used to further increase the efficacy of breast cancer early detection. to accomplish the general and specific aims of this project, we plan to proceed as

follows: (1) develop and implement computer programs for estimating the hazard functions from data on breast cancer incidence; (2) conduct analysis of real data and select significant prognostic variables for a large cohort of women identified through the Utah Population Data Base and the Utah Cancer Registry; (3) construct optimal schedules of breast cancer surveillance and evaluate their potential for enhancing the efficacy of breast cancer detection. This annual report is concerned with estimation of the hazard function and other characteristics of the natural history of breast cancer from epidemiological data.
DTIC
Cancer; Detection; Females; Mammary Glands; Physical Examinations

20010066787 Cambridge Univ., Cambridge, UK
Characterization of Two C. Elegans Homologuses of Oncogenic Inhibitor of Apoptosis Proteins (IAPs) and Identification of Interacting Genes *Annual Report*
Fraser, Andrew; Ahringer, Julie; Sep. 2000; 52p; In English
Contract(s)/Grant(s): DAMD17-99-1-9135
Report No.(s): AD-A390410; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Inhibitor of Apoptosis Proteins (IAPs) suppress apoptosis both in the fruit fly Drosophila melanogaster and in vertebrates. All IAPs contain at least a single copy of a highly conserved domain, the Baculovirus IAP Repeat (BIR) domain; this is essential for their anti-apoptotic activity. Understanding how a BIR domain regulates apoptosis is thus an important step in furthering our understanding of the molecular mechanisms of apoptosis. I have previously identified two BIR-containing Proteins (BIRPs) in the nematode worm C. elegans. One of these, BIR-l, appears to play no role in the regulation of programmed cell death in C. elegans; however, BIR-l is required for the completion of cytokinesis. Cytokinesis is a complex process that is likely to be highly regulated and to involve a large number of proteins. My approach to understanding how BIR-l functions in cytokinesis has been to try to identify other genes that are also required for cytokinesis in C. elegans and subsequently to attempt to understand how BIR-l relates to this machinery. Rather than examine individual candidate genes to determine whether they have a role in cytokinesis, I wished to carry out a genome-wide screen to identify all genes that are required for cytokinesis; to do this I have made use of RNA-mediated inhibition (RNAi). RNAi is a technique whereby the activity of a particular gene is transiently inhibited following the introduction of dsRNA of sequence specific to the targeted gene. The specificity and potency of RNAi make it an ideal technique to investigate gene function beginning only with genomic sequence. I have screened 90% of genes on Chromosome I of C. elegans for RNAi phenotypes and have identified S genes which have a similar RNAi phenotype to BIR-l. I aim to extend this to approach over the entire genome in the coming year and thence to spend time characterizing genes found to be required for cytokinesis.
DTIC
Proteins; Cancer; Apoptosis; Carcinogens; Genes; Tumors

20010066868 NASA Ames Research Center, Moffett Field, CA USA
Balanced Branching in Transcription Termination
Harrington, K. J., Stanford Univ., USA; Laughlin, R. B., Stanford Univ., USA; Liang, S., NASA Ames Research Center, USA; PNAS Early Edition; [2000], pp. 1-6; In English
Contract(s)/Grant(s): NCC2-794; Copyright; Avail: Issuing Activity

The theory of stochastic transcription termination based on free-energy competition [von Hippel, P. H. & YAGer, T. D. (1992) Science 255,809-812 and van Hippel, P. H. & YAGer, T. D. (1991) Proc. Natl. Acad. Sci. USA 88, 2307-2311] requires two or more reaction rates to be delicately balanced over a wide range of physical conditions. A large body of work on glasses and large molecules suggests that this balancing should be impossible in such a large system in the absence of a new organizing principle of matter. We review the experimental literature of termination and find no evidence for such a principle, but do find many troubling Inconsistencies, most notably, anomalous memory effects. These effects suggest that termination has a deterministic component and may conceivably not be stochastic at all. We find that a key experiment by Wilson and von Hippel [Wilson, K. S. & von Hippel, P. H. (1994) J. Mol. Biol. 244,36-51] thought to demonstrate stochastic termination was an incorrectly analyzed regulatory effect of Mg(2+) binding.
Author
Stochastic Processes; Free Energy; Reaction Kinetics

20010066878 Albany Medical Coll., NY USA

Development of an Array for Prostate Cancer Based on Methylation Status of Glutathione S-Transferase-Pi ***Annual Report, 1 Mar. 1999 - 28 Feb. 2000***

Ross, Jeffrey S., Albany Medical Coll., USA; March 2000; 33p; In English

Contract(s)/Grant(s): DAMD17-99-1-9016

Report No.(s): AD-A387638; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Glutathiaone-s-transferase (GST)-pi gene is frequently methylated in prostate cancer and recent evidence has linked aberrant expression of this gene with the development of prostatic adenocarcinomas (PACs). The main purpose of this study is to evaluate GST-pi protein expression by immunohistochemistry (IHC) and develop a simple DNA amplification assay for detection of GST-pi methylation status. Two hundred twenty cases including 180 PACs and 20 cases each of normal and benign hyperplastic tissues were identified. Protein expression was evaluated on 4-micrometer paraffin sections in all cases using a polyclonal rabbit antihuman GST-pi antibody by an automated method. Methylation status was assessed in 24 cases including 18 PACs and six benign tissues using the 466/468 primer pair by a gel based PCR amplification method. One hundred seventy-five of 180 PACs demonstrated loss of GST-pi protein expression in comparison to the presence of this protein in 100% of benign tissues including normal and BPH specimens. Seven of 18 cases of PACs and one of six benign tissues demonstrated methylated GST-pi promoter DNA. Given that the overwhelming majority of PACs lacked GST-pi protein expression, no correlation was found with any prognostic variables. In conclusion, GST-pi protein is downregulated in almost all prostate cancers and is associated with methylation of the promoter region of the gene. Further studies are warranted to evaluate the utility of the GST-pi methylation assay in screening and diagnosis of prostate cancer.

Author

Assaying; Cancer; Methyl Compounds; Prostate Gland; Proteins

20010066933 Beth Israel Deaconess Medical Center, Boston, MA USA

Investigating the Use of the Prostate-Specific Membrane Antigen as a Receptor for Retroviral Gene-Transfer Agents ***Annual Report, 1 Jul. 1999 - 30 Jun. 2000***

Pandori, Mark; Jul. 2000; 9p; In English

Contract(s)/Grant(s): DAMD17-99-1-9510

Report No.(s): AD-A390139; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The goal of this proposal is to attempt a novel strategy for the use of viruses in the delivery of anti-cancer genes to prostate cancer cells. Current methods involving the use of viruses to deliver therapeutic genes for the treatment of any disease are hindered by the inability to target viral agents specifically to diseased tissue or organs. Recently, a protein marker has been characterized on the surface of prostate cancer cells. This marker, called the prostate-specific membrane antigen (PSMA), is readily detectable on prostate cancer cells from a large percentage of patients with prostate cancer. The abundance of this marker on cancerous prostate cells allows such cells to be detected and discriminated from both normal prostate cells and the cells of other bodily tissues. We have sought to analyze the possibility of utilizing the PSMA on the surface of prostate cancer cells as a way to target viral gene therapy agents specifically to tumors of the prostate.

DTIC

Antigens; Cancer; Genes; Membranes; Prostate Gland; Cells (Biology); Receptors (Physiology)

20010066974 Arkansas Univ., Dept. of Physics, Fayetteville, AR USA

Nonlinear Optical Properties of Bacteriorhodopsin ***Final Report, 1 Jun. 1996 - 1 May 1999***

Salamo, Gregory J.; Jun. 1999; 13p; In English

Contract(s)/Grant(s): DAAH04-96-1-0251

Report No.(s): AD-A390133; ARO-35840.1-RT-AAS; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We demonstrated for the first time a saturable polarization rotation in Bacteriorhodopsin that acts as an effective optical limiter. Using a multiple pass scheme and cross polarizes we achieved a ninety degree polarization rotation of a probe beam and a corresponding optical density of 10(exp -4).

DTIC

Bacteria; Optical Properties; Photoreceptors; Nonlinear Systems

20010066976 Duke Univ., Medical Center, Durham, NC USA

The Essential Role of Protein Phosphatase-1 in Mitogenic Signalling and Breast Cancer ***Annual Report, 1 Jul. 1999 - 30 Jun. 2000***

Oliver, Carey, Duke Univ., USA; Shenoliker, Shirish, Duke Univ., USA; July 2000; 18p; In English

Contract(s)/Grant(s): DAMD17-98-1-8075

Report No.(s): AD-A387640; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Organization of the actin cytoskeleton is crucial for a diverse set of cell functions including cell division, intracellular signaling, cell shape, and motility. Cancerous cells demonstrate changes in cell adhesion and growth consistent with altered regulation of the actin cytoskeleton. Our research has focused on the regulation of protein phosphorylation, specifically signals mediated by protein phosphatase 1 (PP1), a serine/threonine phosphatase, in these processes. Current work is focused on a class of regulatory subunits, neurabin 1 and neurabin 2, that direct PP1 to the actin cytoskeleton. Neurabin 1 and neurabin 2 were cloned from rat tissue either as PP1 or F-actin binding proteins and contain multiple domains. We have cloned homologues of these proteins from Xenopus laevis and C. elegans. The high degree of structural homology from worms to mammals in specific domains, such as the PP1 binding domain and the PDZ domain, begin to highlight regions most likely to be important for the in vivo function of these proteins in these diverse species. GFP-tagged constructs of full length neruabin 1 transfected into HEK-293 cells show that the full-length protein localizes to the actin cytoskeleton. A C-terminal truncation of the coiled-coil and PDZ domains also localized neurabin 1 to the actin cytoskeleton and causes cells for form filopodia-like extensions. However, an N-terminal deletion, which deletes the actin binding domain, localizes the protein to the cytosol. These experiments indicate that mislocalization of neurabin can cause rearrangement of the actin cytoskeleton. We have also begun to study the in vivo phosphorylation of neurabin 1. The C-terminal truncated protein failed to get phosphorylated in cells suggesting a link between its covalent modification and subcellular localization. Future study will define the molecular basis of neurabin localization, phosphorylation, and the regulation of the actin cytoskeleton, as well as the potential role of the neurabin-PP1 complex in cytoskeletal dynamics.

Author

Cancer; Proteins; Phosphorylation

20010066977 Columbia Univ., New York, NY USA

Effect of Green Tea Polyphenols on Breast Cancer Signaling ***Final Report, 1 Apr. 1998 - 30 Apr. 2000***

Cobrinik, David, Columbia Univ., USA; April 2000; 37p; In English

Contract(s)/Grant(s): DAMD17-98-1-8051

Report No.(s): AD-A387639; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

This project aimed to define the effects of green tea polyphenols (GTPs) on cell signaling pathways and on mammary tumorigenesis in MMTV/c-neu transgenic mice. The studies showed that the major polyphenol in green tea, EGCG, did not impair erbB-2 tyrosine phosphorylation or EGF-dependent activation of MAP kinase in transformed or untransformed MCF10A cells, and that orally administered green tea or GTPs did not inhibit mammary tumorigenesis. Subsequent studies focused on the mechanism by which EGCG inhibits mammary epithelial cell cycle progression. EGCG inhibited S phase entry in epidermal growth factor (EGF)-stimulated MCF10A breast epithelial cells when provided in G0 or mid G1, but not when provided after the late G1 restriction point. EGCG induced p21 inhibited cyclin D1-associated pRB kinase activity, increased the association of p21 with cyclin D1, and impaired pRB phosphorylation. EGCG induced p21 expression at the mRNA level. In addition, the ability of EGCG to induce p21 depended on the addition of EGF, indicating that EGCG synergizes with growth factor-dependent signals. While these findings provide a mechanism by which polyphenolic compounds may inhibit proliferation, their relevance to breast cancer tumorigenesis in MMTV/c-neu transgenic mice.

Author

Cancer; Enzyme Activity; Mammary Glands; Phenols

20010066978 Baylor Coll. of Medicine, Houston, TX USA

The Molecular Basis of the Response to Radiation ***Annual Report, 1 Jul. 1999 - 30 Jun. 2000***

Plon, Sharon, Baylor Coll. of Medicine, USA; July 2000; 18p; In English

Contract(s)/Grant(s): DAMD17-97-1-7284

Report No.(s): AD-A387637; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

In the third year of this CDA Award we have continued to make progress towards all three Technical Objectives. The most challenging problem is the isolation of the novel cDNAs encoding human homologs of yeast DNA damage response genes. Major efforts to isolate cDNAs for RAD9 and DUN1 during the previous year have not been successful. In contrast, two hybrid screens have resulted in the isolation of human homologs of RAD18 and RAD 21. Thus, the focus over year three has been the

characterization of the human Rad21 protein in mammalian cells. We found alterations in expression of human Rad21 mRNA and protein in human breast cancer cell lines. This has lead to development of immunohistochemistry techniques to now expand this research to human breast cancer samples. In Technical Objective 3 we did not see alteration in RAD21 mRNA or Rad21 protein phosphorylation in human cells exposed to DNA damage. However, we found that induction of the apoptotic pathway (as opposed to DNA damage itself) induces specific cleavage of the human Rad21 cohesion protein. This cleavage product may play a role in signaling subsequent events in apoptosis or result in aneuploidy in cells that survive the apoptotic response.
Author
Cancer; Cells (Biology); Damage; Deoxyribonucleic Acid; Mammary Glands; Proteins

20010067034 Ben Gurion Univ. of the Negev, Beersheva, Israel
Bioanalytical Sensors, Biochips and Nanobiotechnologies
Marks, Robert; Cosnier, Serge; Dec. 2000; 82p; In English; In French; 2nd; France-Israel Workshop, 11-16 Dec. 2000, Grenoble, France; Original contains color plates; Meeting sponsord in part by Ministry of Science, Culture and Sport, Israel
Contract(s)/Grant(s): N68171-00-M-6057
Report No.(s): AD-A389791; ARDSG-R/D8997-BC-03; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

THis worksshop in Grenoble area in France is the reciprocat of the First France-israel workshop on biosensors and biochips, held in Omer, Israel in 27-28 October, 1998. Science and medicine promice the possibilities of revolutionary diagnostic and therapeutic techniques.
Derived from text
Biotechnology; Nanotechnology; Bioinstrumentation; Therapy

20010067068 Statens Serum Inst., Copenhagen, Denmark
Risk Factors for Breast Cancer and Its Prognosis ***Final Report, 23 Sep. 1996 - 31 Jul. 2000***
Melbye, Mads; Aug. 2000; 286p; In English
Contract(s)/Grant(s): DAMD17-96-1-6321
Report No.(s): AD-A390423; No Copyright; Avail: CASI; A03, Microfiche; A13, Hardcopy

This project investigated the influence of reproductive history on risk of breast cancer and its prognosis by taking advantage of very large linkages between population-based health and demographic registries in Denmark. Many of these registries have existed for several decades and contain mandatorily reported information, making very complete and long-term follow-up studies possible. A total of 18 studies were conducted during the study period. In 13 studies, the influence on breast cancer risk of induced abortion, age at birth, number of births, gender of child, multiple births, weight of child, alpha-fetoprotein level during pregnancy and family history was investigated in great detail. Breast cancer was not only investigated as a single outcome but also according to type, size of tumor at time of diagnosis, nodal spread, etc. Five studies dealt with factors that might influence the prognosis of breast cancer. Low age at first birth but not parity was associated with poor survival. A diagnosis of breast cancer less than 2 years after a child birth gave particularly poor survival. Young women had particularly poor survival but only those diagnosed with low-risk disease not receiving adjuvant cytotoxic therapy,-indicating that they would benefit from being given cytotoxic therapy in the future. A pregnancy subsequent to breast cancer did not aggravate the prognosis. Finally, we found a 20-30% difference in chance of survival depending on what quadrant in the breast the tumor was first diagnosed. Survival was most poor for tumors in the lower two quadrants, indicating that a more aggressive treatment approach might increase survival of those tumors.
DTIC
Risk; Mammary Glands; Cancer; Diagnosis; Health

20010067078 Georgetown Univ., Washington, DC USA
Phase I NKX3.1 in Prostate ***Final Report, 1 Jul. 1998 - 31 Dec. 2000***
Gelmann, Edward P.; Jan. 2001; 13p; In English; Original contains color plates
Contract(s)/Grant(s): DAMD17-98-1-8484
Report No.(s): AD-A390414; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

We have isolated a prostate-specific gene, NKX3.1, that maps to chromosome 8p21, a common region for loss of heterozygosity in human prostate cancer. NKX3.1 is a homeobox gene that is expressed at high levels in adult human prostate. Deletion of NKX3.1 in the mouse has suggested that NKX3.1 has a suppressor effect on prostatic epithelial cell growth, and that haploinsufficiency is sufficient to produce epithelial hyperplasia. Inconsistent with the interpretation that NKX3.1 is a classical tumor suppressor gene, the coding region of NKX3.1 is not mutated in human prostate cancer. We have generated an antibody highly specific for NKX3.1. Using this reagent we have shown that loss of NKX3.1 expression is increasingly likely with prostate tumor progression. This loss of expression ranges from 16% of radical prostatectomy specimens to 80% in metastases. We have

shown that a genetic polymorphism (NKX3.1 R52C) that changes DNA-binding properties of the NKX3.1 protein is present in approximately 10% of the human population. We have not found a difference in the frequency of NKX3.1 R52C between Caucasians and African Americans. The polymorphism is a risk factor for aggressive prostate cancer (high grade or high stage) (RR=1.8, 95%CI = 1.01-3.22).
DTIC
Prostate Gland; Cancer; Clinical Medicine

20010067157 Promed Trading S.A., Panama City, Panama
Evaluation of Drug and Vaccine Candidates in the Human Malaria/Aotus Monkey Model ***Final Report, 1 May 1996 - 28 Feb. 2001***
Obaldia, Nicanor; Jul. 2001; 94p; In English
Contract(s)/Grant(s): DAMD17-96-C-6051
Report No.(s): AD-A390416; No Copyright; Avail: CASI; A01, Microfiche; A05, Hardcopy

This report presents data: 1) On the evaluation of antimalarial drugs, and 2) plasmid DNA and recombinant protein malaria vaccines in the Aotus/Plasmodium falciparum and vivax model. During the course of these experiments neither Aotus immunized ID with AMA-1, EBA-1 75 and MSP-1 plasmids alone or in combination with or without aGMCSF were protected against a P. falciparum FVO challenge A C2A clone P. falciparum was adapted to intact and splenectomized Aotus. Chloroquine resistance reversal was achieved in Aotus infected with the AMRU-1 strain of P. vivax by using chloroquine and prochiorperazine in combination. Oligodeoxynucleotides when given intramuscularly to Aotus improved immunogenicity of a P. falciparum PADRE 45 peptide immunogen. A significant degree cross-protector was developed in FVO immune Aotus that were challenged with an heterologous CAMP strain of P. falciparum. Immunization with a plasmid encoding region II of EBA-1 75 followed with a recombinant protein boost, partially protected Aotus monkeys against P. falciparum challenge. Both Artelinic Acid and Artesunic Acid at 8-32 mg/kg orally for five days were effective at clearing parasitemia in P. falciparum FVO inoculated Aotus. Aotus immunized with plasmids and/or recombinant MSP142 were partially protected against a P. falciparum FVO challenge.
DTIC
Clinical Medicine; Vaccines; Drugs; Parasitic Diseases

20010067175 Lockheed Martin Michoud Space Systems, New Orleans, LA USA
Effects of Potassium Permanganate Oxidation on Subsurface Microbial Activity
Rowland, Martin A., Lockheed Martin Michoud Space Systems, USA; Brubaker, Gaylen R., ThermoRetec Consulting Corp., USA; Westray, Mark, ThermoRetec Consulting Corp., USA; Morris, Damon, ThermoRetec Consulting Corp., USA; Kohler, Keisha, ThermoRetec Consulting Corp., USA; [2001]; 15p; In English; Battelle Symposium, 4-7 Jun. 2001, San Diego, CA, USA; Original contains color illustrations
Contract(s)/Grant(s): NAS8-39243; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In situ chemical oxidation has the potential for degrading large quantities of organic contaminants and can be more effective and timely than traditional ex situ treatment methods. However, there is a need to better characterize the potential effects of this treatment on natural processes. This study focuses on potential inhibition to anaerobic dechlorination of trichloroethene (TCE) in soils from a large manufacturing facility as a result of in situ oxidation using potassium permanganate (KMn04)Previous microcosm studies established that natural attenuation occurs on-site and that it is enhanced by the addition of ethanol to the system. A potential remediation scheme for the site involves the use of potassium permanganate to reduce levels of TCE in heavily contaminated areas, then to inject ethanol into the system to ”neutralize” excess oxidant and enhance microbial degradation. However, it is currently unknown whether the exposure of indigenous microbial populations to potassium permanganate may adversely affect biological reductive dechlorination by these microorganisms. Consequently, additional microcosm studies were conducted to evaluate this remediation scheme and assess the effect of potassium permanganate addition on biological reductive dechlorination of TCE. Samples of subsurface soil and groundwater were collected from a TCE-impacted area of the site. A portion of the soil was pretreated with nutrients and ethanol to stimulate microbial activity, while the remainder of the soil was left unamended. Soil/groundwater microcosms were prepared in sealed vials using the nutrient-amended and unamended soils, and the effects of potassium permanganate addition were evaluated using two permanganate concentrations (0.8 and 2.4 percent) and two contact times (1 and 3 weeks). TCE was then re-added to each microcosm and TCE and dichloroethene (DCE) concentrations were monitored to determine the degree to which microbial dechlorination occurred following chemical oxidation. Evidence of microbial degradation was generally detected within four weeks after TCE addition. Increases in DCE concentrations were consistent with decreases in TCE. The concentration of TCE in the nutrient-amended samples exposed to 2.4% KMnO4 for one week degraded somewhat more slowly than the samples exposed to the 0.8% KMnO4. The rates of degradation did not correlate with the length of KMn04 exposure for the nutrient-amended microcosms. Microbial degradation of TCE in the

unamended microcosms was generally similar to that observed in the nutrient-amended microcosms. One treatment condition (unamended, one week exposure, 2.4% KMnO4) was exposed to elevated levels of ethanol and showed little evidence of degradation. It is suspected that the high levels of ethanol were toxic to the microorganisms. The results of the study indicate that exposure of indigenous soil and groundwater microbial populations to KMnO4 at concentrations of 0.8 to 2.4% do not impair the ability of the microbial populations to dechlorinate TCE. Consequently, the combination of chemical oxidation followed by enhanced biological reductive dechlorination appears to be a viable remedial strategy for highly-impacted subsurface areas of the site.
Author
Contaminants; Exposure; Microorganisms; Oxidation; Potassium; Toxicity; Permanganates

20010067276 NASA Langley Research Center, Hampton, VA USA
Assessment of the State-of-the-Art in the Design and Manufacturing of Large Composite Structure
Harris, C. E., NASA Langley Research Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 27p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

This viewgraph presentation gives an assessment of the state-of-the-art in the design and manufacturing of large component structures, including details on the use of continuous fiber reinforced polymer matrix composites (CFRP) in commercial and military aircraft and in space launch vehicles. Project risk mitigation plans must include a building-block test approach to structural design development, manufacturing process scale-up development tests, and pre-flight ground tests to verify structural integrity. The potential benefits of composite structures justifies NASA's investment in developing the technology. Advanced composite structures technology is enabling to virtually every Aero-Space Technology Enterprise Goal.
Derived from text
Composite Structures; Fiber Composites; Structural Design; Design Analysis

20010067374 NASA Ames Research Center, Moffett Field, CA USA
Models of the Protocellular Structures, Functions and Evolution
Pohorille, Andrew, NASA Ames Research Center, USA; New, Michael, NASA Ames Research Center, USA; Keefe, Anthony, Massachusetts General Hospital, USA; Szostak, Jack W., Massachusetts General Hospital, USA; Lanyi, Janos F., California Univ., USA; [2000]; 2p; In English; Frontiers of Life, 25 Jun. - 1 Jul. 2000, Blois, France
Contract(s)/Grant(s): RTOP 344-38-22-06; No Copyright; Avail: Issuing Activity; Abstract Only

In the absence of extinct or extant record of protocells, the most direct way to test our understanding of the origin of cellular life is to construct laboratory models that capture important features of protocellular systems. Such efforts are currently underway in a collaborative project between NASA-Ames, Harvard medical School and University of California. They are accompanied by computational studies aimed at explaining self-organization of simple molecules into ordered structures. The centerpiece of this project is a method for the in vitro evolution of protein enzymes toward arbitrary catalytic targets. A similar approach has already been developed for nucleic acids: First, a very large population of candidate molecules is generated using a random synthetic approach. Next, the small numbers of molecules that can accomplish the desired task are selected. These molecules are next vastly multiplied using the polymerase chain reaction. A mutagenic approach, in which the sequences of selected molecules are randomly altered, can yield further improvements in performance or alterations of specificities. Unfortunately, the catalytic potential of nucleic acids is rather limited. Proteins are more catalytically capable but cannot be directly amplified. In the new technique, this problem is circumvented by covalently linking each protein of the initial, diverse, pool to the RNA sequence that codes for it. Then, selection is performed on the proteins, but the nucleic acids are replicated. to date, we have obtained "a proof of concept" by evolving simple, novel proteins capable of selectively binding adenosine tri-phosphate (ATP). Our next goal is to create an enzyme that can phosphorylate amino acids and another to catalyze the formation of peptide bonds in the absence of nucleic acid templates. This latter reaction does not take place in contemporary cells. once developed, these enzymes will be encapsulated in liposomes so that they will function in a simulated cellular environment. to provide a continuous energy supply, usually needed to activate the substrates, an energy transduction complex which generates ATP from adenosine diphosphate, inorganic phosphate and light will be used. This system, consisting of two modern proteins, ATP synthase and bacteriorhodopsin, has already been built and shown to work efficiently. by coupling chemical synthesis to such a system, it will be possible to drive chemical reactions by light if only the substrates for these reactions are supplied.
Author
Protobiology; Cells (Biology); Chemical Reactions; Biological Evolution; Proteins; Enzymes; Amino Acids

20010067375 Search for Extraterrestrial Intelligence Inst., Moffett Field, CA USA

Ammonia Formation by the Reduction of Nitrite/Nitrate by FeS: Ammonia Formation Under Acidic Conditions

Summers, David P., Search for Extraterrestrial Intelligence Inst., USA; [2000]; 1p; In English

Contract(s)/Grant(s): NCC2-1161; RTOP 344-38-22-12; No Copyright; Avail: Issuing Activity; Abstract Only

FeS reduces nitrite to, ammonia at pHs lower than the corresponding reduction by aqueous Fe+2. The reduction follows a reasonable first order decay, in nitrite concentration, with a half life of about 150 min (room temperature, CO2, pH 6.25). The highest ammonia product yield measured was 53%. Under CO2, the product yield decreases from pH 5.0 to pH 6.9. The increasing concentration of bicarbonate at higher pH interferes with the reaction. Bicarbonate interference is shown by comparing runs under N2 and CO2. The reaction proceeds well in the presence of such species as chloride, sulfate, and phosphate though the yield drops significantly with phosphate. FeS also reduces nitrate and, unlike with Fe+2, the reduction shows more reproducibility. Again, the product yield decreases with increasing pH, from 7% at pH 4.7 to 0% at pH 6.9. It appears as if nitrate is much more sensitive to the presence of added species, perhaps not competing as well for binding sites on the FeS surface. This may be the cause of the lack of reproducibility of nitrate reduction by Fe+2 (which also can be sensitive to binding by certain species).

Author

Ammonia; Carbonates; Chemical Bonds; Nitrites; Nitrates

20010067407 Duke Univ., Durham, NC USA

Functional Analysis of SMAD Activation in TGF-B-mediated Negative Growth Control in Breast Epithelial Cells ***Annual Report, 16 Mar. 1999 - 15 Mar. 2000***

Frederick, Joshua; Wang, Xiao-Fan; Jul. 2000; 57p; In English

Contract(s)/Grant(s): DAMD17-98-1-8067

Report No.(s): AD-A389575; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Transforming growth factor-beta (TGF-beta) is a potent growth inhibitory polypeptide hormone. Although the loss of this negative proliferative signal is often seen in the deregulated growth of early cancer formation, the TGF-beta mediated intracellular pathways that control cell growth remain largely unknown. We propose three aims to 1) elucidate the functional role of Smads in TGF-beta signaling; 2) assess their contribution in regulating cell proliferation; and 3) to provide evidence that Smad3 acts in vivo as a tumor suppressor of early breast cancer formation. In the first year of funding, we have provided evidence that the Smads are specific sequence DNA-binding proteins, and functionally interact with other transcription factors and the p300/CBP coactivator family of proteins to coordinate disparate pathways in the regulation of specific genes. Towards the goal of the second aim, we demonstrated that Smad3 is an essential component of TGF-(3 mediated growth inhibition in fibroblasts and epithelial cells, and that cyclin Dl and c-Myc are Smad3 dependent TGF-beta repressible target genes. The last aim to evidence that Smad3 may be an in vivo tumor suppressor will be completed with the use of the Smad3 null mouse model, carcinogen treatment and crossing into the APCmin mouse background.

DTIC

Cells (Biology); Genes; Mammary Glands; Functional Analysis; Epithelium

20010067408 Toledo Univ., OH USA

Expression of Inapproptriate Cadherins in Human Breast Carcinomas ***Annual Report, 15 Jul. 1999 - 14 Jul. 2000***

Wheelock, Margaret; Aug. 2000; 41p; In English

Contract(s)/Grant(s): DAMD17-96-1-8252

Report No.(s): AD-A389587; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This is the second year report for my three year IDEA Award. The purpose of this award was to initiate a breast cancer project in my lab. My lab has been focused for many years on the role of cadherin cell adhesion molecules in cellular behavior. Cadherins are cell-surface proteins that play important roles in normal cell-cell interactions. Members of the cadherin family of transmembrane glycoproteins mediate calcium-dependent, homotypic cell-cell adhesion. Numerous studies have implicated E-cadherin as a tumor suppresser protein in carcinomas; i.e., decreased E-cadherin adhesion correlates with a tumor phenotype. The mechanism by which the adhesive function is decreased varies amongst different tumors, but disruption of the function of E-cadherin, regardless of the mechanism, is thought to aid in the formation of a tumor. With this award, I have been able to focus some of my efforts on studying similar questions with regard to human breast cancer cells. Two graduate students focused their efforts on getting the breast cancer project off the ground. Marvin Nieman has been a Ph.D. student in my lab for 4 years and has been studying the effect of dominant-negative cadherins on squamous epithelial cells. He finished up that project and moved on to the breast cancer project. Ryan Prudoff is a masters student in the lab who spent a year working with Marvin on a survey of a large number of breast cancer cell lines for expression of cadherins. In addition, technical help has been provided by Christine Trapp. The effort of these individuals has contributed to our understanding of how cadherin-mediated cell interactions may

influence the behavior of breast cancer cells. In particular, our lab has shown that N-cadherin, which is not normally expressed by epithelial cells, promotes motility and invasion when expressed by human breast cancer cells. Both Marvin Nieman and Ryan Prudoff graduated and their work will be continued by Young
DTIC
Cancer; Mammary Glands; Cytology

20010067447 Garvan Inst. of Medical Research, Australia
A Potential Tumor Suppressor Protein: Expression and Function in Human Breast Cancer Cells ***Annual Report, 1 Jul. 1999-30 Jun. 2000***
Callaghan, Michelle; Jul. 2000; 10p; In English
Contract(s)/Grant(s): DAMD17-98-1-8335
Report No.(s): AD-A389536; No Copyright; Avail: CASI; A01, Microfiche; A02, Hardcopy

In a search for genes with a role in hormonal control of cell proliferation, we cloned a novel progestin-induced gene, EDD (previously DD5) that appears to be the human homologue of the hyd tumor suppressor gene of Drosophila melanogaster. by amino acid homology with other known proteins it is likely that the EDD protein is an E3 ubiquitin-protein ligase, enzymes which target one or more key proteins for destruction by ubiquitin- mediated proteolysis. The interaction between EDD and two potential ubiquitination substrates was further characterize. Evidence was obtained suggesting that one of these might be regulated by the proteasome while the other most likely serves to localize EDD in the cell. This was supported by cellular fractionation experiments using HEK293 cells over-expressing EDD.
DTIC
Cancer; Mammary Glands; Suppressors; Proteins; Cells (Biology)

20010067458 National Inst. of Environmental Health Sciences, Research Triangle Park, NC USA
Mammary-Specific Targeting of the BRCA2 Breast Cancer Susceptibility Gene in Mice ***Annual Report, 1 Nov. 1999 - 31 Oct. 2000***
McAllister, Kimberly A.; Wiseman, Roger; Nov. 2000; 44p; In English
Contract(s)/Grant(s): DAMD17-98-1-8131
Report No.(s): AD-A389330; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

BRCA2 hereditary gene mutations confer a profound predisposition to breast cancer in women. We have generated mice carrying a Cre-loxP conditional Erca2 mutated allele by flanking exon 27 with loxP sites and we predict that this will disrupt basic functions of Brca2 in DNA repair. The mammary- specific removal of Brca2 exon 27 by Cre-mediated recombination in vivo was performed by crossing the homozygous floxed Brca2 mice with MMTV-Cre transgenic mice. The effect of-this mutation on the formation of mammary gland tumors and alterations in mammary gland morphogenesis is currently being examined for both untreated and radiation-treated animals. Mice with a homozygous germline deletion of Brca2 exon 27 have also been created by transiently electroporating embryonic stem cells carrying the floxed Brca2 allele with a Cre-expression plasmid. These studies have generated the first completely viable germline homozygous Erca2 knockout mice. Female mice with this homozygous Brce2 disruption display an inhibition of ductal morphogenesis in the mammary gland by six months of age, which may be an early biological marker for cancer susceptibility. Parallel studies using these two distinct animal models for Brca2 inactivation should provide valuable insights into the functional role of Brca2 in the breast and throughout the body.
DTIC
Mammary Glands; Cancer; Mutations; Genetic Engineering; Genes

20010067459 California Univ., San Diego, La Jolla, CA USA
Estrogen Nuclear Receptor Coactivators in Pathogenesis of Breast Cancer ***Final Report, 15 Jul. 1997 - 14 Jul. 2000***
Korzus, Edward; Rosenfeld, M.; Aug. 2000; 50p; In English; Original contains color plates
Contract(s)/Grant(s): DAMD17-97-1-7104
Report No.(s): AD-A389332; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The success of anti-estrogen tamoxifen treatment of breast cancer and the discoveries that in a large number C breast tumors, proliferation of cells is stimulated by estrogen while retinoic acid exerts inhibitory effects have generated extensive interest among both clinicians and basic scientists. Presented studies have revealed a novel nuclear receptor coactivator of transcription referred to as p/CAF that is required for estrogen-, thyroid hormone and retinoic acid-dependent gene expression. DNA bound nuclear receptor directly recruits its coactivator p/CAF, and the association of p/CAF with a nuclear receptor depends upon ligand-dependent nuclear receptor corepressor (NCoR) dismissal. The critical role of the intrinsic acetyltransferase enzymatic activity of p/CAF in hormone regulated transcription provides a link between the function of this coactivator and

steroid-dependent regulation of cell growth in pathogenesis of breast cancer. A substitution mutation eliminating acetyltransferase activity has been introduced into the p/CAF gene locus in order to examine biological function of this gene mouse. These studies have advanced our understanding of the molecular mechanism of hormone regulated gene expression and might open a new direction for improved treatment of breast cancer.
DTIC
Mammary Glands; Cancer; Estrogens; Pathogenesis; Receptors (Physiology)

20010067470 Cornell Univ., Ithaca, NY USA
Characterization of Heregulin-Stimulated Signal Transduction Pathways to the Nucleus ***Final Report, 25 Aug. 1997 - 24 Aug. 2000***
Wilson, Kristin; Cerione, Richard A.; Sep. 2000; 33p; In English
Contract(s)/Grant(s): DAMD17-97-1-7308
Report No.(s): AD-A389318; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Heregulin is a glycoprotein ligand that interacts with the receptor tyrosine kinases, ErbB3 and ErbB4. This interaction induces a dimerization with and subsequent activation of the Neu/ErbB2 protein, which it turn initiates cellular signaling cascades. The signaling pathways that function as a consequence of Neu/ErbB2 activation are of great interest as the overexpression of Neu/ErbB2 is found in up to 40% of breast cancers and correlates with a poor prognosis for women with breast cancer. Mapping the molecular determinants of the heregulin/ErbB2 signaling pathway will be important in determining viable cellular targets for therapeutic intervention. to this end, we have identified the nuclear cap-binding complex (CBC) as a novel target for heregulin signaling. As the CBC plays an important role in the regulation of gene expression at the level of RNA processing, it is likely that heregulin can affect cell growth by altering the expression of genes important for mitogenesis. Indeed, we have shown heregulin to promote mRNA splicing, presumably through increasing the affinity of the CBC for capped RNAs. Additionally, we have determined some of the fundamental players in heregulin signaling to the CBC, including CDC42, FRAP, and S6 kinase. Transforming alleles of CDC42, like heregulin, can increase mRNA splicing, while a specific CDC42 mutant which can no longer transform cells is no longer able to promote RNA splicing. Together these data identify a specific heregulin-Neu/ErbB2 pathway, and suggest a CBC-directed mechanism by which the activation of this pathway affects cell growth by altering post-transcriptional gene expression.
DTIC
Mammary Glands; Cancer; Clinical Medicine; Ligands; Transferring

20010067471 Meharry Medical Coll., Nashville, TN USA
Empowering Factors Among Breast Cancer Screening Compliant Underserved Populations ***Annual Report, 1 Oct. 1999 - 30 Sep. 2000***
Ahmed, Nasar U.; Oct. 2000; 53p; In English
Contract(s)/Grant(s): DAMD17-99-1-9288
Report No.(s): AD-A389320; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Breast cancer is the second leading cause of cancer deaths in all women. Breast cancer mortality can be reduced by 50% by mammography screening. Unfortunately, mammography usage is still under utilized by all groups especially low income and minority women. With insurance, the most common objective barrier removed, a vast majority of eligible women are not receiving free mammograms. However, 30% of women with comparable backgrounds to the non-compliant group have indeed obtained regular mammograms. The purpose is to study these underserved compliant women who could provide clear insight regarding what triggered their behavior change, despite all barriers. A novel approach is to focus on what empowers these women to be successful. We believe that this research will discover those key factors of the success should be replicable in their non-compliant counterparts. Study participants are being selected from the claims data received from the partner Managed Care Organization, Tennessee Coordinated Care Network (TCCN). Focus group discussions suggest that as a result of their breast cancer prevention knowledge and belief in early detection, compliant women value mammography. These women also share similar characteristics: plan oriented, organized and proactive health seeking attitudes. A questionnaire has been developed to further investigate these initial findings.
DTIC
Mammary Glands; Cancer; Detection; Imaging Techniques

20010067472 National Rehabilitation Hospital, Washington, DC USA
Assistive Technology Research Center ***Annual Report, 1 Feb. 2000-31 Jan. 2001***
Toerge, John; Bleiberg, Joseph; Rose, Michael; Mar. 2001; 36p; In English
Contract(s)/Grant(s): DAMD17-00-1-0056
Report No.(s): AD-A389326; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

The ATNRC is entering the second year of its second four-year funding cycle. Its missions remain the following: Assessment and enhancement of cognitive and motor function; evaluation and support for Activities of Daily Living; applications of telehealth and Virtual Reality; and product design. Accomplishments from year one of the new cycle included the development of a turnkey Virtual Reality testbed that incorporates gaze monitoring. Automated Neuropsychological Assessment Metrics (ANAM) was implemented in brain concussion studies of the 82nd Airborne at Ft. Bragg and the US Military Academy at West Point. These studies encompassed over 6,000 baseline assessments and demonstrated ANAM's capability as a population surveillance instrument for military and civilian health applications. Informatics software was developed for manipulating unprecedented quantities of ANAM information, and sharing that software with military and civilian ANAM users. These users' groups included NASA, several Veterans Administration hospitals, and such academic institutions as Georgetown, Northwestern, University of Virginia, Johns Hopkins, and the University of North Carolina. Four peer-reviewed papers on diverse ANAM issues saw publication in year one. These works dealt with the psychopharmacology of migraine, the natural history of recovery from concussion, and the psychometric factor structure of ANAM subtests in relation to traditional clinical neuropsychological tests.
DTIC
Clinical Medicine; Research Facilities; Neurology; Psychology; Telemedicine; Military Technology

20010067473 Army Research Inst. of Environmental Medicine, Natick, MA USA
Study on the Physiological Significance of Endotoxin in Heatstroke
DuBose, David A.; Balcius, James A.; Morehouse, David H.; Apr. 2001; 29p; In English
Report No.(s): AD-A389327; USARIEM-TR-T-01-6; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Cytokines are signaling proteins that regulate immune system function. Though local inflammatory reactions mediated by TNF-alpha and IL-1beta are relatively benign, systemic release of these cytokines can result in vascular shock. It is through such an immune system mechanism that bacterial E upon entering the blood stream evokes vascular shock. E, TNF-alpha and IL-lbeta circulate in human heatstroke to suggest E release from a heat-damaged gut may stimulate cytokines that contribute to the vascular shock noted in heatstroke. However, when damaged tissue undergoes necrotic cell death, immune activation can occur with the release of cytokine. Thus, shock cytokines might be released by heat-induced tissue necrosis, even in the absence of E. to further define the physiological significance of E in heatstroke, this study determined if heat injury of HWB could induce a cytokine response in the absence of E. Using thermoelectric technology, HWB was exposed to temperature modulations that precisely replicated those associated with a 70% rat heatstroke mortality rate. Following heat stress, some HWB cultures were exposed to E at concentrations reported to circulate in human heatstroke, while others remained unexposed. In the presence or absence of prior heat stress, the presence of E stimulated inflammatory cytokine (TNF-a and IL-1beta) release, while in E's absence such cytokines were not generated. Similar findings were noted for IL-6, a cytokine noted for its modulatory effects on TNF metabolism. Relative to anti-inflammatory cytokines, heat stress and/or E had no effect on IL-1srII, while heat stress reduced E-mediated IL-1ra levels. Thus, some factor, like endotoxin was required to provoke HWB cytokine expression, which tended to support an etiological role for E in heatstroke cytokine responses. Moreover, the heat stress and E conditions that characterize heatstroke affected HWB cytokine metabolism to favor a pro-inflammatory environment.
DTIC
Heat Tolerance; Physiology; Endotoxins; Proteins; Clinical Medicine

20010067474 North Carolina Univ., Chapel Hill, NC USA
Characterization of p120ctn, an Adherens Junction Protein with a Potential Role in Tumorigenesis and Cancer Metastasis ***Annual Report***
Polevoy, Gordon, North Carolina Univ., USA; Peiffer, Mark, North Carolina Univ., USA; Jul. 2000; 8p; In English
Contract(s)/Grant(s): DAMD17-98-1-8220
Report No.(s): AD-A389328; No Copyright; Avail: CASI; A01, Microfiche; A02, Hardcopy

One of the deadliest and least understood aspects of cancer is metastasis. Before a tumor can metastasize, individual cells must acquire mutations which down-regulate adhesion to neighboring cells. Down-regulating components of the adherens junctions causes increased invasiveness and metastatic potential of tumors. Adherens junctions form around cadherins that interact homotypically to cadherins on neighboring cells. The cytoplasmic domain of cadherins interacts with a set or accessory proteins called catenins, which anchor cadherins to the actin cytoskeleton. pl20ctn, which was discovered in vertebrates, seems

to be playing a regulatory rather than a structural role in adherens junctions. Before we can understand the role pl20ctn is playing in cancer, we must understand its normal cellular function. We have been studying pl20ctn in the rruitfly, Drosophila inelanogaster. The objective of this research project is to characterize the role of pl20ctn by generating flies mutant for the p120 gene and characterizing them phenotypically and biochemically. We have generated 200 mutations in the pl20ctn region, and have identified a small chromosomal deletion that removes pl2Octn and affects only two complementation groups. We are testing these to determine whether either is the pl2Octn gene. We are also characterizinq anti-pl20ctn antisera.
DTIC
Cancer; Mammary Glands; Cytology; Proteins; Cells (Biology)

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 Science. For the effects of space on animals and plants see 51 Life Sciences.

20010066119 Air Force Inst. of Tech., School of Engineering, Wright-Patterson AFB, OH USA
A Pharmacokinetic Study of the Effects of Stress and Exercise on Chemical Exposure
Watson, Karen M.; Mar. 20, 2001; 218p; In English
Report No.(s): AD-A389556; AFIT/GEE/ENV/01M-23; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

Several concerns about the effects of the combinations of human chemical exposures with the stressful conditions of the Gulf War have been raised. Stress causes changes in the human body, including blood flow, hormonal, and ventilation changes, and may increase the permeability of the blood-brain barrier. Each change influences the chemical uptake, distribution, and accumulation in the body. The purpose of this thesis was to model and predict changes that occur when stress and exercise are combined with chemical exposure. A Physiologically-based pharmacokinetic (PBPK) model was used as a tool to visualize, predict, and generate a hypothesis about chemical exposures. The PBPK model developed simulated human tissue compartments during chemical exposure under varying stress and exercise conditions. The results suggest that the chemical concentrations in the brain are highly dependent on the transport mechanisms involved. The transport mechanisms and their respective strengths have been identified as key parameters for further study.
DTIC
Pharmacology; Physical Exercise; Stress (Physiology); Exposure

20010066188 Army Research Inst. of Environmental Medicine, Natick, MA USA
Acute Mountain Sickness: Relationship to Brain Volume and Effect of Oral Glycerol Prophylaxis
Muza, Stephen R.; Lyons, Timothy; Rock, Paul B.; Fulco, Charles S.; June 1998; 37p; In English
Report No.(s): AD-A345324; No Copyright; Avail: Defense Technical Information Center (DTIC)

The objective of this study was to test the hypothesis that oral glycerol administration prior to and during exposure to high altitude will decrease the prevalence and severity of AMS. The basis for this hypothesis was that glycerol would create an osmotic gradient between the blood and the cerebral spinal fluid producing a net movement of water out of the CNS, thus attenuating development of cerebral edema. Furthermore, to assess whether AMS was associated with development of cerebral edema, we used MR imaging and post-processing to quantify changes in brain tissue volume, hypothesized to increase due to cerebral edema. MRI studies were performed in subjects at sea level and following a 32-h exposure to an altitude of 4,572 m in a hypobaric chamber. The study found that oral administration of glycerol did not alleviate the symptoms associated with AMS, and that whole brain volume was increased by 2% following the hypobaric exposure. There was no relationship between the AMS prevalence or severity and the magnitude of the brain volume changes.
DTIC
Central Nervous System; Hypobaric Atmospheres

20010066259 Ukrainian Armed Forces, Research Inst. of Military Medicine, Irpen, Ukraine
Post-Deployment Phase Medical Status Monitoring Functions
Varus, Vasiliy, Ukrainian Armed Forces, Ukraine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 7-1 - 7-3; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

History shows that even in peace time, the State sometimes forces military specialists to work under conditions which demand a maximal mobilization of the body functional reserves. Vivid examples are the participation of the Ukraine Armed Forces in the

emergency and clean-up operations after the Chernobyl disaster and in the process of dismantling the Ukraine nuclear weapon arsenal, the need to maintain high levels of professional skills and combat strength among military personnel notwithstanding limited materiel supplies and serious financial problems, and the participation of the Ukraine peacekeeping contingent in a multinational military mission. Successful task performance among military personnel is based on their professional capabilities. Taken together, these can be considered as the combat potential that is needed to attain tactical, physical and psychological superiority over adversaries. However, statistics show that a significant part of the specialized troops in the Ukraine Armed Forces, who have high levels of training level and long operational experience, leave the Armed Forces prematurely due to health problems. An analysis of the behavior and the functional status of these individuals has revealed that they have a reduced resistance to the impact of extreme physical and psychosocial stressors. A study of Ukraine Armed Forces Research Institute of Military Medicine has demonstrated that occupational hazards combined with insufficient physiological, hygienic, and social protection of military personnel should not just be considered as risk factors, but are actually causing damage to the body on cellular, organ, and systemic levels. In view of the need to implement adequate counter measures, a permanent monitoring system has been set up in order to screen the health status of personnel and to evaluate potentially damaging conditions and factors. A military-medical computer data-base was created by the Military-Medical Service of the Ukraine Armed Forces, as an integral part of a national population health monitoring system. The main task of this hygienic monitoring activity is to provide the military-medical authorities with adequate information.
Derived from text
Health; Medical Services; Human Performance; Monitors

20010066260 Ukrainian Inst. of Public Health, Kiev, Ukraine
The Program of Reforming the Public Health System of Ukraine and the Perspectives for Its Realization
Moskalenko, V., Ukrainian Inst. of Public Health, Ukraine; Ponomarenko, V., Ukrainian Inst. of Public Health, Ukraine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 8-1 - 8-3; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

An analysis of the public health conditions in Ukraine reveals an unsatisfactory medico-demographic situation which is characterized by a low birth rate, a relatively high mortality rate, a negative population growth, a reduction of the expected human life-span as well as dissemination of a large group of diseases. Obviously, the existing public health system in Ukraine does not meet the requirements of an up-to-date efficient public health system. There have been extensive developments, but experience indicates that there are many economic and organizational problems, as well as strategic flaws in the development of the public health system. I must repeat that the existing system of public health does not meet today's requirements and needs to be improved.
Author
Public Health; Management Systems; Improvement

20010066262 Ministry of Defence, Sixth Central Military Clinical Hospital, Moscow, USSR
The Problem of the Pilot's Professional Health Restoration
Shakula, A., Ministry of Defence, USSR; Pulik, A., Ministry of Defence, USSR; Kuzina, L., Ministry of Defence, USSR; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 10-1 - 10-4; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

When analyzing the dynamics of the Russian Airforce air crew's functional condition, working capacity and professional reliability in the process of their flight activity and the results of clinical and physiological examinations, we witness a distinct tendency for deterioration of air crew's level of professional health owing to a complex mixture of psycho-physiological, social, organizational, ecological, and demographic factors. The main tasks when rehabilitating the pilot's functional status in pre-flight or in post-flight situations include: (1) enduring and stable maintenance of operational working capacity; (2) mobilization of psycho-physiological functions to perform the most crucial stages of work; (3) treatment of acute forms of neuro-emotional reactions; (4) treatment of monotony, hypodynamics, and tiredness (exhaustion); (5) rapid restoration of functional status after physical and mental overload; (6) regulating the level of neuropsychic and motivational activity, creating a favorable emotional and sensory background; (7) optimization of adaptive reactions of the organism to shifts in environmental factors and in working conditions; and (8) formation and maintenance of professionally significant aspects of psychosomatic functioning of air crew. Such a variety of tasks necessitates the development and utilization of a wide complex of means and methods for rehabilitating the pilot's functional condition, and these should be able to have an effect on different functional systems of the organism. The specific choice of means and methods depends on the specific nature of the air crew's functional disorder, and the work schedule as well as the personality of each pilot should be taken into consideration. The ultimate aim of the treatment is to maintain proper

levels of efficiency by mobilizing the protective and compensatory abilities of the organism. Hence, rehabilitation of the pilot's functional status serves to maintain the pilot's professional health.
Derived from text
Flight Crews; Health; Pilot Performance; Physiology

20010066264 Institute of Aviation Medicine, Germany
Battle Trauma and DNBI
Roedig, Erich, Institute of Aviation Medicine, Germany; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 12-1 - 12-4; In English; See also 20010066252; Original contains color illustrations; Copyright Waived; Avail: CASI; A01, Hardcopy

New NATO force structures and strategic concepts emphasise Mobility, Interoperability, Sustainability Jointness, and Multinationality; i.e., deployment of multinational forces to any are for any mission. The very nature of those operations calls for the likelihood of missions in locations far from those of the sending nations, areas that may have challenging factors of geographical conditions, lack of infrastructure, or indigenous populations suffering from hunger, thirst, epidemic and endemic diseases, trauma, or disability. Special environmental and occupational hazards given in the mission areas have to be considered. Therefore appropriate Force health protection is a core competency. It must ensure a full spectrum health services that: (1) emphasise fitness, preparedness, and preventive measures; (2) improve the monitoring and surveillance of forces engaged in military operations; (3) enhance service members and commanders awareness of health threats before they can effect the force; and (4) support the health needs of the military forces and their families across the continuum of medical services.
Author
Health; Medical Services; Protection; Prevention

20010066267 Ukrainian Association of Computer Medicine, Dept. of Clinical Informatics, Kharkiv, Ukraine
Perspectives of Telemedicine Development in Ukraine
Mayorov, Oleg Y., Ukrainian Association of Computer Medicine, Ukraine; Ponomarenko, Victor M., Ukrainian Association of Computer Medicine, Ukraine; Kalnish, Valentin V., Ukrainian Association of Computer Medicine, Ukraine; Olenin, Mihael V., Ukrainian Association of Computer Medicine, Ukraine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 15-1 - 15-5; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

The healthcare system in Ukraine has seen the creations of National Medical Networks and Registers (databases). There are two extensively developed medical networks operating within the framework of the computer network of the first generation 'HealthNet'. The most ramified of these two is the National Register of the individuals who are suffering from consequences of the Chernobyl disaster. This Register monitors the health of more than 700,000 persons. A computer network has been created in order to maintain this Register, covering 25 districts and cities under direct central administration - Kiev and Sebastopol. The second most ramified network is the net of the Sanitary and Epidemiological Service fo the Ministry of Health of Ukraine, which is implemented on the computer centers of the district Sanitary and Epidemiological Service, which transmits operative information on the current sanitary, epidemiological, and ecological situation to the Ministry of Health of Ukraine. These nets are integrated in a common net called 'HealthNet'. A third medical network has been created for the monitoring of oncological patients in Ukraine. This network links the regional Oncological Dispensaries with the Institute of Oncology in Keiev, on the basis of which the Oncological Register functions.
Author
Data Bases; Health; Telemedicine; Information Management

20010066269 National Medical Univ., Kiev, Ukraine
Immunogenetic Approach to Prognosis of Military Specialist' Health Status
Afonina, G., National Medical Univ., Ukraine; Varys, V., National Medical Univ., Ukraine; Yatsenko, V., National Medical Univ., Ukraine; Bely, A., National Medical Univ., Ukraine; Bruzgina, T., National Medical Univ., Ukraine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 17-1 - 17-4; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

In summary, the immuno-genetic approach to the prognosis of changes in the health status of military specialists has enabled us; (1) to develop new methodological and organizational medical principles for the dispensary system and for the rehabilitation of military personnel working under extreme conditions; (2) to set new criteria for a scientific evaluation of working conditions; (3) to unify the medical screening of military personnel which has repeatedly been exposed to adverse and harmful occupational

and environmental conditions; and (4) to obtain information on which medical-prophylactic and preventive rehabilitation measures can be based.
Derived from text
Monitors; Health; Prognosis

20010066372 Air Force Research Lab., Human Effectiveness Directorate, Wright-Patterson AFB, OH USA
Physiologically Based Pharmacokinetic Models for Trichloroethylene and its Oxidative Metabolites, *Mar. 1997 - Nov. 1999*
Fisher, Jeffrey W., Air Force Research Lab., USA; Environmental Health Perspectives; May 2000; Volume 108, Supplement 2, pp. 265-272; In English
Contract(s)/Grant(s): F41624-96-C-9010
Report No.(s): AD-A387528; AFRL-HE-WP-TR-2001-0020; Copyright; Avail: Defense Technical Information Center (DTIC)

Trichlorothylene (TCE) pharmacokinetics have been studied in experimental animals and humans for over 30 years. Compartmental and physiologically based pharmacokinetic (PBPK) models have been developed for the uptake, distribution, and metabolism of TCE and the production, distribution, metabolism, and elimination of P450-mediated metabolites of TCE. TCE is readily taken up into systemic circulation by oral and inhalation routes of exposure and is rapidly metabolized by the hepatic P450 system and to a much lesser degree, by direct conjugation with gluathione. Recent PBPK models for TCE and its metabolites have focussed on the published compartmental and PBPK models for TCE. Trichloracetic acid (TCA) is considered a principle metabolite responsible for TCE-induced liver cancer in mice. Liver cancer in mice was considered a critical effect by the US Environmental Protection Agency for deriving the current maximum contaminant level for TCE in water. to reduce confusion about disparately measured and model-predicted levels of TCE in plasma and the whole blood, model-predicted outcomes are compared for first-generation and second-generation PBPK models published by Fisher and colleagues.
Author
Metabolism; Metabolites; Pharmacology; Trichloroethylene

20010066548 Army Research Inst. of Environmental Medicine, Natick, MA USA
The Impact of Load and Grade on Energy Expenditure During Load Carriage, Part II: Field Study
Santee, William R.; Blanchard, Laurie A.; Small, Mark G.; Gonzalez, Julio A.; Matthew, William T.; May 2001; 33p; In English
Report No.(s): AD-A390501; USARIEM-TR-T01-11; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The metabolic costs of load carriage were measured for 8 volunteers on uphill, level and downhill grades at Yakima Training Center (YTC). Volunteers carried loads of 0, 13.6 or 27.2 kg as they walked on grades of 0% (level), +/- 14%, +/- 8.6% and approx. 12% at 3 mph. Mean values for oxygen consumption (VO2) during load carriage indicate costs increased with increasing load and uphill grade, and decreased with negative grades. A mathematical model, using a terrain factor of 1.1 for sites with gravel, was used to calculate load carriage costs. Those values were compared to field data. Results for the negative data showed no significant difference between the model and downhill measurements. For the +8.6% grade there was a significant difference between the measured and model calculated values, which underestimated the measured costs. Results obtained under field conditions were also compared to results obtained under laboratory conditions on treadmill grades of 0%, +/- 4%, +/- 8% and approx. 12%. When the field data were compared to laboratory values, the field data were also higher than the laboratory data. It is possible that the difference between observed and model calculated values reflects a difference between laboratory and field conditions.
DTIC
Impact Loads; Endurance; Loads (Forces); Metabolism; Costs

20010066565 Walter Reed Army Inst. of Research, Dept. of Enteric Infections, Silver Spring, MD USA
Isolation and Characterization of a Shigella Flexneri Invasin Complex Subunit Vaccine
Turbyfill, K. Ross, Walter Reed Army Inst. of Research, USA; Hartman, Antoinette B., Walter Reed Army Inst. of Research, USA; Oaks, Edwin V., Walter Reed Army Inst. of Research, USA; Infection and Immunity; December 2000; ISSN 0019-9567, pp. 6624-6632; In English
Report No.(s): AD-A386676; Copyright; Avail: Defense Technical Information Center (DTIC)

The invasiveness and virulence of Shigella spp. are largely due to the expression of plasmid-encoded virulence factors, among which are the invasion plasmid antigens (Ipa proteins). After infection, the host immune response is directed primarily against lipopolysaccharide (LPS) and the virulence proteins (IpaB, IpaC, and IpaD). Recent observations have indicated that the Ipa proteins (IpaB, IpaC, and possibly IpaD) form a multiprotein complex capable of inducing the phagocytic event which internalized the bacterium. We have isolated a complex of invasions and LPS from water-extractable antigens of virulent shigellae by ion-exchange chromatography. Western blot analysis of the complex indicates that all of the major virulence antigens of Shigella,

including IpaB, IpaC, and IpaD, and LPS are components of this macromolecular complex. Mice or guinea pigs immunized intranasally with purified invasion complex (invaplex), without any additional adjuvant, mounted a significant immunoglobulin G (IgG) and IgA antibody response against the Shigella virulence antigens and LPS. The virulence-specific response was very similar to that previously noted in primates infected with shigellae. Guinea pigs (keratoconjunctivities model) or mice (lethal lung model) immunized intranasally on days 0, 14, and 28 and challenged three weeks later with virulent shigella were protected from disease.
Author
Antigens; Bacteria; Physiological Responses; Proteins; Virulence

20010066566 Walter Reed Army Inst. of Research, Div. of Neurosciences, Silver Spring, MD USA
Chronic Sustained Stress Increased Levels of Anterior Pituitary Prolactin mRNA
Dave, Jitendra R., Walter Reed Army Inst. of Research, USA; Anderson, Sally M., Walter Reed Army Inst. of Research, USA; Saviolakis, George A., Walter Reed Army Inst. of Research, USA; Mougey, Edward H., Walter Reed Army Inst. of Research, USA; Bauman, Richard A., Walter Reed Army Inst. of Research, USA; Kant, G. Jean, Walter Reed Army Inst. of Research, USA; Pharmacology, Biochemistry and Behavior; 2000; ISSN 0091-3057; Volume 67, pp. 423-431; In English
Report No.(s): AD-A386672; Copyright; Avail: Defense Technical Information Center (DTIC)

Our laboratory is investigating the effects of chronic stress on physiological, endocrine, and behavioral measures, in order to elucidate the neuronal substrates for the pathophysiological consequences of stress in humans. In these studies, we have employed a rodent model of sustained stress in which rates are exposed to around-the-clock intermittent footshock that can be avoided or escaped by rats in the controllable stress group, but not by rats in the uncontrollable stress group. Each rat in the uncontrollable stress group is paired (yoked) to a rate in the controllable stress group such that the controllable stress group rat avoids or escapes shock for both rats. A third group of rats receives no shock (controls). We have previously reported that in male rats, plasma prolactin levels were elevated after three days of stress in both stress groups. In the present experiments we determined whether the increases in plasma prolactin were correlated with these responses in female as well as male rats. Adult male and female Sprague-Dawley rats were exposed to chronic stress for 1, 3, or 14 days. In unstressed control rats, levels of anterior pituitary prolactin mRNA were fivefold higher in female as compared to male rats. However, stress increased levels of anterior prolactin mRNA over baseline in both genders. After one day of stress, anterior pituitary prolactin mRNA levels increased in male and female rats belonging to both stress groups, with no significant difference seen between the uncontrollable vs. controllable stress groups. After three days of stress, anterior pituitary prolactin mRNA levels were even more elevated, and rats in the uncontrollable stress group had higher anterior pituitary prolactin mRNA levels than those in the controllable stress group. After 14 days of stress, there were no significant differences in control and stressed groups with respect to anterior pituitary prolactin mRNA. These data suggest that chronic sustained stress increases the synthesis of anterior pituitary prolactin mRNA during the fist days of stress, and that levels return to pre-stress values sometime between 3 and 14 days of stress.
Author
Pituitary Gland; Pituitary Hormones; Stress (Physiology); Stress Analysis; Physiological Responses

20010066569 Walter Reed Army Inst. of Research, Washington, DC USA
Antioxidant Loading Reduces Oxidative Stress Induced by High-Energy Impulse Noise (Blast) Exposure
Elsayed, Nabil M., Walter Reed Army Inst. of Research, USA; Armstrong, Karyn L., Walter Reed Army Inst. of Research, USA; William, Myron T., Walter Reed Army Inst. of Research, USA; Cooper, Mary F., Walter Reed Army Inst. of Research, USA; Toxicology; 2000; ISSN 0300-483X; Volume 155, pp. 91-99; In English
Report No.(s): AD-A386656; Copyright; Avail: Defense Technical Information Center (DTIC)

Detonation of explosives, firing of large caliber weapons and occupational explosions, professional or accidental, produce high-energy impulse noise (blast) waves characterized by a rapid rise in atmospheric pressure (overpressure) followed by gradual decay to ambient level. Exposure to blast waves causes injury, predominantly to the hollow organs such as ears and lungs. We have previously reported that blast exposure can induce free radical-mediated oxidative stress in the lungs characterized by antioxidant depletion, lipid peroxidation, and hemoglobin (Hb) oxidation. In this study, we examined whether pre-loading, adequately fed rats, with pharmacological doses of antioxidants would reduce the response to blast. Sprague-Dawley rats weighing 300-350 g were loaded with either 800 IU vitamin E (VE), 1000 mg vitamin C (VC), or 25 mg lipoic acid (LA) for three consecutive days by gavage before exposure to blast. Both VE and LA were dissolved in 2 ml corn oil, but VC in 2 ml water. After the three-day antioxidant loading, the rats were divided into six groups (five rats per group), deeply anesthetized with sodium pentobarbital (60 mg/kg body weight), then exposed to a low level blast (62 +/- 2 kPa peak pressure and 5 ms duration). A matched number of groups were sham exposed and served as controls. One hour after exposure, all rats were euthanized, then blood and lung tissue was analyzed. We found that antioxidant loading resulted in restored Hb oxygenation, and reduced lipid peroxidation.

Lung tissue VE content was elevated after loading but VC did not change possibly due to their different bioavailability and saturation kinetics. These observations suggest that brief antioxidant loading with pharmacological doses can reduce blast-induced oxidative stress, and may have occupational and clinical implications.
Author
Antioxidants; Explosions; Exposure; Lungs; Damage

20010066869 Air Force Research Lab., Biodynamics and Protection Div., Brooks AFB, TX USA
Effects of Inertial Load and Countermeasure on the Distribution of Pulmonary Blood Flow ***Final Report, 8 Apr. 1998 - 31 Jan. 2000***
Chornuk, Myron A., Washington Univ., USA; Bernard, Susan L., Washington Univ., USA; Burns, John W., Air Force Research Lab., USA; Glenny, Robb W., Washington Univ., USA; Sheriff, Don D., Iowa Univ., USA; Sinclair, Scott E., Washington Univ., USA; Polissar, Nayak L., Mountain-Whisper-Light Statistical Consulting, USA; Hlastala, Michael P., Washington Univ., USA; Journal of Applied Physiology; 2000; Volume 89, pp. 445-457; In English
Contract(s)/Grant(s): NIH-NHLBI-HL-12174; NIH-NHLBI-HL-24163; AF Proj. 7184
Report No.(s): AD-A387857; AFRL-HE-BR-TR-2001-0028; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

We assessed the influence of cranial-to-caudal inertial force (+Gz) and the countermeasures of anti-G suit and positive pressure breathing during G (PBG), specifically during +Gz, on regional pulmonary blood flow distribution. Unanesthetized swine were exposed randomly to 1 Gz (resting), +3Gz, +6Gz, and +9Gz, with and without anti-G suit and PBG with the use of the Air Force Research Laboratory centrifuge at Brooks Air Force Base (the gravitational force of the earth, that is, the dorsal-to-ventral inertial force, was present for all runs). Fluorescent microspheres were injected into the pulmonary vasculature as a marker of regional pulmonary blood flow. Lungs were excised, dried, and diced into 2 cubic cm pieces, and the fluorescence of each piece was measured. As +Gz was increased from 0 to +3Gz, blood flow shifted from the cranial and hilar regions toward caudal and peripheral regions of the lung. This redistribution shifted back toward cranial and hilar regions as anti-G suit inflation pressure increased at +6 and +9 Gz. Perfusion heterogeneity increased with +Gz stress and decreased at the higher anti-G suit pressures. The distribution of pulmonary blood flow was not affected by PBG. ANOVA indicated anatomic structure as the major determinant of pulmonary blood flow.
Author
Blood Flow; Pressure Breathing; Lungs; Cranium

20010066884 Air Force Research Lab., Flight Stress Protection Div., Brooks AFB, TX USA
Effects of Rotation on Somatographic Illusions ***Final Report, 1 Oct. 1998 - 1 Oct. 1999***
Lessard, Charles S., Veridian, Inc., USA; Matthews, Roger, Air Force Research Lab., USA; Yauch, David, Air Force Research Lab., USA; IEEE Engineering in Medicine and Biology; March/April 2000; ISSN 0739-5175; Volume 19, No. 2, pp. 59-65; In English
Contract(s)/Grant(s): AF Proj. 7184
Report No.(s): AD-A387855; AFRL-HE-BR-TR-2001-0047; No Copyright; Avail: CASI, Magnetic Tape

This research was conducted as a result of the findings and recommendations from a previous study titled 'Visual Effects on the somatogravic Illusion'. The objectives of this study were to investigate two areas: (1) the SGI profile, in order to determine if a daylight visual scene in the ASDD can achieve visual dominance over nonvisual vestibular orientational inputs; e.g., otolith and semicircular ducts, and (2) evaluation the effects of rotation on pitch perception, in order to determine if there is otolith-semicircular canal interaction, which may cause reduction of the somatogravic perception. Sixteen male and female subjects participated in the study. Eight subjects were experienced military pilots and the remaining eight subjects were nonpilots. It was concluded that pilots were visually coupled to the scene with the simulated accelerating, level-flight night scene and day scene. It was also concluded that there are significant differences between pilots and nonpilots for conditions with pitch and rotation. Perhaps one of the most important conclusions is the need to use pilots in any study that evaluates responses in flight or simulated flights. There should be no doubt that the training pilots receive should result in different perception of motion when compared to the nontrained subject.
Author
Illusions; Rotation; Attitude (Inclination)

20010066975 Hawaii Univ., Biotechnology Program, Honolulu, HI USA

Molecular Analysis of Thermoregulation of Phaseolotoxin-Resistant Ornithine Carbamoyltransferase (argK) from Pseudomonas syringae pv. phaseolicola

Rowley, Karla B., Hawaii Univ., USA; Xu, Rong-Hui, Hawaii Univ., USA; Patil, Suresh S., Hawaii Univ., USA; Molecular Plant-Microbe Interactions; 2000; Volume 13, No. 10, pp. 1071-1080; In English

Contract(s)/Grant(s): DAAH04-96-1-0032

Report No.(s): AD-A387130; ARO-35524.2-LS-SAH; MPMI-M-2000-0728-01R; Copyright; Avail: Defense Technical Information Center (DTIC)

The phaseolotoxin-resistant ornithine carbamoyltransferase (ROCT) and phaseolotoxin are produced by Pseudomonas syringae pv. phaseolicola at 18 C but not at 28 C. At 28 C, the pathogen produces a protein(s) that binds (in vitro) to a 485-bp fragment (thermoregulatory region, TRR) from a heterologous clone from the pathogen genomic library, which in multiple copies overrides thermoregulation of phaseolotoxin production in wild-type cells. We report here that DNase I protection analysis of the 485-bp fragment shows that a single site is protected from cleavage by the protein in the 28 C extract and that this site contains two repeats of a core motif G/C AAAG separated by a 5-bp spacer. Partially purified binding protein forms specific complexes with a synthetic oligonucloutide containing four tandem repeats of this motif. A 492-bp upstream fragment from argK encoding ROCT also forms specific complexes with the protein in the 28 C crude extract, and a 260-bp subfragment from the TRR containing the binding site cross competes with the argK fragment, indicating that the same protein binds to nucleotides in both fragments. DNase I protection analysis of the fragment from argK revealed four separate protected sequence elements, with element III containing half of the core motif sequence (CTTTG), and the other elements containing similar sequences. Gel shift assays were done with DNA fragments from which one or all of the sites were removed as competitor DNAs against the argK probe. The results of these experiments confirmed that the binding sites (in argK) are necessary for the protein to bind to the argK fragment in a specific manner. Taken together, the results of studies presented here suggest that in cells of P. syringae pv. phaseolicola grown at high temperature argK may be negatively regulated by the protein produced at this temperature.

Derived from text

Fragments; Pathogens; Protection; Proteins; Pseudomonas

20010066979 Air Force Research Lab., Brooks AFB, TX USA

Brief Exposure to -Gz Reduces Cerebral Perfusion Pressure During Subsequent +Gz Stress in Rats ***Final Report, 1 Oct. 1998 - 30 Sep. 1999***

Sheriff, Don D., Iowa Univ., USA; Isdahl, Wayne M., Air Force Research Lab., USA; Nelson, Christopher D., Iowa Univ., USA; Werchan, Paul M., Air Force Research Lab., USA; Aviation, Space and Environmental Medicine; January 2001; Volume 72, No. 1, pp. 8-12; In English

Contract(s)/Grant(s): NIH-NHLBI-HL-46314; AF Proj. 2313

Report No.(s): AD-A387854; AFRL-HE-BR-TR-2001-0053; Copyright; Avail: Defense Technical Information Center (DTIC)

In humans, +Gz exposure immediately preceded by exposure to zero or -Gz can result in unexpected incapacitation (push-pull) effect. Our goals were to establish whether this phenomenon exists in rats and to evaluate the importance of varying the duration of -Gz exposure on magnitude of the push-pull effect on cerebral perfusion pressure. Eight conscious male rats were studied in the transition from + 5 Gz to + 10 Gz imposed by centrifugation. This was done with (push-pull) or without (control) 2 s exposure to -5 G applied using a counterbalanced design. Seven isoflurane anesthetized rats were studied in the transition from 0 Gz (+1 Gz) to + Gz imposed by tilting. This was done with (push-pull) or without (control) 0.5, 1, 3, or 9 s exposure to -1 Gz imposed immediately prior to the transition applied using a counterbalanced design. Exposure to 2 s of -5 GZ significantly reduced carotid artery pressure in the fourth through eighth seconds of exposure to +10 Gz by an average of 15 mmHg compared with control. In the tilt experiments, a push-pull effect was found with mild Gz exposure (+/- Gz) with as little as 0.5 s -Gz exposure. Varying the head-down dwell time did not alter the magnitude of the exaggerated hypotension induced by push-pull. We conclude that rats express a push-pull effect similar to that observed in humans but that altering the duration of exposure to -Gz does not influence the magnitude of the push-pull effect.

Author

Physiological Effects; Microgravity; Gravitational Effects

20010067510 Civil Aeromedical Inst., Oklahoma City, OK USA

Index to FAA Office of Aviation Medicine Reports: 1961 Through 2000 ***Final Report, 1961-2000***

Collins, William E., Civil Aeromedical Inst., USA; Wayda, Michael E., Civil Aeromedical Inst., USA; Jan. 2001; 98p; In English

Report No.(s): AD-A389987; DOT/FAA/AM-01/1; No Copyright; Avail: CASI; A02, Microfiche; A05, Hardcopy

An index to Federal Aviation Administration Office of Aviation Medicine Reports (1964-2000), CARI Reports (1961-1963), and Civil Aeromedical Institute Reports is presented for those engaged in aviation medicine and related activities. The index lists all FAA aviation medicine reports published from 1961 through 2000: chronologically, alphabetically by author, and alphabetically by subject. A foreword describes historical aspects of the Civil Aeromedical Institute's 40 years of service, describes the index's sections, and explains how to obtain copies of published Office of Aviation Medicine technical reports.
DTIC
Aerospace Medicine; Indexes (Documentation); Research

53
BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

20010066109 NASA Ames Research Center, Moffett Field, CA USA
Conceptual Coordination Bridges Information Processing and Neurophysiology
Clancey, William J., NASA Ames Research Center, USA; [2000]; 10p; In English; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Information processing theories of memory and skills can be reformulated in terms of how categories are physically and temporally related, a process called conceptual coordination. Dreaming can then be understood as a story understanding process in which two mechanisms found in everyday comprehension are missing: conceiving sequences (chunking categories in time as a categorization) and coordinating across modalities (e.g., relating the sound of a word and the image of its meaning). On this basis, we can readily identify isomorphisms between dream phenomenology and neurophysiology, and explain the function of dreaming as facilitating future coordination of sequential, cross-modal categorization (i.e., REM sleep lowers activation thresholds, "unlearning").
Author
Neurophysiology; Information; Data Processing; Coordination

20010067401 Air Force Inst. of Tech., School of Engineering, Wright-Patterson AFB, OH USA
Influence of Personality Type and Anonymity on Participation in a Group Support System
Hartmann, Robert E.; Mar. 2000; 180p; In English
Report No.(s): AD-A389387; AFIT/GIR/ENV/01M-09; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

A group support system (GSS) uses a combination of networked personal computers, software that collects, manipulates, and aggregates member's individual input, and human facilitation to improve the group decision-making process. A GSS has been promoted as a means of improving the quantity and quality of ideas within a decision-making meeting. Research into GSS has focused on the benefits of providing anonymity to improve participation. Anonymity in a GSS meeting has been offered as a means to improve participation, which in turn improves decision quality. to date this has not been proven through research. In fact, there is conflicting evidence as to what the actual effects of anonymity are. Research in social psychology provides a possible explanation for the conflicting results of the effects of anonymity. An individual's personality characteristics can effect how they participate in a decision-making meeting. The study examined how an individual's personality type and varying degrees of anonymity influence individual participation in a GSS meeting. The results of the study suggest personality characteristics have a significant impact on participation within a GSS supported meeting. Further, the results suggest personality and its interaction with anonymity has a positive effect on participation for some individuals, but not all. Consistent with most prior GSS studies, the results suggest anonymity does have a positive effect; however, this effect was significant only for certain personality traits.
DTIC
Decision Making; Group Dynamics; Computer Programs

54
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human factors engineering; bionics, man-machine, life support, space suits and protective clothing. For related information see also 16 Space Transportation and 52 Aerospace Medicine..

20010066098 Naval Postgraduate School, Monterey, CA USA
Investigation of Biomechanical Response Due to Fragment Impact on Ballistic Protective Helmet
King, Quinten M.; March 1998; 131p; In English
Report No.(s): AD-A345514; No Copyright; Avail: Defense Technical Information Center (DTIC)

Technology has increased dramatically over the last 25 years. It has allowed the development of personnel body armor capable of preventing penetration of fragments traveling in excess of 2000 ft/s (609 m/s). However, these strides have also exposed the body to greater impact energies without a lethal penetration. The objective of this research was to examine how the body in particular the Head-Neck Complex responds to these impacts. A finite element model was developed to characterize the behavior of this biomechanical system. This model was then validated &against existing experimental work form the automotive industry. The validated model was then subjected to impacts at different positions to induce different load cases. Each set of results were then compared to the Head Injury Criteria (HIC), Abbreviated Injury Scale (MS), and the Injury Assessment Reference Values (IARVS) for evidence of injury potential. Disc stiffness was found to be proportional to the injury potential. Rupture of the disc was considered likely for 5 of the 6 cases examined. Fracture of the vertebral body was considered likely in 3 of the 6 cases. Suggestions for future research are included in the hopes to furthering research into this area.
DTIC
Armor; Automobiles; Biodynamics; Finite Element Method; Helmets

20010066217 Army Research Inst. of Environmental Medicine, Natick, MA USA
Metabolic Rate and Heat Stress Associated With Flying Military Rotary-Wing Aircraft
Staab, Janet E.; Kolka, Margaret A.; Cadarette, Bruce S.; Jun. 1998; 18p; In English
Report No.(s): AD-A345641; USARIEM-TN98-3; No Copyright; Avail: Defense Technical Information Center (DTIC)

This report focuses on the metabolic rates of front- and rear-seated crewmembers operating military rotary-wing aircraft. A review of the literature was performed and summarized to include US Army and NATO aircraft. Based on the findings of this report, piloting such aircraft requires very light to light metabolic intensities (105-240 watts). Preflight activities and crewmember duties are considered moderate metabolic intensity (206-490 watts). The operational scenario for military aviation is described along with a brief explanation of US Army helicopters including a summary of general crewmember tasks. Since heat stress is a limiting factor in the helicopter cockpit, a summary of temperature data is also included. Although temperature control devices have shown some success in alleviating heat stress in the cockpit, there is still evidence of decrements in aviator performance mainly due to wearing impermeable chemical protective clothing.
DTIC
Rotary Wing Aircraft; Tailless Aircraft; Heat Tolerance

20010066252 Research and Technology Organization, Human Factors and Medicine Panel, Neuilly-sur-Seine, France
The Impact of NATO/Multinational Military Missions on Health Care Management ***L'Impact des Missions OTAN/Militaires Internationales sur la Gestion des Soins de Sante***
The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001; 140p; In English, 4-6 Sep. 2000, Kiev, Ukraine; See also 20010066253 through 20010066273; CD-ROM contains full text document in PDF format
Report No.(s): RTO-MP-068; AC/323(HFM-051)TP/35; ISBN 92-837-1059-2; Copyright Waived; Avail: CASI; C01, CD-ROM; A07, Hardcopy; A02, Microfiche

The proceedings include the Technical Evaluation Report, two key-note addresses, and solicited papers of the Specialists' meeting sponsored by the NATO Human Factors and Medicine panel and held at the 'Ukrainsky Dim' in Kiev, Ukraine, 4-6 September 2000. Recent major events across the world and at national levels have radically altered the global picture and have reshaped the NATO strategy from one aimed at resolving international conflict to one predominantly aimed at missions other than way (peacekeeping, humanitarian, disaster relief, etc.). Most of these missions are performed by multinational forces, which requires the cooperation of all military services including the medical support systems. The new objectives require radical changes in the organizational structure, management, and supply of national and allied military health systems. The purpose of this Specialists' Meeting was to exchange information and experience on Health Service Support (HSS) of multinational troops, to review the development of interoperable forms of multinational HSS in the field, to examine the lessons learned during actual

operational deployment of multinational medical facilities, and to discuss the interplay between multinational, alliance/NGO, and civil/military operations in coping with disasters which require alliance or EAPC assistance.
Author
Medical Services; Health; North Atlantic Treaty Organization (NATO); International Cooperation; Standardization; Emergencies

20010066253 Ukranian Armed Forces, Military Medical Service, Kiev, Ukraine
Medical Support of Armed Forces of Ukraine: New Vision of Organizational Structure and Management
Bily, V. Y., Ukranian Armed Forces, Ukraine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 1-1 - 1-5; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

In recent years, the contribution of the human factor (personnel combat strength) to the fighting readiness of combat troops has increased considerably. On the one hand, the use of weapons with highly destructive characteristics may not only cause losses in manpower on a significantly higher scale, but these losses also have different characteristics (large numbers of multiple injuries, in addition to combat stress and fatigue). On the other hand, the armed forces of the civilized nations consist of military specialists managing modern military technologies. As is well known, the expenses of training a modern high quality military pilot training costs several million dollars, which is comparable with the cost of a jet-fighter. Therefore, the health and professional sustainability of military experts has obtained strategic importance. The purpose of the present report, which can be important for international medical community, is to describe the problems the Ukraine Armed Forces are currently facing in the area of military medical support. We have developed a concept for a new system of military-medical service, which is capable of providing modern quality standards of medical care. The concept aims at establishing a military-medical service which will include and combine three managerial infrastructures (curative-prophylactic, hygiene-epidemiological, and military-medical supply) and two systems (training of military-medical personnel and research).
Derived from text
Medical Services; Health; Armed Forces (Foreign); Management Systems

20010066254 Supreme Headquarters Allied Powers Europe, Logistics Div., Casteau, Belgium
NATO Medical Support to Crisis Response Operations: A Strategic View
Klein, Leo, Supreme Headquarters Allied Powers Europe, Belgium; Kasper, Martin, Supreme Headquarters Allied Powers Europe, Belgium; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 2-1 - 2-6; In English; See also 20010066252; Original contains color illustrations; Copyright Waived; Avail: CASI; A02, Hardcopy

The paper will present the Strategic Command Europe's view on multinational medical operations including current developments and the way ahead.
Author
Medical Services; International Cooperation

20010066255 German Air Force, First Air Div., Karlsruhe, Germany
Flexibility is the Key to Airpower, Medical Power is the Key to Operations Success: Lessons Learned from Flying Operations over the Balkans
Jertz, Walter, German Air Force, Germany; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 3-1 - 3-6; In English; See also 20010066252; Copyright Waived; Avail: CASI; A02, Hardcopy

This paper presents a brief overview of the European situation as described during the Summit Meeting of the Head of States in Washington, April 1999. The requirements for adequate Health Care Management from a military operational standpoint will be reviewed. The preparation and training, the situation in combat operations as well as after action care for airmen will be described, along with a discussion of lessons learned from recent military operations with special emphasis on the German view.
Author
Health; Medical Services; Military Operations; Requirements

20010066256 Ukrainian Armed Forces, Research Inst. of Military Medicine, Kiev, Ukraine
Rational Distribution and Use of Military-Medical Resources
Vovkodav, Nikolay N., Ukrainian Armed Forces, Ukraine; Varus, Vassily, Ukrainian Armed Forces, Ukraine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 4-1 - 4-3; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

The support of resources, including assessment of needs, the structure of the acquisition system, and the distribution and utilization of medical goods are among the most urgent problems of the military health care in Ukraine. The often ineffective

performance of the military-medical service is due to the rigid, inflexible health resources system. A second negative factor is the irrational distribution of the limited resources, particular of the funds for the treatment of patients. The discrepancies can be explained by the high disease incident rates among military personnel. A third negative factor is the inadequate system of military-medical system financing, which does not allow the commanders to spend money on measures promoting the health of personnel. The paper describes the scope and essence of the current reform of distribution system and of the use of medical resources in the Ukraine Armed Forces. We will try to answer the following questions: (1) How can the leadership of the military-medical service develop strategies for a more rational distribution and utilization of military-medical resources? (2) What role do the managerial bodies of the military-medical system play in undertaking the reform of the health resource system?
Derived from text
Health; Medical Services; Resource Allocation; Financial Management

20010066257 Supreme Headquarters Allied Powers Europe, Logistics Div., Casteau, Belgium
Pre-Deployment Medical Readiness Preparation
Kasper, Martin, Supreme Headquarters Allied Powers Europe, Belgium; Klein, Leo, Supreme Headquarters Allied Powers Europe, Belgium; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 5-1 - 5-4; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

With emphasis on medical readiness preparation for the deployment of forces to a NATO/Multinational Military Mission, this paper will cover the following topics: (1) NATO Medical Support Principles and Policies; (2) Medical Operational Principles; (3) Allied Joint Medical Support Doctrine; (4) Crucial Aspects of the Most Likely Types of Current and Future Operations (Medical); (5) Force Protection, Medical Force Protection and Medical Force Protection Assessment; (6) Life-Cycle Medical Surveillance for Operational Deployment; and (7) Pre-Deployment Medical Readiness Preparation and Baseline Assessment.
Author
Policies; Medical Services; Preparation; Military Operations

20010066258 Ministry of Defence, Main Military Clinical Hospital, Kiev, Ukraine
System of Primary Health Care in Kiev Military-Medical Center
Bojchack, M. P., Ministry of Defence, Ukraine; Holyk, L. A., Ministry of Defence, Ukraine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 6-1 - 6-6; In English; See also 20010066252; Original contains color illustrations; Copyright Waived; Avail: CASI; A02, Hardcopy

The strategy of the World Health Organization (WHO) concerning the reorientation of health service to the primary medical care (PMC) is accepted by the majority of the states of the world. There are strong methodical, financial, and economical arguments for this. Taking into account the urgency and the importance of this problem, the Ministers of Health of many nations have accepted the Lublin Charter in 1996, which recommends that all health care systems develop and improve the PMC. The specific features of the health care system reform in Ukraine, the status of its financing, the process of decentralization and the transition to a market economy, all also emphasize the need to give a high priority to PMC. The main purpose and tasks of the reform of PMC are: (1) the gradual improvement of the health status of the population by the introduction of preventive measures, by early diagnosis of diseases, and by improving health care access and quality; (2) to distribute health care in an equitable manner across primary, secondary, and tertiary levels; (3) the rationalization of all types of public health services; (4) to reduce the costs of medical care by restricting specialized medical care to cases that really need it; and (5) to reduce the number of hospital admissions and to expand the network of day-care and medical aid stations. In this way, we will open the possibilities for the population as a whole to employ medical services, we will increase the patient's opportunities to choose a doctor, and we will increase the responsibility of the physician for the health status of his patients.
Derived from text
Medical Services; Priorities; Public Health; Management Systems

20010066261 Supreme Headquarters Allied Powers Europe, Logistics Div., Casteau, Belgium
Deployment Phase Medical Readiness Support
Kasper, Martin, Supreme Headquarters Allied Powers Europe, Belgium; Klein, Leo, Supreme Headquarters Allied Powers Europe, Belgium; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 9-1 - 9-4; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

This paper on 'Deployment Phase Medical Readiness Support' will complete the information on medical readiness preparation requirements for the deployment of force to a NATO/Multinational Medical Mission.
Author
Deployment; Medical Services; Preparation; Requirements

20010066263 Ukrainian Armed Forces, Research Inst. of Military Medicine, Irpen, Ukraine

Unified Principles, Requirements and Standards of Armed Forces Medical Support

Sokhin, Alexander, Ukrainian Armed Forces, Ukraine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 11-1 - 11-8; In English; See also 20010066252; Copyright Waived; Avail: CASI; A02, Hardcopy

Successful completion of any military mission requires a proper organization of the health service support (HSS) of the troops. The principal document serving as a guide for military and military-medical commanders, planning staff and physicians, is the Military-Medical Doctrine (Doctrine). There are national (multiservice), allied (NATO) and combined (NATO and PfP) Doctrines. Allied and combined Doctrines are designed to provide the necessary level of unification and standardization allowing to carry out joint medical services tasks more effectively and at low cost. On the other hand, they should take the special nature of national systems of medical services into account. Conceptions of allied or partner Doctrines must be presented in such manner that national differences in the Armed Forces medical support of participating countries will not trouble their interaction and cooperation. This paper focuses on the conceptual approach to the development of the Doctrine for Ukraine, and on differences and similarities with Doctrines of NATO and other countries. It will be emphasized that it is a common task for military commanders and the medical service, to ensure high standards of professional health as a crucial component of the combat strength of military personnel. Therefore, it is necessary to clearly determine the responsibilities and actions that are necessary in order to protect and preserve the health and life of military personnel.

Author

Health; Medical Services; Standardization

20010066265 Ukrainian Military-Medical Academy, Kiev, Ukraine

System of Training and Certification of Military-Medical Personnel in Ukraine Armed Forces

Pasko, Vladimyr V., Ukrainian Military-Medical Academy, Ukraine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 13-1 - 13-4; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

When Ukraine was proclaimed as an independent State, a national system for military-medical education was established. In the early nineties, the conceptual approaches and the structural model for the military-medical personnel training was developed. The tasks, organization, and principles of functioning of the Ukrainian Military-Medical Academy (UMMA) were determined and approved. by that time, there were 34 military educational institutions dislocated in Ukraine, but none of these was engaged in the training of military physicians, or in research in military medicine. All institutions working in these areas were historically situated in the Russian Federation. In 1992, initial legislative measures were taken by the government of Ukraine relating to the foundation of the UMMA. First of all, the training of military-medical specialists was recognized as one of the basic tasks of the National medical university. Then, the Government took the important decision to establish the Military Medical Department (MMD) as a part of this University. Undergraduate training, postgraduate training and specialization of military physicians and provisors meeting the State standards were set as the paramount tasks for the MMD. A no less important objective was the postgraduate training of military-medical managers and administrators of the Ministry of Defense, of specialists of civil health institutions working in the field of the State defense and security as well as of the medical corps of the Ministry of Emergency Situations. An essential part of the MMD's activities referred to the organization and implementation of fundamental and applied research in the field of military medicine. The first students were admitted to the MMD in 1993. Next, the Ukraine Military Medical Academy was founded on the base of the MMD as an independent training, research, methodical and information center of military-medical service. The present organization structure of the UMMA is shown.

Derived from text

Education; Medical Personnel; Medical Services; Personnel Development; Management Systems

20010066266 National Medical Univ., NILC, Kiev, Ukraine

Partnership in Ukraine Ministry of Health and Academy of Medical Sciences Scientific Direction of "Aerospace Medicine"

Yatsenko, Valentine, National Medical Univ., Ukraine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 14-1 - 14-4; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

The scientific direction of 'Aerospace Medicine' was generated in 1996 under the Ministry of Health (MOH) and the Academy of Medical Sciences (AMS) of Ukraine with the purpose: to link up the scientific potential of the MOH and the AMS of Ukraine for the solution of fundamental and applied problems of aviation and space medicine; to coordinate the partner relationships with establishments of a National Academy of Sciences, National Space Agency, Ministry of Defense of Ukraine and other departments; to advance international cooperation. to realize these objectives, seven scientific commissions have been

set up, which cover the following topics: (1) Space Ecology; (2) Space Biotechnology; (3) Space Radiation Medicine; (4) Space Pharmacology and Toxicology; (5) Space Biomedicine; (6) Telemedicine; and (7) Aerospace Medicine.
Derived from text
Health; Medical Science; Aerospace Medicine; International Cooperation

20010066268 North Atlantic Treaty Organization, International Military Staff, Brussels, Belgium
International Military Medical Standardization: Status and Prospects
Lam, David M., North Atlantic Treaty Organization, Belgium; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 16-1 - 16-9; In English; See also 20010066252; Copyright Waived; Avail: CASI; A02, Hardcopy

The purpose of this paper is to discuss medical standardization within the international military arena. I will present the driving factors, procedures, and an overview of medical standardization within NATO of importance to PFP nations.
Author
Standardization; Medical Services

20010066270 Ukrainian Inst. of Public Health, Kiev, Ukraine
The Role of the Branch Unified Standards of Medical Technologies in Ukrainian Public Health System
Ponomarenko, V. M., Ukrainian Inst. of Public Health, Ukraine; Nahorna, A. M., Ukrainian Inst. of Public Health, Ukraine; Stepanenko, A. V., Ukrainian Inst. of Public Health, Ukraine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 18-1 - 18-3; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

The history of development of medical standards in Ukraine started from the late of 1980s when on the wave of economic innovations, a number of local medical facilities standards have been produced. Their practical use, however, led to obtain not only positive but also negative experience such as a lack of uniform criteria, scientific and methodological substitutions of standards creation did not allow to carry out of the comparative evaluation of medical facilities activity and to undertake analysis of medical and economic effectiveness of standards use. The technological standards had various levels to guarantee the medical care quality providing by comparable medical facilities.
Derived from text
Public Health; Standards; Medical Services

20010066271 North Atlantic Treaty Organization, International Military Staff, Brussels, Belgium
Medical Evacuation, History and Development: The Future in the Multinational Environment
Lam, David M., North Atlantic Treaty Organization, Belgium; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 19-1 - 19-7; In English; See also 20010066252; Copyright Waived; Avail: CASI; A02, Hardcopy

This paper will present a brief overview of the history of casualty evacuation from the battlefield. The development of this essential part of military medical services will be reviewed, with particular emphasis upon the development of air evacuation. The future of casualty evacuation in the multinational environment of the new strategic situation will be discussed, along with NATO efforts to standardize various aspects of this modality of patient care.
Author
Casualties; Evacuating (Transportation); Medical Services

20010066272 Institute of Aviation Medicine, Germany
Qualified Aeromedical Evacuation in the Extended Task Spectrum of National and International Military Missions
Roedig, Erich, Institute of Aviation Medicine, Germany; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 20-1 - 20-9; In English; See also 20010066252; Original contains color illustrations; Copyright Waived; Avail: CASI; A02, Hardcopy

The history of aeromedical evacuation (AE) is short and closely associated with the beginning of manned aviation. Its origins are credited to the Dutch medical officer De Mooy who, in about 1910, was the first to conceptualize the air transport of wounded patients and to describe the interaction of road, rail, and air transport. Air transport of wounded patients in hot-air balloons, frequently mentioned in the context of the Franco-Prussian War, however, must be considered a military anecdote as there is no historical evidence for it. First documented evidence for the routine employment of aircraft for the transport of wounded patients exists for the First World War when France established an aircraft ambulance organization. During the Spanish Civil War (1936 - 1938), the air transport of wounded patients to Germany was conducted on a larger scale, JU-52 type aircraft were equipped with

ten stretchers. In addition, there were seats for up to eight soldiers. Medical oxygen was available and administered during the crossing of the Alps. by time of the Second Word War, organized air transport of wounded patients had been established in the military. The US-Army Air Corps for instance had evacuated 1.25 million patients by aircraft and with limited in-flight care (flight nurses) by 1945. While approximately 4% of the wounded were dead by the time they arrived for the first emergency surgical treatment during the Second World War, this percentage could be reduced to 1% during the Vietnam War when the introduction of helicopters for air rescue missions was brought to bear on a large scale. The operational need for a qualified AE system can also be inferred from the example of operation Desert Storm where approximately 30,000 allied soldiers were evacuated from the operational theater for reasons of health. During the KFOR/SFOR mission, the German Air Force evacuated 3o2 soldiers in 1999 by air, of which 25 patients were under critical conditions. During the UN Interfet mission in East Timor in 47 missions 230 soldiers and civilians were evacuated from East Timor to Darwin/Australia, of which 25 patients needed intensive care.
Author
Air Transportation; Evacuating (Transportation); Medical Services; Rescue Operations

20010066273 Akademiya Nauk URSR, Radiation Medicine Research Center, Kiev, Ukraine
Experience in Organization of Urgent Medical Care in Large-Scale Accident Conditions at Nuclear Power Stations
Bebeshko, V., Akademiya Nauk URSR, Ukraine; The Impact of NATO/Multinational Military Missions on Health Care Management; May 2001, pp. 21-1- 21-3; In English; See also 20010066252; Copyright Waived; Avail: CASI; A01, Hardcopy

I would like to say that previous experience makes it possible not to repeat the same mistakes as well as optimize a complex of preventive and accident relief measures for minimizing possible damage. The further development of the urgent medical care service in radiation accident situations within united national disaster medicine service will minimize both the risk of an emergency at nuclear power stations and manpower and financial expenditures of public health authorities and institutions. The Chernobyl experience has shown, that early planning, proper organization and permanent preparedness of each branch of the urgent medical service in radiation accident situations will make its work well-coordinated and effective both in so called quiet periods and in emergency situations.
Author
Medical Services; Public Health; Emergencies

20010066305 FROM
Human Factors/Ergonomics Handbook for the Design for Ease of Maintenance. DOE Handbook
Feb. 2001; 236p
Report No.(s): PB2001-105916; DOE-HDBK-1140-2001; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

The purpose of this handbook is to provide Department of Energy (DOE) contractors with information that can be used to design equipment and maintenance programs in order to reduce human errors and subsequently accidents and injuries due to human errors with maintenance activities. This handbook provides human factors good practices for design of equipment, systems, subsystems, and facilities, including support facilities and equipment, as well as, guidance for maintenance support equipment and procedures, maintenance aids, and maintenance programs.
NTIS
Human Factors Engineering; Handbooks; Maintenance; Armed Forces

20010066311 NASA Ames Research Center, Moffett Field, CA USA
NASA Space Technology Can Improve Soldier Health, Performance and Safety
Cowings, Patricia S., NASA Ames Research Center, USA; Toscano, William B., NASA Ames Research Center, USA; [2000]; 8p; In English
Contract(s)/Grant(s): RTOP 199-14-12-50; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

One of the primary goals of NASA Life Sciences research is '... to enable a permanent human presence in space.' to meet this goal, NASA is creating alternative protocols designed to evaluate and test countermeasures that will account for and correct the environmental effects of space flight on crewmembers health, safety, and operational performance. NASA investigators have previously evaluated the effects of long-duration space flight on physiology and performance of cosmonauts aboard the MIR space station. They also initiated tests of a countermeasure, Autogenic-Feedback Training Exercise (AFTE) designed to prevent and/or correct adverse effects, i.e., facilitate adaptation to space and re-adaptation to Earth. AFTE is a six-hour physiological training program that has proven to be a highly efficient and effective method for enabling people to monitor and voluntarily control a range of their own physiological responses, thereby minimizing adverse reactions to environmental stress. However, because of

limited opportunities to test this technology with space flight crews, it is essential to find operational or 'real world' environments in which to validate the efficacy of this approach.
Author
Countermeasures; Physiological Responses; Spacecrews; Stress (Physiology); Long Duration Space Flight

20010066617 DCS Corp., Alexanderia, VA USA
Driver Performance Measurement to Support Thermal System Development
Piccione, Dino, DCS Corp., USA; Ferrett, Don, Army Combat Developments Command, USA; Feb. 1999; 11p; In English; Original contains color plates
Report No.(s): AD-A390362; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Driver's Vision Enhancer (DVE) program is providing thermal imaging systems to enlarge the driving envelope for the community of military wheeled and tracked vehicles. The DVE provides the driver with thermal images of the forward scene under night and adverse day conditions. During the DVE development program, several questions emerged that required performance-based data to resolve. A multi-phased program to provide the Project Manager, Night Vision/Reconnaissance, Surveillance, and Target Acquisition with driver performance data is described in this paper. The program involves several completed and ongoing efforts including: the relative merits of the DVE and night vision goggles (NVG); drivers' ability to detect the presence of drop-offs when using the DVE and NVG; the analysis of drivers' vision using an eye-tracker; and the effect on performance of various levels of pixel nonuniformity and nonresponsiveness in the display/sensor system. Results will be presented to show the relative capabilities of the various sensors given the environmental conditions of the tests. The data collected has already been used to aid in updating the DVE performance specification for the Thermal Omnibus procurement. The goals of these efforts are to reduce cost without sacrificing driver performance, gain an understanding of how drivers use the DVE in operational settings, and determine where training is needed to enhance performance and reduce risk on the battlefield.
DTIC
Night Vision; Performance Tests; Functional Design Specifications; Display Devices; Surface Vehicles; Tracked Vehicles; Target Acquisition; Thermal Mapping

20010066620 Creare, Inc., Hanover, NH USA
Predicting Performance of Protective Clothing Systems ***Final Report, 12 Apr. 2000-11 Apr. 2001***
Hill, Roger W.; Barry, James J.; Elkouh, Nabil A.; May 14, 2001; 39p; In English; Original contains color plates
Report No.(s): AD-A390210; CLEARE-TM-2087; No Copyright; Avail: Defense Technical Information Center (DTIC)

Modern chemical-protective clothing must provide effective protection from chemical agents while avoiding undue thermal stress on the wearer under battlefield conditions. Currently, design of protective garments relies on slow and costly trial-and-error laboratory or field testing to assess performance. This project is developing advanced computational models for a clothed human that will enable the military to develop new and improved protective clothing more rapidly and less expensively. The models utilize state-of-the-art computational fluid dynamics (CFD) software to model the transport and sorption of chemical agents and the heat transfer due to convection, diffusion, and phase change through the clothing layers. This report documents results from the first year of a two-year project.
DTIC
Protective Clothing; Computer Programs; Heat Transfer; Performance Prediction

20010067469 Army Center for Health Promotion and Preventive Medicine (Provisional), Environmental Health Engine, Aberdeen Proving Ground, MD USA
Ergonomic Assessment of Navigation Lock Control Rooms and Consoles ***Final Report***
Pentikis, John; Dec. 2000; 109p; In English
Report No.(s): AD-A389150; ERDC/CERL-TR-00-45; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Between 23 September and 30 October 1998, an ergonomics team from the U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) evaluated the lock control rooms and consoles at the Melvin Price Locks and Dam (Illinois), the Bonneville Lock and Dam (Oregon), the Kentucky Lock and Dam (Kentucky), and the Barkley Lock and Dam (Kentucky). From 10 to 19 November 1999, the USACHPPM team evaluated eight European lock control rooms and consoles. The evaluation team identified deficiencies in the design of the control room and in the design of the console. Lock control operators encountered other stressful conditions as well.
DTIC
Human Factors Engineering; Consoles; Navigation

20010067600 Defence Science and Technology Organisation, Information Technology Div., Canberra Australia
Size Estimation with Night Vision Goggles
Zalevski, Anna; Meehan, James W.; Hughes, Philip K.; Feb. 2001; 32p; In English
Report No.(s): AD-A390742; DSTO-RR-0201; DODA-AR-011-775; Copyright; Avail: Issuing Activity

Human observers matched the size of a comparison disc object to the perceived size of a test disc located at between 1 and 6 m under normal daylight viewing and when viewing through night vision goggles (NVGs) under simulated starlight. The results showed that observers were more accurate at judging size with unaided vision than when viewing with NVGs. The results for unaided viewing were in accord with the law of size constancy that predicts that accurate size estimation is a result of observers taking into account the distance at which objects are located. The results for viewing with NVGs depart from size constancy and are influenced to a greater extent by the law of visual angle that predicts that size estimates are based more on the angular size of the target because there is inadequate distance information available in this condition. These results demonstrate that NVCs alter normal visual space perception and this should be taken into account in training aircrew and evaluating the effect of NVGs on flying performance. Our results are consistent with other results reported in the literature for longer observation distances.
DTIC
Night Vision; Goggles; Estimates; Size (Dimensions)

20010067614 NASA Langley Research Center, Hampton, VA USA
The Efficacy of Psychophysiological Measures for Implementing Adaptive Technology
Scerbo, Mark W., Old Dominion Univ., USA; Freeman, Frederick G., Old Dominion Univ., USA; Mikulka, Peter J., Old Dominion Univ., USA; Parasuraman, Raja, Catholic Univ. of America, USA; DiNocero, Francesco, Catholic Univ. of America, USA; Prinzel, Lawrence J., III, NASA Langley Research Center, USA; June 2001; 71p; In English
Contract(s)/Grant(s): RTOP 711-50-21-01
Report No.(s): NASA/TP-2001-211018; L-18086; NAS 1.60:211018; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Adaptive automation refers to technology that can change its mode of operation dynamically. Further, both the technology and the operator can initiate changes in the level or mode of automation. The present paper reviews research on adaptive technology. It is divided into three primary sections. In the first section, issues surrounding the development and implementation of adaptive automation are presented. Because physiological-based measures show much promise for implementing adaptive automation, the second section is devoted to examining candidate indices. In the final section, those techniques that show the greatest promise for adaptive automation as well as issues that still need to be resolved are discussed.
Author
Adaptive Control; Psychophysiology; Physiology; Dynamic Characteristics

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.

20010066066 University of Western Michigan, Dept. of Mechnical and Aeronautical Engineering, Kalamazoo, MI USA
Spatial Linear Instability of Confluent Wake/Boundary Layers
Liou, William W., University of Western Michigan, USA; Liu, Feng-Jun, University of Western Michigan, USA; [2001]; 10p; In English; 31st AIAA Fluid Dynamics Conference and Exhibit, 11-14 Jun. 2001, Anaheim, CA, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Contract(s)/Grant(s): NAG1-1979
Report No.(s): AIAA Paper 2001-2702; Copyright Waived; Avail: CASI; A02, Hardcopy; A01, Microfiche

The spatial linear instability of incompressible confluent wake/boundary layers is analyzed. The flow model adopted is a superposition of the Blasius boundary layer and a wake located above the boundary layer. The Orr-Sommerfeld equation is solved using a global numerical method for the resulting eigenvalue problem. The numerical procedure is validated by comparing the present solutions for the instability of the Blasius boundary layer and for the instability of a wake with published results. For the confluent wake/boundary layers, modes associated with the boundary layer and the wake, respectively, are identified. The boundary layer mode is found amplified as the wake approaches the wall. On the other hand, the modes associated with the wake, including a symmetric mode and an antisymmetric mode, are stabilized by the reduced distance between the wall and the wake.

An unstable mode switching at low frequency is observed where the antisymmetric mode becomes more unstable than the symmetric mode when the wake velocity defect is high.
Author
Linearity; Wakes; Incompressible Boundary Layer; Stability

20010066134 University of Western Michigan, Dept. of Mechanical and Aeronautical Engineering, Kalamazoo, MI USA
Computational Modeling For The Transitional Flow Over A Multi-Element Airfoil
Liou, William W., University of Western Michigan, USA; Liu, Feng-Jun, University of Western Michigan, USA; [2000]; 11p; In English
Contract(s)/Grant(s): NAG1-1979
Report No.(s): AIAA Paper 2000-4322; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

The transitional flow over a multi-element airfoil in a landing configuration are computed using a two equation transition model. The transition model is predictive in the sense that the transition onset is a result of the calculation and no prior knowledge of the transition location is required. The computations were performed using the INS2D) Navier-Stokes code. Overset grids are used for the three-element airfoil. The airfoil operating conditions are varied for a range of angle of attack and for two different Reynolds numbers of 5 million and 9 million. The computed results are compared with experimental data for the surface pressure, skin friction, transition onset location, and velocity magnitude. In general, the comparison shows a good agreement with the experimental data.
Author
Mathematical Models; Computational Grids; Transition Flow; Airfoils; Skin Friction

20010066135 University of Western Michigan, Dept. of Mechanical and Aeronautical Engineering, Kalamazoo, MI USA
Computational Modeling for the Flow Over a Multi-Element Airfoil
Liou, William W., University of Western Michigan, USA; Liu, Feng-Jun, University of Western Michigan, USA; [1999]; 9p; In English; AIAA 17th Applied Aerodynamics Conference, Jun. 1999, Norfolk, VA, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Contract(s)/Grant(s): NAG1-1979
Report No.(s): AIAA Paper 99-3177; Copyright Waived; Avail: CASI; A02, Hardcopy; A01, Microfiche

The flow over a multi-element airfoil is computed using two two-equation turbulence models. The computations are performed using the INS2D) Navier-Stokes code for two angles of attack. Overset grids are used for the three-element airfoil. The computed results are compared with experimental data for the surface pressure, skin friction coefficient, and velocity magnitude. The computed surface quantities generally agree well with the measurement. The computed results reveal the possible existence of a mixing-layer-like region of flow next to the suction surface of the slat for both angles of attack.
Author
Mathematical Models; Computational Grids; Airfoils; Skin Friction; Transition Flow

20010066151 Rutherford Appleton Lab., Chilton UK
Design of a Portable Parallel Frontal Solver for Chemical Process Engineering Problems
Scott, J. A.; Feb. 12, 2001; 22p
Report No.(s): PB2001-105879; RAL-TR-2001-011; Copyright; Avail: National Technical Information Service (NTIS), Microfiche

The authors report on the design and development of a parallel frontal code for the numerical solution of the large sparse highly unsymmetric linear systems of equations that arise in industrial-scale chemical process engineering. The code has been developed as routine HSL-MP43 for the mathematical software library HSL 2000 (http://www.cse. clrc.ac.uk/Activity/HSL). The main design goals for HSL-MP43 were: portability, ease of use, efficiency, and flexibility. The authors discuss how each of these objectives are addressed within HSL-MP43 and illustrate the performance of the code using a range of large-scale problems from chemical process simulation and optimization.
NTIS
Parallel Processing (Computers); Chemical Engineering; Design Analysis

20010066155 Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette France
Noncommutative Geometry Year 2000
Connes, A.; Nov. 2000; 78p
Report No.(s): PB2001-105133; IHES/M/00/73; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The authors' geometric concepts evolved first through the discovery of NonEuclidean geometry. The discovery of quantum mechanics in the form of the noncommuting coordinates on the phase space of atomic systems entails an equally drastic evolution. The authors describe a basic construction which extends the familiar duality between ordinary spaces and commutative algebras to a duality between Quotient spaces and Noncommutative algebras.
NTIS
Quantum Mechanics; Differential Geometry

20010066177 Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette France
Hyperbolic Dynamical Systems
Hasselblatt, B.; Aug. 2000; 89p
Report No.(s): PB2001-105128; IHES/M/00/59; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
The aim of this survey is to outline important results in the theory of uniformly hyperbolic dynamical systems on compact spaces as well as its extension to nonuniformly hyperbolic systems, and to indicate techniques used in the development of the basic theory.
NTIS
Dynamical Systems; Hyperbolic Systems; Topology

20010066193 FROM
Non-Radially Symmetric Solutions to the Ginzburg-Landau Equation
Ovchinnikov, Y. N.; Sigal, I. M.; Jun. 2000; 46p
Report No.(s): PB2001-105127; IHES/P/00/45; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The authors consider the question of existing of non-radical solutions to Ginzburg-Landau equation. The authors present results indicating that such solutions do exist. The authors look for such solutions as saddle points of the renormalized Ginzburg-Landau free energy functional (the latter was introduced in reference (OS1)). There was two main points in the authors' analyses: they look for solutions having certain point symmetries and they characterize saddle point solutions in terms of critical points of certain intervortex energy function when they introduce. The latter critical points correspond to forceless vortex configuration.
NTIS
Critical Point; Free Energy; Radicals; Saddle Points; Symmetry; Vortices

20010066307 Los Alamos National Lab., NM USA
AFREET: Human-Inspired Spatio-Spectral Feature Construction for Image Classification with Support Vector Machines
Perkins, S.; Harvey, N.; Jan. 21, 2000; 14p; In English
Report No.(s): PB2001-105823; LA-UR-01-0891; No Copyright; Avail: National Technical Information Service (NTIS)
We examine the task of pixel-by-pixel classification of the multispectral and gray-scale images typically found in remote-sensing and medical applications. Simple machine learning techniques have long been applied to remote-sensed image classification, but almost always using purely spectral information about each pixel. Humans can often outperform these systems, and make extensive use of spatial context to make classification decisions. We present Afreet an SVM-based learning system which attempts to automatically construct and refine spatio-spectral features in a somewhat human-inspired fashion. Comparisons with traditionally used machine learning techniques show that Afreet achieves significantly higher performance. The use of spatial context is particularly useful for medical imagery, where multispectral images are still rare.
NTIS
Image Classification; Machine Learning; Remote Sensing

20010066882 Central Lab. of the Research Councils, Computational Science and Engineering Dept., Warrington, UK
Two-Stage Ordering for Unsymmetric Parallel Row-by-Row Frontal Solvers
Scott, J. A.; Jul. 27, 2000; ISSN 1358-6254; 20p; In English
Report No.(s): PB2001-105863; RAL-TR-2000-030; Copyright; Avail: National Technical Information Service (NTIS)
The row-by-row frontal method may be used to solve general large sparse linear systems of equations. by partitioning the matrix into (nearly) independent blocks and applying the frontal method to each block, a coarse-grained parallel frontal algorithm is obtained. The success of this approach depends on preordering the matrix. This can be done in two stages: (1) order the matrix to bordered block diagonal form (2) order the rows within each block to minimize the size of the frontal matrix. A number of recent papers have considered stage (1). In this paper, an algorithm is proposed for stage (2). For a range of practical examples from

chemical process engineering it is shown that the proposed algorithm substantially reduces the block frontal matrix size and, for sufficiently large problems, this can lead to significant reductions in the factorization times when the row-by-row frontal method is implemented in parallel.
NTIS
Linear Systems; Algorithms

20010067651 Rutherford Appleton Lab., Chilton UK
Incremental Norm Estimation for Dense and Sparse Matrices
Duff, J. S.; Voemel, C.; Jan. 26, 2001; 24p
Report No.(s): PB2001-105870; RAL-TR-2001-005; Copyright; Avail: National Technical Information Service (NTIS), Microfiche

The authors discuss the benefits of an incremental approach to norm estimation for triangular matrices. The authors' investigation covers both dense and sparce matrices. If the authors' use their incremental norm estimation on explicitly generated entries of the inverse of the triangular matrix, they can relate their results to incremental condition estimation (ICE). The authors show that their algorithm extends more naturally to the sparse case than ICE. Their scheme can be used to develop a robust pivot selection criterion for QR factorization or as the basis of a rank-revealing factorization.
NTIS
Pivots; Criteria; Algorithms

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.

20010066064 Clemson Univ., SC USA
A Linux Workstation for High Performance Graphics ***Final Report***
Geist, Robert, Clemson Univ., USA; Westall, James, Clemson Univ., USA; Jul. 11, 2000; 5p; In English; Original contains color illustrations
Contract(s)/Grant(s): NAG2-1107; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The primary goal of this effort was to provide a low-cost method of obtaining high-performance 3-D graphics using an industry standard library (OpenGL) on PC class computers. Previously, users interested in doing substantial visualization or graphical manipulation were constrained to using specialized, custom hardware most often found in computers from Silicon Graphics (SGI). We provided an alternative to expensive SGI hardware by taking advantage of third-party, 3-D graphics accelerators that have now become available at very affordable prices. to make use of this hardware our goal was to provide a free, redistributable, and fully-compatible OpenGL work-alike library so that existing bodies of code could simply be recompiled. for PC class machines running a free version of UNIX. This should allow substantial cost savings while greatly expanding the population of people with access to a serious graphics development and viewing environment. This should offer a means for NASA to provide a spectrum of graphics performance to its scientists, supplying high-end specialized SGI hardware for high-performance visualization while fulfilling the requirements of medium and lower performance applications with generic, off-the-shelf components and still maintaining compatibility between the two.
Derived from text
Workstations; Computer Graphics; Low Cost; Personal Computers

20010066212 Rice Univ., Houston, TX USA
Compiling Scientific Programs for Scalable Parallel Systems ***Final Report, Jun 1996-May 1999***
Kennedy, Ken, Rice Univ., USA; MellorCrummey, John, Rice Univ., USA; Jin, Guohua, Rice Univ., USA; Adve, Vikram, Rice Univ., USA; Fowler, Robert J., Rice Univ., USA; Feb. 2001; 83p; In English
Contract(s)/Grant(s): F30602-96-1-0159; AF Proj. C322
Report No.(s): AD-A389314; AFRL-IF-RS-TR-2001-18; No Copyright; Avail: CASI; A01, Microfiche; A05, Hardcopy

This report details research into compiler technology to support machine-independent data parallel programming for scientific application. The investigation focused on focused on design and development of dHPF, an advanced prototype compiler for High Performance FORTRAN (HPF). The research performed in this project included new techniques for recognizing implicit parallelism in sequential programs, a powerful and precise set-based framework for analysis and transformation of data-parallel

programs, support for sophisticated data and computation partitioning, effective support for generation and optimization of parallel code for message-passing and distribution shared-memory systems; techniques for supporting sophisticated data-parallel applications with irregular structure, and an integrated compiled effort that included a multi-level memory hierarchy simulator and techniques for improving locality in irregular computations.
DTIC
Parallel Processing (Computers); Compilers; Memory (Computers); Parallel Programming; Computation

20010066223 Army Research Inst. for the Behavioral and Social Sciences, Alexandria, VA USA
Personal Computers in the Light Infantry: A Survey on Office and Home Computers ***Final Report, Dec. 1996 - Dec. 1997***
Fober, Gene W.; Stephens III, Robert L.; February 1998; 13p; In English
Report No.(s): AD-A340880; ARI-RN-98-03; No Copyright; Avail: Defense Technical Information Center (DTIC)
Computers with certain certain minimum hardware requirements are needed to perform information management functions and computer-based training (CBT). The purpose of this study was to determine the availability and features of computers for use by battle staffs. A survey was designed to obtain this information from Light Intantry brigades. The results from fourteen brigades indicated that variations in computer features existed. Further information was obtained by making the survey available to battalion and brigade units training at the Leaders Training program at the Joint Readiness Training Center. A total of thirty-six units completed the survey. About half of the available computers were Pentiums with most of the remaining being 486s. Many of the computers lacking the necessary features could be inexpensively upgraded. It was concluded that CBT courseware developers should consider the target audience's hardware capabilities for running the software.
DTIC
Computer Assisted Instruction; Information Management; Information Systems; Data Management; Personal Computers

20010066289 Texas Instruments, Inc., Defense Systems and Electronics Group, Plano, TX USA
Test Bus Evaluation ***Final Report, Mar. 1992 - Jan. 1993***
Dennis, Philip; Vining, Sue; Daniel, Wayne; Marisch, Jim; April 1998; 224p; In English
Contract(s)/Grant(s): F30602-88-D-0028; AF Proj. 2338
Report No.(s): AD-A345632; AFRL-IF-RS-TR-1998-38; No Copyright; Avail: Defense Technical Information Center (DTIC)
The purpose of the Test Bus Evaluation report was to evaluate and document the applications and impact of standard test buses on overall system testability. Current and proposed test bus architectures were surveyed and identified as most appropriate for coordinating testability approaches between the chip and the system level. Eleven test bus architectures were investigated. A Data Gathering task was first undertaken to characterize the major attributes of the test buses. These attributes include the bus architecture, current status, functions supported, interface and number of pins, protocol, intended uses and speed. This data collection included a library search of existing literature that is documented in the Bibliography. Current and planned test bus extensions were explored and documented in the report. Test Bus control issues were investigated and documented to include hardware controller applications to device and module test buses, and test bus control software. Standard test bus control languages and vector formats are also addressed in this report.
DTIC
Bus Conductors; Evaluation; Performance Tests; Architecture (Computers); Central Processing Units

20010066317 University of the Virgin Islands, Saint Thomas, Virgin Islands (U.S.)
Interactive Computer Classroom Proposal to the Department of Defense Infrastructure Support Program ***Final Report, Sep. 1998 - Sep. 1999***
Stolz, Robert; McKayle, Camille; Sep. 1999; 5p; In English
Contract(s)/Grant(s): F49620-98-1-0484
Report No.(s): AD-A389367; AFRL-SR-BL-TR-01-0295; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche
The focus of this project was student exploration and student directed learning. We requested computer equipment and software to support a mathematics classroom with computers on the periphery. The room now have a variety of uses: Classroom Use: It is an interactive classroom in which mathematics is taught. Class time is a mixture of lecture, demonstrations, and student exploration. The computers allow conjectures to be tested with numerous examples in an efficient manner. Students see mathematics from numerical, graphical, and symbolic points of view. Open Use: Building on the knowledge and skills gained in the interactive classroom setting, teachers of upper level mathematics courses and other upper level science courses assign homework, projects, and open ended questions for which the students use technology as an additional means of exploration. Use for Faculty and Student Research: The nurturing environment at the University of the Virgin Islands has led to many faculty

directed undergraduate student research projects. The availability of the computer classroom has expanded this tradition. The computer classroom workshop has provided a means of creating and testing physical models.
DTIC
Computers; Computer Components; Education; Lectures

20010066932 Carnegie-Mellon Univ., Pittsburgh, PA USA
Ultra-High Density Optical Recording ***Final Report, 10 Jul. 1995 - 09 Jul. 1999***
Kryder, Mark H.; Jul. 1999; 11p; In English
Contract(s)/Grant(s): DAAH04-95-1-0474
Report No.(s): AD-A389179; ARO-34644.1-RT-AAS; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Research on ultra-high density optical recording systems funded by the U.S. Army Research Office was conducted at the Data Storage Systems Center at Carnegie-Mellon University. The goal of this research was to supplement a broader DSSC effort to investigate optical recording technologies that could lead to ultra-high recording densities. The work was directed at developing an understanding of the cyclability of phase change media, the fabrication of solid immersion lens, the development of improved integrated engineering test beds, and the evaluation of different optical media structures.
DTIC
Optical Data Storage Materials; Fabrication; Optical Equipment

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.

20010066106 Advanced Management Technology, Inc., Moffett Field, CA USA
Accelerating Demand Paging for Local and Remote Out-of-Core Visualization
Ellsworth, David, Advanced Management Technology, Inc., USA; June 2001; 10p; In English; Original contains color illustrations
Contract(s)/Grant(s): DTTS59-99-D-00437; NASA Order A-61812-D
Report No.(s): NAS-TR-01-004; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This paper describes a new algorithm that improves the performance of application-controlled demand paging for the out-of-core visualization of data sets that are on either local disks or disks on remote servers. The performance improvements come from better overlapping the computation with the page reading process, and by performing multiple page reads in parallel. The new algorithm can be applied to many different visualization algorithms since application-controlled demand paging is not specific to any visualization algorithm. The paper includes measurements that show that the new multi-threaded paging algorithm decreases the time needed to compute visualizations by one third when using one processor and reading data from local disk. The time needed when using one processor and reading data from remote disk decreased by up to 60%. Visualization runs using data from remote disk ran about as fast as ones using data from local disk because the remote runs were able to make use of the remote server's high performance disk array.
Author
Algorithms; Computation; Reading; Applications Programs (Computers)

20010066110 NASA Ames Research Center, Moffett Field, CA USA
Supporting Scientific Analysis within Collaborative Problem Solving Environments
Watson, Velvin R., NASA Ames Research Center, USA; [2000]; 23p; In English; HICSS34: Minitrack on Developing and Deploying Collaborative Problem Solving Environments, 3-6 Jan. 2001, Maui, HI, USA
Contract(s)/Grant(s): RTOP 519-40-22; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Collaborative problem solving environments for scientists should contain the analysis tools the scientists require in addition to the remote collaboration tools used for general communication. Unfortunately, most scientific analysis tools have been designed for a "stand-alone mode" and cannot be easily modified to work well in a collaborative environment. This paper addresses the questions, "What features are desired in a scientific analysis tool contained within a collaborative environment?", "What are the tool design criteria needed to provide these features?", and "What support is required from the architecture to support these design criteria?." First, the features of scientific analysis tools that are important for effective analysis in collaborative environments are listed. Next, several design criteria for developing analysis tools that will provide these features

are presented. Then requirements for the architecture to support these design criteria are listed. Sonic proposed architectures for collaborative problem solving environments are reviewed and their capabilities to support the specified design criteria are discussed. A deficiency in the most popular architecture for remote application sharing, the ITU T. 120 architecture, prevents it from supporting highly interactive, dynamic, high resolution graphics. to illustrate that the specified design criteria can provide a highly effective analysis tool within a collaborative problem solving environment, a scientific analysis tool that contains the specified design criteria has been integrated into a collaborative environment and tested for effectiveness. The tests were conducted in collaborations between remote sites in the US and between remote sites on different continents. The tests showed that the tool (a tool for the visual analysis of computer simulations of physics) was highly effective for both synchronous and asynchronous collaborative analyses. The important features provided by the tool (and made possible by the specified design criteria) are: 1. The tool provides highly interactive, dynamic, high resolution, 3D graphics. 2. All remote scientists can view the same dynamic, high resolution, 3D scenes of the analysis as the analysis is being conducted. 3. The responsiveness of the tool is nearly identical to the responsiveness of the tool in a stand-alone mode. 4. The scientists can transfer control of the analysis between themselves. 5. Any analysis session or segment of an analysis session, whether done individually or collaboratively, can be recorded and posted on the Web for other scientists or students to download and play in either a collaborative or individual mode. 6. The scientist or student who downloaded the session can, individually or collaboratively, modify or extend the session with his/her own ”what if” analysis of the data and post his/her version of the analysis back onto the Web. 7. The peak network bandwidth used in the collaborative sessions is only 1K bit/second even though the scientists at all sites are viewing high resolution (1280 x 1024 pixels), dynamic, 3D scenes of the analysis. The links between the specified design criteria and these performance features are presented.
Author
Problem Solving; Design Analysis; Scientific Visualization; Computerized Simulation

20010066126 Pennsylvania Univ., Medical Image Processing Group, Philadelphia, PA USA
Development of a Computer Decision Support System for Women with BRCA1 and BRACA2 Mutations ***Annual Report, 15 Jul. 1999-14 Jul. 2000***
Armstrong, Katrina; Aug. 2000; 181p; In English; Original contains color plates
Contract(s)/Grant(s): DAMD17-98-1-8234
Report No.(s): AD-A389632; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche
”Development of a Computer Decision Support System for Women with BRCA1 or BRCA2 Mutations” is a project that aims to develop a decision support system that provides individualized information about the expected benefits of alternative cancer risk reductions strategies for women with either a BRCAl or BRCA1 mutation. Many valuable steps have been taken in the second year of this grant, including the development of the educational booklet, the layout of the decision aid, the completion of the decision support system, and the protocol for the randomized control trial. All of the elements are in place for the randomized control trial to begin. Although delayed somewhat by the complexities of the computerized decision support system, enrollment for the randomized control trial will begin on August 1, 2000.
DTIC
Decision Support Systems; Females; Mutations; Cancer; Computer Programs

20010066205 Air Force Research Lab., Wright-Patterson AFB, OH USA
Creating Resource Agents for Collaborative Engineering Environment (CEE) Research Using the Common Object Request Broker Architecture (CORBA) Framework
Emmert, John M.; Concha, Luis; Pedersen, Keith; Starkey, Diane; Mar. 27, 2001; 31p; In English
Report No.(s): AD-A389389; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
In this report we describe the setup of a collaborative engineering environment (CEE) for performing research on the performance of distributed systems. We provide the basis for implementing a multi-tiered host network that is capable of operating across several different computing platforms without modification to system software. The CEE allows multiple processes to be launched on remote systems taking advantage of distributed processing capabilities. The object broker within the environment provides a platform to test and analyze smart network software. Smart network software includes but is not limited to algorithms and methods to determine which available processor is the best choice for performing a particular task or operation.
DTIC
Architecture (Computers); Computer Systems Programs; Systems Engineering

20010066213 University of Southern California, Los Angeles, CA USA
Multiscale Photonic Data Fusion Networks and Their Interfaces ***Final Report, 30 Sep. 1995 - 29 Nov. 1997***
Sawchuk, Alexander A.; Kuo, C. C.; Li, Victor; Willner, Alan; Mar. 01, 1998; 71p; In English
Report No.(s): AD-A345565; AFRL-SR-BL-TR-98-0462; No Copyright; Avail: Defense Technical Information Center (DTIC)

We describe results for the period 30 September 1995 - 29 November 1997 in a basic research program on Multiscale Photonic Data Fusion Networks and Their Interfaces, part of the DoD Focused Research Initiative (FRI) program performed at the University of Southern California (USC). The research results include: (1) high speed photonic network architectures, (2) photonic system design and integration for space, (2) wavelength and time signal processing and transmission, and (3) image processing, compression and coding algorithms. The report contents includes: (1) Optoelectronic Interfaces for Optical Page-Oriented Memory and High Speed; (2) Wavelength-Division-Multiplexing for High-Speed Network Gateways; and (3) Pruned Octree Feature for Interactive Retrieval.
DTIC
Image Processing; Information Retrieval; Measure and Integration; Optical Memory (Data Storage); Multisensor Fusion

20010066246 Yuan-Ze Univ., Dept. of Electrical Engineering, Chung-Li, Taiwan, Province of China
Image Quality Measurement Based on Statistics of Activity Regions
Chen, Yung-Sheng, Yuan-Ze Univ., Taiwan, Province of China; Meng, Fan-Chang, Yuan-Ze Univ., Taiwan, Province of China; Journal of the Chinese Institute of Engineers; May 2001; ISSN 0253-3839; Volume 24, No. 3, pp. 379-388; In English
Contract(s)/Grant(s): NSC-87-2213-E-155-020; Copyright; Avail: Issuing Activity

Image restoration is a well-known technique for dealing with images that have been recorded in the presence of one or more sources of degradation. However why do we want to perform image restoration upon a given image? Who call tell us the image quality is good or needs to be processed? In this paper, based on the activity regions of a gray image, we present an approach to performing both objectives and subjective evaluations for measuring image quality. Four versions of an image are transformed, and the results obtained by the proposed approach are used for comparisons and discussions. Experiments show that the proposed approach is feasible for reporting the image quality.
Author
Image Resolution; Quality; Image Processing

20010066294 Tulsa Univ., Dept. of Mathematics and Computer Science, OK USA
A Formal Framework for Architectural and Integration Styles ***Final Report, 1 Feb. 1996 - 30 Nov. 2001***
Gamble, Rosanne F.; Feb. 28, 2001; 22p; In English
Contract(s)/Grant(s): F49620-98-1-0217
Report No.(s): AD-A389363; Rept-14-2-1203182; AFRL-SR-BL-TR-01-0294; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Component interoperability has become an important concern as industry and government migrate legacy systems, integrate COTS products, and assemble modules from disparate sources into a single application. Interoperability problems, their complexity and their resolution, can mean the difference between the successful, seamless integration of software and the complete failure of a composite system. Emerging research has shown that interoperability problems can be traced to differences in the software architectures of the components and the integrated application environment. Current technology does not fully identify what must be made explicit about software architecture to add in the prediction of interoperability problems. The overall goat of our research is to define and build this technology. We focus on three technical areas: analysis process, modeling, and case studies. The results of the research to date are the categorization of architecture characteristics, the definition of a set of common conflicts, and the initial development of a theory of interoperability.
DTIC
Topology; Integrated Circuits; Network Analysis; Measure and Integration

20010066353 Cornell Univ., Ithaca, NY USA
Active Models in Support of Collaborative Design ***Final Report, 1 Apr. 1996 - 31 Dec. 1999***
Constable, Robert L.; Apr. 17, 2001; 4p; In English
Contract(s)/Grant(s): N00014-96-1-0699
Report No.(s): AD-A389147; No Copyright; Avail: CASI; A01, Microfiche; A01, Hardcopy

The project was concerned with providing mathematical models of artifacts that capture both their externally visible properties and their behavior as well. It was also concerned with providing ways to share these models among various software systems.
DTIC
Mathematical Models; Software Engineering; Methodology; Problem Solving

20010066364 North Carolina State Univ., Computer Science Dept., Raleigh, NC USA
Globally Distributed Microsystems Design: Proof-of-Concept ***Final Report, 1 Aug. 1997 - 31 Aug. 2000***
Brglez, Franc; Aug. 2000; 12p; In English
Contract(s)/Grant(s): DAAG55-97-1-0345
Report No.(s): AD-A389950; ARO-37575.1-CI; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The rapid advances in computing and networking technologies continue to stimulate formations of distributed teams worldwide. The advantages of an effective distributed design environment of tools, databases, and data management include the opportunity for a rapid assembly of a project-specific team of specialists who can immediately contribute towards the goals of the project-from almost anywhere, at any time. The DARPA-funded Vela project, named after constellation that forms the sail of Argo Navis (the Argonauts ship), brought together distributed university-based participants from six locations: MIT (Massachusetts Institute of Technology) , MSU (Mississippi State Univ.), NCSU (North Carolina State Univ.), Stanford University, UCB (Univ. of California, Berkeley), and UCSC (Univ. of California, Santa Cruz). As conceived initially, the project was to balance two major asks: a multi-media processor design as a project driver, and a web-based tool set for distributed design and benchmarking as the project infrastructure, with a major deliverable as a proof-of-concept demo in the University Booth during the Design Automation Conference. A total of three such demos were presented during 1998-2000, and a web-based archive of 26 peer-reviewed publications, data sets, software prototypes, and demo presentations are now accessible from http://www.cbl.ncsu.edu/vela and http://www.cbl.ncsu.edu/OpenProjects/.
DTIC
Systems Engineering; Computer Aided Design; Computer Networks; Data Base Management Systems; Prototypes

20010066513 NASA Ames Research Center, Moffett Field, CA USA
Field Model: An Object-Oriented Data Model for Fields
Moran, Patrick J., NASA Ames Research Center, USA; [2001]; 55p; In English; Original contains color illustrations
Report No.(s): NAS-01-005; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

We present an extensible, object-oriented data model designed for field data entitled Field Model (FM). FM objects can represent a wide variety of fields, including fields of arbitrary dimension and node type. FM can also handle time-series data. FM achieves generality through carefully selected topological primitives and through an implementation that leverages the potential of templated C++. FM supports fields where the nodes values are paired with any cell type. Thus FM can represent data where the field nodes are paired with the vertices (”vertex-centered” data), fields where the nodes are paired with the D-dimensional cells in R(sup D) (often called ”cell-centered” data), as well as fields where nodes are paired with edges or other cell types. FM is designed to effectively handle very large data sets; in particular FM employs a demand-driven evaluation strategy that works especially well with large field data. Finally, the interfaces developed for FM have the potential to effectively abstract field data based on adaptive meshes. We present initial results with a triangular adaptive grid in R(sup 2) and discuss how the same design abstractions would work equally well with other adaptive-grid variations, including meshes in R(sup 3).
Author
Object-Oriented Programming; Potential Fields; C++ (Programming Language)

20010066523 NASA Ames Research Center, Moffett Field, CA USA
Optimal Reward Functions in Distributed Reinforcement Learning
Wolpert, David H., NASA Ames Research Center, USA; Tumer, Kagan, NASA Ames Research Center, USA; [2000]; 7p; In English; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We consider the design of multi-agent systems so as to optimize an overall world utility function when (1) those systems lack centralized communication and control, and (2) each agents runs a distinct Reinforcement Learning (RL) algorithm. A crucial issue in such design problems is to initialize/update each agent’s private utility function, so as to induce best possible world utility. Traditional ’team game’ solutions to this problem sidestep this issue and simply assign to each agent the world utility as its private utility function. In previous work we used the ’Collective Intelligence’ framework to derive a better choice of private utility functions, one that results in world utility performance up to orders of magnitude superior to that ensuing from use of the team game utility. In this paper we extend these results. We derive the general class of private utility functions that both are easy for

the individual agents to learn and that, if learned well, result in high world utility. We demonstrate experimentally that using these new utility functions can result in significantly improved performance over that of our previously proposed utility, over and above that previous utility's superiority to the conventional team game utility.
Author
Algorithms; Reinforcement (Psychology)

20010066551 Defence Science and Technology Organisation, Electronics Research Lab., Salisbury, Australia
Component-Based Engineering of Knowledge-Enabled Systems: Research Vision and Strategy
Goodburn, D. P., Defence Science and Technology Organisation, Australia; Pattison, T. R., Defence Science and Technology Organisation, Australia; Vernik, R. J., Defence Science and Technology Organisation, Australia; Feb. 2001; 30p; In English
Report No.(s): AD-A390495; DSTO-GD-0271; DODA-AR-011-705; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Australia's Strategic Policy assigns the highest capability development priority to the achievement of the "knowledge edge" over our adversaries and identifies a single Command Support System that exhibits flexibility, cost-effectiveness, robustness and adaptivity as being an important enabler of the knowledge edge. This emphasis on the knowledge edge is reinforced in the Defence 2000 White Paper 2, which states that the knowledge edge 'will be the foundation of our military capability over the coming decades'. The Software Systems Engineering (SSE) group of ITD is currently conducting research into new software engineering principles and practices, collectively referred to as component-based software engineering (CBSE), which are expected to meet the requirements of cost-effectiveness and flexibility in the development of command support systems. In addition, knowledge-based techniques, and in particular intelligent agents, provide the opportunity to incorporate adaptivity and robustness into software systems through the use of machine-learning, automated reasoning and encapsulation of domain knowledge. In this paper we outline an extension of the Software Systems Engineering Group's research into CBSE to investigate ways in which intelligent agents can be used to exploit the combined advantages of component-based software engineering and know ledge-based techniques for the development of software for military applications.
DTIC
Software Engineering; Systems Engineering; Computer Programming; Applications Programs (Computers); Machine Learning

20010066603 Alabama Univ., Dept. of Mathematics, Huntsville, AL USA
BST Imagery Generation Task ***Final Report, 11 Aug. 1997 - 31 Dec. 1997***
Dow, Stephen J.; Jan. 30, 1998; 8p; In English
Contract(s)/Grant(s): DAAH01-91-D-R002
Report No.(s): AD-A346086; No Copyright; Avail: Defense Technical Information Center (DTIC)

Report discusses calibration procedures for deriving camera parameters used in the Depth Finder program, and documents a program called Depth Editor, developed as part of this task for manual editing of depth images.
DTIC
Depth Measurement; Imagery; Manuals

20010066605 Naval Postgraduate School, Monterey, CA USA
Security Issues for the Software Evolution Model
Rambidis, Anastasios X.; Mar. 1998; 116p; In English
Report No.(s): AD-A346067; No Copyright; Avail: Defense Technical Information Center (DTIC)

This thesis examines the security requirements of the software evolution model and identifies possible security mechanisms called "control classes" that are applicable to the model. Then, based on combinations of "control classes," proposes a suitable security level for each of the model's databases. Furthermore this thesis deals with the possibility of using Pretty Good Privacy as a method for protection of software data stored in databases. The software evolution model captures all the necessary changes in requirements early during the development process in order to help in minimization of project cancellation, delivery delays and extra costs for fixing errors. The protection of software data against unauthorized accesses and modifications is a primary consideration for the software evolution process. In this way, we can develop a secure environment on which the software evolution can rely for accomplishing its goal.
DTIC
Optimization; Protection; Software Engineering; Programming Environments; Software Development Tools; Security

20010066606 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA

Combining Symbolic Model Checking with Uninterpreted Functions for Out-of-Order Processor Verification

Berezin, Sergey; Biere, Armin; Clarke, Edmund; Zhu, Yunshan; Apr. 20, 1998; 21p; In English

Contract(s)/Grant(s): DABT63-96-C-0071; NSF-CCR95-05472

Report No.(s): AD-A346065; CMU-CS-98-124; No Copyright; Avail: Defense Technical Information Center (DTIC)

We present a new approach to the verification of hardware systems with data dependencies using temporal logic symbolic model checking. As a benchmark we take Tomasulo's algorithm HP96 for out-of-order instruction scheduling. Our approach is similar to the idea of uninterpreted function symbols BD94. We use symbolic values and instructions instead of concrete ones. This allows us to show the correctness of the machine independently of the actual instruction set architecture and the implementation of the functional units. Instead of using first order terms as in BD94, we represent symbolic values with a new compact encoding. In addition, we apply some other reduction techniques to the model. This significantly reduces the state space and allows the use of highly efficient symbolic model checkers like SMV instead of special decision procedures. The correctness of the method has been proven formally with the PVS theorem prover.

DTIC

Algorithms; Temporal Logic; Program Verification (Computers); Architecture (Computers)

20010066742 SRI International Corp., Menlo Park, CA USA

Theory Interpretations in PVS *Final Report*

Owre, Sam, SRI International Corp., USA; Shankar, Natarajan, SRI International Corp., USA; July 2001; 39p; In English

Contract(s)/Grant(s): NAS1-20334; RTOP 704-50-11-01

Report No.(s): NASA/CR-2001-211024; NAS 1.26:211024; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this task was to provide a mechanism for theory interpretations in a prototype verification system (PVS) so that it is possible to demonstrate the consistency of a theory by exhibiting an interpretation that validates the axioms. The mechanization makes it possible to show that one collection of theories is correctly interpreted by another collection of theories under a user-specified interpretation for the uninterpreted types and constants. A theory instance is generated and imported, while the axiom instances are generated as proof obligations to ensure that the interpretation is valid. Interpretations can be used to show that an implementation is a correct refinement of a specification, that an axiomatically defined specification is consistent, or that a axiomatically defined specification captures its intended models. In addition, the theory parameter mechanism has been extended with a notion of theory as parameter so that a theory instance can be given as an actual parameter to an imported theory. Theory interpretations can thus be used to refine an abstract specification or to demonstrate the consistency of an axiomatic theory. In this report we describe the mechanism in detail. This extension is a part of PVS version 3.0, which will be publicly released in mid-2001.

Author

Mechanization; Programming Languages; Proving

20010066789 Information Assurance Technology Analysis Center, McLean, VA USA

Modes of Operation Validation System for the Triple Data Encryption Algorithm (TMOVS): Requirements and Procedures

Keller, Sharon S., Information Assurance Technology Analysis Center, USA; Apr. 01, 2000; 316p; In English

Report No.(s): AD-A389644; No Copyright; Avail: CASI; A03, Microfiche; A14, Hardcopy

The National Institute of Standards and Technology (NIST) Triple Data Encryption Algorithm(TDEA) Modes of Operation Validation System (TMOVS) specifies the procedures involved invalidating implementations of the Triple DES algorithm in FIPS PUB 46-3 Data Encryption Standard (DES) (and ANSI X9.52 - 1998). The TMOVS is designed to perform automated testing on Implementations Under Test (IUTs) . This publication provides brief overviews of the Triple DES algorithm and introduces the basic design and configuration of the TMOVS. Including this overview are the specifications for the two categories of tests that make up the TMOVS,i.e., the Known Answer tests and the Monte Carlo tests. The requirements and administrative procedures to he followed by those seeking normal NIST validation of an implementation of the Triple DES algorithm are presented. The requirements described include the specific protocols for communication between the IUT and the TMOVS, the types of tests which the IUT must pass formal NIST validation, and general instructions for accessing and interfacing with the TMOVS. An appendix with tables of values and results for the Triple DES Known Answer tests is also provided.

DTIC

Algorithms; Monte Carlo Method; Cryptography

20010066791 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA

Respectful Type Converters

Wing, Jeannette M.; Ockerbloom, John; May 1998; 23p; In English

Contract(s)/Grant(s): F33615-93-1-1330; F30602-97-2-0031

Report No.(s): AD-A345874; CMU-CS-98-130; No Copyright; Avail: Defense Technical Information Center (DTIC)

In converting an object of one type to another, we expect some of the original object's behavior to remain the same, and some to change. How can we state the relationship between the original object and converted object to characterize what information is preserved and what is lost after the conversion takes place? We answer this question by introducing the new relation, respects, and say that a type converter function C : A right arrow B respects a type T. We formally define respects in terms of the Liskov and Wing behavioral notion of subtyping; types A and B are subtypes of T. We explain in detail the applicability of respectful type converters in the context of the Typed Object Model (TOM) Conversion Service, built at Carnegie Mellon and used on a daily basis throughout the world. We also briefly discuss how our respects relation addresses a similar question in two other contexts: type evolution and interoperability.

DTIC

Wings; Object-Oriented Programming

20010066792 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA

Relational Interpretations of Recursive Types in an Operational Setting

Birkedal, Lars; Harper, Robert; Apr. 24, 1998; 76p; In English

Report No.(s): AD-A345868; CMU-CS-98-125; No Copyright; Avail: Defense Technical Information Center (DTIC)

Relational interpretations of type systems are useful for establishing properties of programming languages. For languages with recursive types it is usually difficult to establish the existence of a relational interpretation. The usual approach is to give a denotational semantics of the language in a domain theoretic model given by an inverse limit construction, and to construct relations over the model by a similar inverse limit construction. However, in passing to a denotational semantics we incur the obligation to prove its adequacy with respect to the operational semantics of the language, which is itself often proved using a relational interpretation of types. In this paper we investigate the construction of relational interpretations of recursive types in a purely operational setting, drawing on recent ideas from domain theory and operational semantics as a guide. We establish a syntactic minimal invariance property for an ML like language with a recursive type that is a syntactic analog of Freyd's universal characterization of the canonical solution of a domain equation. As Pitts has shown in the setting of domains, minimal invariance suffices to establish the existence of relational interpretations of recursive types. We give two applications of this construction. First, we derive a notion of logical equivalence for expressions of the language that we show coincides with contextual equivalence and which, by virtue of its construction, validates useful induction and conduction principles for reasoning about the recursive type. Second, we give a relational proof of correctness of the continuation passing transformation which is used in some compilers for functional languages. The proof relies on the construction of a family of simulation relations whose existence follows from syntactic minimal invariance.

DTIC

Construction; Domains; Equivalence; Invariance; Languages; Programming Languages

20010066907 NASA Wallops Flight Center, Wallops Island, VA USA

GEOSAT Follow-on (GFO) Altimeter Document Series, Volume 1, GFO Altimeter Engineering Assessment Report: From Launch to Acceptance, 10 February 1998 to 29 November 2000, 1.0

Hancock, David W., III, NASA Wallops Flight Center, USA; Hayne, George S., NASA Wallops Flight Center, USA; Brooks, Ronald L., Raytheon Information Technology and Scientific Services, USA; Lockwood, Dennis W., Raytheon Information Technology and Scientific Services, USA; March 2001; 92p; In English

Contract(s)/Grant(s): NAS5-00181; RTOP 622-47-36-78

Report No.(s): NASA/TM-2001-209984/VER1/VOL1; Rept-2001-02001-0/VER1/VOL1; NAS 1.15:209984/VER1/VOL1; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The US Navy's Geosat Follow-On (GFO) Mission, launched on February 10, 1998, is the latest in a series of altimetric satellites which include Seasat, Geosat, ERS-1, and TOPEX/POSEIDON (T/P). The purpose of this report is to document the GFO altimeter performance determined from the analyses and results performed by the NASA/GSFC/Wallops altimeter calibration team. It is the first of an anticipated series of NASA/GSFC/Wallops' GFO performance documents, each of which will update assessment results. This report covers the performance from launch to instrument acceptance by the Navy on November 29, 2000. Data derived from GFO will lead to improvements in the knowledge of ocean circulation, ice sheet topography, and climate change. In order to capture the maximum amount of information from the GFO data, accurate altimeter calibrations are required

for the civilian data set which NOAA will produce. Wallops Flight Facility has provided similar products for the Geosat and T/P missions and is doing the same for GFO.
Author
Radio Altimeters; Performance Tests; Calibrating

20010067195 NASA Marshall Space Flight Center, Huntsville, AL USA
The Use of Human Modeling of EVA Tasks as a Systems Engineering Tool
Dischinger, H. Charles, Jr., NASA Marshall Space Flight Center, USA; Schmidt, Henry J., Boeing Co., USA; [2001]; 7p; In English; 31st International Conference on Environmental Systems, 9-12 Jul. 2001, Orlando, FL, USA; Original contains color illustrations; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Computer-generated human models have been used in aerospace design for a decade. They have come to be highly reliable for worksite analysis of certain types of EVA tasks. In many design environments, this analysis comes after the structural design is largely complete. However, the use of these models as a development tool is gaining acceptance within organizations that practice good systems engineering processes. The design of the USA Propulsion Module for the International Space Station provides an example of this application. The Propulsion Module will provide augmentation to the propulsion capability supplied by the Russian Service Module Zvezda. It is a late addition to the set of modules provided by the USA to the ISS Program, and as a result, faces design challenges that result from the level of immaturity of its integration into the Station. Among these are heat dissipation and physical envelopes. Since the rest of the Station was designed to maximize the use of the cooling system, little margin is available for the addition of another module. The Propulsion Module will attach at the forward end of the Station, and will be between the Orbiter and the rest of ISS. Since cargo must be removed from the Payload Bay and transferred to Station by the Canadarm, there is a potential for protrusions from the module, such as thruster booms, to interfere with robotic operations. These and similar engineering issues must be addressed as part of the development. In the implementation of good system design, all design solutions should be analyzed for compatibility with all affected subsystems. Human modeling has been used in this project to provide rapid input to system trades of design concepts. For example, the placement of radiators and avionics components for optimization of heat dissipation had to be examined for feasibility of EVA translation paths and worksite development. Likewise, the location of and mechanism for the retraction of thruster booms was partly driven by available Orbiter, robotic arm, and other module envelopes; worksite analysis was required for early assessment of task success. Since these trade studies included the EVA analysis as part of the decision criteria, the design had a high degree of assurance of EVA supportability from the outset. This approach contributes greatly to mission success.
Author
Compatibility; Cooling Systems; Human Performance; Service Modules; Structural Design; Models; Systems Engineering; Software Development Tools

20010067263 NASA Marshall Space Flight Center, Huntsville, AL USA
Preliminary Component Integration Utilizing Rapid Prototyping Techniques
Cooper, K., NASA Marshall Space Flight Center, USA; Salvail, P., Illinois Inst. of Tech., USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 6p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

One of the most costly errors committed during the development of an element to be used in the space industry is the lack of communication between design and manufacturing engineers. A very important tool that should be utilized in the development stages by both design and manufacturing disciplines is rapid prototyping. Communication levels are intensified with the injection of functional models that are generated from a drawing. At the Marshall Space Flight Center, this discipline is utilized on a more frequent basis as a manner by which hardware may be tested for design and material compatibility.
Author
Prototypes; Technology Utilization; Manufacturing

20010067410 Army Research Lab., Weapons and Materials Research Directorate, Aberdeen Proving Ground, MD USA
Editing a Distributed Fact Base With an ORG Chart ***Final Report, Aug. 1995 - Jul. 1997***
Caton, Howell; Sep. 2000; 32p; In English
Report No.(s): AD-A389606; ARL-MR-480; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This document is a guide to using ORG chart. ORG Chart was originally a tool for displaying organization tables in a tree format of U.S. Army units and tables of organization and equipment. The date that ORG Chart displays is kept in a distributed fact base, a component of the Information Distribution Technology software that was developed at the U.S. Army Research

Laboratory. ORG Chart has recently been augmented to provide a convenient and efficient interface for entering data into a distributed fact base. This document is a guide to using ORG Chart in both its display capacity and its data input capacity.
DTIC
Charts; Editing Routines (Computers); Distributed Processing

20010067480 Defence Science and Technology Organisation, Aeronautical and Maritime Reseach Lab., Melbourne, Australia
Streamlined Algorithm Deployment via JavaBeans
Hew, Patrick Chisan, Defence Science and Technology Organisation, Australia; February 2001; 35p; In English; CD-ROM contains full text document in PDF format
Report No.(s): DSTO-TN-0335; DODA-AR-011-784; Copyright; Avail: Issuing Activity

This paper introduces JavaBean Calculation Engines (JBCEs), a procedure for deploying algorithms in a standard JavaBean framework. For the algorithm developer, JBCEs are a finishing point for deploying an algorithm as a ”qualified product”. For the GUI developer, JBCEs shield internal computations behind a JavaBean interface. by standardising the interface between computational and GUI code, JBCEs improve reusability and maintainability. The paper demonstrates JBCEs through a tutorial example, and discusses the use of JBCEs in a deployed product.
Author
Algorithms; Java (Programming Language); Computer Programming; Software Engineering; Object-Oriented Programming

20010067573 Sandia National Labs., Albuquerque, NM USA
Model-Based Reliability Analysis
Bierbaum, R. L.; Brown, T. D.; Kerschen, T. J.; 2001; 18p; In English
Report No.(s): PB2001-106435; SAND2000-8640C; No Copyright; Avail: National Technical Information Service (NTIS)

Modeling, in conjunction with testing, is a rich source of insight. Model parameters are easily controlled and monitoring can be done unobtrusively. The ability to inject faults without otherwise affecting performance is particularly critical. Many iterations can be done quickly with a model while varying parameters and conditions based on a small number of validation tests. The objective of Model-Based Reliability Analysis (MBRA) is to identify ways to capitalize on the insights gained from modeling to make both qualitative and quantitative statements about product reliability. MBRA will be developed and exercised in the realm of weapon system development and maintenance, where the challenges of severe environmental requirements, limited production quantities, and use of one-shot devices can make testing prohibitively expensive. However, the general principles will also be applicable to other product types.
NTIS
Systems Engineering; Reliability Analysis; Computer Aided Design; Quality Control

20010067605 Human Resources Research Organization, Alexandria, VA USA
Assessing and Managing User-Produced Training Support Packages ***Final Report, 3 Jan. 2000 - 2 Mar. 2001***
Gossman, J. R.; Graves, Christopher R.; Mauzy, Rebecca P.; Clagg, Robert A.; May 2001; 169p; In English; Prepared in cooperation with Litton PRC, McLean,VA and L-3 Communications Link Simulation and Training, Herndon,VA.
Contract(s)/Grant(s): DASW01-99-D-0021; Proj-A792
Report No.(s): AD-A390420; HUMRRO-RR-1772; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

This report describes the conduct and results of a project to examine assessment and management of user-produced training support packages (TSPs) for collective training exercises in live, virtual, constructive, and combined training environments for combat arms organizations at brigade and below at present and for the next five years. ”User-produced” refers to TSPs that are developed by unit commanders and other unit trainers as well as institutional trainers who will be directly involved with executing the exercises they produce. The major research activities consisted of: data collection, data analysis, and development of products to fulfill the project objectives. A major focus of data collection was coordinating with the ongoing development of the Army Training Information Architecture which will establish a framework within which the products of the current project will fit. The project produced the following: a process for identifying core set exercises for combat arms units; the list of components and elements of a TSP for collective training exercises identified to a level sufficient to develop database specifications for them; recommendations for TSP assessment, approval, and distribution; and an identification of six types of users of TSPs along with their roles in exercise execution.
DTIC
Product Development; Training Devices; Data Acquisition; Data Processing; Computer Assisted Instruction

20010067650 Oak Ridge National Lab., TN USA

Demonstration of BEPLATE Electroforming Simulation Code In General Production Conditions and Geometries. CRADA Final Report

Giles, G. E.; Gray, I. J.; Bullock, J. S.; Wise, S.; 2001; 30p; In English

Report No.(s): PB2001-106497; C/ORNL96-0457; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this project was to develop a tool for the design of optimum geometries and electrochemical parameters for the electroforming process as used at the Y-12 plant and at Cemcom, Inc. Electroforming is an electrochemical process to manufacture freestanding parts by cathodically depositing metal on a mandrel. Electroforming can produce complex-shaped parts, with constant or varying wall thicknesses as needed, the manufacture of which would not be feasible using other methods. One surface of the electroform exactly copies the mandrel surface. Even fine, microscopic details of the mandrel surface can be replicated on the electroformed part. Precise control of the location (wall thickness) and surface morphology (roughness) of the opposite or growth surface is more difficult.

NTIS

Electroforming; Computer Aided Design; Computer Aided Manufacturing; Deposition; Morphology

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.

20010066102 Army War Coll., Carlisle Barracks, PA USA

Managing Risk to the National Information Infrastructure

Thomas, James H.; Apr. 08, 1998; 39p; In English

Report No.(s): AD-A345540; No Copyright; Avail: Defense Technical Information Center (DTIC)

Now, more than ever, the survival of our information based society depends on the integrity of our National Information Infrastructure (NII). Our information systems are vulnerable to a wide spectrum of threat ranging from a dissatisfied employee to a coordinated transnational attack to gain strategic advantage. Interconnected military, government and civilian information systems throughout our critical infrastructures, with limited self-protection features, are susceptible and attractive targets. The NII suffers attack almost constantly and we must do better at dealing with the consequences of such attacks. The ends, ways and means of managing the consequences of malevolent intrusion into the NII are within the capabilities of the nation to implement. Our success at dealing with these assaults, thus preventing an adversary from gaining strategic advantage jeopardizing our way of life will hinge on taking action to resolve the technological, legal, and sociological impediments to information infrastructure protection.

DTIC

Attacking (Assaulting); Information Systems; Intrusion; Survival; Targets

20010066309 NASA Ames Research Center, Moffett Field, CA USA

The Biological Relevance of Artificial Life: Lessons from Artificial Intelligence

Colombano, Silvano, NASA Ames Research Center, USA; [2000]; 1p; In English; Artificial Life VII Conference Astrobiology Workshop, 1-6 Aug. 2000, Portland, OR, USA; No Copyright; Avail: Issuing Activity; Abstract Only

There is no fundamental reason why A-life couldn't simply be a branch of computer science that deals with algorithms that are inspired by, or emulate biological phenomena. However, if these are the limits we place on this field, we miss the opportunity to help advance Theoretical Biology and to contribute to a deeper understanding of the nature of life. The history of Artificial Intelligence provides a good example, in that early interest in the nature of cognition quickly was lost to the process of building tools, such as "expert systems" that, were certainly useful, but provided little insight in the nature of cognition. Based on this lesson, I will discuss criteria for increasing the biological relevance of A-life and the probability that this field may provide a theoretical foundation for Biology.

Author

Algorithms; Artificial Intelligence; Life Sciences

20010066535 Information Assurance Technology Analysis Center, Falls Church, VA USA

Rome Laboratory Computer Security

Giordano, Joseph, Information Assurance Technology Analysis Center, USA; Oct. 11, 1993; 21p; In English

Report No.(s): AD-A390667; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

The objective of this presentation is to develop and demonstrate the tools and technology necessary to realize trusted C3I systems in Air Force and DOD applications, and to emphasize use of normal Verification to assure Security/Trust Mechanism Satisfies Formal Security/Trust Policy Model.

DTIC

Computer Information Security; Data Management; Computer Programs; Command and Control; Communication

20010066611 Massachusetts Inst. of Tech., Dept. of Electrical Engineering, Cambridge, MA USA

Energy-Scalable Protocols for Battery-Operated MicroSensor Networks

Wang, Alice; Heinzelman, Wendi R.; Chandrakasan, Anantha P.; Jan. 1999; 11p; In English; Prepared through collaborative participation in the Advanced Sensors Consortium sponsored by the U.S. Army Research Laboratory under Cooperative Agreement DAAL01-96-2-001.

Contract(s)/Grant(s): DAAL01-96-2-001

Report No.(s): AD-A390320; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

To maximize battery lifetimes of distributed wireless sensors, network protocols and data fusion algorithms should he designed with low power techniques. Network protocols minimize energy by using localized communication and control and by exploiting computation/communication trade-offs. In addition, data fusion algorithms such as beamforming aggregate data from multiple sources to reduce data redundancy and enhance signal-to-noise ratios, thus further reducing the required communications. We have developed a sensor network system that uses a localized clustering protocol and beamforming data fusion to enable energy-efficient collaboration. We have implemented two beamforming algorithms, the Maximum Power and the Least Mean Squares (LMS) beamforming algorithms, on the StrongARM (SA-1100) processor. Results from our experiments show that the LMS algorithm requires less than one-fifth the energy required by the Maximum Power beamforming algorithm with only a 3 dB loss in performance. The energy requirements of the LMS algorithm was further reduced through the use of variable length filters, a variable voltage supply, and variable adaptation time.

DTIC

Algorithms; Protocol (Computers); Multisensor Fusion; Electric Batteries

20010066618 Naval Postgraduate School, Monterey, CA USA

Quality of service for IP-Based Networks

Sambanis, Konstantinos, Naval Postgraduate School, USA; Mar. 2001; 90p; In English

Report No.(s): AD-A390400; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

In recent decades, the networking community has been looking for strategies to converge over a single common network infrastructure carrying voice, video and data. The pervasive and ubiquitous packet-based IP network provides the most convenient platform for the desirable convergence, where resources can be managed in an efficient and dynamic manner. The gradual convergence into the IP infrastructure introduces multimedia-rich and interactive applications that are bandwidth-intensive and delay-bound, while more sophisticated data applications are deployed that place new demands onto IP networks. The IP-based network is evolving to satisfy the requirements of traffic differentiation and reliable service. Quality of Service (QoS) mechanisms are introduced to meet the traffic expectations and enhance the basic service model of the network in many subtle ways. This thesis provides a comprehensive examination of QoS mechanisms and protocols that have surfaced to optimize the utilization of network resources, to provide differentiated treatment of traffic and enforce the appropriate policies. The study proposes a balanced approach of bandwidth increase and integration of robust QoS techniques into existing IP network infrastructure to arrive at a convergent, multiservice and scalable telecommunications network. Findings from this thesis can be incorporated into the design and implementation of an integrated network within a large organization that will deliver accurate services and defined level of performances.

DTIC

Qualitative Analysis; Network Analysis; Internets; Computer Conferencing

20010067104 Information Assurance Technology Analysis Center, Falls Church, VA USA
Policy for Establishing and Maintaining Publicly Accessible Department of Defense Web Information Service
Jul. 18, 1997; 11p; In English
Report No.(s): AD-A389432; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

This policy memorandum outlines policy related to establishing and maintaining publicly accessible web information services. It supersedes the ”Guidelines for Establishing and Maintaining a Department of Defense Web Information Service” published by the Office of the Assistant Secretary of Defense (Public Affairs) on 28 December 1995.
DTIC
Defense Program; Information Systems; Policies

20010067399 State Univ. of New York, Center for Multisource Information Fusion, Buffalo, NY USA
Empirical Investigations of Trust-Related Systems Vulnerabilities in Aided, Adversarial Decision Making ***Interim Report, Oct. 1998 - Sep. 1999***
Bisantz, Ann; Llinas, James; Seong, Younho; Finger, Richard; Jian, Jiun-Yin; Mar. 2000; 97p; In English; Original contains color plates
Contract(s)/Grant(s): F41624-94-D-6000; AF Proj. 7184
Report No.(s): AD-A389378; AFRL-HE-WP-TR-2000-0115; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

In modern military environments, command-and-control decisions are increasingly supported by information systems which collect, analyze, and display information from multiple sources and sensors, to give decision-makers real time information about an evolving tactical situation. Aided-adversarial decision-making (AADM) refers to military command and control decision in such environments, in which computerized aids are available to groups of co-located and distributed decision-makers, and in which there is a potential for adversarial forces to tamper with and disrupt such aids. In aided, adversarial, decision-making environments, various threats from and offensive opportunities for information Warfare (IW) activities may exist. In these situations, it is crucial to understand the effect of degraded or altered information on human decision-makers, particularly when that information may be intentionally manipulated. The research described in this report continues two prior phases of research which focused on defining, characterizing, and (where possible) modeling the dependencies and vulnerabilities of AADM on components of information, and considered the role of the human decision maker in AADM, developing a theoretical framework to investigate issues of trust in AADM, and a scale to measure human-automation trust. This report presents research which describes and further develops the theoretical approach begun earlier, describes the completed trust scale, and describes an experimental test bed and an initial experiment which tested the theoretical framework developed. Additionally, an initial description of how cultural issues in AADM can be represented by formalisms in different decision-making models is presented and experimentation in the area of graphical data presentation and trust in AADM is described.
DTIC
Decision Making; Vulnerability; Warfare; Military Technology

20010067400 Army Command and General Staff Coll., School of Advanced Military Studies, Fort Leavenworth, KS USA
Effective Response to Attacks On Department of Defense Computer Networks, ***Feb. 2001 - Apr. 2001***
Shaha, Patrick J.; May 2001; 54p; In English
Report No.(s): AD-A389380; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The proliferation of information technology within Department of Defense (DoD) has markedly improved the speed and reach of command and control capabilities. The ease of entry and global availability of network access makes automation linked through networks an optimal medium for sharing information. For the Commanders-in-Chief (CINCs), computer networking has proven especially useful in maintaining contact and sharing data with elements forward deployed as well as with host nation governments and agencies. The significant improvements have come, however, at a high cost in security. Internet access is, by design, wide open to all public networks and to all users, regardless of nationality, language, or intent (criminal or otherwise). Though protection measures are somewhat more robust than in the recent past, virtually any network user is capable of causing serious damage to systems connected to the Internet, as well as trigger isolated collapse of the network itself. The ability to selectively share and deny access to sensitive information with multiple network users has proven a daunting challenge. to date there is no central authoritative body empowered to direct Internet structure or enforce rules of operation. Rather, the very lack of regulation and oversight is seen as the real strength and power of the Internet. Within the regimented world of the DoD there has been in the past little cooperative agreement on how to handle network standardization and upgrade issues, particularly when

the warfighting CINCs attempt to use their Title X authority to enhance interoperability among their subordinate service components.
DTIC
Computer Networks; Defense Program; Computer Information Security

20010067406 Lawrence Livermore National Lab., Livermore, CA USA
Window's NT Network Security A Manager's Guide
Kelley, Marcey; Mayson, Wendall; Dec. 01, 1997; 22p; In English; Prepared in cooperation with Westinghouse Savannah River Co., Aiken, SC.
Contract(s)/Grant(s): W-7405-ENG-48
Report No.(s): AD-A389537; UCRL-MA-128827; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy
This document outlines NT security mechanisms, discusses terminology, provides a generic security model, discusses designing the NT environment including trusts and domains, group management, managing NT file systems, and monitoring system activities.
DTIC
Windows (Computer Programs); User Manuals (Computer Programs); Computer Information Security; Operating Systems (Computers)

20010067412 ODS Networks, Inc., Richardson, TX USA
Stopping Insider Abuse and Spying. Detecting the Hard Stuff: Stolen Passwords Unauthorized Records Browsing, Employee Espionage, Infiltration, and Insertion of Unwelcome Code, via Automatic Behavior Profiling
Steinman, Dave; Celiceo, Mike; Head, Joe; Jun. 03, 1999; 84p; In English
Report No.(s): AD-A389613; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
This briefing addresses the issue of stopping the insider abuse and spying , which is detecting the hard stuff: Stolen passwords, unauthorized records browsing, employee espionage, infiltration, and insertion of unwelcome code via automatic behavior profiling.
DTIC
Computer Information Security; Computer Programs

20010067414 National Inst. of Standards and Technology, Gaithersburg, MD USA
Data Encryption Standard (DES)
Jan. 1999; 26p; In English
Report No.(s): AD-A389653; FIPS-PUB-46-3; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The selective application of technological and related procedural safeguards is an important responsibility of every Federal organization in providing adequate security to its electronic data systems. This publication specifies two cryptographic algorithms, the Data Encryption Algorithm (DEA) and the Triple Data Encryption Algorithm (TDEA) which may he used by Federal organizations to protect sensitive data. Protection of data during transmission or while in storage may be necessary to maintain the confidentiality and integrity of the information represented by the data. The algorithms uniquely define the mathematical steps required to transform data into a cryptographic cipher and also to transform the cipher back to the original form. The Data Encryption Standard is being made available for use by Federal agencies within the context of a total security program consisting of physical security procedures, good information management practices, and computer system/network access controls. This revision supersedes FIPS 46-2 in its entirety.
DTIC
Algorithms; Cryptography; Data Processing

20010067497 Web-Based Education Commission, Washington, DC USA
Power of the Internet for Learning: Moving From Promise to Practice
Dec. 2000; 188p; In English; Original contains color illustrations
Report No.(s): PB2001-105809; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche
Table of Contents: Foreword; Executive summary; The power of the Internet for learning; Seizing the opportunity; Moving from promise to practice: A call to action and Appendices.
NTIS
Education; Internets

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.

20010066058 Naval Postgraduate School, Monterey, CA USA
Development of a Control System for a SMA Actuated Medical Manipulator
Thiel, Richard A.; December 1997; 88p; In English
Contract(s)/Grant(s): ARPA ORDER-B795; ARPA ORDER-8578
Report No.(s): AD-A340992; No Copyright; Avail: Defense Technical Information Center (DTIC)

This thesis discusses the development of a digital control system for the operation of a conceptual robotic manipulator for use in minimally invasive surgery. The motion of the manipulator is envisioned to be accomplished with actuators made of Shape Memory Alloy (SMA). SMA has the ability to recover permanent deformation by undergoing a phase transformation. The recovery of the deformation results in motion of the SMA material which can be exploited for useful work. SMA was chosen as the actuator because it can be miniaturized and has a very high power density as compared to conventional actuators. An Actuator Matrix Driver (AMD) board was designed, as part of the digital control system, to power and control the SMA actuators. The matrix configuration of the AMD and the use of Amplitude Modulated Pulsed (AMP) current allows for a reduction in the number of leads for the powering and control of the actuators. The electrical resistance, a physical property of SMA which characteristically changes with phase transformation, can be used to determine the state or phase of the SMA actuators and can therefore be used for closed loop control.
DTIC
Shape Memory Alloys; Manipulators; Actuators; Surgery; Medical Equipment; Control Systems Design; Amplitude Modulation; Digital Systems; Feedback Control

20010066060 National Chiao Tung Univ., Dept. of Electrical and Control Engineering, Hsinchu, Taiwan, Province of China
Automated Facial Expression Recognition System Using Neural Networks
Chang, Jyh-Yeong, National Chiao Tung Univ., Taiwan, Province of China; Chen, Jia-Lin, National Chiao Tung Univ., Taiwan, Province of China; Journal of the Chinese Institute of Engineers; May 2001; ISSN 0253-3839; Volume 24, No. 3, pp. 345-356; In English
Contract(s)/Grant(s): NSC-87-2213-E-009-134; Copyright; Avail: Issuing Activity

This paper proposes an automated facial expression recognition system using neural network classifiers. First, we use the rough contour estimation routine, mathematical morphology, and point contour detection method to extract the precise contours of the eyebrows, eyes, and mouth of a face image. Then we define 30 facial characteristic points to describe the position and shape of these three facial features. Facial expressions can be described by combining different action units, which are specified by the basic muscle movements of a human face. We choose six main action units, composed of facial characteristic point movements, as the input vectors of two different neural network-based expression classifiers including a radial basis function network and a multilayer perceptron network. Using these two networks, we have obtained recognition rates as high as 92.1% in categorizing the facial expressions into neutral, anger, or happiness. Simulation results by the computer demonstrate that computers are capable of extracting high-level or abstract information like humans.
Author
Classifiers; Computer Programs; Neural Nets; Pattern Recognition; Face (Anatomy)

20010066225 Naval Postgraduate School, Monterey, CA USA
Artificial Intelligence and Foreign Policy Decision-Making
Berkoff, Russ H.; December 1997; 180p; In English
Report No.(s): AD-A340985; No Copyright; Avail: Defense Technical Information Center (DTIC)

With the advent of a global information society, the US will seek to tap the potential of advanced computing capability to enhance its ability to conduct foreign policy decision making. This thesis explores the potential for improving individual and organizational decision making capabilities by means of artificial intelligence (AI). The use of AI will allow us to take advantage of the plethora of information available to obtain an edge over potential adversaries. Another purpose of this thesis is to give guidance to the software community as to what policymakers will need in order to improve future decision making processes. The third purpose is to encourage government and private sector decision makers to allocate adequate resources to actualize the potential of AI. The method of analysis this thesis uses is to examine US foreign policy decision making on the cognitive or individual, group, and organizational levels. Using the Cuban Missile Crisis and the Yom Kippur War as test beds for critical

analysis, identification of both decision enhancing and impeding functions is accomplished. Finally, a counterfactual analytic framework, using an AI model, tests the likely influence of AI on decision making. The results substantiate the value of AI as both a decision making enhancer and an impediment reducer for the policymaker. Additional conclusions are derived that improve the decision making system and its processes by means of introducing an AI capability.
DTIC
Artificial Intelligence; Decision Making; Foreign Policy; Decision Support Systems

20010066245 National Taiwan Ocean Univ., Dept. of Electrical Engineering, Keelung, Taiwan, Province of China
Learning Temporal Sequences Using Dual-Weight Neurons
Wang, Jung-Hua, National Taiwan Ocean Univ., Taiwan, Province of China; Tsai, Ming-Chieh, Aver Corp., Taiwan, Province of China; Su, Wen-Sheng, National Taiwan Ocean Univ., Taiwan, Province of China; Journal of the Chinese Institute of Engineers; May 2001; ISSN 0253-3839; Volume 24, No. 3, pp. 329-344; In English
Contract(s)/Grant(s): NSC-87-2613-E-019-007; Copyright; Avail: Issuing Activity

This paper considers the use of neural networks (NN's) in learning temporal sequence recognition and reproduction for which the sequence degree is unknown. This approach uses the output ambiguity to train the network without the need to assume or construct a separate model for the input sequence degree. First we introduce a primitive network called the DNN, comprising a plurality of dual-weight (DN) neurons. Each neuron is linked to other neurons by it long-term excitatory weight and a short-term inhibitory weight. Fast learning is made possible by employing a two-pass training rule to encode the temporal distance between two arbitrary pattern occurrences. The resulting DNN is then extended into a more generalized model, namely the DNN2. by incorporating the two-pass rule and a self-organizing algorithm, the DNN2 can achieve autonomous temporal sequence recognition and reproduction. Using training, efficiency, and hardware complexity criteria, the DNN networks are also contrasted with the work of Wang and Yuwono.
Author
Neural Nets; Neurons; Sequencing; Pattern Recognition

20010066288 Bolt, Beranek, and Newman, Inc., Cambridge, MA USA
Increasing the Accuracy of Mammogram Interpretation ***Annual Report, 15 Sep. 1996 - 14 Sep 1997***
Swets, John A.; Oct. 1997; 60p; In English
Contract(s)/Grant(s): DAMD17-94-C-4082
Report No.(s): AD-A346062; No Copyright; Avail: Defense Technical Information Center (DTIC)

The project's aim is to refine and evaluate clinically a computer-based system to provide decision support to the radiologist in interpreting mammograms, and generate automatically a standardized report of the mammogram findings to the referring physician. In Year 3, representative case sets of mammograms and clinical data, with pathology or follow-up, were finally assembled at the Brigham and Women's Hospital (referral setting) and at Harvard Pilgrim Health Care (a screening setting). Five BWH radiologists read their 200 cases to provide scale values for each of a checklist of perceptual features, in order to train a set of statistical prediction rules. Five HPHC readers have performed a baseline reading of their 150 case, as a comparison for the aided readings to be made in Year 4. The automated report writer was brought to a stage suitable for evaluation by a focus group of referring physicians in Year 4.
DTIC
Clinical Medicine; Medical Services; Radiology; Computer Techniques; Standardization

20010066456 Cornell Univ., Dept. of Computer Science, Ithaca, NY USA
Algorithms for Networks and Link Structured Data*, May 2000 - Apr. 2001*
Kleinberg, Jon; Apr. 2001; 6p; In English
Contract(s)/Grant(s): N00014-99-1-0463
Report No.(s): AD-A390344; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The goal of this work is the design of methods for optimization and resource allocation in networks; for disseminating information in large decentralized networks; and for identifying clusters and important resources in a networked information environment. Underlying this is the goal of new models for understanding the dynamics by which information is propagated in networks, and the processes by which networks such as the Web evolve over time.
DTIC
Algorithms; Resource Allocation; Information Dissemination

20010066540 Clarkson Univ., Dept. of Electrical and Computer Engineering, Potsdam, NY USA
Cooperative Intelligent Systems for Communication Network Management ***Final Report, Feb. 1991-Apr. 1996***
Meyer, Robert A., Clarkson Univ., USA; Conry, Susan E., Clarkson Univ., USA; Apr. 2001; 296p; In English
Contract(s)/Grant(s): F30602-91-C-0029; AF Proj. 2155
Report No.(s): AD-A390655; AFRL-IF-RS-TR-2001-59; No Copyright; Avail: CASI; A03, Microfiche; A13, Hardcopy

This report documents new techniques for building intelligent, cooperative agents for assisting in the management of communication networks. First, we undertook a redesign and upgrade of an existing testbed for a distributed simulation environment. Second, we developed a generalization of previous work in distributed automated reasoning to provide for distributed expert systems built using an extension of conventional production rule technology. Third, we enhanced a distributed reasoning system by utilizing a stronger inference rule known as hyper-resolution. Fourth, we developed a distributed constraint based planner. Our results demonstrate a technique for solving the coordination problem among multiple problem solving agents in a distributed extension of the classical artificial intelligence blocks world domain. We have analyzed real world communication equipment, presented a typical problem scenario, and identified the expert knowledge required to solve the problem. We have experimental data that demonstrate significant improvements in the performance of distributed reasoning tasks. We also have experimental data that illustrate the effectiveness of our distributed constraint based planner. Finally, the problem of link activation scheduling is discussed. We show that our planner is able to solve this problem.
DTIC
Computerized Simulation; Communication Networks; Artificial Intelligence; Expert Systems

20010066546 Defence Science and Technology Organisation, Electronics and Surveillance Research, Salisbury, Australia
Rapid Assembly and Deployment of Domain Visualisation Solutions
Pattison, T. R., Defence Science and Technology Organisation, Australia; Vernik, R. J., Defence Science and Technology Organisation, Australia; Goodburn, D. P., Defence Science and Technology Organisation, Australia; Phillips, M. P., Defence Science and Technology Organisation, Australia; Feb. 2001; 28p; In English; Original contains color plates
Report No.(s): AD-A390503; DSTO-TR-1100; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Information visualisation exploits the natural perceptual capabilities of the decision-maker to facilitate the rapid assimilation and analysis of abstract, complex and often voluminous information. In this paper we argue that a major advance for computer-based information visualisation will be the definition of an open, component-based framework to support the rapid assembly and deployment of visualisation solutions. The proposed visualisation framework should not only support and extend the functionality common to existing visualisation tools, such as view generation and user interaction, but also provide support for the deployment of that tool into the customer's organisational environment. Successful deployment should encompass: the integration of the deployed visualisation tool with existing work processes, the information space and the available information technology tools and services; and ongoing support for the use and evolution of the tool. We describe InVision - an open framework for the development and deployment of integrated visualisation solutions, which employs computer-based visualisation techniques, component-based software engineering, and agent-based computing - and describe a research program to validate the InVision concepts and promote the adoption, extension, and integration of the InVision framework by visualisation researchers and application developers.
DTIC
Decision Making; Information Systems; Computer Techniques; Software Engineering

20010066572 Space and Naval Warfare Systems Center, San Diego, CA USA
Robotics for Law Enforcement: Beyond Explosive Ordnance Disposal
Nguyen, H. G.; Bott, J. P.; Nov. 2000; 56p; In English
Report No.(s): AD-A390341; SSC/SD-TR-1839; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A web-based survey was conducted to establish law-enforcement robotics needs for applications that extend beyond explosive ordnance disposal. The survey addressed scenarios and tasks where a robot would be used, if available, and the tools, features, and parameters considered most important to carry out those tasks. This report presents survey results and summarizes current robotics research and development efforts by various segments of the Department of Defense that could potentially help meet those law-enforcement needs. The report also recommends a course of action for the Department of Justice to acquire these robotics capabilities.
DTIC
Robotics; Law (Jurisprudence)

20010066966 HNC Software, Inc., San Diego, CA USA

Adaptive Infrared Non-Uniformity Correction

Means, Robert W., HNC Software, Inc., USA; VonTersch, Brad, HNC Software, Inc., USA; Scribner, Dean A., HNC Software, Inc., USA; Feb. 1999; 16p; In English

Contract(s)/Grant(s): N00014-96-C-2061

Report No.(s): AD-A390347; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Real-time adaptive non-uniformity correction by a neural network algorithm was implemented on the 12- bit digital image from a Boeing SE-U20 uncooled 320x240 microbolometer camera. Nonlinearities in an infrared sensor require either periodic recalibration of a one or two point correction algorithm as the scene and environment change or require an adaptive continuous correction. The adaptive neural network correction is performed in real-time with an off-the-shelf processor board inserted in an IBM PC compatible machine. The real time implementation allows long term stability and performance issues of the algorithm to be addressed. Evaluation of the adaptive algorithm shows that the spatial noise in the corrected image depends strongly on the estimate of the desired image used in the adaptive algorithm. The desired value is calculated by means of neighborhood functions such as median or convolution with kernels such as the sinc function. We have determined that the adaptive algorithm works better when the time sample between images of a moving scene is large; that is, when the images are relatively uncorrelated. This effect must be balanced by the need to have the algorithm converge in a finite time. The net effect of this balance is that the hardware signal processing requirements are reduced considerably since the algorithmic calculations need not be done on every frame.

DTIC

Neural Nets; Image Processing; Digital Systems; Infrared Detectors; Real Time Operation; Algorithms

20010067329 NASA Marshall Space Flight Center, Huntsville, AL USA

X-traktor: A Rookie Robot, Simple, Yet Complex, Impeccably Designed, a Very Innovative Multidisciplinary Engineering Masterpiece

Henderson, A. J., Jr., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

FIRST is the acronym of For Inspiration and Recognition of Science and Technology. FIRST is a 501.C.3 non-profit organization whose mission is to generate an interest in science and engineering among today's young adults and youth. This mission is accomplished through a robot competition held annually in the spring of each year. NASAs Marshall Space Flight Center, Education Programs Department, awarded a grant to Lee High School, the sole engineering magnet school in Huntsville, Alabama. MSFC awarded the grant in hopes of fulfilling its goal of giving back invaluable resources to its community and engineers, as well as educating tomorrow's work force in the high-tech area of science and technology. Marshall engineers, Lee High School students and teachers, and a host of other volunteers and parents officially initiated this robot design process and competitive strategic game plan. The FIRST Robotics Competition is a national engineering contest, which immerses high school students in the exciting world of science and engineering. Teaming with engineers from government agencies, businesses, and universities enables the students to learn about the engineering profession. The students and engineers have six weeks to work together to brainstorm, design, procure, construct, and test their robot. The team then competes in a spirited, 'no-holds barred' tournament, complete with referees, other FIRST-designed robots, cheerleaders, and time clocks. The partnerships developed between schools, government agencies, businesses, and universities provide an exchange of resources and talent that build cooperation and expose students to new and rewarding career options. The result is a fun, exciting, and stimulating environment in which all participants discover the important connections between classroom experiences and real-world applications. This paper will highlight the story, engineering development, and evolutionary design of Xtraktor, the rookie robot, a manufacturing marvel and engineering achievement.

Author

Robots; Students; Product Development

20010067376 State Univ. of New York, Dept. of Computer Science, Stony Brook, NY USA

Compositional Analysis of Expected Delay in Networks of Automata ***Final Report, 1 Apr. 1996 - 31 Mar. 2000***

Smolka, Scott A.; Mar. 31, 2000; 8p; In English

Contract(s)/Grant(s): F49620-96-1-0087

Report No.(s): AD-A388763; No Copyright; Avail: CASI; A01, Microfiche; A02, Hardcopy

We have succeeded in extending our earlier work on probabilistic I/O automata to obtain a practical method for computing termination probabilities and expected termination times in networks of PIOA. Our method is compositional, avoiding the construction of the network's global state space, and as a result very efficient. This represents the culmination of work we first

reported in last year's annual report. Probabilistic I/O Automata (PIOA), a natural extension of the '10 Automaton model of Lynch and Tuttle, have been developed by the Pis to model and analyze distributed systems that exhibit behavior that is statistical or probabilistic in nature and subject to timing constraints. The objectives of this grant are to: (1) continue our investigation of the probabilistic I/O automaton model with an emphasis on developing techniques that will permit the probabilistic behavior and delay in distributed systems to be analyzed compositionally; (2) implement the resulting techniques in the Concurrency Factory, a CASE environment for the design, specification, verification, and implementation of asynchronous distributed systems; and 3. perform a technology transfer with Northrop Grumman by applying our techniques to several applications currently of interest to Northrop Grumman.
DTIC
Automata Theory; Networks; Composition (Property)

20010067377 Clemson Univ., SC USA
Rapid Training of GIL Neural Networks ***Final Report, 1 Sep. 1998 - 28 Feb. 1999***
Kiessler, Peter; Jefferies, Clark; Ntasin, Louis; Feb. 28, 1999; 17p; In English
Contract(s)/Grant(s): DAAG55-98-1-0414
Report No.(s): AD-A388753; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy
Applying generalized inverse learning to a feedforward neural network has been shown to be a effective tool in pattern recognition. The difficult computational step is finding the pseudo-inverse of a matrix. This paper develops an efficient method using differential equations to calculate the pseudo-inverse.
DTIC
Neural Nets; Education; Pattern Recognition; Feedforward Control

20010067415 Information Assurance Technology Analysis Center, Falls Church, VA USA
Watermark Estimation through Detector Observations
Kalker, Ton; Mar. 1998; 6p; In English; Presented at the Conference - Benelux Signal Processing Symposium 98 in Leuven, Belgium on Mar 1998.
Report No.(s): AD-A389655; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
A Watermark is a perceptually unobtrusive signal embedded in an image, an audio or video clip, or any other multimedia asset. Its purpose is to be a label which is holographically attached to the content. Moreover, it can only be removed by malicious and deliberate attacks (without a great loss of content quality) if some secret parameter K is known. In contrast, a waterman should be readily detectable by electronic means. This implies that electronic watermark detection is only feasible if the watermark detector is aware of the secret K. In many watermarking business scenarios the watermark detector will be available to the public as a black box D. The following question is therefore justified: Can the secret K be deduced from the operation of the a black box D? An if yes, what is the complexity of this process? In this paper we will address this issue for the watermarking method Patchwork.
DTIC
Detection; Multimedia; Imaging Techniques

20010067467 Army War Coll., Carlisle Barracks, PA USA
Center of Gravity Analysis: Preparing for Intelligent Agents
Bowman, Michael; Feb. 23, 2001; 33p; In English
Report No.(s): AD-A389112; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The center of gravity is defined as the foundation of capability - what Clausewitz called the "hub of all power and movement, on which everything depends... the point at which all our energies should be directed." This Strategic Research Project uses knowledge engineering and artificial intelligence techniques to identify and describe the background knowledge, concepts, information, and scenarios that would be required to create intelligent agents that would conduct center of gravity analysis. The paper explores the possibility of intelligent agents being used by strategic decision makers to assist in the determination of the center of gravity for a force. If this can be done, it will be a significant step in achieving information superiority and will have a profound impact on joint operational capabilities.
DTIC
Artificial Intelligence; Center of Gravity; Defense Program

64
NUMERICAL ANALYSIS

Includes iteration, differential and difference equations, and numerical approximation.

20010066154 Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette France
Arithmetic and Geometry of a Generic Hypersurface Section
Tankeev, S. G.; Dec. 2000; 34p; In English; Portions of this document are not fully legible
Report No.(s): PB2001-105850; IHES/M/00/81; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

If the Hodge conjecture (respectively the Tate conjecture or the Mumford - Tate conjecture) holds for a smooth projective variety X over a field k of characteristic zero, then it holds for a generic member X(sub t) of a k-rational Lefschetz pencil of hypersurface sections of X of sufficiently high degree. The Mumford - Tate conjecture is true for the Hodge Q-structure associated with the vanishing cycles on X(sub t). If the transcendental part of the second cohomology of K3 surface S over a number field is an absolutely irreducible module under the action of the Hodge group Hg(S), then the punctual Hilbert scheme Hilb(sup 2)(S) is a hyperkahler fourfold satisfying the conjectures of Hodge, Tate and Mumford - Tate.
NTIS
Arithmetic; Transcendental Functions; Geometry

20010067587 Institute for Computer Applications in Science and Engineering, Hampton, VA USA
Free-form Airfoil Shape Optimization Under Uncertainty Using Maximum Expected Value and Second-order Second-moment Strategies ***Final Report***
Huyse, Luc, Institute for Computer Applications in Science and Engineering, USA; June 2001; 29p; In English
Contract(s)/Grant(s): NAS1-97046; RTOP 505-90-52-01
Report No.(s): NASA/CR-2001-211020; NAS 1.26:211020; ICASE-2001-18; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Free-form shape optimization of airfoils poses unexpected difficulties. Practical experience has indicated that a deterministic optimization for discrete operating conditions can result in dramatically inferior performance when the actual operating conditions are different from the - somewhat arbitrary - design values used for the optimization. Extensions to multi-point optimization have proven unable to adequately remedy this problem of ”localized optimization” near the sampled operating conditions. This paper presents an intrinsically statistical approach and demonstrates how the shortcomings of multi-point optimization with respect to ”localized optimization” can be overcome. The practical examples also reveal how the relative likelihood of each of the operating conditions is automatically taken into consideration during the optimization process. This is a key advantage over the use of multipoint methods.
Author
Airfoils; Shape Optimization; Statistical Analysis; Computational Fluid Dynamics

65
STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; time series and analysis; and stochastic processes.

20010066107 NASA Ames Research Center, Moffett Field, CA USA
Exact Solutions to Time-Dependent MDPs
Boyan, Justin A., NASA Ames Research Center, USA; Littman, Michael L., American Telephone and Telegraph Co., USA; [2000]; 7p; In English
Contract(s)/Grant(s): NSF IRI-97-02576; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We describe an extension of the Markov decision process model in which a continuous time dimension is included in the state space. This allows for the representation and exact solution of a wide range of problems in which transitions or rewards vary over time. We examine problems based on route planning with public transportation and telescope observation scheduling.
Author
Time Dependence; Scheduling; Routes

20010066224 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Investigating Sorbent Geometry Response Surfaces from Sorption Rate Data
Harrison, H. M.; March 1998; 91p; In English
Report No.(s): AD-A340923; AFIT/GOA/ENV/98M-01; No Copyright; Avail: Defense Technical Information Center (DTIC)

Sorption and desorption of hydrophobic organic compounds (HOCs) into soil particles occurs at Air Force contamination sites. Long-term desorption extends clean up time, costing billions. Accurately modeling desorption will reduce costs and improve clean up designs. State of the art models depict soil as uniform spherical particles which lose the effect of longer sorption path lengths. An alternate approach, the multiple sites in series (MSS) model, describes the sorption capacity of a mixture of soil particle sizes and shapes using a composite particle defined by a two parameter statistical distribution. When the MSS model uses a general radial geometry function as the statistical distribution, unique parameters can not be fit to laboratory experimental data. This research employs response surface methodology (RSM) to investigate the non-unique parameter model deficiency. Analysis shows that the response surface for the general radial geometry function is a trough with no unique minimum. A unique minimum is found when the statistical distribution is changed to a gamma distribution.
DTIC
Water Pollution; Soils; Organic Compounds; Contamination; Sorption; Sorbents

20010066306 Los Alamos National Lab., Theoretical Div., NM USA
Equilibrium and Nonequilibrium Foundations of Free Energy Computational Methods
Jarzynski, C.; 2001; 20p; In English
Report No.(s): PB2001-105824; LA-UR-01-1412; No Copyright; Avail: National Technical Information Service (NTIS)

Statistical mechanics provides a rigorous framework for the numerical estimation of free energy differences in complex systems such as biomolecules. This paper presents a brief review of the statistical mechanical identities underlying a number of techniques for computing free energy differences. Both equilibrium and nonequilibrium methods are included.
NTIS
Free Energy; Computation; Numerical Analysis; Biochemistry

20010067570 Naval Undersea Warfare Center, Newport, RI USA
Saddlepoint Approximations for Various Statistics of Dependent, Non-Gaussian Random Variable: Applications to the Maximum Variate and the Range Variate
Nuttall, A. H.; Apr. 10, 2001; 88p; In English
Report No.(s): PB2001-106522; NUWC-NPT-TR-11-280; No Copyright; Avail: National Technical Information Service (NTIS)

The determination of the statistics of a set of random variables (RVs) is frequently achieved by assuming the RVs to be joint Gaussian or to be statistically independent of each other. Although this assumption greatly simplifies the analysis, it can lead to very misleading probability measures, especially on the tails of the distributions, where the exact details of the particular RVs can be important. This report presents a new method for deriving saddlepoint approximations (SPAs) for a number of very useful statistics of a general set of M dependent RVs, including the joint moments, the joint cumulative distribution function (CDF), the joint exceedance distribution function (EDF), and the joint probability density function (PDF). In particular, application to the maximum RV of a set of M dependent non-Gaussian RVs will be thoroughly investigated for two different examples. Also, the statistics of the range variate (maximum-minimum) are determined for the same two examples.
NTIS
Random Variables; Probability Theory; Approximation

66
SYSTEMS ANALYSIS AND OPERATIONS RESEARCH

Includes mathematical modeling of systems; network analysis; mathematical programming; decision theory; and game theory.

20010066200 Cornell Univ., Dept. of Computer Science, Ithaca, NY USA
Artificial Intelligence and Operations Research: Challenges and Opportunities in Planning and Scheduling ***Final Report, Dec. 1997-Nov. 2000***
Gomes, Carla P., Cornell Univ., USA; Mar. 2001; 65p; In English
Contract(s)/Grant(s): F30602-98-1-0008; AF Proj. 2304
Report No.(s): AD-A389356; AFRL-IF-RS-TR-2001-33; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

The objective of this effort was to research technology, tools, and techniques to support more efficient techniques for solving hard computational problems. Both the Artificial Intelligence (Al) community and the Operations Research (OR) community are interested in developing techniques for solving hard combinatorial problems, in particular in the domain of planning and scheduling. Al approaches encompass a rich collection of knowledge representation formalisms for dealing with a wide variety of real-world problems. OR based techniques have demonstrated the ability to identify optimal and locally optimal solutions for well-defined problem spaces. In general, however, OR solutions are restricted to rigid models with limited expressive power. Al techniques, on the other hand, provide richer and more flexible representations of real-world problems, supporting efficient constraint-based reasoning mechanisms as well as mixed initiative frameworks, which allow the human expertise to be in the loop. The challenge lies in providing representations that are expensive enough to describe real-world problems and at the same time guaranteeing good and fast solutions.
DTIC
Scheduling; Artificial Intelligence; Knowledge Representation; Operations Research; Combinatorial Analysis

20010066358 Information Assurance Technology Analysis Center, Falls Church, VA USA
Air and Space Command and Control Agency (ASC2A)
Fellows, Jack; Mar. 1998; 33p; In English
Report No.(s): AD-A389306; C41-00015; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The briefing, on the air and Space Command and Control Agency (ASC2A) includes its command relationships, mission, vision, common operational picture, and defense in depth.
DTIC
Command and Control; Military Operations

20010066575 Naval Postgraduate School, Monterey, CA USA
Operational-Level Naval Planning Using Agent-Based Simulation
Ercetin, Askin; Mar. 2001; 118p; In English
Report No.(s): AD-A390332; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche
This thesis uses agent-based modeling techniques to develop a simulation of the operational-level naval planning process. The simulation serves as an initial exploratory laboratory for analyzing the consequences of the force allocation, force deployment, and force movement decisions made by operational-level naval commanders during times of conflict or crisis. This model will hopefully help decision-makers in gaining insight into the naval planning process and enable them to make more informed decisions in the future. The agents in the model represent the opponent operational-level naval commanders. These agents perform force allocation, force deployment, and force movement tasks based on their perceived environment, attributes, and movement personalities. There are seven naval platform types represented in the model by default, but any type of naval platform can be added to the simulation. An integrated graphical user interface enables the user to instantiate agent and platform attributes, set simulation parameters, and analyze statistical output. The resulting model demonstrates the ability of the agent-based modeling to capture many dynamic aspects of the operational-level naval planning process. It establishes an initial simulation tool to further explore the operational-level naval planning process.
DTIC
Armed Forces (USA); Simulation; Tools; Knowledge Based Systems; Planning

20010067393 Johns Hopkins Univ., Baltimore, MD USA
A Cost-Benefit Approach to Resource Allocation in Scalable Metacomputers ***Final Report, 12 Aug. 1996 - 12 Sep. 2000***
Borgstrom, R. S.; Awerbuch, Baruch; Amir, Yair; Mar. 2001; 136p; In English
Contract(s)/Grant(s): F30602-96-1-0293; DARPA Order AOD985; AF Proj. D985
Report No.(s): AD-A389590; AFRL-IF-RS-TR-2001-38; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
The work described in this report develops, tests, and implements several advanced strategies for resource management in a network of machines. The Cost-Benefit Framework, developed in this work, offers a new approach to job assignment on metacomputers. It smoothly handles heterogeneous resources by converting them into a unitless cost.
DTIC
Computer Networks; Resource Allocation; Cost Effectiveness

20010067405 Naval War Coll., Newport, RI USA

Air Power Projection in the Era of "Double Digit" SAMS ***Final Report***

Hudson, Walter B.; Feb. 05, 2001; 20p; In English

Report No.(s): AD-A389535; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The USA military has had the advantage of being able to achieve air superiority during armed conflicts over the last 30 years. The ability to access the airspace over adversary territory has become part of the American way of war. Access to foreign hostile airspace in the future will become increasingly difficult. While performance of manned aircraft are reaching their limits, performance characteristics of surface-to-air missiles are still improving. Lessons from recent operations in Kosovo prove that a nation can exercise air denial using inexpensive air defense weaponry. The ability to exploit enemy airspace will continue to be a necessity in the future. In order to make that possible, we must focus our efforts on sensors and weapons that are more difficult for the enemy to detect and defend against. Unmanned Aerial Vehicles and standoff weapons are well suited to be these enemy airspace exploitation weapons. Joint forces with standoff weapon capability and targeting information provided by UAVs together with a common battlespace picture will have the ability to exploit enemy airspace in the future. The capability exists today; the necessity will exist tomorrow.

DTIC

Air Defense; Surface to Air Missiles; Pilotless Aircraft

20010067409 Naval War Coll., Joint Military Operations Dept., Newport, RI USA

The JFACC in a Network Centric World ***Final Report***

Woodcock, Al; Feb. 05, 2001; 30p; In English

Report No.(s): AD-A389589; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The current Joint Forces Air Component Command (JFACC) command and control (C2) structure is rapidly becoming cumbersome and unable to meet the challenges of modern warfare. The infrastructure and manning required to meet the needs of command and control of the air are too large. The current processes involved in the control of air assets are excessively lengthy and unresponsive. These processes limit the flexibility and speed of modern aircraft and sensors. Network Centric Warfare (NCW) holds the promise of mitigating many of the current shortfalls in the system. Through networking and reachback principles, NCW will allow geographically dislocated entities to function as one organization. This ability enables JFACC staffs to become more agile and adaptable. It also facilitates the distribution of control to decision makers who can rapidly analyze, decide and act in given situations, thereby enabling a pace of operations not previously possible. All of this will allow the JFACC to more efficiently and effectively employ airpower than ever before.

DTIC

Command and Control; Defense Program

20010067559 General Accounting Office, Washington, DC USA

Military Readiness: Management Focus Needed on Airfields for Overseas Deployments

Jun. 2001; 42p; In English

Report No.(s): PB2001-106657; GAO-01-566; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

The National Military Strategy calls for the Department of Defense (DOD) to maintain the transportation capability to quickly move the large amounts of personnel and equipment needed to win two nearly simultaneous major theater wars anywhere in the world. to provide this mobility, DOD relies on a transportation system that includes an airlift fleet of cargo aircraft and a critical network of overseas airfields that provide logistical support to aircraft on their way to the war zones. DOD calls this network of bases the En Route System (ERS). Although the two-war requirement and other aspects of the National Military Strategy are currently under review by the new Administration, the ERS remains critically important as the primary means of quickly moving U.S. soldiers and equipment to areas of conflict around the world. Because of concerns about the adequacy of U.S. mobility capabilities, the former Chairman of the Subcommittee asked us to assess whether U.S. airlift capabilities and the supporting ERS infrastructure are up to the task of carrying out the National Military Strategy.

NTIS

Deployment; Defense Program; Airports

67
THEORETICAL MATHEMATICS

Includes algebra, functional analysis, geometry, topology set theory, group theory and and number theory.

20010066071 Chung Yuan Christian Univ., Dept. of Electrical Engineering, Chung-Li, Taiwan, Province of China
Genetic Fuzzy Entropy-Constrained Vector Quantization
Hwang, Wen-Jyi, Chung Yuan Christian Univ., Taiwan, Province of China; Chine, Ching-Fung, Chung Yuan Christian Univ., Taiwan, Province of China; Hong, Sheng-Lin, Chung Yuan Christian Univ., Taiwan, Province of China; Journal of the Chinese Institute of Engineers; May 2001; ISSN 0253-3839; Volume 24, No. 3, pp. 369-377; In English; Copyright; Avail: Issuing Activity

A novel variable-rate vector quantizer (VQ) design algorithm using both genetic and fuzzy clustering techniques is presented. The algorithm, termed genetic fuzzy entropy-constrained VQ (GFECVQ) design algorithm, has a superior rate-distortion performance than that of the existing variable-rate VQ design algorithms. The algorithm utilizes fuzzy clustering technique to enhance the rate-distortion performance for the VQ design. In addition, a novel genetic algorithm is employed to ensure the robustness of the performance against the selection of initial parameters. Simulation results demonstrate that the FECVQ can be an effective alternative for the design of variable-rate VQS.
Author
Algorithms; Vector Quantization; Computerized Simulation

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.

20010066097 Phillips Lab., Kirtland AFB, NM USA
A Comparison of Exact Versus Perturbed Pole Locations of Dielectric Objects in Dielectric Medium
Worthy, Mark C.; Baum, Carl E.; Jul. 03, 1997; 13p; In English
Report No.(s): AD-A345504; No Copyright; Avail: Defense Technical Information Center (DTIC)

The dielectric properties of soils and plastic targets are given. The approach for finding exact pole locations from a dielectric infinite slab, a dielectric sphere, and a dielectric infinite cylinder is presented (and applied). The exact poles for the slab and sphere are found for various sizes and dielectric properties. There is a discussion (and use) of Carl E. Baum's perturbation formulas for dielectric slabs and spheres. George Hanson's results (formulas, from using Carl's same approach) are given (and used) for an infinite dielectric cylinder. The poles found from the perturbation formulas are compared with the exact poles and an "effective" region for using the perturbation formulas is established.
DTIC
Dielectric Properties; Dielectrics; Perturbation; Position (Location)

20010066156 Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette France
General Structure of the Non-Abelian Born-Infeld Action
Cornalba, L.; Jun. 2000; 66p
Report No.(s): PB2001-105125; IHES/P/OO/43; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The authors discuss the general structure of the non-abelian Born-Infeld action, together with all of the alpha derivative corrections, in flat D-dimensional space-time. More specifically, the authors show how the connection between open strings propagating in background magnetic fields and gauge theories on non-commutative spaces can be used to constrain the form of the effective action for the massless modes of open strings at weak coupling. In particular, the authors exploit the invariance in form of the effective action under a change of non-commutativity scale of space-time to derive algebraic equations relating the various terms in the alpha expansion. Moreover, the authors explicitly solve these equations in the simple case D = 2, and they show, in particular, how to construct the minimal invariant derivative extension of the NBI action.
NTIS
Born-Infeld Theory; Algebra

20010066159 National Inst. of Standards and Technology, Gaithersburg, MD USA
Journal of Research of the National Institute of Standards and Technology, November/December 2000. Volume 105, Number 6
2000; 156p; In English
Report No.(s): PB2001-106281; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche
Contents include the following: Articles; Opto-Mechanical and Electronic Design of a Tunnel-Trap Si Radiometer; External-Field Shifts of the (199)Hg(plus) Optical Frequency Standard; Round Robin for Optical Fiber Bragg Grating Metrology; Calibration of High-Resolution X-Ray Tomography with Atomic Force Microscopy; Accelerating Scientific Discovery through Computation and Visualization; Treasure of the Past V: Experimental Manufacture of Paper for War Maps; Errata: Erratum: Comparison of the NIST and NPL Air Kerma Standards used for X-Ray Measurements between 10kV and 80kV; and Indexes to Volume 105.
NTIS
Standards; Metrology

20010066793 American Inst. of Physics, New York, NY USA
Proceedings of the Seventh Joint Magnetism and Magnetic Materials-Intermag Conference, Volume 83
Jun. 01, 1998; 1234p; In English, 6-9 Jan. 1998, San Francisco, CA, USA
Report No.(s): AD-A345866; No Copyright; Avail: Defense Technical Information Center (DTIC)
The proceedings from the seventh joint materials conference.
Author
Magnetic Materials; Magnetic Properties

20010067572 Fermi National Accelerator Lab., Batavia, IL USA
Magnetic System of the Tevatron Electron Lens
Bogdanov, I.; Kozub, S.; Kuznetsov, G.; Pleskach, V.; Sery, A.; Jan. 2001; 8p; In English; Original contains color illustrations
Report No.(s): PB2001-106442; FERMILAB-CONF-00/337; No Copyright; Avail: Issuing Activity
In the framework of collaboration between IHEP and FNAL, a magnetic system of the Tevatron Electron Lens (TEL) has been designed and built. The TEL magnetic system will be set in the superconducting ring of the Tevatron proton-antiproton collider. The system provides solenoidal field to focus an electron beam, which affects on antiproton beam and, thus, compensates beam-beam effects in the Tevatron.
NTIS
Electron Beams; Particle Accelerators; Superconducting Magnets

20010067652 Rutherford Appleton Lab., Chilton UK
Neutron-Electron Spectroscopy
Balcar, E.; Lovesey, S. W.; Oct. 11, 2000; 24p
Report No.(s): PB2001-105854; RAL-TR-2000-044; Copyright; Avail: National Technical Information Service (NTIS), Microfiche
Inelastic scattering of neutrons by electrons in a solid is an established technique by which to investigate processes that occur on a scale of energy up to about 0.2 eV, and processes include spin-wave excitations and crystal-field states. The article looks at some examples of what can be gained from investigations conducted above this energy and up to several electron volts.
NTIS
Neutrons; Electrons; Electron Spectroscopy; Crystal Structure; Magnons

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 Propulsion and Power.

20010066065 Florida Univ., Interdisciplinary Microsystems Group, Gainesville, FL USA
Advanced Technology Development for Active Acoustic Liners ***Progress Report, 1 Nov. 1999 - 31 Oct. 2000***
Sheplak, Mark, Florida Univ., USA; Cattafesta, Louis N., III, Florida Univ., USA; Nishida, Toshikazu, Florida Univ., USA; Kurdila, Andrew J., Florida Univ., USA; [2001]; 8p; In English
Contract(s)/Grant(s): NAG1-2261; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Objectives include: (1) Develop electro-mechanical/acoustic models of a Helmholtz resonator possessing a compliant diaphragm coupled to a piezoelectric device; (2) Design and fabricate the energy reclamation module and active Helmholtz resonator; (3) Develop and build appropriate energy reclamation/storage circuit; (4) Develop and fabricate appropriate piezoelectric shunt circuit to tune the compliance of the active Helmholtz resonator via a variable capacitor; (5) Quantify energy reclamation module efficiency in a grazing-flow plane wave tube possessing known acoustic energy input; and (6) Quantify actively tuned Helmholtz resonator performance in grazing-flow plane wave tube for a white-noise input
Derived from text
Acoustic Emission; Piezoelectricity; Elastic Properties; Energy Storage

20010066221 Naval Postgraduate School, Monterey, CA USA
Analysis of Acoustic Plane-Wave Variability in the Region of the Mid-Atlantic Bight Shelf Break
Sullivan, Jerry L.; December 1997; 57p; In English
Report No.(s): AD-A346075; No Copyright; Avail: Defense Technical Information Center (DTIC)

From the summer cruise of the Mid-Atlantic Bight Experiment, conducted jointly by Naval Postgraduate School, University of Rhode Island, and Woods Hole Oceanographic Institution, a study of acoustic variability in the region of Mid-Atlantic Bight shelf break was conducted. The period of the experiment was 19 July to 09 August 1996. The experiment consisted of a suite of acoustic and oceanographic sensors including three 400 Hz (100 Hz bandwidth) transceivers, one 224 Hz (16 Hz bandwidth) transceiver and two vertical line arrays (VLAs). This study involves the signal processing of data collected by a telemetry buoy, an analysis of the spatial and temporal coherence of the phones and plane-wave beams of the vertical array, and the tidal and seasonal variabilities of plane-wave arrivals at the vertical array. Results of the changes in arrival time of the beams, the horizontal displacement of the front, the changes in the speed of propagation of the wave, and the change in the water temperature are discussed.
DTIC
Underwater Acoustics; Plane Waves; Signal Processing; Bays (Topographic Features); Signal Detectors; Sound Waves

20010066247 National Taiwan Univ., Dept. of Civil Engineering, Taipei, Taiwan, Province of China
Sound Propagation Near Tunnel Outlets
Huang, Liang-Hsiung, National Taiwan Univ., Taiwan, Province of China; Chen, Guan-Rong, National Taiwan Univ., Taiwan, Province of China; Hwang, Wei-Shien, National Taiwan Univ., Taiwan, Province of China; Journal of the Chinese Institute of Engineers; May 2001; ISSN 0253-3839; Volume 24, No. 3, pp. 321-328; In English; Copyright; Avail: Issuing Activity

This paper investigates the noise propagation in a tunnel by both normal mode and boundary element methods. The analysis of the sound field close to the tunnel outlet is the main concern of this study, since the pressure of sound varies abruptly in this region. The boundary element method is used to construct numerical solutions in this study for convenience. On the other hand, a theoretical analysis of axisymmetric solutions inside circular pipes with an inclined flange, based on the three-dimensional wave equation and the normal mode method, is set up to verify the numerical results. The conference of the analytical solutions and the accuracy of the numerical approach are tested for different pipe-radii and wavelength ratios. Finally, the boundary element method, with an approximated radiation condition, is used to simulate a tunnel noise field.
Author
Boundary Element Method; Noise Propagation; Sound Propagation; Sound Fields; Outlets; Computerized Simulation

20010066361 Silver Image Management, Scottsdale, AZ USA
Metadata Guidelines for Digital Sound ***Final Report, 1 Oct. 1999-11 Oct. 2000***
Flynn, Marcy; Oct. 11, 2000; 121p; In English
Contract(s)/Grant(s): SP4700-98-M-0450; SP4700-99-M-0592
Report No.(s): AD-A389856; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

These guidelines contain instructions for cataloging digital sound (audio) as part of the Defense Technical Information Center (DTIC) Defense Virtual Library (DVL). This project was initiated by DTIC in cooperation with the Defense Advanced Research Projects Agency (DARPA) and the Corporation for National Research Initiatives (CNRI). Over 60 data elements (fields) have been described, all of which conform to the Machine Readable Cataloging (MARC) and Anglo-American Cataloging Rules, 2 nd edition (AACR2) standards. MARC guidelines follow those in ”MARC21 Format for Bibliographic Data.” Examples for each data element and sample records are presented. This manual is also available at the Defense Virtual Library Web site, http://dvl.dtic.mil:8100/notes.html
DTIC
Software Engineering; Bibliographies; Digital Electronics

20010066848 Brown Univ., Providence, RI USA

High Order Discontinuous Galerkin Methods for Convection Dominated Problems with Applications to Aeroacoustics

Final Report, 1 Jun. 1998 - 30 Nov. 2000

Shu, Chi-Wang, Brown Univ., USA; [2000]; 5p; In English

Contract(s)/Grant(s): NAG1-2070; Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

This project is about the investigation of the development of the discontinuous Galerkin finite element methods, for general geometry and triangulations, for solving convection dominated problems, with applications to aeroacoustics. On the analysis side, we have studied the efficient and stable discontinuous Galerkin framework for small second derivative terms, for example in Navier-Stokes equations, and also for related equations such as the Hamilton-Jacobi equations. This is a truly local discontinuous formulation where derivatives are considered as new variables. On the applied side, we have implemented and tested the efficiency of different approaches numerically. Related issues in high order ENO and WENO finite difference methods and spectral methods have also been investigated.

Derived from text

Galerkin Method; Hamilton-Jacobi Equation; Spectral Methods; Finite Element Method

20010067326 Creative EnterpriZes, Lake Jackson, TX USA

At Last, Something New! Cleaning Without Chemistry, and Reusing the Waste Water!

Durkee, J., Creative EnterpriZes, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The poster describes research performed by Creative EnterpriZes and a client firm to investigate management of industrial soils from their existence on parts to their disposal as a concentrate in water. These soils came from the manufacture of metal parts and include oils used for drawing, forming, cutting, grinding, lubricating, and honing; phosphate-based lubricants used in compression threading; dry lubricants, such as molybdenum disulfide; and other materials whose composition was unknown. The research produced the following knowledge: (1) How these soils could be cleaned from parts using only ultrasonic energy and without use of cleaning chemistry; (2) How these soils could be made so as to not reinfect the parts in the cleaning bath; (3) The surprising effects of temperature and cleaning time on surface finish; (4) How to construct an evaporator for separation of the soils from water; and (5) Specifications about recycle of the distilled and condensed liquid water. The technology had been used at both high-precision and low-quality levels of cleaning. This knowledge has been implemented in full-scale cleaning machines, which also will be described.

Author

Cleaning; Soils; Industrial Wastes

20010067597 Southampton Univ., Fluid Dynamics and Acoustics Group, UK

A Review of Scattering Models for Ultrasonic Propagation in Trabecular Bone

Hughes, E. R., Southampton Univ., UK; Leighton, T. G., Southampton Univ., UK; Petley, G. W., Southampton Universities NHS Trust, UK; White, P. R., Southampton Univ., UK; May 2001; 22p; In English

Contract(s)/Grant(s): EPSRC-GR/M/37806

Report No.(s): ISVR-TR-293; Copyright; Avail: Issuing Activity

Trabecular bone, found at the core of many bones in the human skeleton, is composed of a porous, marrow-filled lattice of calcified rods. This structure erodes with the onset of the debilitating bone disease osteoporosis. Osteoporosis can be treated effectively to reduce the risk of fracture, if diagnosed sufficiently early. In recent years, a wide range of ultrasonic bone assessment systems have become commercially available, collectively known as Quantitative Ultrasonography (QUS). QUS assessment measures Broadband Ultrasonic Attenuation and the speed of sound in bone. In the absence of a satisfactory model of the interaction of ultrasound and bone, it is unclear how this complementary information may be used to improve diagnosis. In particular, the main loss factors in bone at frequencies between 200 kHz and I MHz are poorly understood. This report is concerned with reviewing recent advances in understanding loss factors at these frequencies, and in particular, several theoretical models of scattering in bone. Models from five authors are considered, each with slightly differing assumptions in terms of ka region in which it is valid (for wavenumber, k, and scatterer size, a), scatterer distribution and the modelling of two compressional waves in trabecular bone.

Author

Mathematical Models; Musculoskeletal System; Ultrasonics; Osteoporosis; Fracturing; Bone Marrow

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.

20010066152 Rutherford Appleton Lab., ISIS Facility, Chilton, UK
IRIS User Guide. 2nd Edition
Adams, M. A.; Howells, W. S.; Telling, M. T. F.; Jan. 19, 2001; ISSN 1358-6254; 44p; In English
Report No.(s): PB2001-105866; RAL-TR-2001-002; Copyright; Avail: National Technical Information Service (NTIS)

This User guide contains all the information necessary to perform a successful neutron scattering experiment on the IRIS high-resolution quasi/in-elastic spectrometer at the ISIS Facility, RAL, UK. However, to ensure it is as concise as possible, other manuals and reports are referenced for specific details. Copies of all reference material are available in the instrument cabin. Your Local Contact is also available for assistance and discussion regarding the precise details of the experiment. This first section addresses the basic underlying of IRIS operating as a high-resolution quasi / in-elastic spectrometer and high-resolution long-wavelength diffractometer. Section 2, 'Performing, an experiment on IRIS', details a typical experimental procedure in a 'step-by-step' manner. Finally, sections 3 and 4 discuss computer control as well as data analysis and visualization.
NTIS
Neutron Scattering; Spectrometers; User Manuals (Computer Programs)

20010066634 Fermi National Accelerator Lab., Batavia, IL USA
RF Design of a Transverse Mode Cavity for Kaon Separation
McAshan, M.; Wanzenberg, R.; May 2001; 84p; In English
Report No.(s): PB2001-106023; FERMILAB-TM-2144; No Copyright; Avail: National Technical Information Service (NTIS)

Two detecting mode RF systems can be used to separate secondary kaons from a momentum selected particle beam, primarily consisting of a mix of protons, pions and kaons, by a time of flight method. The principles of this methods and the choices of the parameters are explained. All numerical field calculations are performed by the MAFIA code. An equivalent circuit model, based on a two chain model, is applied to a 7-cell cavity. It is demonstrated that the dispersion diagram obtained by MAFIA calculations can be very well approximated by this equivalent circuit.
NTIS
Cavities; Radio Frequencies; Kaons; Separation

20010066765 Brookhaven National Lab., Physics Dept., Upton, NY USA
Neutrino Factories - Physics Potentials
Parsa, Z.; Feb. 2001, pp. 781-789; In English; 7th; Presented at AIP Conf. Proc.549, 'Intersections of Particle and Nuclear Physics (CIPANP-2000), 22-28 May 2000, Quebec, Canada
Report No.(s): PB2001-106007; BNL-68140; No Copyright; Avail: National Technical Information Service (NTIS)

The recent results from Super-Kamiolrande atmospheric and solar neutrino observations opens a new era in neutrino physics and has sparked a considerable interest in the physics possibilities with a Neutrino Factory based on the muon storage ring. We present physics opportunities at a Neutrino Factory, and prospects of Neutrino oscillation experiments. Using the precisely known flavor composition of the beam, one could envision an extensive program to measure the neutrino oscillation mixing matrix, including possible CP violating effects. These and Neutrino Interaction Rates for examples of a Neutrino Factory at BNL (and FNAL) with detectors at Gran SASso, SLAC and Sudan are also presented.
NTIS
Storage Rings (Particle Accelerators); Muons; Solar Neutrinos

20010067492 Oak Ridge National Lab., Physics Div., TN USA
Breakup and Recombination of Identical Bosons: He Dimer-Monomer Collisions
Macek, J. H.; 2001; 8p; In English
Report No.(s): PB2001-106407; No Copyright; Avail: National Technical Information Service (NTIS)

Three He atoms can react in vapor at temperatures of the order of a few degrees Kelvin to form a dimer and a free atom by three-body collisions. Conversely, the dimer may fragment by collisions with free He atoms. Cross sections and reaction rates for these processes have been computed at milliKelvin temperatures using the hyperspherical hidden crossing theory. At higher

energies, of the order of 0.1 to 5 Kelvin, the impulse approximation has been used to estimate these processes. The computed fragmentation cross section is reported.
NTIS
Helium Atoms; Bosons; Atomic Collisions; Dimers

20010067642 NASA Goddard Space Flight Center, Greenbelt, MD USA
Atomic Data and Spectral Line Intensities for Ni XXI
Bhatia, A. K., NASA Goddard Space Flight Center, USA; Landi, E., Naval Research Lab., USA; [2001]; 28p; In English
Contract(s)/Grant(s): NASA Order W-19539; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Electron impact collision strengths, energy levels, oscillator strengths and spontaneous radiative decay rates are calculated for Ni XXI. The configurations used are 2s(sup 2)2p(sup 4), 2s2p(sup 5), 2p(sup 6), 2s(sup 2)2p(sup 3)3s, and 2s(sup 2)3p(sup 3)3d giving rise to 58 fine-structure levels in intermediate coupling. Collision strengths are calculated at five incident energies, 85, 170, 255, 340, and 425 Ry. Excitation rate coefficients are calculated by assuming a Maxwellian electron velocity distribution at an electron temperature of log T(sub e)(K)=6.9, corresponding to maximum abundance of Ni XXI. Using the excitation rate coefficients and the radiative transition rates, statistical equilibrium equations for level populations are solved at electron densities 10(exp 8)-10(exp 14) per cubic centimeter. Relative spectral line intensities are calculated. Proton excitation rates between the lowest three levels have been included in the statistical equilibrium equations. The predicted intensity ratios are compared with available observations.
Author
Line Spectra; Atomic Structure; Nickel; Atomic Energy Levels

20010067656 Old Dominion Univ., Dept. of Physics, Norfolk, VA USA
High-Energy QCD and Wilson Lines
Balitsky, I.; Jan. 05, 2001; 114p; In English; Original contains color illustrations
Report No.(s): PB2001-106146; JLAB-THY-00-44; No Copyright; Avail: National Technical Information Service (NTIS)

Contents include the following: Introduction; The hard pomeron in pQCD; Operator expansion for high-energy scattering; Factorization and effective action for high-energy scattering; High-energy effective action in sQCD; Conclusions and outlook and Appendix.
NTIS
Quantum Chromodynamics; Lines

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.

20010066095 Johns Hopkins Univ., Baltimore, MD USA
In Vivo Microscopic MR Imaging of Breast Lesions ***Final Report, 1 Oct. 1994 - 30 Sep. 1997***
Zerhouni, Elias A.; Octtober 1997; 10p; In English
Contract(s)/Grant(s): DAMD17-94-J-4067
Report No.(s): AD-A345983; No Copyright; Avail: Issuing Activity

This study explored whether microscopic magnetic resonance imaging (MRI) could help determine the nature of suspicious breast lesions. After mammography identifies a suspicious lesion, there is currently no reliable, noninvasive way to determine whether the lesion is malignant, which results in unnecessary biopsies. In this study, we developed a special set-up, to be used in a GIS Signa 1.5F magnet. The breast was gently compressed and small receiver coils were used to detect the MR signal to produce very high resolution images of the breast lesions. Using these coils, as well as a contrast agent, several types of images were obtained for all patients. There were 10 patients, all of whom underwent biopsies, and the biopsy results were compared with the acquired images. The resolution was sufficient to be able to characterize the structure of the lesions. The most significant difference between the two types of lesions was the border appearance of each lesion. Benign lesions had smooth edges and

malignant lesions had infiltrating edges. Very high resolution MRI could help to diagnose suspicious lesions and reduce the number of unnecessary biopsies.
DTIC
Microscopy; Mammary Glands; Magnetic Resonance; Imaging Techniques; In Vivo Methods and Tests

20010066202 Alabama A & M Univ., Normal, AL USA
AAMU Materials Research Science and Engineering Center ***Final Report, 1 Aug. 1998-31 Jul. 1999***
Ila, Daryush; Mar. 2000; 4p; In English
Contract(s)/Grant(s): F49620-98-1-0497
Report No.(s): AD-A389365; AFRL-SR-BL-TR-01-0297; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The instrumentation funds of this grant were used to upgrade an NEC 5SDH-2 high energy implanter with an upgraded gas stripper chamber, insulating gas transfer system, and residual gas analyzer. These upgrades improve ion beam current, reduce repair and maintenance costs and downtime. The Eaton low energy implanter was provided with new vacuum pumps to replace irreparable pumps. This implanter will allow materials modification by low energy, high current ion beams at AAMU, rather than at other facilities. Funds were also use to acquire a micro-Raman spectrometer (DILOR LabRam) and an optical spectrophotometer (Spectral Instruments). These instruments analyze materials modified by ion beams, created by in-house deposition systems or provided by customers. Funds were also expended to purchase a guass meter probe for the ion selection magnet on the high energy implanter and a near infrared viewer for use in analyzing ion beam modified channel waveguides.
DTIC
Measuring Instruments; Materials Science; Gas Analysis

20010067571 Fermi National Accelerator Lab., Batavia, IL USA
NUFACT00: Interface Between Machine and Physics Working Group Summary
Cadenas, J. J. G.; Geer, S.; Mori, Y.; 2001; 14p; In English
Report No.(s): PB2001-106443; FERMILAB-CONF-01/003E; No Copyright; Avail: National Technical Information Service (NTIS)

The main conclusions from the working group 3 presentations and deliberations at NUFACT00 are summarized. The goal of Working Group 3 at NUFACT00 was to arrive at a set of neutrino factory parameters, taking into account physics needs and accelerator limitations.
NTIS
Industrial Plants; Neutrinos; Accelerators

20010067575 Fermi National Accelerator Lab., Batavia, IL USA
Double Alpha MEBT for H Beam
Popovic, M.; Jan. 2001; 10p; In English
Report No.(s): PB2001-106147; FERMILAB-TM-2138; No Copyright; Avail: Issuing Activity

This note describes simulation studies of the H-beam matching condition between a 750keV rod radio-frequency quadrupole (RFQ) and the existing Fermilab drift tube linac (DTL). The RFQ design used in this study is that of an existing RFQ designed and built by A. Schempp from IAP- Goethe University. It is assumed that the medium-energy beam transport (MEBT) line uses hardware built for a positron emission tomography (PET) project. The MEBT is made out of two Alpha magnets and seven quadrupoles and was designed by D. Larson. The beam from the exit of the RFQ is matched to the entrance in the DTL in all three dimensions. The study shows that up to 65mA of H-beam can be transported and cleanly injected into the present linac.
NTIS
Quadrupoles; Simulation; Electron Beams; H Alpha Line

20010067657 High Energy Accelerator Research Organization, Ibaraki Japan
Superbunch Hadron Colliders
Takayama, K.; Kishiro, J.; Sakuda, M.; Wake, M.; Mar. 16, 2001; 14p; In English; Original contains color illustrations
Report No.(s): PB2001-106141; WSRC-MS-2000-00517; No Copyright; Avail: National Technical Information Service (NTIS)

A novel concept of a high luminosity hadron collider is proposed. This would be a typical application of an induction synchrotron being newly developed. Extremely long bunches, referred to as superbunches are generated by a multi-bunch stacking method employing barrier buckets at the injection into the collider, and are accelerated to the collider energy with an step-voltage

induced in the induction gaps. Superbunches intersect with each other, yielding a luminosity of more than 1035/cm2/sec. A combination of vertical crossing and horizontal crossing can be used in order to avoid any significant beam-beam tune shift.
NTIS
Hadrons; Luminosity

74
OPTICS

Includes light phenomena and the theory of optical devices. For lasers see 36 Lasers and Masers.

20010066081 University of Southern California, Dept. of Materials Science and Engineering, Los Angeles, CA USA
Imaging of Spatially Separated Electron-Hole Plasma Dynamics in Nipi-Doped Photonic Materials ***Final Report***
Rich, Daniel H.; Dec. 15, 1997; 7p; In English
Contract(s)/Grant(s): DAAH04-94-G-0260
Report No.(s): AD-A344510; ARO-32869.21-PH-YIP; No Copyright; Avail: Defense Technical Information Center (DTIC)

The aim of this research is to examine the structural and optical properties of strained InGaAs/GaAs quantum wells, quantum wires (QWRs) and dots (QDs) using new spatially, spectrally, and temporally resolved electron probes. The presence of defects will degrade the nonlinear optical properties and impact the performance of spatial light modulators and lasers. The carrier recombination dynamics and nonlinear optical properties in nipi-doped InGaAs/GaAs quantum wells were studied using a new approach called electron beam induced absorption (EBIA) modulation. Time-resolved cathodoluminescence (CL) was used to study InGaP and GaAs based QDs and QWRs. Carrier thermalization, ambipolar diffusion, and phase-space filling were studied with CL and EBIA, in an attempt to understand the interrelationship between the optical, transport, and structural properties in strained quantum heterostructures and nanostructures. These findings are expected to influence the design and implementation of these materials in light modulators and lasers, which can be used for digital optical communication, pattern recognition, and target tracking applications.
DTIC
Cathodoluminescence; Electron Probes; Gallium Arsenides; Holes (Electron Deficiencies)

20010066137 SRS Technologies, Huntsville, AL USA
Ultra-Light Precision Membrane Optics ***Final Report***
Moore, Jim, SRS Technologies, USA; Gunter, Kent, SRS Technologies, USA; Patrick, Brian, SRS Technologies, USA; Marty, Dave, SRS Technologies, USA; Bates, Kevin, SRS Technologies, USA; Gatlin, Romona, SRS Technologies, USA; Clayton, Bill, SRS Technologies, USA; Rood, Bob, SRS Technologies, USA; Jun. 18, 2001; 33p; In English; Original contains color illustrations
Contract(s)/Grant(s): NAS8-00105
Report No.(s): TR01-1056; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

SRS Technologies and NASA Marshall Space Flight Center have conducted a research effort to explore the possibility of developing ultra-lightweight membrane optics for future imaging applications. High precision optical flats and spherical mirrors were produced under this research effort. The thin film mirrors were manufactured using surface replication casting of CPI(Trademark), a polyimide material developed specifically for UV hardness and thermal stability. In the course of this program, numerous polyimide films were cast with surface finishes better than 1.5 nanometers rms and thickness variation of less than 63 nanometers. Precision membrane optical flats were manufactured demonstrating better than 1/13 wave figure error when measured at 633 nanometers. The aerial density of these films is 0.037 kilograms per square meter. Several 0.5-meter spherical mirrors were also manufactured. These mirrors had excellent surface finish (1.5 nanometers rms) and figure error on the order of tens of microns. This places their figure error within the demonstrated correctability of advanced wavefront correction technologies such as real time holography.
Author
Membranes; Imaging Techniques; Mirrors; Thin Films; Real Time Operation; Surface Finishing

20010066157 National Inst. of Standards and Technology, Optical Technology Div., Gaithersburg, MD USA
Standard Reference Materials: Infrared Transmittance Standards - SRM's 2053, 2054, 2055, and 2056
Kaplan, S. G.; Hanssen, L. M.; May 2001; 58p; In English
Report No.(s): PB2000-108258; NIST/SP-260-123; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Standard Reference Materials 2053, 2054, 2055, and 2056 are transmission filters designed to have nominally neutral attenuation over the 2 micrometers to 25 micrometers wavelength region, with optical densities near 1, 2, 3, and 4, respectively.

The filters are made of polished single-crystal Si substrates, 25 mm in diameter and 0.25 mm in thickness, with thin Ni:Cr or Cu:Ni coatings appropriate for the given attenuation level. They are intended to be used for checking the accuracy of the ordinate scale of infrared spectrophotometers. The regular spectral transmittance of each filter has been measured with 8 (sub -1) resolution using an FT-IR spectrophotometer. The uncertainty in transmittance of each filter has been determined, including both type-A (statistical) and type-B (systematic) components.
NTIS
Standards; Infrared Spectroscopy; Fourier Transformation

20010066172 Sandia National Labs., Albuquerque, NM USA
Thin-Skin Deployable Mirrors for Remote Sensing Systems
Henson, T. D.; Wehlburg, J. C.; Redmond, J. M.; Main, J. A.; Martin, J. W.; Jan. 2001; 66p; In English; Original contains color illustrations
Report No.(s): PB2001-106101; SAND-2001-0101; No Copyright; Avail: National Technical Information Service (NTIS)

This report summarizes an initial research effort into the development of piezoelectric thin-skin mirrors. A thin-skin piezoelectric bimorph mirror will bend in response to an applied electric field and can therefore be deformed into desirable shapes using a scanning electron gun. Recent progress is described in the key areas of experimental testbed development, mirror figure sensing methods, electron gun excitation, and shape control algorithm development. Results show that although this field of research is in its infancy, many of the technological barriers to realization of a deployable mirror are surmountable. Continued research in this field is warranted on the basis of its potential for dramatically improving the resolution and sensitivity of future space based optical systems.
NTIS
Mirrors; Remote Sensing; Optical Equipment

20010066189 Air Force Research Lab., Human Effectiveness Directorate, Wright-Patterson AFB, OH USA
Interlaboratory Study (ILS) for the Determination of the Angular Displacement of Multiple Images in Transparent Parts ***Interim Report, Apr. 1995 - Dec. 1997***
Pinkus, Alan R.; Task, Harry L.; March 1998; 82p; In English
Contract(s)/Grant(s): AF Proj. 7184
Report No.(s): AD-A345368; AFRL-HE-WP-TR-1998-0011; No Copyright; Avail: Defense Technical Information Center (DTIC)

An Interlaboratory Study (ILS) was undertaken in order to determine the precision of the test method for measuring the angular displacement of multiple images by transparent parts. Multiple imaging is defined as the angular separation of secondary images from their respective primary images as viewed from the design eye position of an aircraft transparency. Newer aircraft now utilize thick, curved, highly angled transparencies resulting in multiple imaging being more frequently cited as an optical problem by pilots. Secondary images vary in intensity and displacement across the transparency thus giving the observer deceptive cues of attitude, velocity and approach angle. Test method F 1165-88 standardizes the measurement technique. This IS determined the precision of this method.
DTIC
Attitude (Inclination); Imaging Techniques; Transparence

20010066315 Defence Science and Technology Organisation, Aeronautical and Maritime Research Lab., Fishermans Bend, Australia
Validation of the SensorVision Thermal Emission Model
Duong, Ninh, Defence Science and Technology Organisation, Australia; Wegener, Michael, Defence Science and Technology Organisation, Australia; April 2001; 80p; In English
Contract(s)/Grant(s): AOR-99/133
Report No.(s): DSTO-RR-0212; DODA-AR-011-866; Copyright; Avail: Issuing Activity

The Systems Simulation Centre of the DSTO is currently considering the implementation of a commercial-off-the-shelf software package called SensorVision to fulfil the scene generation function of an infrared hardware-in-the-loop (HIL) system. Before the software can be used for the intended application, there is a need to verify and validate the SensorVision models to ensure that the generated scenes are sufficiently realistic for HIL simulation purposes. This report discloses the results and conclusions of a validation effort focused on the SensorVision thermal emission model, which includes both the surface temperature prediction of objects and the thermal radiance calculations. It is shown that the thermal emission model employed by SensorVision has errors that can affect the level of realism associated with the generated infrared images. Unrealistic scenes

can cause spurious HIL simulation results, since these infrared images are used as the primary stimuli for the system being tested. A procedure for providing confidence in HIL simulation results is recommended, involving general guidelines for simulation construction and post-processing operations to provide users with image error indications.
Author
Commercial Off-The-Shelf Products; Systems Simulation; Infrared Instruments; Infrared Imagery; Applications Programs (Computers)

20010067411 Pattern Analysis and Recognition Corp., Rome, NY USA
Extended Experimentation Using Polarization Techniques ***Final Report, Mar. - Sep. 1999***
Duggin, Michael J.; Mar. 2001; 23p; In English
Contract(s)/Grant(s): F30602-99-C-0051; AF Proj. 2304
Report No.(s): AD-A389608; Rept-113112-02; AFRL-IF-RS-TR-2001-41; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Polarization can yield image intelligence additional to that accessible from radiometric intensity, wavelength-dependence, texture, topography, or feature shape, size or relative disposition. In this study, investigations were performed to determine to what extent this is true, and to investigate controlling parameters. The objective of this effort was to extend the investigation of the use of polarized light to enhance target-to-background contrast in order to improve target feature detection and discrimination. This study demonstrated, using digital image data collected during 1997 and 1998, that there is great variation in polarization in and between each of the bandpasses, and this variation is comparable to the magnitude of the variation intensity. In addition, it is shown that the contrast in polarization is greater than for intensity, and that polarization contrast increases as intensity contrast decreases. It is also demonstrated that chromaticity can be used to make targets such as camouflage netting stand out more clearly against background. Multiband imaging polarimetry is likely to provide an advantage in feature detection and discrimination.
DTIC
Imaging Techniques; Polarized Light; Polarimetry

20010067460 National Inst. of Standards and Technology, Manufacturing Engineering Lab., Gaithersburg, MD USA
Rationale and Procedures for Development of a NASA Primary Metrology Lab for Large Optics
Vorburger, T. V.; Evans, C. J.; Estler, W. T.; Mar. 2001; 60p; In English; Original contains color illustrations
Report No.(s): PB2001-102391; NISTIR-6710; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Contents: Introduction; Definitions; Measurement Requirements in Common; NGST Requirements; Constellation X Requirements; Achieving Traceability on MSFC Instruments - Examples of Road Maps; Overall Recommendations; Acknowledgments; References.
NTIS
Metrology; Optical Measurement

75
PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see 46 Geophysics. For space plasmas see 90 Astrophysics.

20010066136 NASA Ames Research Center, Moffett Field, CA USA
Plasma Heating and Ultrafast Semiconductor Laser Modulation Through a Terahertz Heating Field
Li, Jian-Zhong, NASA Ames Research Center, USA; Ning, C. Z., NASA Ames Research Center, USA; [2000]; 25p; In English
Contract(s)/Grant(s): NAS2-14303; DTT59-99-D-00437; NASA Order A-61812-D; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Electron-hole plasma heating and ultrafast modulation in a semiconductor laser under a terahertz electrical field are investigated using a set of hydrodynamic equations derived from the semiconductor Bloch equations. The self-consistent treatment of lasing and heating processes leads to the prediction of a strong saturation and degradation of modulation depth even at moderate terahertz field intensity. This saturation places a severe limit to bandwidth achievable with such scheme in ultrafast modulation. Strategies for increasing modulation depth are discussed.
Author
Plasma Heating; Light Modulation; Semiconductor Lasers; Holes (Electron Deficiencies); Electron Plasma; Electric Fields

20010066299 McMaster Univ., Dept. of Engineering Physics, Hamilton, Ontario Canada

Pacifichem 2000 Symposium on Plasma Chemistry and Technology for Green Manufacturing, Pollution Control and Processing Applications ***Final Report, 1 Dec. 2000 - 15 Mar. 2001***

Chang, Jen-Shih; Mar. 19, 2001; 32p; In English, 14-19 Dec. 2000, Honolulu, HI, USA

Contract(s)/Grant(s): DAAD19-01-1-0008

Report No.(s): AD-A389583; ARO-41688.1-PH-CF; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Plasma chemistry and technology represents a significant advance and improvement for green manufacturing, pollution control, and various processing applications. The US Army as well as the DoD have a very large number of operational and military needs that can be addressed by state-of-the-art plasma technologies. These include clean-up/restoration of a wide range of contaminated sites (soils and groundwater), control of release of toxic vapors during peacetime operations at military bases and depots, as well as combat applications such as decontamination of personnel clothing and materiel contaminated by CBW agents. The Pacific Basin Chemical Societies jointly organize a major Congress every five years. The Pacifichem 2000 was held from December 14-19, 2000 in Honolulu, HI. This Congress consists of over 120 symposia. amongst them the Symposium on Plasma Chemistry and Technology for Green Manufacturing, Pollution Control, and Processing Applications. This symposium was aimed at highlighting many of the new and exciting developments in the plasma chemistry many field beyond the more traditional and mature fields of semiconductor and materials processing. This symposium was focus on three areas: Pollution Control with Standard and Hybrid Non-Thermal Plasmas; Green Chemical Synthesis, Conversion, and Materials Modification; and Plasmas in Food and Agricultural applications.

DTIC

Agriculture; Ground Water; Plasma Chemistry; Pollution Control; Semiconductors (Materials); Synthesis (Chemistry); Thermal Plasmas; Toxic Hazards; Vapors

20010066766 Georgia Inst. of Tech., Fusion Research Center, Atlanta, GA USA

Calculation Model for Density Limits in Auxiliary Heated, Gas Fueled Tokamaks and Application to DIII-D Model Problems

Stacey, W. M.; Apr. 2001; 40p; In English

Report No.(s): PB2001-105910; GTFR-154; Copyright; Avail: Issuing Activity

A model for the calculation of density limits in high confinement (H-mode) tokamaks is described. The model consists of coupled calculations of: (1) the power, particle and momentum balances for the core plasma and for the divertor/SOL plasma; (2) the transport of fueling and recycling neutrals; (3) pedestal gradient scale lengths and MHD limits; (4) confinement degradation due to thermal instabilities in the edge transport barrier; (5) divertor and core MARFE (multifaceted asymmetric radiation from edge) onset; (6) radiative collapse leading to disruption, and (7) power threshold for high-to-low mode transition.

NTIS

Plasma Physics; Tokamak Devices; Density; Plasma Heating

20010066767 Georgia Inst. of Tech., Fusion Research Center, Atlanta, GA USA

Edge Pedestal Model Based on Transport and Atomic Physics

Stacey, W. M.; Apr. 2001; 22p; In English

Report No.(s): PB2001-105909; GTFR-155; Copyright; Avail: Issuing Activity

A model is presented for the calculation of the characteristic scale lengths from transport considerations in the edge pedestal region of high confinement (H-mode) plasmas. The model is based on the requirements of heat and particle removal through the edge. Atomic physics effects on edge density and temperature gradient scale lengths are taken into account. Magnetohydrodynamic constraints on the maximum allowable pressure gradient are implicitly included via the use of empirical fits for the width of the edge pedestal transport barrier. Model problems calculations indicate that the model predicts the magnitudes and some trends of characteristic gradient scale lengths observed in current experiments.

NTIS

Plasmas (Physics); Plasma Physics; Plasma Control; Atomic Physics

20010067288 NASA Marshall Space Flight Center, Huntsville, AL USA

Vacuum Plasma Spray of Cu-8Cr-4Nb for Advanced Liquid-Fuel Combustion Chambers

Zimmerman, F., NASA Marshall Space Flight Center, USA; Elam, S., NASA Marshall Space Flight Center, USA; Ellis, D., NASA Glenn Research Center, USA; Miller, H., Boeing Aerospace Co., USA; McKechnie, T., Plasma Processes, USA; Hickman, R., Plasma Processes, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 21p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

Vacuum plasma spray (VPS) formed Cu-8Cr-4Nb alloy, with low oxygen, exhibits higher strength at room and elevated temperature than material formed by extrusion. The VPS formed material exhibits slightly lower ductility than the extruded material. VPS forming of Cu-8Cr-4Nb can be used to produce near net structures with mechanical properties comparable to current extruded material.
Derived from text
Extruding; Copper Alloys; Plasma Spraying; Performance Tests

20010067289 Boeing Co., Rocketdyne Propulsion and Power, Canoga Park, CA USA
Dynamic Oxidation of a Plasma-Sprayed Cu-Cr-Coating
Chiang, K. T., Boeing Co., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 6p; In English; See also 20010067226
Contract(s)/Grant(s): F33657-910C-2012; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

The dynamic oxidation of a plasma-sprayed Cu-30 vol% Cr coating was investigated in an electric arc-heated wind tunnel. The wind tunnel generated high velocity, fully dissociated air containing atomic oxygen. The metal surface temperature was maintained at 650 C for up to five hours. The high velocity atomic oxygen enhanced oxidative evaporation of Cr metal resulted in rapid metal weight loss. The high temperature atomic oxygen caused rapid oxide formation on Cu. The scale cracked and spalled severely during cooling to room temperature. The plasma-sprayed Cu-Cr coating provided good oxidation protection for the copper alloy substrate under a dynamic environment. The oxidation mechanism involved four steps. First, oxidative evaporation of elemental Cr resulted in a Cu-enriched surface with increased nucleation sites. Second, rapid whisker formation resulted in a mushroom-like Cu-oxide scale morphology. Scale formation involved a combination of surface diffusion. short circuit diffusion, lattice diffusion and evaporation. Third, inward migration of oxygen atom formed mixed oxides of CuO and CuCrO2. Fourth, formation of a continuous Cr2O3 layer beneath the external Cu, Cr mixed oxides. The scale morphology and oxidation mechanisms will be compared with those of static laboratory furnace oxidation.
Author
Oxidation; Wind Tunnel Tests; Sprayed Coatings; Plasma Spraying

20010067453 NASA Ames Research Center, Moffett Field, CA USA
Langmuir Probe Measurements in an Inductively Coupled Ar/CF4 Plasmas
Rao, M. V. V. S., NASA Ames Research Center, USA; Meyyappan, M., NASA Ames Research Center, USA; Sharma, S. P., NASA Ames Research Center, USA; [2000]; 1p; In English, 2-6 Oct. 2000, Boston, MA, USA; Sponsored by American Vacuum Society, USA
Contract(s)/Grant(s): RTOP 632-10-01; No Copyright; Avail: Issuing Activity; Abstract Only

Technological advancement in the microelectronics industry requires an understanding of the physical and chemical processes occurring in plasmas of fluorocarbon gases, such as carbon tetrafluoride (CF4) which is commonly used as an etchant, and their mixtures to optimize various operating parameters. In this paper we report data on electron number density (ne), electron temperature'(Te), electron energy distribution function (EEDF), mean electron energy, ion number density (ni), and plasma potential (Vp) measured by using Langmuir probe in an inductively coupled 13.56 MHz radio frequency plasmas generated in 50%Ar:50%CF4 mixture in the GEC cell. The probe data were recorded at various radial positions providing radial profiles of these plasma parameters at 10-50 mTorr pressures and 200 W and 300 W of RF power. Present measurements indicate that the electron and ion number densities increase with increase in pressure and power. Whereas the plasma potential and electron temperature decrease with increase in pressure, and they weakly depend on RF power. The radial profiles exhibit that the electron and ion number densities and the plasma potential peak at the center of the plasma with an exponential fall away from it, while the electron temperature has a minimum at the center and it increases steadily towards the electrode edge. The EEDFs have a characteristic drop near the low energy end at all pressures and pressures and their shapes represent non-Maxwellian plasma and exhibit more like Druyvesteyn energy distribution.v
Author
Electrostatic Probes; Carbon Tetrafluoride; Fluorocarbons; Electron Density (Concentration); Microelectronics; Electron Energy

20010067645 NASA Marshall Space Flight Center, Huntsville, AL USA
Magnetized Target Fusion Driven by Plasma Liners
Thio, Y. C. Francis, NASA Marshall Space Flight Center, USA; Eskridge, Richard, NASA Marshall Space Flight Center, USA; Smith, James, NASA Marshall Space Flight Center, USA; Lee, Michael, NASA Marshall Space Flight Center, USA; Richeson, Jeff, NASA Marshall Space Flight Center, USA; Schmidt, George, NASA Marshall Space Flight Center, USA; Knapp, Charles

E., Los Alamos National Lab., USA; Kirkpatrick, Ronald C., Los Alamos National Lab., USA; Turchi, Peter J., Los Alamos National Lab., USA; [2001]; 3p; In English, 27 Apr. 2001, Reno, NV, USA; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Magnetized target fusion (MTF) attempts to combine the favorable attributes of magnetic confinement fusion (MCF) for energy confinement with the attributes of inertial confinement fusion (ICF) for efficient compression heating and wall-free containment of the fusing plasma. It uses a material liner to compress and contain a magnetized plasma. For practical applications, standoff drivers to deliver the imploding momentum flux to the target plasma remotely are required. Spherically converging plasma jets have been proposed as standoff drivers for this purpose. The concept involves the dynamic formation of a spherical plasma liner by the merging of plasma jets, and the use of the liner so formed to compress a spheromak or a field reversed configuration (FRC). For the successful implementation of the scheme, plasma jets of the requisite momentum flux density need to be produced. Their transport over sufficiently large distances (a few meters) needs to be assured. When they collide and merge into a liner, relative differences in velocity, density and temperature of the jets could give rise to instabilities in the development of the liner. Variation in the jet properties must be controlled to ensure that the growth rate of the instabilities are not significant over the time scale of the liner formation before engaging with the target plasma. On impact with the target plasma, some plasma interpenetration might occur between the liner and the target. The operating parameter space needs to be identified to ensure that a reasonably robust and conducting contact surface is formed between the liner and the target. A mismatch in the ”impedance” between the liner and the target plasma could give rise to undesirable shock heating of the liner leading to increased entropy (thermal losses) in the liner. Any irregularities in the liner will accentuate the Rayleigh-Taylor instabilities during the compression of the target plasma by the liner.

Derived from text

Plasma Compression; Magnetic Properties; Targets; Controlled Fusion; Confinement; Containment; Inertial Confinement Fusion; Plasma Control

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.

20010066084 Duke Univ., Durham, NC USA

Correlation of Substitutional Hydrogen to Refractive Index Profiles in Annealed Proton-Exchanged Z- and X-Cut LiNbO3 ***Final Report, 1 Sep. 1992 - 30 Sep. 1997***

Zavada, J. M.; Casey, H. C.; States, R. J.; Novak, S. W.; Loni, A.; Feb. 20, 1998; 52p; In English

Contract(s)/Grant(s): DAAL03-89-D-0002

Report No.(s): AD-A344565; HCC98-2; ARO-30763.1-EL; No Copyright; Avail: Defense Technical Information Center (DTIC)

The goal of this project was to investigate waveguiding in optoelectronic crystals. Studies of the correlation between hydrogen (H) concentration and the extraordinary refractive index n sub e in proton-exchanged lithium niobate (LiNbO3) were resolved by partitioning the total H into optically active substitutional H and optically inactive interstitial H. These results were summarized in two publications: Applied Physics Letters, 63, 718 (1993) and Journal of Applied Physics, 77, 2697 (1995). Studies were initiated on the group III nitrides. These studies included the investigation of the surface properties of GaN, the absorption coefficient in GaN, and the emission properties of blue light-emitting diodes.

DTIC

Absorptivity; Light Emitting Diodes; Lithium Niobates; Crystals; Semiconductors (Materials)

20010066143 Oak Ridge National Lab., TN USA

Progress Towards A Low-Cost Coated Conductor Technology

Annavarapu, S.; Fritzemeier, L.; Li, Q.; Malozemoff, A.; Prunier, V.; 2001; 8p; In English; Original contains color illustrations

Report No.(s): PB2001-106193; No Copyright; Avail: National Technical Information Service (NTIS)

Progress in the development of an economically and technically viable YBCO coated conductor technology for High-temperature supercoducting (HTS) wire using deformation-textured buffered substrates and solution-deposited superconductor layers is reported. Biaxially textured Ni substrates have been fabricated using a deformation texturing process.

Epitaxial oxide buffer layers have been deposited by a combination of e-beam deposition and magnetron sputtering. Epitaxial YBCO films have been grown using a trifluoroacetate solution precursor.
NTIS
YBCO Superconductors; Superconducting Films

20010066227 Naval Postgraduate School, Monterey, CA USA
Microstructure, Composition and Crystallography of Aalbrog Lion Brand Danish White Cement
Maldonado, Fernando; September 1997; 83p; In English
Report No.(s): AD-A341133; No Copyright; Avail: Defense Technical Information Center (DTIC)

The morphology and crystallography of fully hardened Aalbrog Lion Brand Danish White cement paste (water cement ratio 0.25) were examined using x-ray diffraction, optical and scanning electron microscopy with energy dispersive x-ray analysis (EDX) and transmission electron microscopy and EDX. These experiments showed the hardened cement to be mostly comprised of equiaxed particles of 3CaO.SiO2 with diameter of the order of 10 microns and larger often surrounded by inner and outer regions of an amorphous gel-like matrix with an average composition of about 1.75CaO.SiO2.3H2O (C-S-H) in which the CaO/SiO2 ratio varied from about 0.3 to 5.74. The hydrated regions were also found to contain significant amounts of Ca(OH)2. Small amounts of ettringite (Ca6Al2(SO4,SiO4,CO3)3 (OH)12.26H2O) were also detected. In addition, selected area electron diffraction of the C-S-H matrix revealed diffuse rings, indicating the presence of short range ordering. The morphology of C-S-H matrix was found to be comprised of small 'cells' of size approximately 5 nm which are no doubt responsible for the good mechanical properties of this particular hardened cement paste. These results were also found to be in excellent agreement with previous research on this topic.
DTIC
Microstructure; Morphology; Amorphous Materials; Cements; Crystallography; Mechanical Properties

20010066318 Kansas State Univ., Manhattan, KS USA
MOVPE Reactor for Deposition of Wide Band Gap Semiconductors ***Final Report, 1 Jul. 1996 - 30 Jun. 2000***
Edgar, James H.; Apr. 20, 2001; 5p; In English
Contract(s)/Grant(s): DAAH04-96-1-0320
Report No.(s): AD-A389584; ARO-36202.6-RT-DPS; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

A metalorganic vapor phase epitaxy reactor was constructed to study the epitaxy of BxGa1-xN and BxAl1-xN on 6H-SiC substrates. The solubility of boron in AlN and GaN was shown experimentally to be very low, less than 3 at %. This low solubility of boron in the group III nitrides was consistent with thermodynamic arguments based on the structure of the binary compounds involved. Adding boron to GaN increased its energy band gap up to the point of two phases forming. Unfortunately, even small additions of diborane greatly reduced the growth rate (at 1000 degrees Celsius) and the crystal quality of the deposits. This furnace is continuing to be used to study the epitaxy of GaN and AlN.
DTIC
Semiconductors (Materials); Substrates; Epitaxy; Crystal Growth; Vapor Deposition

20010066625 Eidgenoessische Technische Hochschule, Inst. of Micro- and Optoelectronics, Lausanne, Switzerland
High-Quality LGS-Type Crystals and Films for Surface Acoustic Wave Applications ***Final Report, Sep. 1999 - Aug. 2000***
Klemenz, Christine; Dec. 18, 2000; 23p; In English
Contract(s)/Grant(s): N68171-99-M-6663
Report No.(s): AD-A390243; R/D-8854-EE-01; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The aim of this project was to investigate the feasibility of liquid phase epitaxy (LPE) for the growth of high-quality langasite-type films for high-frequency RF resonator applications. The work done during this period included phase diagram studies, the search for a suitable solvent, systematic flux growth experiments of LGS, LGN and LGT, X-ray analysis of crystallized phases, preparation (orientation, sawing, polishing, etching) of LGS and LGT substrates from provided bulk Czochralski-grown crystals, top-seeded solution growth (TSSG) and LPE experiments. LPE films of LGS up to 1 x 1 sq cm could be grown on X- and Y-cut (YZ, XZ in-plane axis, respectively) LGS substrates for the first time. The clear tendency to step/facet formation observed on Y-LGS films indicates that this plane (at least) may evoluate to the equilibrium facet, e.g.; a perfectly oriented and flat surface, which is very interesting in view of SAW & BAW applications.
DTIC
Liquid Phase Epitaxy; Surface Acoustic Wave Devices; Czochralski Method; Crystals

20010066775 Oklahoma State Univ., Center for Laser Research, Stillwater, OK USA
Optical Properties and Lasing in GaN ***Final Report, 15 Jul. 1996 - 14 Jun. 2000***
Song, J. J.; Shan, W.; May 2001; 60p; In English
Contract(s)/Grant(s): F49620-96-1-0339
Report No.(s): AD-A390275; AFRL-SR-BL-TR-01-0324; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report includes a book chapter (review article), two of our recent Physical Review B (PRB) articles, and our publication list. In the first PRB article femtosecond pump-probe spectroscopy and time-resolved photoluminescence were used to investigate the carrier dynamics in an In(0.18)Ga(0.82)N thin film photoexcited well above the band gap at 10 K. Optical gain occurring after 2.5 Ps time delay caused stimulated emission with a 28 Ps decay time. In the second article. femtosecond pump-probe transmission spectroscopy was used to study the nonequilibrium carrier dynamics in a GaN thin film at 10 K with carrier densities ranging from 4 x 10(exp 17) to 10(exp 19)/cu cm. Because of hot phonon effects, the carriers were strongly confined in a nonthermal distribution and collectively relaxed very slowly to the band edge for 1 ps. Excitonic resonances persisted at carrier densities well above the Mott density at early time delays indicating that the excitons do not strongly couple to the nonthermal electron-hole plasma.
DTIC
Optical Properties; Photonics; Gallium Nitrides; Thin Films; Semiconductor Devices; Electron Plasma; Photoexcitation

20010067324 NASA Marshall Space Flight Center, Huntsville, AL USA
Nanotechnology Concepts at Marshall Space Flight Center: Engineering Directorate
Bhat, B., NASA Marshall Space Flight Center, USA; Kaul, R., NASA Marshall Space Flight Center, USA; Shah, S., NASA Marshall Space Flight Center, USA; Smithers, G., NASA Marshall Space Flight Center, USA; Watson, M. D., NASA Marshall Space Flight Center, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 1p; In English; See also 20010067226; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Nanotechnology is the art and science of building materials and devices at the ultimate level of finesse: atom by atom. Our nation's space program has need for miniaturization of components, minimization of weight, and maximization of performance, and nanotechnology will help us get there. Marshall Space Flight Center's (MSFC's) Engineering Directorate is committed to developing nanotechnology that will enable MSFC missions in space transportation, space science, and space optics manufacturing. MSFC has a dedicated group of technologists who are currently developing high-payoff nanotechnology concepts. This poster presentation will outline some of the concepts being developed including, nanophase structural materials, carbon nanotube reinforced metal and polymer matrix composites, nanotube temperature sensors, and aerogels. The poster will outline these concepts and discuss associated technical challenges in turning these concepts into real components and systems.
Author
Miniaturization; Nanotechnology; Aerospace Engineering

20010067457 Argonne National Lab., IL USA
Practical Superconductor Development for Electrical Power Applications ***Annual Report, FY 2000***
Balachandran, U.; Dec. 2000; 92p; In English; Original contains color illustrations
Report No.(s): PB2001-106430; ANL-00/28; No Copyright; Avail: National Technical Information Service (NTIS)

Most large-scale high-critical-temperature superconductor applications require wires or tapes that can carry high currents in applied magnetic fields. This report describes technical progress of research and development efforts aimed at producing superconducting components and devices in the Y-Ba-Cu-O and Bi-(Pb)-SR-Ca-Cu-O systems. Topics discussed are formation of first-and second-generation composite conductors, characterization of structures and superconducting and mechanical properties, modeling of grain-boundary current transport, and fabrication and analysis of prototype components.
NTIS
YBCO Superconductors; Electric Power

20010067476 Wisconsin Univ., Dept. of Chemical Engineering, Madison, WI USA
Defects and Interfacial Structure of Bonded Interfaces ***Final Report, Apr. 1998 - Mar. 2001***
Kuech, Thomas F.; May 2001; 14p; In English
Contract(s)/Grant(s): N00014-98-1-0462
Report No.(s): AD-A390965; FR-144-HF94; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The growth of lattice mismatched epitaxial layers on a binary compound semiconductor interface can lead to a high density of defects, such as dislocations, that can degrade subsequent device performance. For the direct growth of lattice-mismatched materials, defects continue to dominate the properties and function of heteroepitaxial structures. The development of compliant

and wafer-bonded structures has provided an alternative approach to the generation substrates for lattice mismatched epitaxial growth. The nature of the interface between bonded layers has not been extensively explored at present. This interface, consisting of a network of dislocations, can however eventually affect or even dictate the properties of the subsequent devices as well as its reliability. We propose to determine the detailed chemical and physical nature of this interface through the application of both conventional and nanoscale characterization tools. The physical and chemical structure of these interfaces was investigated by FTIR and high-resolution spectroscopies. The impact of thermal stress on these structures, as a measure of their long-term stability, will be assessed in the context of device reliability.
DTIC
Crystal Defects; Chemical Composition; Binary Systems (Materials); Bonded Joints; Interfaces

20010067491 Auburn Univ., Dept. of Physics, AL USA
Nitrogen Passivation of the Interface States Near the Conduction Band Edge in 4H-Silicon Carbide
Williams, J. R.; Chung, G. Y.; Tin, C. C.; McDonald, K.; Farmer, D.; 2001; 16p; In English
Report No.(s): PB2001-106424; No Copyright; Avail: National Technical Information Service (NTIS)

This paper describes the development of a nitrogen-based passivation technique for interface states near the conduction band edge in (D(sub it)(E(sub c))) 4H-SiC/SiO2. These states have been observed and characterized in several laboratories for n- and p-SiC since their existence was first proposed by Schorner, et al. The origin of these states remains a point of discussion, but there is now general agreement that these states are largely responsible for the lower channel mobilities that are reported for n-channel, inversion mode 4H-SiC MOSFETs. Over the past year, much attention has been focused on finding methods by which these states can be passivated. The nitrogen passivation process that is described herein is based on post-oxidation, high temperature anneals in nitric oxide. An NO anneal at atmospheric pressure, 1175 degrees C and 200-400sccm for 2hr reduces the interface state density at Ec-E is congruent to 0.1eV in n-4H-SiC by more than one order of magnitude - from greater than 3x10(sup 13) approximately 2x10(sup 12)cm(sup -2)eV(sup -1). Measurements for passivated MOSFETs yield effective channel mobilities of approximately 30-35cm(sup 2)/V-s and low field mobilities of around 100cm(sup 2)/V-s. These mobilities are the highest yet reported for MOSFETs fabricated with thermal oxides on standard 4H-SiC and represent a significant improvement compared to the single digit mobilities commonly reported for 4H inversion mode devices. The reduction in the interface state density is associated with the passivation of carbon cluster states that have energies near the conduction band edge. However, attempts to optimize the the passivation process for both dry and wet thermal oxides do not appear to reduce Dit(Ec) below about 2x10 to the twelfth power cm(sup -2)eV(sup -1) (compared to approximately 10(sup10)cm(sup -2)eV(sup -1) for passivated Si/SiO2). This may be an indication that two types of interface states exist in the upper half of the SiC band gap - one type that is amenable to passivation by nitrogen and one that is not. Following NO passivation, the average breakdown field for dry oxides on p-4H-SiC is higher than the average field for wet oxides (7.6MV/cm compared to 7.1MV/cm at room temperature). However, both breakdown fields are lower than the average value of 8.2MV/cm measured for wet oxide layers that were not passivated. The lower breakdown fields can be attributed to donor-like states that appear near the valance band edge during passivation.
NTIS
Conduction Bands; Nitrogen; Passivity; Silicon Carbides; Silicon Dioxide

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.

20010066090 Clarkson Univ., Div. of Research, Potsdam, NY USA
Quantum Mechanics of Computing in Condensed Matter Systems ***Final Report, Jan - Dec. 1997***
Privman, Vladimir; Schulman, Lawrence S.; Apr. 1998; 70p; In English
Contract(s)/Grant(s): F30602-97-2-0089; AF Proj. 4600
Report No.(s): AD-A345671; AFRL-SN-RS-TR-1998-29; No Copyright; Avail: Defense Technical Information Center (DTIC)

New conceptual models for solid state fermionic interactions have been investigated for quantum computational atomic-level systems. The effects of decoherence in general as well as adiabatic decoherence upon coherent states of quantum computational elemental structures have been analyzed. Hamiltonians for quantum mechanical logic gates have been derived. The main result

has been a new proposal for quantum computation in solid-state systems in the regime of the quantum Hall effect. These results provide insight into the quantum mechanical issues facing the new field of quantum information theory.
DTIC
Condensed Matter Physics; Gates (Circuits); Hall Effect; Hamiltonian Functions; Information Theory; Quantum Mechanics

20010066091 Air Force Research Lab., Rome, NY USA
Quantum Computing, *Jan. 1996 - Sep. 1997*
Hotaling, Steven P.; Apr. 1998; 83p; In English
Contract(s)/Grant(s): AF Proj. 2300; AF Proj. 4600
Report No.(s): AD-A345672; AFRL-SN-RS-TR-1998-49; No Copyright; Avail: Defense Technical Information Center (DTIC)
This report presents the derivation of quantum mechanical Hamiltonians and quantum logics as applied to the concept of quantum computation. The Hamiltonians and quantum logics derived herein are potentially realizable in spin-bearing solid state crystals or trapped ionic species. The study of quantum mechanical analogues to conventional digital computers is in its infancy and there is still much speculation regarding the eventual successful building of a quantum computer.
DTIC
Analogs; Computation; Crystals; Digital Computers; Hamiltonian Functions

20010066153 Rutherford Appleton Lab., Chilton UK
Proceedings of the School for Young High Energy Physicists
Watkins, P. M.; Mar. 2001; 378p
Report No.(s): PB2001-105851; RAL-TR-2001-016; Copyright; Avail: National Technical Information Service (NTIS), Microfiche
The document contains lectures presented at the School for Young High Energy Physicists, Rutherford Appleton Laboratory, September 2000. Contents include: Introduction to Quantum Field Theory; Introduction to QED; The Standard Model; and Topics in Standard Model Phenomenology.
NTIS
Conferences; Quantum Electrodynamics; Education

80
SOCIAL AND INFORMATION SCIENCES (GENERAL)

Includes general research topics related to sociology; educational programs and curricula.

20010066545 Naval Air Warfare Center, Training Systems Div., Orlando, FL USA
Theoretical Foundation for Advanced Distributed Learning Research
Hays, Robert T., Naval Air Warfare Center, USA; May 2001; 42p; In English; Sponsored in part by the Joint ADL Co., Lab., Orland, FL
Report No.(s): AD-A390504; NAWCTSD-TR-2001-006; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy
Advanced Distributed Learning (ADL) has been embraced by the Department of Defense, other Government agencies, private industry, and academia as a tool that has the potential to improve the efficiency and effectiveness of modem instructional systems. As with any other instructional approach, ADL cannot achieve its full potential if the individuals and organizations involved in its development fail to understand that ADL systems are controlled and constrained by system principles. The goal of this paper is to sensitize individuals working in all aspects of ADL systems to the power of a system view and to provide several examples of system methods and tools. The paper presents a theoretical foundation for an ADL research agenda based upon an overview of system concepts and discussion of how they apply to the development and implementation of ADL systems. It argues that the adoption of a system perspective will improve the communication and understanding among the diverse groups engaged in ADL system development and can help ADL mature into an effective instructional alternative. A number of ADL research issues are discussed and several system-oriented methodologies are suggested to address these issues.
DTIC
Information Systems; Computer Assisted Instruction; Human-Computer Interface; Education

20010066582 University of the Virgin Islands, Saint Thomas, Virgin Islands (U.S.)

Interactive Computer Classroom Proposal to the Department of Defense Infrastructure Support Program, *Sep. 1998-Sep. 1999*

Stolz, Robert, University of the Virgin Islands, Virgin Islands (U.S.); McKayle, Camille, University of the Virgin Islands, Virgin Islands (U.S.); Apr. 13, 2000; 5p; In English

Contract(s)/Grant(s): F49620-98-1-0484

Report No.(s): AD-A390203; AFRL-SR-BL-TR-01-0332; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The focus of this project was student exploration and student directed learning. We requested computer equipment and software to support a mathematics classroom with computers on the periphery. The room now have a variety of uses: Classroom Use: It is an interactive classroom in which mathematics is taught. Class time is a mixture of lecture, demonstrations, and student exploration. The computers allow conjectures to be tested with numerous examples in an efficient manner. Students see mathematics from numerical, graphical, and symbolic points of view. Open Use: Building on the knowledge and skills gained in the interactive classroom setting, teachers of upper level mathematics courses and other upper level science courses assign homework, projects, and open ended questions for which the students use technology as an additional means of exploration. Use for Faculty and Student Research: The nurturing environment at the University of the Virgin Islands has led to many faculty directed undergraduate student research projects. The availability of the computer classroom has expanded this tradition. The computer classroom workshop has provided a means of creating and testing physical models.

DTIC

Computers; Defense Program; Education

20010067238 Calhoun Community Coll., Decatur, AL USA

State, Industry and Education Partnerships Expanding Education to Meet Workforce Challenges

Swindell, J. E., Calhoun Community Coll., USA; Reynolds, W. R., Boeing Co., USA; Bass, D. C., Alabama Industrial Development Training, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 33p; In English; See also 20010067226; No Copyright; Avail: CASI; A03, Hardcopy; A10, Microfiche

This viewgraph presentation gives an overview of the workforce planning efforts of Boeing Decatur, including details on the site and facility, some of the workforce partners (such as AIDT, Calhoun Community College, and Fluor Daniel), recruiting and application progress, training, and program implementation.

Author

Education; Industries

81
ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

20010066312 QSS Group, Inc., USA

On Reformulating Planning as Dynamic Constraint Satisfaction

Frank, Jeremy, QSS Group, Inc., USA; Jonsson, Ari K., Research Inst. for Advanced Computer Science, USA; Morris, Paul, Research Inst. for Advanced Computer Science, USA; [2000]; 10p; In English; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

In recent years, researchers have reformulated STRIPS planning problems as SAT problems or CSPs. In this paper, we discuss the Constraint-Based Interval Planning (CBIP) paradigm, which can represent planning problems incorporating interval time and resources. We describe how to reformulate mutual exclusion constraints for a CBIP-based system, the Extendible Uniform Remote Operations Planner Architecture (EUROPA). We show that reformulations involving dynamic variable domains restrict the algorithms which can be used to solve the resulting DCSP. We present an alternative formulation which does not employ dynamic domains, and describe the relative merits of the different reformulations.

Author

Domains; Exclusion; Planning

20010066830 General Accounting Office, Washington, DC USA

Report to the Chairman, Committee on Armed Services, US Senate. Export Controls: System for Controlling Exports of High Performance Computing Is Ineffective

December 2000; 60p; In English

Report No.(s): AD-A387120; GAO-01-10; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

Because high performance computing is an important enabling technology for military purposes, the US government controls the export of high performance computers to sensitive destinations, such as Russia and China, based on foreign policy and national security concerns. A high performance computer has both civilian and military applications, operates at or above a defined performance threshold, and requires an export license to particular destinations, according to the Commerce Department, the agency responsible for licensing dual-use items. US policy with respect to the export of sensitive technology, including computers is to seek a balance between the US economic interest in promoting exports and its national security interests in both maintaining a military advantage over potential adversaries and denying the spread of technologies used in developing weapons of mass destruction.

Author

Computers; Foreign Policy; International Trade

20010067468 Army War Coll., Carlisle Barracks, PA USA

A Blessing and a Curse: Communications as an Enabler to Micro-Management

Kline, Jared A.; Apr. 09, 2000; 25p; In English

Report No.(s): AD-A389119; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Technical improvements in telecommunications and information management open unprecedented possibilities for mankind, including military applications and effects. Potential advantages are clear, but no less certain is the potential for actually making matters worse if the power of the technology is misapplied. Modern information systems may be used to enable micro-management to a degree unprecedented in history. As the former technical impediments to micro-management disappear, the degree of micro-management applied in a military setting becomes more a matter of choice and decision.

DTIC

Information Management; Telecommunication; Military Technology

20010067568 General Accounting Office, Washington, DC USA

Defense Acquisition: Comanche Program Objectives Need to Be Revised to More Achievable Levels

Jun. 2001; 30p; In English

Report No.(s): PB2001-106650; GAO-01-450; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Since 1983, the Army has been working to build its next-generation helicopter, the Comanche, with the intention of significantly expanding the Army's capability to conduct attack and reconnaissance operations in all battlefield environments, day or night and during adverse weather conditions. In August 1999, we reported that the program faced significant risks related to cost overruns, scheduling delays, and degraded performance. The Army faced these risks primarily because it decided to (1) begin engineering and manufacturing development before key technologies had matured, (2) compress the flight-test schedule, which increases concurrency between developmental and operational testing, and (3) begin initial production before completing operational testing. We also reported that by proceeding to the next development phase with high levels of uncertainty, the program's actions were not in accordance with best practices followed by successful commercial firms. In response to the findings of our 1999 report, you requested that we (1) evaluate changes in the Comanche's status with regard to cost, schedule, and performance and (2) assess whether the Army will have the knowledge it needs on the helicopter's performance and costs to proceed with its current production plans.

NTIS

Defense Program; Acquisition; Military Helicopters

82
DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography. For computer documentation see 61 Computer Programming and Software.

20010066094 Army War Coll., Carlisle Barracks, PA USA
Riding the Superhighway to Glory: Jody WilliamsVersus US
Duran, Henry A.; Mar. 16, 1998; 34p; In English
Report No.(s): AD-A345887; No Copyright; Avail: Defense Technical Information Center (DTIC)

The Internet has given rise to an entirely new set of organizations that can form, do business, and promulgate their agendas with marginal resources and no physical proximity. These organizations are capable of enormous power through influence and are difficult for existing nation state governments to control. Jody Williams of the International Campaign to Ban Land Mines gave US policy and prestige a notable set back with minimal resources.
DTIC
Commerce; Internets; Organizations

20010066120 Karolinska Inst., Stockholm, Sweden
Extreme Prematurity and the Risk of Breast Cancer: A Cohort Study ***Final Report, 6 Apr. 1998-5 Apr. 2000***
Ekbom, Anders; May 2000; 10p; In English
Contract(s)/Grant(s): DAMD17-98-1-8117
Report No.(s): AD-A389573; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Purpose: to analyze to what extent women born extreme premature and women characterized as small for gestational age at birth differ with regards to breast cancer risk as adults. Scope: to identify all women within a study base of 290,000 female births during the years 1925 to 1949 in central Sweden born before the 35th gestational week and/or with a birth weight below 2,000 grams. The women in the cohort still alive in 1958 have been followed up for occurrence of breast cancer through linkage with Swedish registries. Major findings: There were 1,847 survivors January 1, 1958, of which 90 were diagnosed with breast cancer up through 1996. Preliminary analyses strongly indicate that women born extremely premature compared to those born small for gestational age have an increased risk of breast cancer. Conclusion: Our findings strongly indicate that early hormonal exposures are of importance for the risk of breast cancer later in life.
DTIC
Cancer; Mammary Glands; Birth

20010066140 Raytheon Information Technology and Scientific Services, Lanham, MD USA
Analysis and Quality Assurance of the SKYMAP 4.0 Guidance and Tracking Star Catalog: The NASA SKY2000 Spacecraft Attitude Determination Star Catalog ***Final Report, 1 Apr. 1997 - 31 Mar. 2001***
Warren, Wayne H., Jr., Raytheon Information Technology and Scientific Services, USA; Apr. 26, 2001; 3p; In English
Contract(s)/Grant(s): NAS5-96097
Report No.(s): RTSC-3447; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

An updated and improved NASA spacecraft attitude determination catalog, now called SKY2000, Version 3, has been prepared and quality assured. The highest priority goals were to replace the astrometric (positions and motions) and photometric (brightnesses and colors) data with the most recent and accurate data available. Quality assurance has been performed in a fairly straightforward manner, i.e., without extensive data checking and analysis, and many errors and Inconsistencies were corrected. Additional work should eventually be done on the variability and multiple-star data In the catalog, while certain other data can be significantly Improved. The current version of the catalog can be found at the GSFC Flight Dynamics website: http://cheli.gsfc.nasa.gov/dist/attitude/skymap.html. Supporting information and reference materials (published papers, format and data descriptions, etc.) can also be found at the website.
Author
Spacecraft Guidance; Astronomical Catalogs; Attitude (Inclination); Aerodynamics; Astrometry; Tracking (Position)

20010066198 Capraro Technologies, Inc., Utica, NY USA

Intelligent Access to Large Knowledge Bases from Heterogeneous Devices Using Multiple Protocols ***Final Report, Apr. 1998-Dec. 2000***

Capraro, Gerard T., Capraro Technologies, Inc., USA; Berden, Gerald B., Capraro Technologies, Inc., USA; Mar. 2001; 67p; In English; Original contains color plates

Contract(s)/Grant(s): F30602-98-C-0171; AF Proj. 5581

Report No.(s): AD-A389315; AFRL-IF-RS-TR-2001-32; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

This report documents the results of an effort with an objective to demonstrate the feasibility of integrating Artificial Intelligence (AI) technology with web technology to bring very large data and knowledge bases to a hand-held computing device. A software architecture is provided consisting of three levels of intelligent software assistance, i.e. a personal assistant, a hardware assistant, and a structured query language (SQL) assistant. To demonstrate the software architecture a USAF Air Mobility Command operational problem domain is simulated to represent the large database from which military personnel want to gather information. A brief overview of the USAF Scientific Advisory Board's Joint Battlespace Infosphere (JBI) is presented with references of how the resultant software developed here instantiated portions of the JBI architecture. The software recognizes a user profile including their computer device and tailors the presentation of information the the user accordingly. the software architecture provides push and pull paradigms. The user may change their profile at any time and the system appropriately responds. A description and demonstration of the software are provided that show how one can access data via an http connection and through email.

DTIC

Artificial Intelligence; Data Bases; Protocol (Computers); Data Systems; Computer Programs; Query Languages

20010066290 Army War Coll., Carlisle Barracks, PA USA

Technology Transfer Policy Applied to the US Army Military History Institute Collection

Bell, William F.; Apr. 15, 1998; 78p; In English

Report No.(s): AD-A345551; No Copyright; Avail: Defense Technical Information Center (DTIC)

Beginning in 1980, Congress passed a number of public laws to encourage the cooperative development of commercial products between the federal government and private companies. This cooperative process is called technology transfer. The main point of the laws is to allow commercial vendors and the organizations of the federal government to enter into cooperative research and development agreements (CRADAs) that enable both partners to the agreement to maximize their resources. Until now, these laws had only been applied to federal laboratory inventions and technical data. This paper applies those same laws to other intellectual properties of the federal government by developing a policy for the U.S. Army Military History Institute for the broad commercial development of their collection. This policy has broad application throughout the Department of Defense.

DTIC

Policies; Technology Transfer; Defense Program; Organizations

20010066291 Research and Development Labs., Culver City, CA USA

Summer Research Program: 1996 Graduate Student Research Program, Volume 7A, Armstrong Laboratory ***Final Report***

Moore, Gary, Research and Development Labs., USA; December 1996; 369p; In English

Contract(s)/Grant(s): F49620-93-C-0063

Report No.(s): AD-A387584; AFRL-SR-BL-TR-00-0736-Vol-7A; No Copyright; Avail: CASI; A03, Microfiche; A16, Hardcopy

The US Air Force Summer Research Program (USAF-SRP) is designed to introduce university, college, and technical institute faculty members, graduate students, and high school students to Air Force research. This is accomplished by the faculty members (Summer Faculty Research Program, SFRP), graduate students (Graduate Student Research Program, GSRP), and high school students (High School Apprenticeship Program, HSAP) being selected on a nationally advertised competitive basis during the summer intersession period to perform research at Air Force Research Laboratory (AFRL) Technical Directorates, Air Force Air Logistics Centers (ALC), and other AF Laboratories. This volume consists of a program overview, program management statistics, and the final technical reports from the GSRP participants at the Armstrong Laboratory.

Author

Education; University Program; Laboratories; Research and Development; Armed Forces (USA)

20010066292 Research and Development Labs., Culver City, CA USA
Summer Research Program: 1996 Graduate Student Research Program, Volume 10B, Wright Laboratory ***Final Report***
Moore, Gary, Research and Development Labs., USA; December 1996; 118p; In English
Contract(s)/Grant(s): F49620-93-C-0063
Report No.(s): AD-A387579; AFRL-SR-BL-TR-00-0741-Vol-10B; No Copyright; Avail: CASI; A02, Microfiche; A06, Hardcopy

The US Air Force Summer Research Program (USAF-SRP) is designed to introduce university, college, and technical institute faculty members, graduate students, and high school students to Air Force research. This is accomplished by the faculty members (Summer Faculty Research Program, SFRP), graduate students (Graduate Student Research Program, GSRP), and high school students (High School Apprenticeship Program, HSAP) being selected on a nationally advertised competitive basis during the summer intersession period to perform research at Air Force Research Laboratory (AFRL) Technical Directorates, Air Force Air Logistics Centers (ALC), and other AF Laboratories. This volume consists of a program overview, program management statistics, and the final technical reports from the GSRP participants at the Wright Laboratory.
Author
Education; Research and Development; University Program; Armed Forces (USA); Laboratories

20010066363 Silver Image Management, Scottsdale, AZ USA
Metadata Guidelines for Digital Moving Images ***Final Report, 1 Oct. 1999 - 11 Oct. 2000***
Flynn, Marcy; Oct. 11, 2000; 132p; In English
Contract(s)/Grant(s): SP4700-99-M-0592
Report No.(s): AD-A389947; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

These guidelines contain instructions for cataloging digital moving images (video) as part of the Defense Technical Information Center (DTIC) Defense Virtual Library (DVL). This project was initiated by DTIC in cooperation with the Defense Advanced Research Projects Agency (DARPA) and the Corporation for National Research Initiatives (CNRI). Over 60 data elements (fields) have been described, all of which conform to the Machine Readable Cataloging (MARC) and Anglo-American Cataloging Rules, 2nd edition (AACR2) standards. MARC guidelines follow those in ”MARC21 Format for Bibliographic Data.” Examples for each data element and sample records are presented. Technical metadata essential to the preservation and management of digital materials is also addressed in the Guidelines. This manual is also available at the Defense Virtual Library Web site, http://dvl.dtic.mil:8100/notes.html
DTIC
Bibliographies; Data Management; Libraries; Video Data

20010066365 Assistant Secretary of the Army (Research, Development and Acquisition), Washington, DC USA
20TH Army Science Conference: Science and Technology for Force XXI, Volume 1, Proceedings
Jun. 1996; 568p; In English; Science and Technology for Force XXI, 24-27 Jun. 1996, Norfolk, VA, USA
Report No.(s): AD-A389953; No Copyright; Avail: CASI; A24, Hardcopy; A04, Microfiche

The 20th Army Science Conference was held at the Norfolk Waterside Marriott and Convention Center in Norfolk, Virginia, 24-27 June 1996. The work in this document was authorized under Contract No. DAALOI-94-C-0051. This work was started and completed in June 1996. Topics discussed included advanced materials and manufacturing, microelectronics and photonics, sensors and information processing, high performance computing and simulation, advanced propulsion technologies and power generation.
DTIC
Simulation; Microelectronics; Manufacturing; Data Processing; Propulsion

20010066368 Research and Development Labs., Culver City, CA USA
Summer Research Program: 1996 Graduate Student Research Program, Volume 7B, Armstrong Laboratory ***Final Report***
Moore, Gary, Research and Development Labs., USA; December 1996; 116p; In English
Contract(s)/Grant(s): F49620-93-C-0063
Report No.(s): AD-A387565; AFRL-SR-BL-TR-00-0737-Vol-7B; No Copyright; Avail: CASI; A02, Microfiche; A06, Hardcopy

The US Air Force Summer Research Program (USAF-SRP) is designed to introduce university, college, and technical institute faculty members, graduate students, and high school students to Air Force research. This is accomplished by the faculty members (Summer Faculty Research Program, SFRP), graduate students (Graduate Student Research Program, GSRP), and high school students (High School Apprenticeship Program, HSAP) being selected on a nationally advertised competitive basis during the summer intersession period to perform research at Air Force Research Laboratory (AFRL) Technical Directorates, Air Force

Air Logistics Centers (ALC), and other AF Laboratories. This volume consists of a program overview, program management statistics, and the final technical reports from the GSRP participants at the Armstrong Laboratory.
Author
Education; Research and Development; University Program; Laboratories; Armed Forces (USA)

20010066369 Research and Development Labs., Culver City, CA USA
Summer Research Program: 1996 Summer Faculty Research Program, Volume 3B, Phillips Laboratory ***Final Report***
Moore, Gary, Research and Development Labs., USA; December 1996; 371p; In English
Contract(s)/Grant(s): F49620-93-C-0063
Report No.(s): AD-A387550; AFRL-SR-BL-TR-00-0730-Vol-3B; No Copyright; Avail: CASI; A03, Microfiche; A16, Hardcopy
The US Air Force Summer Research Program (USAF-SRP) is designed to introduce university, college, and technical institute faculty members, graduate students, and high school students to Air Force research. This is accomplished by the faculty members (Summer Faculty Research Program, SFRP), graduate students (Graduate Student Research Program, GSRP), and high school students (High School Apprenticeship Program, HSAP) being selected on a nationally advertised competitive basis during the summer intersession period to perform research at Air Force Research Laboratory (AFRL) Technical Directorates, Air Force Air Logistics Centers (ALC), and other AF Laboratories. This volume consists of a program overview, program management statistics, and the final technical reports from the GSRP participants at the Phillips Laboratory.
Author
Education; Research and Development; University Program; Armed Forces (USA); Laboratories

20010066370 Research and Development Labs., Culver City, CA USA
Summer Research Program: 1996 Graduate Student Research Program, Volume 8, Phillips Laboratory ***Final Report***
Moore, Gary, Research and Development Labs., USA; December 1996; 378p; In English
Contract(s)/Grant(s): F49620-93-C-0063
Report No.(s): AD-A387549; AFRL-SR-BL-TR-00-0738-Vol-8; No Copyright; Avail: CASI; A03, Microfiche; A17, Hardcopy
The US Air Force Summer Research Program (USAF-SRP) is designed to introduce university, college, and technical institute faculty members, graduate students, and high school students to Air Force research. This is accomplished by the faculty members (Summer Faculty Research Program, SFRP), graduate students (Graduate Student Research Program, GSRP), and high school students (High School Apprenticeship Program, HSAP) being selected on a nationally advertised competitive basis during the summer intersession period to perform research at Air Force Research Laboratory (AFRL) Technical Directorates, Air Force Air Logistics Centers (ALC), and other AF Laboratories. This volume consists of a program overview, program management statistics, and the final technical reports from the GSRP participants at the Phillips Laboratory.
Author
Education; Research and Development; University Program; Armed Forces (USA); Laboratories

20010066371 Research and Development Labs., Culver City, CA USA
Summer Research Program: 1996 Graduate Student Research Program, Volume 9, Rome Laboratory ***Final Report***
Moore, Gary, Research and Development Labs., USA; December 1996; 199p; In English
Contract(s)/Grant(s): F49620-93-C-0063
Report No.(s): AD-A387543; AFRL-SR-BL-TR-00-0739-Vol-9; No Copyright; Avail: CASI; A03, Microfiche; A09, Hardcopy
The US Air Force Summer Research Program (USAF-SRP) is designed to introduce university, college, and technical institute faculty members, graduate students, and high school students to Air Force research. This is accomplished by the faculty members (Summer Faculty Research Program, SFRP), graduate students (Graduate Student Research Program, GSRP), and high school students (High School Apprenticeship Program, HSAP) being selected on a nationally advertised competitive basis during the summer intersession period to perform research at Air Force Research Laboratory (AFRL) Technical Directorates, Air Force Air Logistics Centers (ALC), and other AF Laboratories. This volume consists of a program overview, program management statistics, and the final technical reports from the GSRP participants at the Rome Laboratory.
Author
Education; Research and Development; University Program; Armed Forces (USA); Laboratories

20010066427 Maryland Univ., Center for Automation Research, College Park, MD USA
Travel Grant-ICMPS
Chellappa, Rama; Yegnanarayana, B.; May 2001; 14p; In English
Contract(s)/Grant(s): N00014-00-1-0858
Report No.(s): AD-A390231; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Under the sponsorship of Office of Naval Research, an international conference on multimedia processing and systems (ICMPS) was held at Indian Institute of Technology, Chennai, India in August 2000. This report presents a summary of the conference. Progress Report Technology developments in computers and communication are enabling us to handle large amount of data for processing, storage, retrieval, distribution, and interpretation. In most cases the volume of data correspond to multimedia data. It is indeed a fact that human interpretation of this data shows that information content is significantly lower than what is inferred from the binary representation of data. The main reason for this is that significant and useful information is in the interaction among the individual components of multimedia data, and we do not yet known how to capture this interaction. Hence there is lot of activity around the world on how to process multimedia data for effective storage and retrieval, communication and interpretation.
DTIC
Conferences; Data Processing; Computers; Communication

20010066538 Semiconductor Research Corp., Research Triangle Park, NC USA
The Third International Workshop on Future Information Processing Technologies ***Final Report, 30 Sep.-31 Dec. 1999***
Calvin, Ralph, Semiconductor Research Corp., USA; Dec. 31, 1999; 5p; In English
Contract(s)/Grant(s): F49620-99-1-0341
Report No.(s): AD-A390660; No Copyright; Avail: CASI; A01, Microfiche; A01, Hardcopy

The sense of the workshop attendees was that CMOS will continue to serve as the mainstream technology for information processing for the foreseeable future. The exponential progress in semiconductor technology characterized by Moore's Law will also continue until at least 0.1 microns, after which there is the possibility that the rate of progress will slow due to the numerous technical challenges that must be overcome.
DTIC
CMOS; Data Processing; Information Systems

20010066541 Defense Information Systems Agency, Arlington, VA USA
Information Assurance Vulnerability Alert DISA Internal Process and System
Snouffer, Jacqueline P.; Feb. 09, 1999; 22p; In English
Report No.(s): AD-A390651; IA-00109; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

DOD has mandated that all C/S/A develop a methodology for ensuring that vulnerability alert notifications are received by System Administrators and vulnerabilities are corrected within 30 days. This report discusses these issues.
DTIC
Defense; Information Systems; Vulnerability

20010066608 Naval Postgraduate School, Monterey, CA USA
A GUI Interface for Reusable Components Storage and Retrieval in the Caps Software Base
Meckstroth, Gregory L.; Jun. 1998; 198p; In English
Report No.(s): AD-A345924; No Copyright; Avail: Defense Technical Information Center (DTIC)

With the increase in size and complexity of software component repositories, the need for an easy to use search and retrieval process becomes a necessity. Multilevel filtering shows great promise as a quick accurate search algorithm. This approach applies a series of filters starting with high recall, low precision syntactic techniques, moving through a range of more computationally expensive high precision syntactic filters. The goal of this thesis is to develop a graphical user interface, using multilevel filtering, to make searching the CAPS component repository a less tedious task. The interface will make the retrieval process less error prone. The user would not need to be an expert in how the software base works thus increasing the ease of use and productivity. The current prototype system has a limited user interface capability. This research will add a graphical user interface for both retrieval and maintenance.
DTIC
Graphical User Interface; Computer Programs; Information Retrieval; Human-Computer Interface

20010066614 Lockheed Martin Missiles and Space, Sunnyvale, CA USA

Integrating Legacy Tools and Data Sources

DukesSchlossberg, Jon, Lockheed Martin Missiles and Space, USA; Barrett, Eamon, Lockheed Martin Missiles and Space, USA; Jan. 1999; 7p; In English; Original contains color plates

Report No.(s): AD-A390340; No Copyright; Avail: CASI; A01, Microfiche; A02, Hardcopy

Under DARPA and internal funding, Lockheed Martin has been researching information needs profiling to manage information dissemination as applied to logistics, image analysis and exploitation, and battlefield information management. We have demonstrated key software tools to aid in the dissemination of data based on a user's needs and the changing world environment. The Lockheed Martin effort has included assisting in the design and development of user information needs models, software that instantiates those information needs models with world information, and software assists in the creation and management of those profiles. We have applied this profiling technology to several applications. Under DARPA's Joint Logistics Program, we are disseminating key transportation, and theater, Defense Logistics Agency, and supplier inventories. Under DARPA's Battlefield Awareness and Data Dissemination program, we are improving both the accuracy and timeliness of "smart information push" to the warfighter. by applying these techniques, "smart push" delivers just the right data, to just the right place, at just the right time. Under internal Lockheed Martin funding, we are investigating the use of information profiles to facilitate user interactions with an image analysis and exploitation system. This system integrates several disparate legacy applications communicating over a commercial publish-subscribe middleware package. We are using Lockheed Martin's commercial Intelligent Library System (ILS) to provide image archiving and retrieval. This paper concentrates on the image analysis and exploitation system.

DTIC

Data Management; Computer Programs; Image Processing; Information Dissemination; Information Management

20010066734 NASA Langley Research Center, Hampton, VA USA

NASA Thesaurus Supplement: A Three-Part Cumulative Update of the 1998 Edition of the NASA Thesaurus, Supplement 7

July 2001; 48p; In English

Report No.(s): NASA/SP-2001-7501/SUPPL7; NAS 1.21:7501/SUPPL7; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The NASA Thesaurus Supplement is a cumulative update to the 1998 edition of the NASA Thesaurus (NASA/SP-1998-7501). The Supplement, published every six months, includes all new terms and associated hierarchies added since the cutoff for the 1998 edition (December 1997). Parts 1 and 2 (Hierarchical Listing and Rotated Term Display) correspond to Volumes 1 and 2 of the 1998 printed edition of the NASA Thesaurus. Definitions are included in Part 1; uppercase/lowercase forms are provided in both Parts 1 and 2. Part 3 is a list of deletions or changes to valid terms.

Author

Hierarchies; Thesauri; Terminology; Terms; Indexes (Documentation); Information Retrieval; Supplements; Dictionaries

20010066831 Department of Energy, Office of Scientific and Technical Information, Washington, DC USA

Workshop Report on a Future Information Infrastructure for the Physical Sciences

Trivelpiece, Alvin W., Department of Energy, USA; May 31, 2000; 32p; In English; Future Information Infrastructure for the Physical Sciences, 30-31 May 2000, Washington, DC, USA

Report No.(s): AD-A387118; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Forty years ago it took days, weeks, or even months for information regarding an interesting discovery to be communicated to the relevant community of scientists and engineers. At that time, most of us kept a collection of postcards that we used to request reprints of the articles as they appeared in the journals we read. This was the situation at the time that Ted Mainman reported his results using ruby as a medium to make a laser. Some 20 years later, this time interval was shortened to days by fax machines when Mueller and Bednorz revealed their experiments demonstrating high temperature superconductivity. Today, with the Internet, that interval has shrunk to seconds, minutes, at most, hours. I suspect that some astronomical observations are announced within seconds of the time it takes to type a note and launch it on the Internet to a few tens or hundreds of one's closest colleagues. This situation makes it imperative to have a system in place that allows the rapid communication of information of value to scientists and engineers who are engaged in what has become an intensely competitive research environment. This Workshop seeks to cast light on the problem of communication and dissemination of information within the physical sciences community, and to make practical suggestions regarding steps that can be taken to improve the situation.

Author

Internets; Information Dissemination; Information Management

20010066967 Information Assurance Technology Analysis Center, Falls Church, VA USA

C2W Exploit

Carter, Ronald, Information Assurance Technology Analysis Center, USA; Oct. 01, 1995; 14p; In English

Report No.(s): AD-A389154; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

This U.S. Army briefing describes the new Army doctrine and the needed intelligence requirements that must be met to be able to effective conduct Information Warfare (IW) operations supporting that doctrine in the future. It discusses briefly the new ways that information is transmitted and the difficulty of attacking that information. The briefing focuses on IW exploitation in support of future Army operations.

DTIC

Information Systems; Military Operations

20010066968 Cambridge Univ., Computer Lab., Cambridge, UK

Information Hiding: an Annotated Bibliography

Anderson, Ross J.; Petitcolas, Fablen A.; Apr. 13, 1999; 63p; In English

Report No.(s): AD-A389372; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

There are a number of application areas in which we want to hide information or to stop someone else from doing so. These steganography, copyright marking, the study of covert channels in operating systems, low-probability of intercept communications, and the study of subliminal channels in digital signature schemes. There follow abstracts of material from number of relevant publications.

DTIC

Bibliographies; Cryptography; Telecommunication

20010066970 Information Assurance Technology Analysis Center, Falls Church, VA USA

Minimal Key Lengths for Symmetric Ciphers to Provide Adequate Commercial Security. A Report by an Ad Hoc Group of Cryptographers and Computer Scientists

Blaze, Matt; Diffie, Whitfield; Rivest, Ronald L.; Schneier, Bruce; Shimomura, Tsutomu; Mar. 01, 1996; 11p; In English

Report No.(s): AD-A389646; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Encryption plays an essential role in protecting the privacy of electronic information against threats from a variety of potential attackers. In so doing, modern cryptography employs a combination of conventional or symmetric cryptographic systems for encrypting data and public key or asymmetric systems for managing the keys used by symmetric systems. Assessing the strength required of the symmetric cryptographic systems is therefore an essential step in employing cryptography for computer and communication security.

DTIC

Cryptography; Computer Information Security

20010067270 Advanced Materials and Processes, Rome, NY USA

National Materials Information System

Guthrie, J., Advanced Materials and Processes, USA; Proceedings of the 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 10p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

The following paper describes the National Materials Information System (NAMIS) developed by the Advanced Materials and Processes Technology Information Analysis Center (AMPTIAC). NAMIS preserves the DoD materials and process knowledge base making it readily available to the materials community. Inside NAMIS, users will find several database modules of interest space and launch vehicles communities. Two searchable bibliographic database containing all past High Temple Workshop and the Cocoa Beach Conference proceedings have individual paper citations linked viewable electronic documents. The third database module, NASP, contains a virtual library of all the NASP (National AeroSpace Plane) final reports from the materials and structures augmentation program. Although it never came to fruition, many breakthroughs in high temperature materials and processes owe their success to the NASP program. Since NASP was never fielded, these breakthroughs in materials never fully transitioned and eventually the technical heritage and expertise dissipated. Both government and industry personnel moved away from high temperature materials problems and often their personal libraries were lost. Today, many proposed new systems present similar technical challenges and require this same expertise. For example, NASA's X33, X34, Reusable Launch Vehicle (RLV), Hyper X, and Future X will need advanced Thermal Protection Systems (TPS), hot structures, and huge liquid hydrogen (LH) and liquid oxygen (LOX) tanks. In the military, Military Space Plane (MSP) will require these same technologies.

Additionally, multiple new missile concepts such as the Common Aero Vehicle (CAV), the Hypersonic Technology program (HyTech), and High Speed Strike program (HST), demand innovative hot structure and TPS.
Author
Data Bases; Information Systems; Computer Programs

20010067282 Thiokol Propulsion, Analytical Lab., Brigham City, UT USA
Problem Solving Applications of Chemical Fingerprinting
Killpack, M. O., Thiokol Propulsion, USA; Fife, D. J., Thiokol Propulsion, USA; Saunders, C. R., Thiokol Propulsion, USA; Whitworth, C. R., Thiokol Propulsion, USA; McClennen, W. H., Thiokol Propulsion, USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 7p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Good manufacturing processes are dependent on the ability to foresee, reduce, or quickly resolve problems critical to the quality and consistency of the end product. Thiokol has initiated a chemical fingerprinting program in conjunction with NASA, designed to identify and mitigate such manufacturing problems through a better understanding of the base materials. A historical database with real-time access maintained by a core of material specialists is an essential problem-solving tool. This 'fingerprinting process' will be discussed in terms of identification of critical materials and analysis techniques, development of a comprehensive database, coordination and concerns of vendors, and actual examples where fingerprinting has been used to reduce and resolve problems.
Derived from text
Chemical Analysis; Data Bases; Computer Programs

20010067312 Westinghouse Savannah River Co., Aiken, SC USA
Automated Acquisition and Analysis of Digital Radiographic Images
Poland, R., Westinghouse Savannah River Co., USA; Immel, D., Westinghouse Savannah River Co., USA; Howard, B., Westinghouse Savannah River Co., USA; Singer, R., Westinghouse Savannah River Co., USA; Moore, B., Westinghouse Savannah River Co., USA; Proceedings of The 4th Conference on Aerospace Materials, Processes, and Environmental Technology; February 2001; 8p; In English; See also 20010067226; No Copyright; Avail: CASI; A02, Hardcopy; A10, Microfiche

Engineers at the Savannah River Technology Center have designed, built, and installed a fully automated small field-of-view, lens-coupled, digital radiography imaging system. The system is installed in one of the Savannah River Sites production facilities to be used for the evaluation of production components. Custom software routines developed for the system automatically acquire, enhance, and diagnostically evaluate critical geometric features of various components that have been captured radiographically. Resolution of the digital radiograms and accuracy of the acquired measurements approaches 0.001. To date, there has been zero deviation in measurement repeatability. The automated image acquisition methodology will be discussed, unique enhancement algorithms will be explained, and the automated routines for measuring the critical component features will be presented. An additional feature discussed is the independent nature of the modular software components, which allows images to be automatically acquired, processed, and evaluated by the computer in the background, while the operator reviews other images on the monitor. System components were also a key in gaining the required image resolution. System factors such as scintillator selection, x-ray source energy, optical components and layout, as well as geometric unsharpness issues are considered in the paper. Finally the paper examines the numerous quality improvement factors and cost saving advantages that will be realized at the Savannah River Site due to the implementation of the Digital Imaging and Measurement System (DIMS).
Author
Radiography; Imaging Techniques; Algorithms; Digital Systems

20010067398 Air Force Inst. of Tech., School of Engineering, Wright-Patterson AFB, OH USA
The Influence of Framing Effects on Perceived Ease of Use, Perceived Usefulness, and Behavioral Intention in Information Technology Systems
Autrey, Jon C.; Mar. 2001; 81p; In English
Report No.(s): AD-A389376; AFIT/GIR/ENV/01M-01; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

Every year the Department of Defense spends millions of dollars on the purchase of new computer equipment. There is some question as to the necessity of the amount of this spending. This thesis looks at the use of information framing to influence users' perceptions of information technology using the Technology Acceptance Model (TAM). TAM does this hy measuring users' perceived ease of use, perceived usefulness, and behavioral intention toward a computer. An experiment was conducted by framing information about the technology level of two computers. Users' perceptions about using those systems were then

collected using the TAM construct measuring instruments. The results of this study suggest that these perceptions about computer technology have more impact on users' actual use of an IT system than the actual technology level that is present in a computer. This indicates that the aggressive product replacement cycles for computers currently used by Air Force units could be reexamined to extend the useful life of existing systems. The savings realized could then be applied to other critical Air Force mission needs.
DTIC
Technology Assessment; Defense Program; Microcomputers

20010067413 Naval Postgraduate School, Monterey, CA USA
Organizational Structure for Inter-Agency Information Operations
Dougherty, Richard K.; Mir, Pablo F.; Mar. 2001; 238p; In English
Report No.(s): AD-A389648; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

The purpose of this thesis is to stimulate a discussion toward developing an all-encompassing Inter-agency Information Operations organization. The authors define an environment and identify theories that point toward the necessity of integrating Information Operations (IO) throughout the U.S. Government (USG). The authors explore the feasibility of establishing and empowering an inter-agency organization that will monitor, evaluate and enforce all aspects of IO. Early forms of IO and their deployment are depicted in the historical backdrop of World War II. Concepts of renown futurists identify the importance of the information Age and the essential process to maximize its' full potential. A correlation between the current national security strategy and the IO environment strongly suggests the need for innovation. An overview of the current IO environment and USG organizations reveals a technological move toward inter-agency IO. Both the art and science sides of IO are incorporated into a new organization. OrgCon 7.0 is used to analyze the proposed IO organizational structure, which provides specific recommendations and defines misfits that must be addressed. The authors conclude that further work is required in modeling the organization via alternate software and a more in depth look is required in the area of National Security IO. The authors provide the essential goundwork for further research.
DTIC
Organizations; Information Management

20010067416 Information Assurance Technology Analysis Center, Falls Church, VA USA
A Reliability Model for the Detection of Electronic Watermarks in Digital Images
Linnartz, Jean P.; Kalker, Ton; Depovere, Geert; Beuker, Rob; Oct. 1997; 11p; In English; 5th Symposium on Communications and Vehicular Technology, Oct. 1997, Enschede, Netherlands
Report No.(s): AD-A389657; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A watermark is a perceptually unobstructive mark embedded in an image, audio or video clip or other multimedia asset. A watermark can carry additional information, for instance about the source and copyright status of a document or its intended recipient, its rights and restrictions. We analyze the reliability of detecting such watermarks, modeling it as a detection problem where the original content acts as noise or interference. Probabilities of incorrect detections are expressed in terms of the watermark-to-image power ratio, showing a significant similarity in the problem of detecting watermarks and interference. Theoretical results are verified by experiments.
DTIC
Probability Theory; Conferences; Reliability Analysis; Digital Data; Detection

20010067417 Information Assurance Technology Analysis Center, Falls Church, VA USA
Intellectual Property Protection Systems and Digital Watermarking
Lacy, Jack; Quackenbush, Schuyler R.; Reibman, Amy; Snyder, James H.; Apr. 01, 1998; 12p; In English
Report No.(s): AD-A389658; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Adequate protection of digital copies of multimedia content - both audio and video - is a prerequisite to the distribution of this content over networks. Until recently digital audio and video content has been protected by its size: it is difficult to distribute and store without compression. Modern compression algorithms allow substantial bitrate reduction while maintaining high fidelity reproduction. If distribution of these algorithms is controlled, cleartext uncompressed content is still protected by its size. However, once the compression algorithms are generally available cleartext content becomes extremely vulnerable to piracy. In this paper we explore the implications of this vulnerability and discuss the use of compression and watermarking in the control of piracy.
DTIC
Digital Television; Multimedia; Intellectual Property

20010067466 National Inst. of Standards and Technology, Computer Security Div., Gaithersburg, MD USA
Understanding the Global Attack Toolkit Using a Database of Dependent Classifiers
Mell, Peter; Nov. 05, 1998; 8p; In English; Pub. in proceedings of Workshop on Research with Security Vulnerabilty Databases (2nd), Purdue Univ., West Lafayette, IN, 21-22 Jan 1999.
Report No.(s): AD-A389107; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

High profile Internet web sites publish a large collection of attack scripts that we call the Global Attack Toolkit (GAT). It is a dangerous tool available to the average web surfer and yet we know little about this set of attacks besides the fact that it exists. We have taken a sample of 119 attacks from the GAT that were published between May and October 1998. We classify these samples with dependent classifications and store the results in a database. Using the database, we generate statistics on important characteristics of the GAT (e.g. what percentage of attacks are launchable from a Windows host, what percentage are remote penetration attacks, and what percentage use UDP). One can also use the database as a forensic tool and as an attack script search tool. As a forensic tool, a search on the database creates a list of attacks that could have compromised a penetrated system. As an attack script search tool, similar search techniques yield lists of attacks that conform to desired specification.
DTIC
Data Bases; Internets; Computer Information Security

20010067495 Kansas State Univ., Dept. of Computer Science, Manhattan, KS USA
Knowledge Management Technologies *Final Report, Jun. 1999 - Aug. 2000*
Wallentine, V.; Hankley, W.; Zamfir-Bleyberg, M.; Aug. 2000; 52p; In English
Contract(s)/Grant(s): C-1147
Report No.(s): PB2001-106373; K-TRAN-KSU-00-5; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report presents recommendations for technologies that have potential to contribute to future development and management of Kansas Department of Transportation (KDOT) information systems. The recommendations are accomplished by examples of designs, software demonstrations, and discussion of experiences using these technologies. The recommendations cover the following topics: (1) use of object models to capture and to present the structure and processing of KDOT information; use of the Unified Modeling Language (UML) and tools to support UML; (2) a structure for flexible, network-based access for KDOT data; use of Java servlet technology and eXtensible Markup Language representation of shared data structures; (3) use of Visual Basic scripts to integrate Office 2000 tools with stored KDOT data; use of Visual Basic scripts and define and enforce KDOT procedures for workflow processing within a network-based environment; and (4) structure of a virtual data warehouse for KDOT project and management information for use in studying deeper relationships in existing data.
NTIS
Data Management; Communication Networks; Software Engineering

20010067654 General Accounting Office, Washington, DC USA
Business Systems Modernization: Results of Review of IRS' Customer Account Data Engine Project
Jun. 2001; 70p; In English; Original contains color illustrations
Report No.(s): PB2001-106668; GAO-01-717; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

As part of its Business Systems Modernization program, the Internal Revenue Service (IRS) initiated the Customer Account Data Engine (CADE) project to modernize the agency's outdated and inefficient data management system. IRS also plans for this project to be the corporate data source for enabling future customer service and financial management applications. As you requested, our objectives were to determine (1) the reported status of CADE and IRS' plans for completing the project, (2) whether IRS is managing the relationship between CADE and the agency's enterprise architecture and current systems environment, (3) whether IRS is managing CADE in accordance with its Enterprise Life Cycle (ELC), and (4) whether IRS is ensuring that CADE will satisfy agency business needs.
NTIS
Commerce; Financial Management; Accounting

20010067655 General Accounting Office, Washington, DC USA
Information Management: Dissemination of Technical Reports
May 2001; 40p; In English
Report No.(s): PB2001-106653; GAO-01-490; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

This report conveys the results of our review of the Department of Commerce's National Technical Information Service (NTIS). NTIS is a permanent repository and principal disseminator of scientific, technical, engineering, and business-related information. NTIS acquires such research reports primarily from federal agencies and their contractors and grantees as well as

from international sources. The objectives were to determine (1) NTIS various functions; (2) the quantity, age, and demand trends of reports in NTIS repository; (3) the extent that reports in NTIS repository are readily available from other public sources; and (4) whether federal agencies are sending their reports to NTIS for sale to the public, as required by law, and, if not, the reasons for this lack of compliance.
NTIS
Reports; Information Management

85
TECHNOLOGY UTILIZATION AND SURFACE TRANSPORTATION

Includes aerospace technology transfer; urban technology; surface and mass transportation. For related information see 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.

20010067496 Texas Southern Univ., Center for Transportation Training and Research, Houston, TX USA
Linking Transportation Research and Expertise to Community Interest: A Technology Transfer Initiative
Boxill, S. A.; Mar. 2001; 64p; In English
Report No.(s): PB2001-106354; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

In order to promote linkages between transit and community needs, as well as enhance the development and transfer of technology, researchers and communities must begin to utilize new and emerging tools designed for the computer. One such tool is the on-line computer network. This report provides a framework for the technology planning process within the overall strategic planning for computerizing technology transfer activities by providing a means for all to be able to give input into the kind and depth of research conducted.
NTIS
Computer Networks; Technology Transfer; Transportation

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.

20010066711 Dayton Univ. Research Inst., OH USA
A New Technique for Achieving Impact Velocities Greater Than 10 km/sec *Final Report*
Piekutowski, A. J., Dayton Univ. Research Inst., USA; May 2001; 78p; In English
Contract(s)/Grant(s): NAS8-98216
Report No.(s): NASA/CR-2001-210990; M-1016; NAS 1.26:210990; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This Contractor Report describes and presents the results of work that was done in an attempt to develop an augmented acceleration technique that would launch small projectiles of known shape, mass, and state to velocities of 10 km/sec and higher. The higher velocities were to be achieved by adding a third stage to a conventional two-stage, light-gas gun and using a modified firing cycle for the third stage. The technique did not achieve the desired results and was modified for use during the development program. Since the design of the components used for the augmented-acceleration, three-stage launcher could be readily adapted for use as a three-stage launcher that used a single-stage acceleration cycle; the remainder of the contract period was spent performing test firings using the modified three-stage launcher. Work with the modified three-stage launcher, although not complete, did produce test firings in which an 0.11-g cylindrical nylon projectile was launched to a velocity of 8.65 km/sec.
Author
Impact Velocity; Launchers; Hypervelocity Projectiles

89
ASTRONOMY

Includes observations of celestial bodies, astronomical instruments and techniques; radio, gamma-ray, x-ray, ultraviolet, and infrared astronomy; and astrometry.

20010067403 Arizona Univ., Steward Observatory, Tucson, AZ USA
Adaptive Optics for the 6.5 m MMT Conversion, Development of Very High Resolution Imaging with Adaptive Optics for Large Telescopes, and Advanced Adaptive Optics for the World's Largest Telescopes ***Final Report, Sep. 1998-Oct. 2000***
Lloyd-Hart, M.; McMahon, T.; Apr. 19, 2001; 26p; In English
Contract(s)/Grant(s): F49620-96-1-0366
Report No.(s): AD-A389431; AFRL-SR-BL-TR-01-0314; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

This report outlines the focus of the development of advanced adaptive optics at the University of Arizona, Steward Observatory's Center for Astronomical Adaptive Optics (CAAO). The main focus of the development effort has been the design and development of the world's first adaptive secondary and control system for the 6.5 m MMT facility in Southern Arizona. The system is now undergoing extensive testing at the Steward Observatory Mirror Laboratory prior to integration with the MMT in the Fall of 2001.
DTIC
Adaptive Optics; Astronomical Observatories; Imaging Techniques

20010067427 Space Telescope Science Inst., Baltimore, MD USA
Hubble's Panoramic Portrait of a Vast Star-Forming Region
Jul. 26, 2001; In English; Videotape: 4 min. 13 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001110130; No Copyright; Avail: CASI; B01, Videotape-Beta; V01, Videotape-VHS

A computerized animation zooms into the 30 Doradus region. Dr. Nolan Walborn explains how the Hubble images of 30 Doradus and its central cluster are changing our understanding of similar star forming regions and what is happening in the gas pillars.
Derived from text
Magellanic Clouds; Nebulae

90
ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

20010066175 Los Alamos National Lab., NM USA
Host Galaxies As Gamma-Ray Burst Distance Indicators
Band, D.; Jimenez, R.; Piran, R.; 2001; 8p; In English
Report No.(s): PB2001-106091; LA-UR-01-0655; No Copyright; Avail: National Technical Information Service (NTIS)

We calculate the distributions of the total burst energy, the peak luminosity and the X-ray afterglow energy using burst observations and distances to the associated host galaxies. to expand the sample, we include redshift estimates for host galaxies without spectroscopic redshifts. The methodology requires a model of the host galaxy population; we found that in the best model the burst rate is proportional to the host galaxy luminosity at the time of the burst.
NTIS
Galaxies; Luminosity; Afterglows; Distance Measuring Equipment; Gamma Ray Bursts

20010066343 Hertfordshire Univ., Dept. of Physical Science, Hatfield, UK
Statistical Properties of Circumnuclear H II Regions in Nearby Galaxies
Alonso-Herrero, Almudena, Hertfordshire Univ., UK; Knapen, Johan H., Hertfordshire Univ., UK; [2001]; 18p; In English; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We analyze the statistical properties of the circumnuclear H(II) regions of a sample of 52 nearby galaxies (v is less than 1000 km/s) from archival HST/NICMOS H-band and Pa-alpha (1.87 micrometers) observations at unprecedented spatial resolutions of between 1 and 30 pc. We catalog H(II) regions from the continuum-subtracted Pa-alpha images, and find H(II) regions in the central regions of most galaxies, and more than a hundred in eight galaxies. In contrast to disk H(II) regions, the physical properties (luminosity and size) of individual circumnuclear H(II) regions do not vary strongly with the morphological type of the host

galaxy, nor does the number of circumnuclear H(II) regions per unit area. The H-alpha luminosity within the central kpc, as derived from H(II) region emission, is significantly enhanced in early-type (S0/a-Sb) galaxies. We find evidence that bars increase the circumnuclear star formation, presumably by funneling gas from the disk towards the nucleus. Barred galaxies exhibit enhanced luminosities of the brightest H(II) region, the central kpc H-alpha luminosities (an effect mostly due to the early type galaxies in our sample), and the star formation rates per unit stellar mass (which could also be understood as the integral equivalent widths of Pa-alpha) over the central kpc with respect to non-barred galaxies. We fit the luminosity functions and diameter distributions of the circumnuclear H(II) regions in eight galaxies where we can catalog enough H(II) regions to do so in a meaningful way. We use power laws and find that the fitted slopes of the H(II) region LF are exactly in the previously found ranges, and even confirm a trend with steeper slopes in galaxies of earlier morphological type. This implies that the physical processes giving rise to enhanced star formation in the circumnuclear regions of galaxies must be similar to those in disks.
Author
Galaxies; H II Regions; Statistical Distributions; Star Formation; Luminosity

20010066761 National Optical Astronomy Observatories, Tucson, AZ USA
A Model for the Breakup of Comet Linear (C/1999 S4)
Samarasinha, Nalin H., National Optical Astronomy Observatories, USA; June 2001; 22p; In English
Report No.(s): NOAO-Preprint-890; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We propose a mechanism based on the rubble-pile hypothesis of the cometary nucleus (Weissman 1986) to explain the catastrophic breakup of comet LINEAR (C/1999 S4) observed during July-August 2000. We suggest that a solid nucleus made up of 10-100 m ”cometesimals” (Weidenschilling 1997) contains a network of inter-connected voids in the inter-cometesimal regions. The production of super-volatile (i.e., species more volatile than water) gases into these voids occurs due to the thermal wave propagating through the nucleus and associated phase transitions of water ice. The network of voids provides an efficient pathway for rapid propagation of these gases within the nucleus resulting in gas pressure caused stresses over a wide regime of the nucleus. This provides a mechanism for catastrophic breakups of small cometary nuclei such as comet LINEAR (C/1999 S4) as well as for some observed cometary outbursts including those that occur at large heliocentric distances (e.g., West et al. 1991). We emphasize the importance of techniques such as radar reflection tomography and radiowave transmission tomography (e.g., Kofman et al. 1998) aboard cometary missions to determine the three dimensional structure of the nucleus in particular the extent of large scale voids.
Author
Comets; Comet Nuclei; Voids; Gas Pressure; Phase Transformations

20010067201 NASA Goddard Space Flight Center, Greenbelt, MD USA
Variable Stars in the Unusual, Metal-Rich Globular Cluster NGC-6441
Pritzl, Barton J., Michigan State Univ., USA; Smith, Horace A., Michigan State Univ., USA; Catelan, Marcio, Virginia Univ., USA; Sweigart, Allen V., NASA Goddard Space Flight Center, USA; [2001]; 94p; In English
Contract(s)/Grant(s): NAS5-26555; NRA-99-01-ATP-039; HF-01105.01-98A; NSF AST-95-28080; NSF AST-99-86943; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

We have undertaken a search for variable stars in the metal-rich globular cluster NGC 6441 using time-series BV photometry. The total number of variables found near NGC 6441 has been increased to approx. 104, with 48 new variables being found in this survey. A significant number of the variables are RR Lyrae stars (approx. 46), most of which are probable cluster members. As was noted by Layden et al. (1999), the periods of the fundamental mode RR Lyrae are unusually long compared to field stars of similar metallicity. The existence of these long period RRab stars is consistent with Sweigart & Catelan’s (1998) prediction that the horizontal branch of NGC 6441 is unusually bright. This result implies that the metallicity-luminosity relationship for RR Lyrae stars is not universal. We discuss the difficulty in determining the Oosterhoff classification of NGC 6441 due to the unusual nature of its RR Lyrae. A number of ab-type RR Lyrae are found to be both brighter and redder than the other probable RRab found along the horizontal branch, which may be a result of blending with stars of redder color. A smaller than usual gap is found between the shortest period fundamental mode and the longest period first-overtone mode RR Lyrae. We determine the reddening of the cluster to be E(B - V) = 0.51 +/- 0.02 mag, with substantial differential reddening across the face of the cluster. The mean V magnitude of the RR Lyrae is found to be 17.51 +/- 0.02 resulting in a distance of 10.4 to 11.9 kpc, for a range of assumed values of is less than M(sub V)> for RR Lyrae stars. The possibility that stars in NGC 6441 may span a range in [Fe/H] is also discussed.
Author
A Stars; Globular Clusters; Lyra Constellation; Metallic Stars; Metallicity; Stellar Evolution; Stellar Spectra

20010067455 Space Telescope Science Inst., Baltimore, MD USA
Galaxy Group Stephan's Quintet Video File HubbleMinute: Battle Royale in Stephan's Quintet
Jul. 19, 2001; In English; Videotape: 12 min. 40 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2001107899; No Copyright; Avail: CASI; B01, Videotape-Beta; V01, Videotape-VHS

The Hubble Space Telescope's closeup view of Stephan's Quintet, a group of five galaxies, reveals a string of brighter star clusters that separate like a diamond necklace. Astronomers studying the compact galaxy group Stephan's Quintet have seen creative destruction in the many collisions taking place among its galaxies. This HubbleMinute discusses what astronomers are learning and hope to learn from exploring the quintet.
Derived from text
Galactic Clusters; Galaxies; Collisions

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.

20010066527 Catholic Univ. of America, Dept. of Chemistry, Washington, DC USA
Studies of Elementary Reactions of Chemical Importance in the Atmospheres of Planets ***Progress Report, 1 May 2000 - 30 Apr. 2001***
Nesbitt, Fred L., Catholic Univ. of America, USA; May 31, 2001; 9p; In English
Contract(s)/Grant(s): NCC5-68; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The methyl self-reaction was studied at T = 298 K and 202 K and at three different pressures, P = 0.5, 1.0, and 2.1 Torr. The experimental measurements were performed in our discharge flow-mass spectrometer (DF-MS) apparatus. The methyl radicals were generated by the reaction of F with methane. Passing a mixture of molecular fluorine, F2, in helium through a microwave cavity generated the atomic fluorine reagent. The atomic F enters the flow tube through a rear port on the flow tube. The methane reagent enters the flow tube through a movable injector located coaxial in the flow tube. The decay of methyl radical signal was monitored at a mass/charge ratio (m/z) of 15 as a function of the injector distance. to minimize secondary chemistry from the reaction CH3 + F to CH2 + HF the initial [CH4](sub 0)/[F](sub 0) was above 37.0 and typically 100. This ensures a 1:1 relationship between initial [F] and [CH3]. A titration of F with excess Cl2 yields the initial [F](sub 0). Our experimental methodology to accurately measure the mass spectrometer scaling factor, i.e., the relationship between initial signal and [CH3](sub 0) has been improved. Now we measure the CH3 signal decay under exponential decay conditions at low initial [F](sub 0), 3x10(exp 11) molecule/cc, in the presence of Cl2. This minimizes the second-order decay contributed by the CH3 self-reaction and a simple extrapolation of the 1n(signal) vs time plot to t = 0 gives the initial signal. This provides the desired relationship between initial signal at 15 amu and [CH3](sub 0). The resulting calibration is then applied to the observed decay of the CH3 signal at high concentrations of CH3 assuming linearity of this scaling factor.
Derived from text
Methyl Compounds; Experimentation; Nucleation; Cosmic Dust

20010067452 NASA Ames Research Center, Moffett Field, CA USA
Evidence for a Trapped Radical (OH) on Ariel, Oberon, and Titania from Hubble Space Telescope Ultraviolet Spectra
Roush, Ted L., NASA Ames Research Center, USA; Noll, Keith S., Space Telescope Science Inst., USA; Pendleton, Yvonne J., NASA Ames Research Center, USA; [2000]; 1p; In English
Contract(s)/Grant(s): RTOP 344-30-30-01; No Copyright; Avail: Issuing Activity; Abstract Only

The moons Ariel, Titania, and Oberon have orbits lying within the magnetosphere of Uranus, exposing them to particle irradiation from trapped Ions. This Is similar to the situation experienced by the jovian moons Europa, Ganymede, and Callisto, as well as the saturnian satellites Enceladus, Tethys, Dione, and Rhea. Identification of SO2 on Europa, Ganymede and Callisto, and O3 on Ganymede, Rhea, and Dione has supported suggestions that chemical modifications occur on icy bodies due to ion bombardment associated with the particles entrained within the magnetospheric fields of Jupiter and Saturn. Similar to the Jovian and saturnian satellites mentioned above, water ice is a major component on the larger uranian satellites", thus one might anticipate chemical modification to he an important process in the uranian system. Laboratory studies or the interaction of ultraviolet (uv) and charged-particle radiation with water ice show that in addition to molecular species, a variety of radicals are also produced.

We report here evidence for an uv absorption feature in the spectra of Ariel, Titania, and Oberon that we identify as due, in part, to OH; providing the first evidence of a radical produced and trapped on an icy moon within our solar system.
Author
Trapped Particles; Radicals; Charged Particles; Hubble Space Telescope; Moon; Atmospheric Chemistry; Absorption Spectra

92
SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots. For related information see 93 Space Radiation.

20010066591 Air Force Inst. of Tech., Graduate School of Engineering and Management, Wright-Patterson AFB, OH USA
Solar Radiation Pressure Modeling Issues for High Altitude Satellite
Cook, Dayne G., Air Force Inst. of Tech., USA; Mar. 08, 2001; 148p; In English
Report No.(s): AD-A390187; AFIT/GSP/ENY/01M-01; No Copyright; Avail: CASI; A02, Microfiche; A07, Hardcopy

Current satellite orbit propagation techniques employ a solar radiation pressure model that makes simplifying assumptions concerning the satellite and its orbital geometry. Solar radiation pressure, a non-gravitational perturbation, significantly affects satellite motion at high altitudes. The model currently in use by the Air Force for orbit determination includes the following assumptions: a constant cross-sectional area projected to the Sun, cylindrical Earth shadow for eclipse, and specular reflection. In reality, the satellite's cross-sectional area with respect to the Sun constantly changes, the Earth's shadow is conical, and reflection is both specular and diffuse. Additionally, the solar flux received at the Earth can be either assumed constant or variably dependent on the distance from the Sun. These four higher order effects may be modeled in lieu of the simplifying assumptions to obtain greater accuracy in orbit predictions. Comparison of a baseline that embodies the Air Force's current solar radiation pressure model, and a truth model that simulates the four solar radiation pressure effects will be presented. The most significant effect relating to solar radiation pressure is the changing cross-sectional area of the satellite projected to the Sun.
DTIC
High Altitude; Solar Radiation; Artificial Satellites; Mathematical Models

20010066763 Emergent Information Technologies-East, Vienna, VA USA
Observational Tests of Recent MHD Turbulence Perspectives ***Annual Report, Jul. 2000 - Jun. 2001***
Ghosh, Sanjoy, Emergent Information Technologies-East, USA; Jun. 09, 2001; 6p; In English
Contract(s)/Grant(s): NASW-98001
Report No.(s): Rept-1042-005#-A2; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This grant seeks to analyze the Heliospheric Missions data to test current theories on the angular dependence (with respect to mean magnetic field direction) of magnetohydrodynamic (MHD) turbulence in the solar wind. Solar wind turbulence may be composed of two or more dynamically independent components. Such components include magnetic pressure-balanced structures, velocity shears, quasi-2D turbulence, and slab (Alfven) waves. We use a method, developed during the first two years of this grant, for extracting the individual reduced spectra of up to three separate turbulence components from a single spacecraft time series. The method has been used on ISEE-3 data, Pioneer Venus Orbiter, Ulysses, and Voyager data samples. The correlation of fluctuations as a function of angle between flow direction and magnetic-field direction is the focus of study during the third year.
Author
Magnetohydrodynamic Turbulence; Magnetic Field Configurations; Solar Wind

20010067639 NASA Marshall Space Flight Center, Huntsville, AL USA
Solar Wind Influence on the Oxygen Content of Ion Outflow in the High-Altitude Polar Cap During Solar Minimum Conditions
Elliott, H. A., Alabama Univ., USA; Comfort, R. H., Alabama Univ., USA; Craven, P. D., NASA Marshall Space Flight Center, USA; Chandler, M. O., NASA Marshall Space Flight Center, USA; Moore, T. E., NASA Goddard Space Flight Center, USA; Journal of Geophysical Research; Apr. 01, 2001; ISSN 0148-0227; Volume 106, No. A4, pp. 6067-6084; In English; Original contains color illustrations
Contract(s)/Grant(s): NCC8-65; NGT5-40018
Report No.(s): Paper-2000JA003022; Copyright; Avail: Issuing Activity

We correlate solar wind and interplanetary magnetic field (IMF) properties with the properties of O(+) and H(+) during early 1996 (solar minimum) at altitudes between 5.5 and 8.9 R(sub E) geocentric using the Thermal Ion Dynamics Experiment (TIDE)

on the Polar satellite. Throughout the high-altitude polar cap we observe H(+) to be more abundant than O(+). O(+) is found to be more abundant at lower latitudes when the solar wind speed is low (and KP is low), while at higher solar wind speeds (and high KP), O(+) is observed across most of the polar cap. The O(+) density and parallel flux are well organized by solar wind dynamic pressure, both increasing with solar wind dynamic pressure. Both the O(+) density and parallel flux have positive correlations with both V(sub SW)B(sub IMF) and E(sub SW). No correlation is found between O(+) density and IMF Bz, although a nonlinear relationship with IMF by is observed, possibly due to a strong linear correlation with the dynamic pressure. H(+) is not as highly correlated with solar wind and IMF parameters, although H(+) density and parallel flux are negatively correlated with IMF By and positively correlated with both V(sub SW)B(sub IMF) and E(sub SW). In this solar minimum data set, H(+) is dominant, so that contributions of this plasma to the plasma sheet would have very low O(+) to H(+) ratios.
Author
Solar Wind; Oxygen Ions; Polar Caps; Solar Activity Effects; High Altitude

93
SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth radiation belts. For biological effects of radiation on plants and animals see 52 Aerospace Medicine. For theory see 73 Nuclear Physics.

20010066733 Old Dominion Univ., Norfolk, VA USA
A Study of Green's Function Methods Applied to Space Radiation Protection ***Final Report***
Heinbockel, John H., Old Dominion Univ., USA; [2001]; 18p; In English
Contract(s)/Grant(s): NCC1-320; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this research was to study the propagation of galactic ions through various materials. Galactic light ions result from the break up of heavy ion particles and their propagation through materials is modeled using the one-dimensional Boltzmann equation. When ions enter materials there can occur (i) the interaction of ions with orbital electrons which causes ionization within the material and (ii) ions collide with atoms causing production of secondary particles which penetrate deeper within the material. These processes are modeled by a continuum model. The basic idea is to place a control volume within the material and examine the change in ion flux across this control volume. In this way on can derive the basic equations for the transport of light and heavy ions in matter. Green's function perturbation methods can then be employed to solve the resulting equations using energy dependent nuclear cross sections.
Derived from text
Green'S Functions; Light Ions; Radiation Protection; Extraterrestrial Radiation; Heavy Ions

Subject Term Index

A

A STARS, 267
ABLATION, 34, 87
ABLATIVE MATERIALS, 21
ABRASIVES, 51
ABSORPTION SPECTRA, 269
ABSORPTIVITY, 248
ACCELERATORS, 242
ACCEPTABILITY, 44
ACCESS TIME, 71
ACCIDENT INVESTIGATION, 21
ACCIDENT PREVENTION, 68
ACCOUNTING, 264
ACCURACY, 9
ACOUSTIC COUPLING, 136
ACOUSTIC EMISSION, 238
ACOUSTIC VELOCITY, 171
ACOUSTICS, 82, 137
ACQUISITION, 254
ACRYLIC RESINS, 86
ACTINIDE SERIES, 41
ACTIVATION, 161
ACTUATORS, 50, 227
ADAPTIVE CONTROL, 209
ADAPTIVE FILTERS, 71
ADAPTIVE OPTICS, 266
ADDITIVES, 24
ADENOVIRUSES, 174
ADSORPTION, 36
ADVECTION, 87, 166
AERIAL RECONNAISSANCE, 5
AERODYNAMIC CHARACTERISTICS, 2
AERODYNAMIC HEATING, 30
AERODYNAMIC LOADS, 2
AERODYNAMICS, 3, 10, 255
AEROELASTICITY, 3, 6
AEROGELS, 49
AERONAUTICAL ENGINEERING, 9
AEROSOLS, 135, 161
AEROSPACE ENGINEERING, 1, 10, 58, 99, 250
AEROSPACE INDUSTRY, 69, 133
AEROSPACE MEDICINE, 201, 206
AEROSPACE SCIENCES, 10
AEROSPACE SYSTEMS, 1, 69
AEROSPIKE ENGINES, 90
AFRICA, 117, 121, 124
AFTERGLOWS, 266
AGGREGATES, 27, 167, 182
AGING (MATERIALS), 58, 65
AGRICULTURE, 110, 246
AIR DEFENSE, 235
AIR LOCKS, 14, 15, 17
AIR POLLUTION, 130, 131, 132, 133, 134
AIR QUALITY, 130, 131, 133, 134
AIR SAMPLING, 22, 133, 161
AIR TRANSPORTATION, 207
AIR WATER INTERACTIONS, 171
AIRCRAFT CARRIERS, 8, 68
AIRCRAFT CONSTRUCTION MATERIALS, 39
AIRCRAFT DESIGN, 5
AIRCRAFT HYDRAULIC SYSTEMS, 48
AIRCRAFT SAFETY, 84
AIRFOILS, 4, 210, 232
AIRFRAMES, 8, 104
AIRPORTS, 235
ALGEBRA, 236
ALGORITHMS, 12, 41, 74, 86, 88, 113, 137, 212, 214, 218, 219, 222, 223, 224, 226, 228, 230, 236, 262
ALLOYING, 41, 45
ALPHA PARTICLES, 175
ALTITUDE, 170
ALUMINUM, 71
ALUMINUM ALLOYS, 43, 44, 45, 50, 53, 62, 105
ALUMINUM COATINGS, 22, 51
ALUMINUM GALLIUM ARSENIDES, 78
ALUMINUM NITRIDES, 78
ALUMINUM OXIDES, 78, 130
ALUMINUM-LITHIUM ALLOYS, 70
AMAZON REGION (SOUTH AMERICA), 119
AMINES, 93
AMINO ACIDS, 176, 189
AMMONIA, 190
AMORPHOUS MATERIALS, 65, 249
AMPLITUDE MODULATION, 227
ANALOGIES, 88
ANALOGS, 252
ANALYSIS (MATHEMATICS), 38
ANALYTICAL CHEMISTRY, 38
ANGULAR DISTRIBUTION, 3
ANIONS, 24
ANODIC COATINGS, 83
ANOMALIES, 84, 117
ANTENNA RADIATION PATTERNS, 76
ANTIBODIES, 177
ANTIGENS, 185, 198
ANTIOXIDANTS, 199
ANTISHIP MISSILES, 91
APOPTOSIS, 184
APPLICATIONS PROGRAMS (COMPUTERS), 81, 214, 218, 245
APPROXIMATION, 233
AQUIFERS, 114, 116, 118
ARABIAN SEA, 172
ARCHITECTURE (COMPUTERS), 213, 215, 219
ARID LANDS, 108
ARITHMETIC, 71, 232
ARMED FORCES, 207
ARMED FORCES (FOREIGN), 203
ARMED FORCES (UNITED STATES), 234, 256, 257, 258
ARMOR, 202
ARRAYS, 82
ARTIFICIAL INTELLIGENCE, 223, 228, 229, 231, 234, 256
ARTIFICIAL SATELLITES, 19, 269
ASBESTOS, 50
ASSAYING, 185
ASSESSMENTS, 13, 121
ASSUMPTIONS, 102
ASTROMETRY, 255
ASTRONAUT TRAINING, 16, 17, 18
ASTRONAUTS, 16, 17, 18
ASTRONOMICAL CATALOGS, 255
ASTRONOMICAL OBSERVATORIES, 266
ASTRONOMY, 10
ASYMMETRY, 96
ATLANTIS (ORBITER), 13, 14, 18
ATMOSPHERIC CHEMISTRY, 269
ATMOSPHERIC CIRCULATION, 166
ATMOSPHERIC COMPOSITION, 134, 161
ATMOSPHERIC EFFECTS, 121, 171
ATMOSPHERIC MODELS, 161, 168
ATMOSPHERIC TEMPERATURE, 170
ATOMIC COLLISIONS, 241
ATOMIC ENERGY LEVELS, 241
ATOMIC PHYSICS, 246
ATOMIC STRUCTURE, 241
ATTACKING (ASSAULTING), 223
ATTENUATION COEFFICIENTS, 135

ATTITUDE (INCLINATION), 5, 199, 244, 255
ATTITUDE CONTROL, 7, 12
AUGMENTATION, 78
AUTOMATA THEORY, 231
AUTOMOBILES, 202
AUTONOMY, 5
AXIAL STRESS, 97
AZIMUTH, 4
AZINES, 27

B

BACKWARD DIFFERENCING, 88
BACTERIA, 179, 185, 198
BARRIER LAYERS, 82
BAY ICE, 106
BAYS (TOPOGRAPHIC FEATURES), 238
BEAMS (RADIATION), 90
BENTONITE, 131
BETA PARTICLES, 176
BIBLIOGRAPHIES, 3, 238, 257, 261
BINARY SYSTEMS (MATERIALS), 251
BIOCHEMISTRY, 233
BIODEGRADATION, 24
BIODYNAMICS, 202
BIOINSTRUMENTATION, 187
BIOLOGICAL EVOLUTION, 189
BIOMIMETICS, 30
BIOTECHNOLOGY, 187
BIPOLAR TRANSISTORS, 78
BIRD-AIRCRAFT COLLISIONS, 3
BIRTH, 255
BLOCK COPOLYMERS, 48
BLOOD FLOW, 199
BONDED JOINTS, 29, 60, 251
BONDING, 28
BONE MARROW, 239
BORN-INFELD THEORY, 236
BOSONS, 241
BOUNDARY ELEMENT METHOD, 238
BOUNDARY LAYER CONTROL, 88
BOUNDARY LAYER SEPARATION, 86
BOUNDARY LAYER TRANSITION, 88
BOUNDARY LAYERS, 41, 90, 171
BRAZIL, 119
BRIGHTNESS, 48, 76
BROWNIAN MOVEMENTS, 102
BUFFETING, 103
BUILDINGS, 120
BUOYANCY, 170, 172
BURNING RATE, 67
BURST TESTS, 29
BUS CONDUCTORS, 213

C

C++ (PROGRAMMING LANGUAGE), 217
CADMIUM TELLURIDES, 82, 180
CALCULUS, 91
CALIBRATING, 72, 168, 221
CAMERAS, 92
CAMEROON, 111, 124
CANCER, 172, 173, 174, 175, 176, 177, 178, 179, 183, 184, 185, 186, 187, 188, 191, 192, 194, 215, 255
CANOPIES (VEGETATION), 105
CAPACITORS, 82
CAPILLARY FLOW, 86
CARBON, 55
CARBON 12, 133
CARBON 14, 133
CARBON DIOXIDE, 56, 64
CARBON DIOXIDE LASERS, 93, 94, 95
CARBON FIBERS, 34
CARBON MONOXIDE, 131
CARBON TETRACHLORIDE, 39
CARBON TETRAFLUORIDE, 247
CARBON-CARBON COMPOSITES, 28, 53
CARBONACEOUS ROCKS, 106
CARBONATES, 190
CARCINOGENS, 178, 182, 184
CARDIOVASCULAR SYSTEM, 175
CARRIER LIFETIME, 95
CASUALTIES, 206
CATALYSTS, 36, 130
CATALYTIC ACTIVITY, 36
CATHODES, 80
CATHODIC COATINGS, 129
CATHODOLUMINESCENCE, 42, 243
CAVITATION FLOW, 86
CAVITIES, 240
CELL DIVISION, 176, 177
CELLS, 179
CELLS (BIOLOGY), 176, 177, 181, 182, 185, 187, 189, 190, 191, 194
CEMENTS, 64, 249
CENTER OF GRAVITY, 231
CENTRAL EUROPE, 126
CENTRAL NERVOUS SYSTEM, 194
CENTRAL PROCESSING UNITS, 213
CERAMIC MATRIX COMPOSITES, 30, 32, 49, 53, 58, 63
CERAMICS, 49, 54, 57
CERTIFICATION, 100
CHAD, 115
CHARACTERIZATION, 12, 32, 84
CHARGED PARTICLES, 269
CHARTS, 222
CHEMICAL ANALYSIS, 35, 57, 58, 106, 178, 262
CHEMICAL BONDS, 190
CHEMICAL COMPATIBILITY, 63
CHEMICAL COMPOSITION, 57, 251
CHEMICAL ENGINEERING, 210
CHEMICAL PROPULSION, 39
CHEMICAL REACTIONS, 189
CHEMOTHERAPY, 175, 183
CHINA, 128
CHLORINE, 161
CHLOROFLUOROCARBONS, 26, 55, 56, 60, 61
CHROMATOGRAPHY, 48
CHROMIUM, 51
CIRCULAR PLATES, 85
CITIES, 111, 116, 119, 120, 124, 125, 126
CLADDING, 94
CLASSIFICATIONS, 84, 122
CLASSIFIERS, 84, 227
CLAYS, 131
CLEAN ENERGY, 65
CLEANERS, 24, 26, 27, 56, 58, 61
CLEANING, 25, 26, 59, 60, 129, 239
CLEANLINESS, 59
CLIMATOLOGY, 170, 171
CLINICAL MEDICINE, 174, 175, 188, 192, 193, 228
CLONING (BIOLOGY), 179
CLOUD-TO-GROUND DISCHARGES, 171
CLOUDS (METEOROLOGY), 168
CLUTTER, 73
CMOS, 259
COALESCING, 167
COASTAL CURRENTS, 123
COATINGS, 25, 45
COCKPITS, 9
CODERS, 71
COHERENT LIGHT, 91
COHERENT RADAR, 72, 94
COLLISIONS, 268
COLLOIDS, 87
COLOR, 48
COMBINATORIAL ANALYSIS, 74, 234
COMBUSTION, 21, 39, 43, 93
COMBUSTION CHAMBERS, 21, 67
COMBUSTION EFFICIENCY, 67
COMBUSTION PHYSICS, 67
COMBUSTION PRODUCTS, 127
COMBUSTION SYNTHESIS, 57
COMET NUCLEI, 267
COMETS, 267

COMMAND AND CONTROL, 72, 112, 224, 234, 235
COMMERCE, 255, 264
COMMERCIAL OFF-THE-SHELF PRODUCTS, 245
COMMERCIAL SPACECRAFT, 72
COMMUNICATION, 224, 259
COMMUNICATION EQUIPMENT, 75
COMMUNICATION NETWORKS, 74, 76, 229, 264
COMMUNICATION SATELLITES, 19, 72
COMPATIBILITY, 26, 40, 221
COMPILERS, 213
COMPLEX COMPOUNDS, 25
COMPOSITE MATERIALS, 25, 28, 29, 31, 34, 40, 50
COMPOSITE STRUCTURES, 30, 31, 32, 34, 35, 59, 62, 104, 189
COMPOSITION (PROPERTY), 231
COMPRESSED AIR, 68
COMPRESSOR ROTORS, 7
COMPUTATION, 11, 112, 213, 214, 233, 252
COMPUTATIONAL CHEMISTRY, 24
COMPUTATIONAL FLUID DYNAMICS, 1, 3, 7, 85, 93, 232
COMPUTATIONAL GRIDS, 86, 103, 210
COMPUTER AIDED DESIGN, 217, 222, 223
COMPUTER AIDED MANUFACTURING, 223
COMPUTER ASSISTED INSTRUCTION, 213, 222, 252
COMPUTER COMPONENTS, 214
COMPUTER CONFERENCING, 224
COMPUTER GRAPHICS, 212
COMPUTER INFORMATION SECURITY, 224, 226, 261, 264
COMPUTER NETWORKS, 217, 226, 234, 265
COMPUTER PROGRAMMING, 218, 222
COMPUTER PROGRAMS, 85, 97, 100, 104, 132, 201, 208, 215, 224, 226, 227, 256, 259, 260, 262
COMPUTER SYSTEMS DESIGN, 85
COMPUTER SYSTEMS PROGRAMS, 3, 215
COMPUTER TECHNIQUES, 108, 228, 229
COMPUTERIZED SIMULATION, 2, 5, 35, 79, 84, 86, 104, 173, 215, 229, 236, 238
COMPUTERS, 9, 91, 112, 214, 253, 254, 259
CONCRETES, 27, 64
CONDENSED MATTER PHYSICS, 35, 252
CONDUCTING POLYMERS, 46
CONDUCTION BANDS, 251
CONDUCTIVE HEAT TRANSFER, 30
CONFERENCES, 1, 6, 39, 79, 84, 132, 252, 259, 263
CONFINEMENT, 248
CONGRESSIONAL REPORTS, 73
CONSERVATION, 129
CONSOLES, 208
CONSTRUCTION, 220
CONTAINMENT, 248
CONTAMINANTS, 24, 60, 66, 132, 133, 189
CONTAMINATION, 38, 39, 40, 59, 105, 132, 233
CONTINENTAL SHELVES, 65
CONTINUOUS WAVE LASERS, 93, 95
CONTINUUM MODELING, 90
CONTRACTS, 73
CONTROL SYSTEMS DESIGN, 227
CONTROL THEORY, 9, 11
CONTROLLED FUSION, 248
CONVECTION, 132, 167
COOLING, 92
COOLING SYSTEMS, 221
COORDINATION, 35, 201
COPPER ALLOYS, 247
CORE SAMPLING, 69, 107
CORRECTION, 121
CORRELATORS, 84
CORROSION, 49
CORROSION PREVENTION, 35, 50
CORROSION RESISTANCE, 46
CORROSION TESTS, 53
COSMIC DUST, 268
COST ANALYSIS, 13, 35
COST EFFECTIVENESS, 70, 234
COST REDUCTION, 13
COSTS, 167, 197
COTE D'IVOIRE, 111, 114
COUNTERMEASURES, 208
COUPLING, 82
CRACK PROPAGATION, 47
CRACKS, 47
CRANIUM, 199
CREW PROCEDURES (INFLIGHT), 13, 14, 15, 16, 17, 18
CREW PROCEDURES (PREFLIGHT), 14
CRITERIA, 212
CRITICAL POINT, 103, 211
CROSS CORRELATION, 84
CRUDE OIL, 66
CRYOGENIC EQUIPMENT, 70
CRYOGENIC FLUID STORAGE, 59
CRYOGENICS, 43
CRYPTOGRAPHY, 219, 226, 261
CRYSTAL DEFECTS, 251
CRYSTAL GROWTH, 249
CRYSTAL STRUCTURE, 237
CRYSTALLOGRAPHY, 249
CRYSTALS, 248, 249, 252
CURING, 61
CYCLES, 79
CYTOLOGY, 191, 194
CZOCHRALSKI METHOD, 249

D

DAMAGE, 187, 199
DATA, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165
DATA ACQUISITION, 107, 172, 222
DATA BASE MANAGEMENT SYSTEMS, 217
DATA BASES, 36, 57, 103, 113, 131, 172, 180, 196, 256, 262, 264
DATA MANAGEMENT, 76, 213, 224, 257, 260, 264
DATA MINING, 180
DATA PROCESSING, 201, 222, 226, 257, 259
DATA REDUCTION, 19
DATA SYSTEMS, 256
DEACTIVATION, 172
DECISION MAKING, 201, 225, 228, 229
DECISION SUPPORT SYSTEMS, 112, 215, 228
DECOMPOSITION, 27, 127
DEFECTS, 100, 179
DEFENSE, 259
DEFENSE PROGRAM, 6, 11, 225, 226, 231, 235, 253, 254, 256, 263
DEFORESTATION, 111
DEFORMATION, 45
DEGRADATION, 35
DEICERS, 24
DENSITY, 246
DEOXYRIBONUCLEIC ACID, 86, 176, 178, 179, 187
DEPLOYMENT, 204, 235
DEPOSITION, 223
DEPOSITS, 40, 66
DEPTH, 134
DEPTH MEASUREMENT, 218
DESERTIFICATION, 108, 110, 124
DESERTS, 109, 136

DESIGN ANALYSIS, 12, 70, 72, 86, 99, 103, 189, 210, 215
DESIGN OPTIMIZATION, 78
DESTINY LABORATORY MODULE, 13
DETECTION, 35, 39, 40, 59, 100, 184, 192, 231, 263
DETECTORS, 80
DETERIORATION, 108
DETERMINANTS, 79
DETONATION, 21
DIAGNOSIS, 182, 187
DICTIONARIES, 260
DIELECTRIC PROPERTIES, 236
DIELECTRICS, 236
DIFFERENTIAL ABSORPTION LIDAR, 94
DIFFERENTIAL GEOMETRY, 211
DIFFUSION, 61
DIFFUSION FLAMES, 41, 67
DIGITAL CAMERAS, 90
DIGITAL COMPUTERS, 252
DIGITAL DATA, 263
DIGITAL ELECTRONICS, 238
DIGITAL SYSTEMS, 75, 78, 181, 227, 230, 262
DIGITAL TECHNIQUES, 180
DIGITAL TELEVISION, 90, 263
DIMENSIONAL MEASUREMENT, 99
DIMERS, 241
DIRECT NUMERICAL SIMULATION, 89
DIRECTORIES, 100
DISASTERS, 116
DISEASES, 37, 178
DISPLAY DEVICES, 208
DISTANCE MEASURING EQUIPMENT, 266
DISTRIBUTED MEMORY, 9
DISTRIBUTED PROCESSING, 222
DISTURBANCES, 20
DIURNAL VARIATIONS, 132
DIVING (UNDERWATER), 35
DOMAINS, 220, 253
DOMESTIC ENERGY, 128
DOPPLER RADAR, 126
DRILLING, 65, 69
DRONE AIRCRAFT, 5
DRUGS, 176, 188
DUCTILITY, 105
DUCTS, 62, 85
DUNES, 110
DURABILITY, 59
DYES, 48
DYNAMIC CHARACTERISTICS, 47, 209
DYNAMIC TESTS, 68
DYNAMICAL SYSTEMS, 211

E

EARTH IONOSPHERE, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165
EARTH MAGNETOSPHERE, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165
EARTH OBSERVATIONS (FROM SPACE), 122
EARTH SURFACE, 115, 135
EARTHQUAKES, 135
ECOLOGY, 105
ECONOMIC FACTORS, 128
ECONOMIC IMPACT, 130
ECOSYSTEMS, 115
EDITING ROUTINES (COMPUTERS), 222
EDUCATION, 10, 16, 17, 85, 205, 214, 226, 231, 252, 253, 256, 257, 258
ELASTIC PROPERTIES, 49, 238
ELASTOMERS, 48, 65
ELECTRIC BATTERIES, 224
ELECTRIC FIELDS, 245
ELECTRIC POWER, 78, 250
ELECTRICAL ENGINEERING, 78, 85
ELECTRICAL PROPERTIES, 39
ELECTRICAL RESISTIVITY, 46
ELECTROACTIVE POLYMERS, 50
ELECTRODES, 35
ELECTROFORMING, 223
ELECTROLYSIS, 80
ELECTROLYTES, 35
ELECTROMAGNETIC INTERFERENCE, 7, 84
ELECTROMECHANICS, 84
ELECTRON BEAMS, 46, 61, 93, 237, 242
ELECTRON DENSITY (CONCENTRATION), 247
ELECTRON ENERGY, 247
ELECTRON MICROSCOPES, 37
ELECTRON MICROSCOPY, 37
ELECTRON PLASMA, 245, 250
ELECTRON PROBES, 243
ELECTRON SPECTROSCOPY, 46, 237
ELECTRONIC COUNTERMEASURES, 73
ELECTRONIC EQUIPMENT, 84
ELECTRONS, 237
ELECTROSTATIC PROBES, 247
EMERGENCIES, 203, 207
EMISSION, 131
ENDEAVOUR (ORBITER), 13
ENDOTOXINS, 193
ENDURANCE, 197
ENERGY ABSORPTION, 23
ENERGY CONSERVATION, 128, 129
ENERGY DISSIPATION, 27, 119
ENERGY LEVELS, 128
ENERGY STORAGE, 238
ENERGY TRANSFER, 27, 37
ENGINE PARTS, 53, 54
ENGINEERING MANAGEMENT, 3
ENVIRONMENT EFFECTS, 24, 26, 63, 132
ENVIRONMENT PROTECTION, 50, 55, 61, 130, 133
ENVIRONMENTAL MONITORING, 133, 134
ENVIRONMENTAL SURVEYS, 8
ENZYME ACTIVITY, 186
ENZYMES, 177, 189
EOSINOPHILS, 183
EPIDEMIOLOGY, 178
EPITAXY, 29, 249
EPITHELIUM, 181, 190
EQUILIBRIUM FLOW, 1
EQUIVALENCE, 220
EROSION, 118, 120
ERRORS, 71
ESCHERICHIA, 183
ESTIMATES, 209
ESTIMATING, 114, 169
ESTROGENS, 173, 176, 177, 192
ESTUARIES, 109
ETCHING, 80
ETHYL ALCOHOL, 24
ETHYL COMPOUNDS, 60
EUROPE, 124
EVACUATING (TRANSPORTATION), 206, 207
EVALUATION, 128, 130, 131, 213
EVAPORATION, 61
EXCLUSION, 253
EXHAUST EMISSION, 132
EXPERIMENT DESIGN, 7, 12, 35
EXPERIMENTATION, 268
EXPERT SYSTEMS, 103, 229
EXPLOITATION, 127
EXPLOSIONS, 199
EXPLOSIVES, 35
EXPOSURE, 24, 63, 180, 189, 194, 199
EXTERNAL TANKS, 15, 61, 98
EXTINCTION, 67
EXTINGUISHING, 56, 97

EXTRATERRESTRIAL ENVIRONMENTS, 179
EXTRATERRESTRIAL RADIATION, 270
EXTRAVEHICULAR ACTIVITY, 13, 14, 15, 16, 17
EXTRUDING, 23, 247

F

FABRICATION, 21, 23, 30, 32, 33, 42, 53, 68, 70, 78, 82, 97, 214
FACE (ANATOMY), 227
FAILURE, 103, 104
FAILURE ANALYSIS, 97
FAILURE MODES, 83
FAST FOURIER TRANSFORMATIONS, 72
FASTENERS, 102
FATIGUE (MATERIALS), 7
FATIGUE TESTS, 52, 53
FAULT DETECTION, 60
FEEDBACK CONTROL, 227
FEEDFORWARD CONTROL, 231
FEMALES, 183, 184, 215
FERROELECTRIC MATERIALS, 82
FERROELECTRICITY, 41, 92
FETUSES, 66
FIBER COMPOSITES, 29, 32, 54, 189
FIBROBLASTS, 175
FIELD EFFECT TRANSISTORS, 78
FIELD TESTS, 68
FIGHTER AIRCRAFT, 6
FILLERS, 98
FILTRATION, 70
FINANCIAL MANAGEMENT, 204, 264
FINENESS, 27
FINITE ELEMENT METHOD, 5, 103, 104, 202, 239
FINITE VOLUME METHOD, 30
FIRE FIGHTING, 56, 68, 97
FIRE PREVENTION, 68
FIRES, 24, 119
FLAME SPRAYING, 94
FLAMMABILITY, 34, 43
FLAT PANEL DISPLAYS, 79
FLIGHT CHARACTERISTICS, 89
FLIGHT CREWS, 196
FLIGHT MECHANICS, 6
FLIGHT OPERATIONS, 8
FLIGHT SIMULATORS, 9
FLOW CHARACTERISTICS, 8
FLOW DISTRIBUTION, 8, 97
FLOW VISUALIZATION, 8
FLUID DYNAMICS, 8
FLUID FLOW, 116
FLUORINATION, 38
FLUORO COMPOUNDS, 27
FLUOROCARBONS, 26, 38, 55, 247
FLUTTER, 2, 103
FLUX (RATE), 167
FOAMS, 23, 55, 57, 61, 68
FOCAL PLANE DEVICES, 82, 92
FOG, 170
FORECASTING, 106
FOREIGN POLICY, 228, 254
FOSSILS, 106
FOURIER TRANSFORMATION, 92, 93, 244
FRACTALS, 118
FRACTURE STRENGTH, 32
FRACTURES (MATERIALS), 102, 135
FRACTURING, 29, 105, 239
FRAGMENTS, 200
FREE ELECTRON LASERS, 93, 94
FREE ENERGY, 184, 211, 233
FREE FLIGHT, 6
FRICTION WELDING, 97, 98
FUEL CELL POWER PLANTS, 128, 129
FUEL CELLS, 128, 129
FUNCTIONAL ANALYSIS, 190
FUNCTIONAL DESIGN SPECIFICATIONS, 208
FUSION WELDING, 98

G

GALACTIC CLUSTERS, 268
GALAXIES, 266, 267, 268
GALERKIN METHOD, 89, 239
GALLIUM ARSENIDES, 78, 243
GALLIUM NITRIDES, 78, 250
GAMMA RAY BURSTS, 266
GAS ANALYSIS, 22, 242
GAS CHROMATOGRAPHY, 38, 47
GAS HEATING, 88
GAS MIXTURES, 36
GAS PRESSURE, 267
GAS RECOVERY, 65
GAS TURBINE ENGINES, 54
GAS TURBINES, 7
GASES, 36
GATES (CIRCUITS), 252
GEARS, 96, 99
GENE EXPRESSION, 172, 173, 174, 179
GENES, 184, 185, 190, 191
GENETIC ALGORITHMS, 130
GENETIC ENGINEERING, 176, 191
GENETICS, 176, 178, 182
GEOLOGICAL FAULTS, 116
GEOLOGICAL SURVEYS, 107
GEOMAGNETIC TAIL, 161
GEOMETRY, 232
GEOPHYSICS, 116, 166
GEOTECHNICAL FABRICS, 27
GERMINATION, 178
GET AWAY SPECIALS (STS), 20
GLASS FIBER REINFORCED PLASTICS, 83
GLOBAL POSITIONING SYSTEM, 112
GLOBULAR CLUSTERS, 267
GLYCOLS, 24
GOGGLES, 209
GOLD, 89
GRAIN BOUNDARIES, 40
GRAPHICAL USER INTERFACE, 259
GRAPHITE-EPOXY COMPOSITES, 29
GRAVITATIONAL EFFECTS, 200
GRAVITATIONAL WAVES, 166
GREASES, 60
GREEN'S FUNCTIONS, 270
GREENHOUSE EFFECT, 166
GROUND WATER, 116, 130, 246
GROUP DYNAMICS, 201
GROWTH, 183
GULF OF MEXICO, 65
GYROSCOPES, 91

H

H ALPHA LINE, 242
H II REGIONS, 267
HADRONS, 243
HALL EFFECT, 252
HALOGEN COMPOUNDS, 27
HALON, 56
HAMILTON-JACOBI EQUATION, 239
HAMILTONIAN FUNCTIONS, 252
HANDBOOKS, 207
HARMONIC GENERATIONS, 93
HAZARDOUS WASTES, 24, 70
HAZARDS, 66
HEALTH, 24, 187, 195, 196, 197, 203, 204, 205, 206
HEARING, 73
HEAT, 80
HEAT MEASUREMENT, 47
HEAT TOLERANCE, 193, 202
HEAT TRANSFER, 208
HEAT TRANSMISSION, 88
HEAVY IONS, 80, 270
HEAVY WATER, 80
HELIOSPHERE, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154,

155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165
HELIUM ATOMS, 241
HELMET MOUNTED DISPLAYS, 4
HELMETS, 202
HETEROJUNCTION DEVICES, 78
HETEROJUNCTIONS, 84
HIERARCHIES, 75, 260
HIGH ALTITUDE, 269, 270
HIGH GAIN, 93
HIGH PRESSURE, 2
HIGH RESOLUTION, 120, 125, 182
HIGH REYNOLDS NUMBER, 2
HIGH STRENGTH STEELS, 43
HIGH TEMPERATURE, 23
HIGH TEMPERATURE ENVIRONMENTS, 49
HIGH TEMPERATURE PLASMAS, 127
HIGH TEMPERATURE TESTS, 95
HISTOLOGY, 130
HISTORIES, 112
HOLES (ELECTRON DEFICIENCIES), 243, 245
HOLOGRAPHY, 46, 91
HONEYCOMB CORES, 30
HONEYCOMB STRUCTURES, 42
HUBBLE SPACE TELESCOPE, 269
HUMAN FACTORS ENGINEERING, 207, 208
HUMAN PERFORMANCE, 195, 221
HUMAN-COMPUTER INTERFACE, 252, 259
HYDRAULIC FLUIDS, 48
HYDRAULIC JETS, 52
HYDROCARBONS, 39
HYDRODYNAMICS, 85, 172
HYDROGEN EMBRITTLEMENT, 53
HYDROGEN FUELS, 129
HYDROGEN IONS, 36
HYDROGEN PEROXIDE, 40
HYDROGEOLOGY, 109, 116
HYDROGRAPHY, 116
HYDROLOGICAL CYCLE, 107
HYDROLOGY, 107, 118, 127
HYDROSTATIC PRESSURE, 97
HYDROSTATICS, 167
HYPERBOLIC SYSTEMS, 211
HYPERSONIC FLOW, 1
HYPERSONIC VEHICLES, 19
HYPERVELOCITY PROJECTILES, 265
HYPOBARIC ATMOSPHERES, 194

I

ICE, 107
ICE FORMATION, 4
IDENTIFYING, 40
ILLUSIONS, 199
IMAGE ANALYSIS, 110, 111, 113, 120, 121, 122, 124, 125
IMAGE CLASSIFICATION, 113, 117, 120, 124, 211
IMAGE ENHANCEMENT, 121
IMAGE PROCESSING, 5, 108, 109, 113, 117, 120, 121, 181, 216, 230, 260
IMAGE RECONSTRUCTION, 2
IMAGE RESOLUTION, 216
IMAGERY, 169, 218
IMAGING RADAR, 20
IMAGING SPECTROMETERS, 20
IMAGING TECHNIQUES, 2, 20, 91, 92, 108, 111, 113, 118, 121, 122, 125, 171, 173, 182, 192, 231, 242, 243, 244, 245, 262, 266
IMPACT LOADS, 197
IMPACT TESTS, 5
IMPACT VELOCITY, 265
IMPEDANCE, 82
IMPROVEMENT, 195
IMPURITIES, 40
IN VIVO METHODS AND TESTS, 242
INCLUSIONS, 43
INCOMPRESSIBLE BOUNDARY LAYER, 210
INDEXES (DOCUMENTATION), 201, 260
INDIUM ALUMINUM ARSENIDES, 92
INDIUM GALLIUM ARSENIDES, 92
INDIUM PHOSPHIDES, 42
INDUCTORS, 78
INDUSTRIAL PLANTS, 242
INDUSTRIAL WASTES, 239
INDUSTRIES, 253
INERT ATMOSPHERE, 38
INERTIAL CONFINEMENT FUSION, 248
INFECTIOUS DISEASES, 178
INFLATABLE SPACE STRUCTURES, 20
INFLATABLE STRUCTURES, 20
INFORMATION, 201
INFORMATION DISSEMINATION, 228, 260
INFORMATION MANAGEMENT, 196, 213, 254, 260, 263, 265
INFORMATION RETRIEVAL, 216, 259, 260
INFORMATION SYSTEMS, 10, 71, 99, 107, 213, 223, 225, 229, 252, 259, 261, 262
INFORMATION THEORY, 252
INFRARED DETECTORS, 81, 82, 91, 230
INFRARED IMAGERY, 91, 245
INFRARED INSPECTION, 31
INFRARED INSTRUMENTS, 245
INFRARED RADIATION, 80, 92, 95
INFRARED SPECTROSCOPY, 244
INSTALLING, 15
INSULATION, 50, 55
INSULATORS, 78
INTEGRATED CIRCUITS, 77, 216
INTELLECTUAL PROPERTY, 263
INTERFACES, 251
INTERLAMINAR STRESS, 28
INTERMOLECULAR FORCES, 170
INTERNATIONAL COOPERATION, 203, 206
INTERNATIONAL RELATIONS, 128
INTERNATIONAL SPACE STATION, 13, 14, 15, 16, 17, 18
INTERNATIONAL TRADE, 254
INTERNETS, 224, 226, 255, 260, 264
INTERPLANETARY SPACE, 179
INTERPOLATION, 86
INTERPROCESSOR COMMUNICATION, 75
INTRUSION, 223
INVARIANCE, 220
INVESTMENT CASTING, 71, 101
IODINE COMPOUNDS, 55
ION IMPLANTATION, 84
ION PLATING, 51
ISOLATION, 67, 75
ISOTROPISM, 104

J

JAVA (PROGRAMMING LANGUAGE), 222
JET ENGINE FUELS, 66
JOINTS (JUNCTIONS), 31, 33
JOSEPHSON JUNCTIONS, 83
JP-8 JET FUEL, 66

K

KAONS, 240
KEROSENE, 67
KETONES, 63
KINEMATICS, 97
KINETICS, 67
KNOWLEDGE BASED SYSTEMS, 234
KNOWLEDGE REPRESENTATION, 234
KNUDSEN FLOW, 85
KOLMOGOROV THEORY, 2

L

LABORATORIES, 100, 126, 256, 257, 258
LABORATORY EQUIPMENT, 38
LAGRANGIAN FUNCTION, 166
LAKE ICE, 106
LAMB WAVES, 100
LAMINAR FLOW, 88
LAND USE, 122
LANGUAGES, 220
LARGE SPACE STRUCTURES, 20
LASER APPLICATIONS, 45, 94, 101
LASER BEAMS, 93, 94
LASER INTERFEROMETRY, 94
LASER RANGE FINDERS, 93, 94
LAUNCH COSTS, 13
LAUNCH VEHICLES, 12
LAUNCHERS, 265
LAW (JURISPRUDENCE), 229
LEAKAGE, 15, 20
LECTURES, 214
LENNARD-JONES POTENTIAL, 170
LEVITATION, 44
LIBRARIES, 257
LICENSING, 100
LIFE (DURABILITY), 32, 99
LIFE SCIENCES, 223
LIGANDS, 25, 192
LIGHT ALLOYS, 98
LIGHT EMITTING DIODES, 248
LIGHT IONS, 270
LIGHT MODULATION, 245
LINE SPECTRA, 241
LINEAR ARRAYS, 76
LINEAR SYSTEMS, 82, 212
LINEARITY, 210
LINES, 241
LIQUID METALS, 44
LIQUID PHASE EPITAXY, 249
LITHIUM NIOBATES, 248
LITHOGRAPHY, 30, 101
LOADING OPERATIONS, 16
LOADS (FORCES), 97, 98, 197
LONG DURATION SPACE FLIGHT, 208
LONG WAVE RADIATION, 132
LOSSES, 119
LOW COST, 23, 212
LOW PRESSURE, 169
LOW REYNOLDS NUMBER, 85
LUBRICANTS, 96
LUBRICATION SYSTEMS, 96
LUMINESCENCE, 42, 86
LUMINOSITY, 243, 266, 267
LUNGS, 199
LYRA CONSTELLATION, 267

M

MACHINE LEARNING, 211, 218
MAGELLANIC CLOUDS, 266
MAGNESIUM ALLOYS, 41
MAGNETIC FIELD CONFIGURATIONS, 269
MAGNETIC FIELDS, 84
MAGNETIC MATERIALS, 237
MAGNETIC PROPERTIES, 237, 248
MAGNETIC RESONANCE, 182, 242
MAGNETOHYDRODYNAMIC GENERATORS, 7
MAGNETOHYDRODYNAMIC TURBULENCE, 269
MAGNONS, 237
MAINTENANCE, 45, 207
MALFUNCTIONS, 90
MALI, 126
MAMMARY GLANDS, 172, 173, 174, 175, 176, 177, 181, 183, 184, 186, 187, 190, 191, 192, 194, 242, 255
MANAGEMENT SYSTEMS, 195, 203, 204, 205
MANIPULATORS, 227
MANUALS, 218
MANUFACTURING, 31, 32, 53, 62, 69, 93, 99, 101, 221, 257
MAPPING, 111, 114, 120, 123, 125
MARINE ENVIRONMENTS, 132, 171
MARINE METEOROLOGY, 168, 170
MASS DISTRIBUTION, 107
MASS SPECTROMETERS, 37, 39
MASS SPECTROSCOPY, 47
MASS TRANSFER, 87
MASSIFS, 122
MATCHED FILTERS, 73
MATERIALS, 70
MATERIALS SCIENCE, 242
MATERIALS TESTS, 33
MATHEMATICAL MODELS, 1, 13, 20, 41, 75, 86, 119, 131, 132, 168, 210, 217, 239, 269
MATRIX MATERIALS, 34, 54
MEASURE AND INTEGRATION, 216
MEASURING INSTRUMENTS, 99, 107, 171, 242
MECHANICAL DRIVES, 96
MECHANICAL PROPERTIES, 31, 33, 34, 41, 43, 44, 45, 46, 53, 55, 58, 64, 90, 249
MECHANIZATION, 219
MEDICAL EQUIPMENT, 227
MEDICAL PERSONNEL, 205
MEDICAL SCIENCE, 206
MEDICAL SERVICES, 180, 195, 196, 203, 204, 205, 206, 207, 228
MEMBRANES, 185, 243
MEMORY (COMPUTERS), 213
MERCURY CADMIUM TELLURIDES, 81, 82
MESOMETEOROLOGY, 170
MESOSCALE PHENOMENA, 167, 170
METABOLISM, 197
METABOLITES, 197
METAL COATINGS, 51
METAL FOAMS, 48
METAL IONS, 25
METAL MATRIX COMPOSITES, 33
METAL OXIDES, 36
METAL SURFACES, 96
METALLIC GLASSES, 44
METALLIC STARS, 267
METALLICITY, 267
METEOROLOGICAL INSTRUMENTS, 20
METEOROLOGICAL SATELLITES, 20, 168
METHODOLOGY, 217
METHYL CHLORIDE, 51
METHYL COMPOUNDS, 63, 185, 268
METROLOGY, 237, 245
MICROANALYSIS, 29
MICROCOMPUTERS, 263
MICROCRACKS, 21
MICROELECTROMECHANICAL SYSTEMS, 81
MICROELECTRONICS, 79, 83, 247, 257
MICROGRAVITY, 67, 75, 200
MICROORGANISMS, 189
MICROSCOPY, 242
MICROSTRUCTURE, 43, 45, 46, 249
MICROWAVE EQUIPMENT, 95
MICROWAVES, 85
MIDDLE EAST, 134
MILITARY AIR FACILITIES, 24, 128
MILITARY AIRCRAFT, 51
MILITARY HELICOPTERS, 254
MILITARY OPERATIONS, 203, 204, 234, 261
MILITARY TECHNOLOGY, 193, 225, 254
MINERALOGY, 46
MINIATURIZATION, 93, 250
MIR SPACE STATION, 10
MIRRORS, 243, 244
MIST, 97
MIXTURES, 26, 100
MOBILITY, 28
MODELS, 19, 90, 99, 221

MOISTURE, 123
MOISTURE CONTENT, 114, 122, 127, 178
MOLECULAR DYNAMICS, 89, 90
MOLECULAR STRUCTURE, 24
MOLECULAR WEIGHT, 64
MOLECULES, 24, 27
MOMENTUM, 167
MONITORS, 195, 197
MONTE CARLO METHOD, 24, 219
MOON, 269
MOROCCO, 108, 109, 110
MORPHOLOGY, 46, 90, 223, 249
MOUNTAINS, 121, 167
MUD, 131
MULTILAYER INSULATION, 30
MULTIMEDIA, 76, 231, 263
MULTIPATH TRANSMISSION, 75
MULTIPLEXING, 71
MULTIPLIERS, 76
MULTISENSOR FUSION, 108, 116, 172, 216, 224
MULTISTATIC RADAR, 76
MUONS, 240
MUSCLES, 50
MUSCULOSKELETAL SYSTEM, 239
MUTATIONS, 36, 174, 176, 191, 215

N

NANOCOMPOSITES, 48
NANOSATELLITES, 161
NANOSTRUCTURES (DEVICES), 29, 42
NANOTECHNOLOGY, 42, 89, 187, 250
NANOTUBES, 90
NASA PROGRAMS, 10, 22
NATURAL GAS, 128, 129
NATURAL GAS EXPLORATION, 65, 66
NAVIER-STOKES EQUATION, 88, 89
NAVIGATION, 208
NEBULAE, 266
NETWORK ANALYSIS, 216, 224
NETWORKS, 231
NEURAL NETS, 137, 227, 228, 230, 231
NEUROLOGY, 193
NEURONS, 182, 228
NEUROPHYSIOLOGY, 201
NEUTRINOS, 242
NEUTRON SCATTERING, 240
NEUTRONS, 237
NICKEL, 241
NIGHT VISION, 80, 208, 209
NITRATES, 190
NITRITES, 190
NITROGEN, 46, 251
NITROGEN DIOXIDE, 131
NITROGEN OXIDES, 131
NOISE PROPAGATION, 238
NOISE SPECTRA, 3
NONDESTRUCTIVE TESTS, 20, 31, 32, 101
NONEQUILIBRIUM IONIZATION, 7
NONLINEAR SYSTEMS, 185
NORTH AMERICA, 112
NORTH ATLANTIC TREATY ORGANIZATION (NATO), 203
NOZZLE DESIGN, 21
NOZZLE WALLS, 20
NUCLEATION, 268
NUMERICAL ANALYSIS, 12, 77, 87, 99, 233
NUMERICAL WEATHER FORECASTING, 169

O

OBJECT-ORIENTED PROGRAMMING, 217, 220, 222
OBSERVATION, 106
OCEAN CURRENTS, 126
OCEAN SURFACE, 171
OCEANOGRAPHY, 123, 172
OHIO, 107
OIL FIELDS, 66
OILS, 65
OPERATING SYSTEMS (COMPUTERS), 226
OPERATIONS RESEARCH, 234
OPTICAL CORRELATORS, 77
OPTICAL COUNTERMEASURES, 73
OPTICAL DATA STORAGE MATERIALS, 214
OPTICAL EQUIPMENT, 214, 244
OPTICAL HETERODYNING, 92
OPTICAL MATERIALS, 80
OPTICAL MEASUREMENT, 245
OPTICAL MEASURING INSTRUMENTS, 68
OPTICAL MEMORY (DATA STORAGE), 216
OPTICAL PROPERTIES, 2, 81, 185, 250
OPTICAL RADAR, 92, 93, 126, 167
OPTIMIZATION, 74, 84, 218
OPTOELECTRONIC DEVICES, 78
ORBITAL RENDEZVOUS, 13, 14
ORGANIC COMPOUNDS, 233
ORGANIC PHOSPHORUS COMPOUNDS, 36
ORGANIZATIONS, 100, 255, 256, 263
OSCILLATORS, 82
OSTEOPOROSIS, 239
OUTLETS, 238
OXIDATION, 45, 189, 247
OXIDATION RESISTANCE, 46
OXYGEN, 43
OXYGEN IONS, 270

P

PAINT REMOVAL, 51, 52, 53
PALLADIUM, 130
PANELS, 30
PARALLEL PROCESSING (COMPUTERS), 210, 213
PARALLEL PROGRAMMING, 213
PARASITIC DISEASES, 188
PARKINSON DISEASE, 182
PARTICLE ACCELERATORS, 237
PARTICULATES, 22, 133, 134
PASSIVITY, 251
PATHOGENESIS, 192
PATHOGENS, 200
PATHOLOGY, 174
PATTERN RECOGNITION, 77, 227, 228, 231
PERFORMANCE PREDICTION, 208
PERFORMANCE TESTS, 23, 43, 51, 52, 53, 55, 63, 95, 105, 208, 213, 221, 247
PERMANGANATES, 189
PEROVSKITES, 82
PERSONAL COMPUTERS, 212, 213
PERSONNEL DEVELOPMENT, 205
PERTURBATION, 236
PHARMACOLOGY, 194, 197
PHASE DETECTORS, 72
PHASE MODULATION, 72
PHASE TRANSFORMATIONS, 41, 267
PHASED ARRAYS, 85
PHENOLS, 186
PHOSPHORUS, 176
PHOSPHORYLATION, 186
PHOTODIODES, 81
PHOTOELECTRICITY, 42
PHOTOEXCITATION, 250
PHOTOLUMINESCENCE, 42
PHOTOMETERS, 92
PHOTONICS, 250
PHOTONS, 86
PHOTORECEPTORS, 185
PHYSICAL EXAMINATIONS, 184
PHYSICAL EXERCISE, 194
PHYSIOLOGICAL EFFECTS, 200
PHYSIOLOGICAL RESPONSES, 198, 208
PHYSIOLOGY, 193, 196, 209
PIEZOELECTRICITY, 238

PILOT PERFORMANCE, 9, 196
PILOTLESS AIRCRAFT, 5, 235
PINS, 98
PIPES (TUBES), 88
PITUITARY GLAND, 198
PITUITARY HORMONES, 198
PIVOTS, 212
PLANE WAVES, 238
PLANNING, 234, 253
PLANT STRESS, 114
PLASMA CHEMISTRY, 246
PLASMA COMPRESSION, 248
PLASMA CONTROL, 12, 246, 248
PLASMA HEATING, 245, 246
PLASMA JETS, 36
PLASMA PHYSICS, 246
PLASMA SPRAYING, 247
PLASMAS (PHYSICS), 246
PLASTIC DEFORMATION, 42
PLATEAUS, 134
PLATING, 51, 94
PLAYAS, 136
PLUMES, 22, 90
POLAR CAPS, 270
POLAR/GGS SPACECRAFT, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165
POLARIMETRY, 127, 245
POLARIZED LIGHT, 245
POLICIES, 73, 204, 225, 256
POLLUTION CONTROL, 25, 70, 129, 130, 131, 133, 134, 246
POLYCARBONATES, 64
POLYCRYSTALS, 41
POLYETHYLENES, 47
POLYMER BLENDS, 47
POLYMER CHEMISTRY, 54
POLYMER MATRIX COMPOSITES, 28, 59, 61, 62, 63
POLYMERIZATION, 46, 64
POLYMERS, 46
POLYPEPTIDES, 181
POLYURETHANE RESINS, 65
POROSITY, 48, 57
POROUS MATERIALS, 57
POROUS PLATES, 41
POSITION (LOCATION), 236
POSTFLIGHT ANALYSIS, 10
POTABLE WATER, 37
POTASSIUM, 189
POTENTIAL ENERGY, 170
POTENTIAL FIELDS, 217
POTENTIAL FLOW, 86
POWDER METALLURGY, 42
POWER SPECTRA, 3
POWER SUPPLIES, 129
PRECISION, 120
PREDICTION ANALYSIS TECHNIQUES, 105, 170
PREDICTIONS, 167
PREDICTOR-CORRECTOR METHODS, 12
PREGNANCY, 66
PREPARATION, 204
PRESERVATIVES, 48
PRESSURE BREATHING, 199
PRESSURE EFFECTS, 41
PRESSURE VESSELS, 97
PRETREATMENT, 22
PREVENTION, 196
PRIMERS (COATINGS), 22
PRINTED CIRCUITS, 83
PRIORITIES, 126, 204
PROBABILITY THEORY, 233, 263
PROBLEM SOLVING, 215, 217
PROCESS CONTROL (INDUSTRY), 70
PRODUCT DEVELOPMENT, 222, 230
PRODUCTION, 65
PRODUCTION ENGINEERING, 80
PROGNOSIS, 174, 197
PROGRAM VERIFICATION (COMPUTERS), 219
PROGRAMMING ENVIRONMENTS, 218
PROGRAMMING LANGUAGES, 219, 220
PROJECT MANAGEMENT, 133
PROJECT PLANNING, 22
PROPELLANT TANKS, 21, 33
PROPELLANTS, 57
PROPULSION, 7, 21, 22, 257
PROPULSION SYSTEM CONFIGURATIONS, 21
PROPYLENE, 24
PROSTATE GLAND, 179, 182, 185, 188
PROTEASE, 178
PROTECTION, 117, 196, 200, 218
PROTECTIVE CLOTHING, 208
PROTECTIVE COATINGS, 25, 46, 50, 51, 94
PROTEINS, 174, 176, 179, 184, 185, 186, 187, 189, 191, 193, 194, 198, 200
PROTOBIOLOGY, 189
PROTOCOL (COMPUTERS), 75, 106, 224, 256
PROTON IRRADIATION, 79
PROTOTYPES, 33, 69, 217, 221
PROVING, 59, 60, 219
PSEUDOMONAS, 200
PSYCHOLOGY, 193
PSYCHOPHYSIOLOGY, 209
PUBLIC HEALTH, 37, 195, 204, 206, 207
PUBLIC LAW, 57
PULSE DETONATION ENGINES, 21
PULSED PLASMA THRUSTERS, 7, 12
PYRAMIDS, 97

Q

QUADRATURE AMPLITUDE MODULATION, 75
QUADRUPOLES, 242
QUALITATIVE ANALYSIS, 224
QUALITY, 216
QUALITY CONTROL, 60, 100, 101, 102, 222
QUANTITATIVE ANALYSIS, 39
QUANTUM CHROMODYNAMICS, 241
QUANTUM ELECTRODYNAMICS, 252
QUANTUM MECHANICS, 211, 252
QUANTUM WELLS, 92
QUARTZ CRYSTALS, 79
QUERY LANGUAGES, 256
QUINOXALINES, 25

R

RADAR DATA, 76
RADAR DETECTION, 94, 112
RADAR IMAGERY, 111, 112, 122, 127
RADAR TARGETS, 93, 94
RADAR TRACKING, 94
RADIATION, 132
RADIATION PROTECTION, 270
RADIATION THERAPY, 175
RADIATIVE HEAT TRANSFER, 30, 48
RADIATIVE TRANSFER, 167, 169
RADICALS, 211, 269
RADIO ALTIMETERS, 221
RADIO COMMUNICATION, 75
RADIO FREQUENCIES, 75, 81, 240
RADIOACTIVE ISOTOPES, 175
RADIOGRAPHY, 181, 262
RADIOLOGY, 228
RADIOMETRIC CORRECTION, 121
RADIOTELEPHONES, 74
RAIN, 117
RAIN FORESTS, 114
RANDOM VARIABLES, 233
RANDOM WALK, 87
RANGEFINDING, 171
RARE EARTH ELEMENTS, 46
RATS, 130
RAYLEIGH WAVES, 134

REACTION KINETICS, 37, 67, 184
READING, 214
REAL TIME OPERATION, 10, 76, 90, 94, 181, 230, 243
RECEPTORS (PHYSIOLOGY), 173, 176, 185, 192
RECYCLING, 64
REENTRY EFFECTS, 30
REENTRY VEHICLES, 5
REFLECTANCE, 76, 135
REFRACTORY MATERIALS, 28, 95
REFRIGERANTS, 55
REGENERATION (PHYSIOLOGY), 177
REINFORCED PLASTICS, 130
REINFORCEMENT (PSYCHOLOGY), 218
REINFORCING FIBERS, 32, 54
RELIABILITY ANALYSIS, 222, 263
REMOTE SENSING, 107, 108, 109, 110, 111, 112, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 211, 244
REMOTE SENSORS, 20
REMOVAL, 56
REPLACING, 60
REPORTS, 265
REPRODUCTION, 66
REQUIREMENTS, 70, 121, 203, 204
RESCUE OPERATIONS, 207
RESEARCH, 10, 201
RESEARCH AND DEVELOPMENT, 69, 256, 257, 258
RESEARCH FACILITIES, 193
RESERVES, 66
RESERVOIRS, 27, 106, 135
RESIDENTIAL AREAS, 111
RESIDUAL STRESS, 104
RESIDUES, 120
RESIN TRANSFER MOLDING, 64
RESONATORS, 79
RESOURCE ALLOCATION, 66, 74, 204, 228, 234
RESOURCES, 65
RESPIRATION, 180
RETRACTABLE EQUIPMENT, 98
REUSABLE LAUNCH VEHICLES, 11, 31, 32, 33, 53
RIBONUCLEIC ACIDS, 179
RISK, 24, 63, 187
ROADS, 111
ROBOT ARMS, 13, 14
ROBOTICS, 50, 229
ROBOTS, 230
ROCKET ENGINES, 62
ROTARY WING AIRCRAFT, 2, 202
ROTATION, 199
ROUTES, 232
RUNGE-KUTTA METHOD, 88
RUNWAYS, 5
RURAL AREAS, 111, 115, 117
RURAL LAND USE, 110, 115, 117

S

SADDLE POINTS, 211
SAFETY, 57
SAHARA DESERT (AFRICA), 110
SALT BATHS, 52
SAMPLING, 39
SANDS, 110, 180
SATELLITE COMMUNICATION, 19, 71, 72
SATELLITE IMAGERY, 109, 111, 112, 113, 114, 115, 116, 118, 120, 121, 122, 125, 126, 167
SATELLITE OBSERVATION, 109, 111, 112, 113, 114, 115, 116, 118, 119, 120, 121, 122, 123, 124, 125
SATELLITE-BORNE INSTRUMENTS, 168
SATELLITES, 82
SATURATION, 94
SCANNING ELECTRON MICROSCOPY, 29
SCHEDULING, 19, 232, 234
SCIENTIFIC VISUALIZATION, 10, 215
SEA ICE, 106
SEA SURFACE TEMPERATURE, 169
SEALERS, 47
SEALING, 47
SEAS, 134
SECURITY, 218
SEDIMENTS, 131, 132
SEISMIC WAVES, 135
SEISMOGRAMS, 166
SEISMOLOGY, 136, 137
SEMANTICS, 74
SEMICONDUCTOR DEVICES, 77, 79, 84, 250
SEMICONDUCTOR LASERS, 93, 95, 245
SEMICONDUCTORS (MATERIALS), 29, 80, 246, 248, 249
SENEGAL, 110
SEPARATION, 65, 240
SEQUENCING, 228
SERVICE MODULES, 221
SHALLOW WATER, 171
SHAPE MEMORY ALLOYS, 41, 227
SHAPE OPTIMIZATION, 232
SHAPES, 169
SHEAR LAYERS, 2
SHEAR STRENGTH, 28
SHEAROGRAPHY, 101
SHIPS, 112, 132
SHORELINES, 123
SIGNAL DETECTORS, 238
SIGNAL PROCESSING, 72, 73, 76, 238
SIGNAL TRANSMISSION, 136
SIGNATURE ANALYSIS, 115
SIGNATURES, 166
SILICON, 83, 84
SILICON CARBIDES, 46, 58, 63, 84, 251
SILICON DIOXIDE, 251
SILICON NITRIDES, 49
SILICONES, 25
SIMULATION, 169, 234, 242, 257
SITE SELECTION, 128, 129
SIZE (DIMENSIONS), 209
SKIN FRICTION, 210
SLIDING FRICTION, 96
SLIP FLOW, 85
SMOKE, 68
SNOW, 127
SOFTWARE DEVELOPMENT TOOLS, 218, 221
SOFTWARE ENGINEERING, 6, 10, 19, 104, 217, 218, 222, 229, 238, 264
SOIL EROSION, 131
SOIL MAPPING, 118
SOIL MOISTURE, 122
SOILS, 108, 117, 118, 233, 239
SOLAR ACTIVITY EFFECTS, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 270
SOLAR NEUTRINOS, 240
SOLAR RADIATION, 269
SOLAR TERRESTRIAL INTER-ACTIONS, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165
SOLAR WIND, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 269, 270
SOLDERS, 83
SOLID STATE, 64
SOLID SURFACES, 29
SOLUBILITY, 60
SOLVENTS, 25, 26, 27, 59, 60, 63
SORBENTS, 233
SORPTION, 233
SOUND FIELDS, 238
SOUND PROPAGATION, 238
SOUND WAVES, 136, 238

SPACE BASED RADAR, 112
SPACE SHUTTLE BOOSTERS, 39
SPACE STATION MODULES, 16, 33
SPACEBORNE EXPERIMENTS, 16, 75
SPACECRAFT CONFIGURATIONS, 161
SPACECRAFT CONSTRUCTION MATERIALS, 25, 31, 49, 99
SPACECRAFT DESIGN, 20
SPACECRAFT DOCKING, 13, 14, 18
SPACECRAFT GUIDANCE, 255
SPACECRAFT LAUNCHING, 13, 14
SPACECRAFT STRUCTURES, 71
SPACECREWS, 15, 16, 17, 18, 208
SPAIN, 108
SPATIAL DISTRIBUTION, 91
SPATIAL RESOLUTION, 108, 125
SPECKLE PATTERNS, 122
SPECTRAL METHODS, 239
SPECTRAL SIGNATURES, 113
SPECTROMETERS, 19, 240
SPECTRUM ANALYSIS, 3
SPORES, 178, 179
SPRAYED COATINGS, 51, 247
SPRAYERS, 97
SPREAD SPECTRUM TRANSMISSION, 19
STABILITY, 88, 210
STAGNATION POINT, 67
STANDARDIZATION, 203, 205, 206, 228
STANDARDS, 57, 99, 131, 206, 237, 244
STAR FORMATION, 267
STARCHES, 51
STATIC TESTS, 50
STATISTICAL ANALYSIS, 44, 75, 82, 232
STATISTICAL DISTRIBUTIONS, 102, 267
STELLAR EVOLUTION, 267
STELLAR SPECTRA, 267
STOCHASTIC PROCESSES, 184
STORAGE RINGS (PARTICLE ACCELERATORS), 240
STORMS, 170
STRAIN ENERGY METHODS, 102
STRATIFICATION, 172
STRATOSPHERE, 161
STRESS (PHYSIOLOGY), 194, 198, 208
STRESS ANALYSIS, 96, 198
STRESSES, 104
STRUCTURAL ANALYSIS, 20, 104
STRUCTURAL BASINS, 136
STRUCTURAL DESIGN, 49, 99, 189, 221
STRUCTURAL PROPERTIES (GEOLOGY), 114, 118
STUDENTS, 91, 230
SUBSTITUTES, 70
SUBSTRATES, 61, 249
SULFUR, 40
SUNLIGHT, 135
SUPERCONDUCTING FILMS, 249
SUPERCONDUCTING MAGNETS, 237
SUPERSONIC COMBUSTION RAMJET ENGINES, 7
SUPPLEMENTS, 260
SUPPRESSORS, 174, 191
SURFACE ACOUSTIC WAVE DEVICES, 249
SURFACE FINISHING, 243
SURFACE LAYERS, 89
SURFACE PROPERTIES, 36, 59, 115, 135, 167
SURFACE ROUGHNESS, 87
SURFACE TO AIR MISSILES, 235
SURFACE TREATMENT, 52, 59
SURFACE VEHICLES, 208
SURFACE WATER, 118, 132
SURFACE WAVES, 171
SURFACTANTS, 38
SURGERY, 227
SURVIVAL, 223
SWITCHES, 81
SYMMETRY, 211
SYNCHROTRON RADIATION, 41
SYNTHESIS (CHEMISTRY), 246
SYNTHETIC APERTURE RADAR, 72, 112
SYSTEM EFFECTIVENESS, 9
SYSTEMS ENGINEERING, 9, 20, 69, 72, 215, 217, 218, 221, 222
SYSTEMS HEALTH MONITORING, 6
SYSTEMS INTEGRATION, 12
SYSTEMS SIMULATION, 245

T

TAILLESS AIRCRAFT, 202
TANKS (CONTAINERS), 70
TARGET ACQUISITION, 73, 208
TARGET RECOGNITION, 93, 112
TARGET THICKNESS, 166
TARGETS, 127, 223, 248
TECHNOLOGIES, 73
TECHNOLOGY ASSESSMENT, 33, 128, 263
TECHNOLOGY TRANSFER, 256, 265
TECHNOLOGY UTILIZATION, 33, 35, 69, 71, 221
TECTONICS, 135
TELECOMMUNICATION, 73, 74, 254, 261
TELEMEDICINE, 193, 196
TEMPERATURE DEPENDENCE, 170
TEMPERATURE EFFECTS, 19, 28
TEMPERATURE MEASURING INSTRUMENTS, 127
TEMPLATES, 166
TEMPORAL DISTRIBUTION, 91
TEMPORAL LOGIC, 219
TENSILE CREEP, 49
TENSILE PROPERTIES, 52, 98
TENSILE STRENGTH, 49
TENSILE TESTS, 98
TERMINOLOGY, 260
TERMS, 260
TERRAIN ANALYSIS, 108
TEST STANDS, 85
TEXTURES, 113, 120
THEMATIC MAPPING, 120
THERAPY, 187
THERMAL ANALYSIS, 30, 47, 54
THERMAL CONDUCTIVITY, 30, 48, 55
THERMAL CONTROL COATINGS, 52
THERMAL EXPANSION, 93
THERMAL INSULATION, 61
THERMAL MAPPING, 208
THERMAL PLASMAS, 246
THERMAL PROTECTION, 31, 57, 87
THERMAL RADIATION, 37
THERMOCHEMISTRY, 36
THERMODYNAMIC PROPERTIES, 34, 36, 81
THERMODYNAMICS, 67, 89
THERMOGRAPHY, 20, 31
THESAURI, 260
THIN FILMS, 41, 82, 180, 243, 250
THIN PLATES, 104
THIN WALLS, 42, 104
THREE DIMENSIONAL MODELS, 28, 170
TIME DEPENDENCE, 232
TITANIUM, 46, 80
TITANIUM ALLOYS, 45
TOKAMAK DEVICES, 246
TOLERANCES (PHYSIOLOGY), 176
TOOLS, 234
TOPOGRAPHY, 120
TOPOLOGY, 211, 216
TOUGHNESS, 43, 54, 105
TOXIC HAZARDS, 246
TOXICITY, 25, 27, 55, 66, 130, 176, 182, 189
TRACKED VEHICLES, 136, 166, 208
TRACKING (POSITION), 255

TRAINING DEVICES, 222
TRAJECTORY ANALYSIS, 161
TRANSCENDENTAL FUNCTIONS, 232
TRANSDUCERS, 69
TRANSFER ORBITS, 11
TRANSFERRING, 192
TRANSITION FLOW, 210
TRANSITION METALS, 25
TRANSONIC FLUTTER, 2
TRANSPARENCE, 244
TRANSPORTATION, 71, 265
TRAPPED PARTICLES, 269
TREES (PLANTS), 122
TRENDS, 80, 99
TRICHLOROETHYLENE, 130, 197
TROPICAL METEOROLOGY, 132
TROPICAL REGIONS, 114, 117, 119, 132
TRUSSES, 101
TUMORS, 174, 177, 183, 184
TUNGSTEN ALLOYS, 42
TURBULENCE, 4
TURBULENCE MODELS, 3
TURBULENT FLOW, 2, 89
TWO DIMENSIONAL MODELS, 38, 166
TYPHOONS, 168

U

ULTRASONIC RADIATION, 100
ULTRASONIC TESTS, 100
ULTRASONICS, 239
UNDERWATER ACOUSTICS, 238
UNITED STATES, 100, 128
UNIVERSITY PROGRAM, 256, 257, 258
UNSTEADY FLOW, 8, 88
UNSTRUCTURED GRIDS (MATHEMATICS), 88
UPWIND SCHEMES (MATHEMATICS), 88
URANIUM, 130
URBAN DEVELOPMENT, 126
USER MANUALS (COMPUTER PROGRAMS), 226, 240

V

VACCINES, 178, 188
VACUUM, 64, 79
VALVES, 15
VAPOR DEPOSITION, 51, 249
VAPOR PHASE LUBRICATION, 96
VAPOR PHASES, 37, 67
VAPORS, 246
VARIABILITY, 105
VECTOR QUANTIZATION, 236
VEGETATION, 108, 111, 114, 120, 122
VEGETATION GROWTH, 110, 114
VELOCITY DISTRIBUTION, 171
VERTICAL MOTION SIMULATORS, 9
VERY LARGE SCALE INTEGRATION, 81
VIBRATION DAMPING, 103
VIBRATION ISOLATORS, 67, 75
VIDEO DATA, 257
VIDEO SIGNALS, 76
VIEWING, 76
VIRULENCE, 198
VISCOELASTIC DAMPING, 102
VISCOELASTICITY, 65, 104
VISIBILITY, 68
VISIBLE INFRARED SPIN SCAN RADIOMETER, 168
VISUAL OBSERVATION, 60
VOIDS, 31, 43, 267
VOLATILE ORGANIC COMPOUNDS, 56
VORTICES, 88, 123, 211
VULNERABILITY, 225, 259

W

WAFERS, 42
WAKES, 210
WALL FLOW, 89
WALL PRESSURE, 97
WALLS, 89
WARFARE, 225
WASTE MANAGEMENT, 22, 63, 70
WASTES, 120
WATER, 97, 109, 114, 116, 123, 136
WATER EROSION, 118
WATER FLOW, 123
WATER POLLUTION, 233
WATER QUALITY, 106, 107, 132
WATER RESOURCES, 106, 107, 118, 123
WATER TABLES, 116
WATER TREATMENT, 37, 106, 131
WATER VAPOR, 168, 169, 170
WATERSHEDS, 116
WAVE ATTENUATION, 135
WAVE FRONTS, 2
WAVELET ANALYSIS, 108
WAXES, 56
WEATHER FORECASTING, 167, 168, 170
WEIGHT (MASS), 133
WELD STRENGTH, 100
WELDING, 33, 45, 98, 100
WETLANDS, 109
WIND (METEOROLOGY), 168
WIND EFFECTS, 4, 68
WIND PROFILES, 170
WIND TUNNEL TESTS, 1, 4, 247
WIND TUNNELS, 2, 9
WIND/GGS SPACECRAFT, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165
WINDOWS (COMPUTER PROGRAMS), 226
WINGS, 220
WIRELESS COMMUNICATION, 75
WORKLOADS (PSYCHOPHYSIOLOGY), 4
WORKSTATIONS, 212

X

X-33 REUSABLE LAUNCH VEHICLE, 12, 21

Y

YBCO SUPERCONDUCTORS, 83, 249, 250

Z

ZINC, 25, 82
ZINC TELLURIDES, 180
ZIRCONIUM CARBIDES, 23

Personal Author Index

A

Adams, M. A., 240
Adragna, Frederic, 114
Adve, Vikram, 212
Affian, Kouadio, 116
Afonina, G., 196
Aftosmis, M. J., 2
Ahmed, Nasar U., 192
Ahringer, Julie, 184
Akono, Alain, 111
Aksay, Ilhan A., 30
Albright, T. V., 28
Alem, El Mehdi, 110
Alexandrov, I. V., 42
Allred, L. D., 50
Alonso-Herrero, Almudena, 266
Amir, Yair, 234
Amram, Olivier, 123
Ananth, Ramagopal, 40
Anderson, Ross J., 261
Anderson, Sally M., 198
Andrianlaina, Rafonomezantosoa Manuel, 117
Annavarapu, S., 248
Anovitz, L. A., 36
Ansari, F., 64
Aoki, Y., 28
Arena, Mark V., 5
Armstrong, Karyn L., 198
Armstrong, Katrina, 215
Arnold, G. S., 59
Arteaga, C. L., 181
Ashcraft, G. W., 10
Askari, Farid, 112
Assako, Joly Assako, 111
Aurelius, Lea, 23
Austin, Meg, 105
Autrey, Jon C., 262
Avellan, F., 86
Awerbuch, Baruch, 234

B

Back, Gerard G., 96
Badaro-Saliba, Nada, 123
Baker, D. L., 56
Baker, D. N., 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165
Balachandran, U., 250
Balcar, E., 237
Balcius, James A., 193
Balitsky, I., 241
Ballerini, G., 52
Balles, D., 22
Bancroft, F. C., 179
Band, D., 266
Bannari, Abderrazak, 120
Bantle, John A., 66
Bar-Cohen, Y., 49
Barbaroussi, Vasso, 125
Barber, R. W., 85
Bardi, U., 52
Barrett, Eamon, 260
Barry, James J., 208
Bartels, R. E., 3
Bartolotta, P. A., 44
Bascle, B. J., 66
Bass, D. C., 253
Bates, Kevin, 243
Baud, R. D., 65
Bauer, Bruce L., 168
Bauer, E., 37
Baum, Carl E., 236
Bauman, Richard A., 198
Bebeshko, V., 207
Becker, K. J., 82
Beech, G. S., 75
Beecroft, M., 40
Beeson, H. D., 59
Belaid, Mohamed Ait, 107
Belhadj-Aissa, Aichouche, 113, 119, 121
Belhadj-Aissa, Mostefa, 119
Bell, William F., 256
Bellan, Marie-France, 119
Belvin, H. L., 31
Bely, A., 196
Benalla, Mansour, 110
Benezeth, P., 36
Benson, K. A., 130
BenZvi, Ilan, 93
Berden, Gerald B., 256
Berezin, Sergey, 219
Bergem, Oddbjorn, 171
Berkoff, Russ H., 227
Bernard, Susan L., 199
Bernier, Monique, 119
Beshears, R., 20
Bettinger, D., 62
Beuker, Rob, 263
Beyler, Craig L., 96
Bhat, B., 250
Bhatia, A. K., 241
Bhattacharya, Kaushik, 41
Bibeau, David R., 85
Bicheron, Patrice, 123
Biegert, L. L., 58, 60
Biemi, Jean, 114, 116, 118
Bierbaum, R. L., 222
Biere, Armin, 219
Bijl, Hester, 88
Billen, Roland, 120
Billings, Marcus D., 5
Bily, V. Y., 203
Binder, Michael J., 128, 129
Binnard, Marc, 111
Birkedal, Lars, 220
Birkler, John, 5
Bisantz, Ann, 225
Blackman, Kathie, 12
Blair, J. C., 11
Blanchard, Laurie A., 197
Blanks, J. W., 60
Blasco, Francois, 119
Blaze, Matt, 261
Bleiberg, Joseph, 193
Blumer, Christian, 117
Boccippio, D. J., 170
Bogdanoff, David W., 6
Bogdanov, I., 237
Bojchack, M. P., 204
Bonacchi, D., 52
Bond, R., 43
Bongiovanni, R., 65
Bonn, Ferdinand, 108, 112, 120
Boone, John, 173
Borgstrom, R. S., 234
Bott, J. P., 229
Bouaouda, Hafida, 109
Bourcier, Alban, 109
Bourcier, Jean-Come, 109
Bower, Mark V., 97
Bowkett, J., 70, 101
Bowman, Howard L., 68
Bowman, Michael, 231
Boxill, S. A., 265
Boyan, Justin A., 232
Bradshaw, Jerald S., 25

Bragg, Michael B., 4
Bramble, Michael L., 71
Branscome, Teresa A., 4
Brasier, C. W., 92
Braunscheidel, E. P., 32
Brennan, J., 62
Brewer, D., 62
Brglez, Franc, 217
Brock, J. S., 86
Bronson, R. T., 25
Brooks, Ronald L., 220
Brostoff, William, 136
Brown, A., 55
Brown, T. D., 222
Browning, C. E., 98
Brubaker, Gaylen R., 188
Bruce, C., 53
Bruhwiler, Lori, 165
Bruzgina, T., 196
Buckley, Mike, 129
Bullock, J. S., 223
Burke, James R., 128
Burlingame, S., 20
Burns, H. L., 106
Burns, John W., 199
Burns, L., 20
Byers, Stephen, 176

C

Cabelli, C., 82
Cadarette, Bruce S., 202
Cadenas, J. J. G., 242
Cairo, R., 62
Callaghan, Michelle, 191
Caloz, Regis, 117
Calvin, Ralph, 259
Campbell, Theresa, 168
Cano, R. J., 31
Capon, Scott, 85
Capraro, Gerard T., 256
Caraccioli, P., 20
Carayon, Jean-Luc, 119
Carpenter, Mark H., 88
Carter, Ronald, 261
Casey, H. C., 248
Catelan, Marcio, 267
Caton, Howell, 221
Cattafesta, Louis N., III, 237
Celiceo, Mike, 226
Cerione, Richard A., 192
Champaud, Jacques, 126
Chandler, M. O., 269
Chandrakasan, Anantha P., 224
Chang, D. J., 28
Chang, Jen-Shih, 246
Chang, Jyh-Yeong, 227
Chang, Kuo-Chun, 102
Chang, Ta-Peng, 27
Chatelain, Cyrille, 114
Chelabi-Kemmouche, Akila, 125
Chellappa, Rama, 259
Chen, E., 37
Chen, Guan-Rong, 238
Chen, H. S., 91
Chen, I. W., 46
Chen, Jia-Lin, 227
Chen, P., 43
Chen, P. C., 3
Chen, Y.-K., 18
Chen, Yung-Sheng, 216
Cheng, Chii-Ming, 102
Cherifi, Dalila, 122
Chiang, K. T., 247
Chine, Ching-Fung, 236
Chornuk, Myron A., 199
Chowdhry, Rajiv, 12
Chung, G. Y., 251
Church, B., 42
Cipriani, R., 32
Clagg, Robert A., 222
Clancey, William J., 201
Clark, J., 42
Clark-Ingram, M., 52
Clarke, Edmund, 219
Clayton, Bill, 243
Clayton, C., 22
Cleyrat, D., 22
Clinton, R. C., Jr., 31, 53
Clinton, R. G., Jr., 22
Clurman, Bruce, 174
Cobrinik, David, 186
Cochran, J., 42
Cohen, Charles, 169
Coldren, L. A., 93
Coleman, D. J., 59
Coleman, M. L., 21
Collet, Claude, 108, 124, 125
Collins, William E., 200
Colombano, Silvano, 223
Comfort, R. H., 269
Concha, Luis, 215
Concha, Monica C., 24
Coney, William B., 166
Cong, Lianli, 134
Connes, A., 210
Conry, Susan E., 229
Constable, Robert L., 216
Cook, Bradly J., 91
Cook, Cynthia R., 5
Cook, Dayne G., 269
Cooper, James R., 66
Cooper, K., 221
Cooper, Mary F., 198
Cooper, S. P., 135
Cooper, Stuart L., 64
Corbett, F., 94
Cornalba, L., 236
Cornelis, Bernard, 120
Cosgrove, Joseph, 83
Cosnier, Serge, 187
Coss, J. R., 79
Coulibaly, Kapo, 116
Courel, Marie-Francoise, 115, 123
Covan, M. A., 90
Cowings, Patricia S., 207
Craven, P. D., 269
Crawford, T. G., 66
Cui, Hong-Liang, 79
Curro, J. G., 47
Curry, Judith, 167
Curtis, S. A., 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165

D

Dabbs, Daniel M., 30
Dai, Jing-Fu, 77
Damour, T., 166
Daniel, Wayne, 213
Danilin, M. Y., 161
Darwin, Robert L., 68
Daryabeigi, Kamran, 29, 30, 48
Das, G., 44
Dash, J., 80
Dave, Jitendra R., 198
Davidson, Ross A., 68
Davis, Donald J., 19
Davis, Mitch, 7
Davis, R. F., 37
Davis, S., 61
Day, A., 34
deFigueiredoRodrigues, Daniel Levy, 11
DeLuca, M. J., 106
Dempsey, B., 42
Dennis, J., 53
Dennis, Philip, 213
deOliveiraeSouza, Marcelo Lopes, 11
Depovere, Geert, 263
DeSimone, Joseph, 63
Desjardins, Robert, 110

DeWames, R. E., 81
Dewan, E. M., 2
Dhooge, P., 55
Dhooge, P. M., 25, 55, 56, 69
Di Iorio, Daniela, 171
Diarra, Balla, 126
DiCristina, V., 31
Diffie, Whitfield, 261
Dimotakis, Paul E., 2
DiNenno, Philip J., 96
Ding, R. J., 98
DiNocero, Francesco, 209
Dinulescu, Liviu, 115
Direnzo, James, 175
Dischinger, H. Charles, Jr., 221
DiSebastian, John D., 20
Do, Dung, 24
Doerry, A. W., 72
Donnay, Jean-Paul, 120, 124, 125
Dougherty, Richard K., 263
Douglas, V. M., 39
Dow, Stephen J., 218
Drake, C., 51
Drakes, J. A., 92
Draper, S., 44
Driks, Adam, 177
Dryden, G., 94
DuBose, David A., 193
Duff, J. S., 212
Duggin, Michael J., 245
DukesSchlossberg, Jon, 260
Dumas, John L., 170
Dumont, Nancy, 181
Duong, Ninh, 244
Duran, Henry A., 255
Durkee, J., 239

E

East, Jack R., 77
Eckel, A., 53
Eddy, N. F., 50
Edgar, James H., 249
Edom, Andreas, 87
Edwall, D., 81
Effinger, M., 32
Effinger, M. R., 53
Ejiri, H., 1
Ekbom, Anders, 255
Elam, S., 33, 53, 246
ElGarouani, Abdelkader, 118
Eliezer, D., 41
Elkouh, Nabil A., 208
Ellingson, B., 32
Elliott, H. A., 269
Ellis, D., 246
Ellsworth, David, 214
Elsayed, Nabil M., 198
Eluszkiewicz, Janusz, 165
Emerson, D. R., 85
Emmert, John M., 215
Emmitt, G. D., 126, 167
Ercetin, Askin, 234
Erdman, Peter, 19
Eric, J., 94
Eriksen, Charles, 172
Eskridge, Richard, 247
Estler, W. T., 245
Evans, C. J., 245
Evans, Frank, 167
Evans, K. B., 58

F

Fairfield, D. H., 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165
Fant, Michael A., 5
Fantini, M., 52
Fargues, M. P., 74
Farhat, M., 86
Farmer, D., 251
Fasanella, Edwin L., 5
Fellows, Jack, 234
Ferda, Leo, 92
Ferguson, Cary V., 180
Fernandez, Manuel, 130
Ferrett, Don, 208
Field, J. E., 86
Fife, D. J., 262
Finckenor, J. L., 33
Finger, Richard, 225
Fink, Brice K., 28
Firsich, D., 94
Fischer, Jonathan, 170
Fisher, Jeffrey W., 197
Flemming, J. G., 78
Flouzat, Guy, 123
Flynn, Marcy, 238, 257
Fober, Gene W., 213
Foor, Wesley E., 83
Forsyth, Graham F., 6
Fortin, Jean-Pierre, 123
Foulkes, William, 173
Fowler, Robert J., 212
Fox, M., 32, 53
Fraga, Carlos G., 38
Frame, B., 61
Frank, Jeremy, 253
Franklin, W., 32
Fraser, Andrew, 184
Frederick, Joshua, 190
Freeman, Frederick G., 209
Fritzemeier, L., 248
Fuangswasdi, Saowarux, 25
Fulco, Charles S., 194
Funabiki, K., 9
Furbert-Harris, Paulette, 183
Futscher, Bernard, 172

G

Gailani, J. Z., 131
Galaitsis, Anthony G., 166
Galbraith, Amy E., 91
Galbreath, Charles S., 11
Gamache, Robert R., 170
Gamble, Rosanne F., 216
Gao, Da-Qing, 182
Garnier, J., 58
Garrison, W. M., Jr., 43
Gastellu-Etchegorry, Jean-Philippe, 114
Gates, T. S., 58
Gatlin, Romona, 243
Gauthier, Yves, 119
Gautier, Laurent, 114
Geer, S., 242
Geise, John E., 73
Geist, Robert, 212
Gellman, Andrew J., 96
Gelmann, Edward P., 187
Genge, G., 53
Gerald, Terry, 132
Getbehead, Mark A., 83
Geyer, U., 44
Ghosh, Malavika G., 177
Ghosh, Sanjoy, 269
Giles, G. E., 223
Gillespie, J., 32
Gioan, Pierre, 116, 118
Giordano, Joseph, 224
Glass, S. M., 25, 55, 56
Gleason, E., 27
Glenny, Robb W., 199
Glumm, Monica M., 4
Gomes, Carla P., 233
Gomi, H., 4
Gonzalez, Julio A., 197
Goodburn, D. P., 218, 229
Gooden, William J., 24
Goodman, S. J., 170
Gordon, B., 62
Gossman, J. R., 222

Gostowski, R., 40
Grama, Vasile, 125
Graser, John C., 5
Graves, Christopher R., 222
Gray, B. J., 106
Gray, I. J., 223
Gray, P., 58
Greenfield, Roy, 136
Gregory, R. B., 84
Griffin, D. E., 25
Griffiths, Hugh, 76
Grimmett, D., 55
Grinevich, Oleg, 48
Grodsinsky, Carlos M., 67
Groppetti, R., 52
Grossbard, N., 2
Grubler, Andrew C., 91
Gueye, Mamadou, 109
Guigne, J. Y., 57
Guilinger, T. R., 78
Gunter, Kent, 243
Gunther, Roland, 175
Gurdal, Zafer, 78
Guthrie, J., 261

H

Haas, A. K., 82
Haboudane, Driss, 108
Hacker, Gary A., 112
Haddad, George I., 77
Hafsia, Raouf, 74
Haire, R. G., 41
Hamada, Y., 4
Hamblen, David G., 83
Hamimed, Abderrahmane, 113
Hampton, R. D., 75
Han, J., 78
Han, K. K., 28
Hancock, David W., III, 220
Hankley, W., 264
Hansen, Richard, 96
Hanssen, L. M., 243
Harik, Vasyl Michael, 89
Harper, Robert, 220
Harrington, K. J., 184
Harris, C. E., 189
Harris, S. P., 100
Harrison, H. M., 233
Harrison, W. B., 106
Hart, George A., 93
Hartman, Antoinette B., 197
Hartman, Nile F., 68
Hartmann, Robert E., 201
Harvey, N., 211
Harvey, Steven P., 36
Hasselblatt, B., 211
Hasson, V., 94
Hatzichristos, G., 74
Hauer, R. L., 32
Havoudane, Driss, 120
Hayes, L., 42
Hayne, George S., 220
Hays, C. C., 44
Hays, Robert T., 252
Head, Joe, 226
Heathman, S., 41
Heckman, S., 170
Heinbockel, John H., 270
Heinzelman, Wendi R., 224
Hemler, Richard S., 165
Henderson, A. J., Jr., 230
Henson, T. D., 244
Hess, R. A., 9
Hesselroth, D. A., 26
Hew, Patrick Chisan, 222
Hickman, R., 246
Hierl, Peter M., 37
Hildebrandt, G., 81
Hill, J. R., 34
Hill, Michael R., 105
Hill, R., 133
Hill, Roger W., 208
Hiltz, John A., 47
Hlastala, Michael P., 199
Hoffman, T., 75
Hogan, J. B., 130
Holcomb, Franklin H., 128, 129
Holland, O. W., 84
Holland, Paul M., 35
Holloway, Paul, 79
Holst, Terry, 86
Holyk, L. A., 204
Hong, Sheng-Lin, 236
Horneck, Gerda, 179
Hornick, J., 62
Hornung, S. D., 59
Hotaling, Steven P., 252
Howard, B., 262
Howe, James D., 80
Howells, W. S., 240
Hsaegawa, Yohei, 168
Huang, Liang-Hsiung, 238
Hudson, Walter B., 235
Hughes, E. R., 239
Hughes, J., 133
Hughes, Philip K., 209
Hulcher, A. B., 31
Hull, R., 94
Humphries, W. R., 11
Hunt, Teresa, 12
Hunter, George Kenneth, 19
Hurysz, K., 42
Huyse, Luc, 232
Hwa, Chua G., 75
Hwang, Wei-Shien, 238
Hwang, Wen-Jyi, 236
Hyer, C. W., 100

I

Ianelli, S., 52
Iijima, T., 9
Ila, Daryush, 242
Immel, D., 262
Imre, W., 51
Inagaki, T., 4
Iorio, L. E., 43
Isdahl, Wayne M., 200
Iyer, B. R., 166

J

Jabrane, Raouf, 118
Jacobson, Nathan S., 49
Jacqueminet, Christine, 122
Jakobsson, Asa, 85
Jamagne, Pierre, 111
Jarikov, Viktor, 48
Jarlan, Lionel, 123
Jarzynski, C., 233
Jaskowiak, M. H., 53
Jefferies, Clark, 231
Jensen, B., 61
Jensen, Kevin L., 79
Jerman, G., 39
Jertz, Walter, 203
Jezek, Kenneth C., 107
Jian, Jiun-Yin, 225
Jimenez, R., 266
Jin, Guohua, 212
Jin, L., 131
Johnson, T. N., 94
Johnson, W. L., 44
Johnston, N. J., 31
Jones, C., 98
Jones, H. N., 33
Jonsson, Ari K., 253

K

Kachurina, O., 50
Kaido, Y., 168

Kajino, Yoshiki, 168
Kalker, Ton, 231, 263
Kalkhoran, Nader M., 180
Kalnish, Valentin V., 196
Kalombo, Kamutanda, 117
Kanegsberg, B., 70
Kanegsberg, E., 70
Kant, G. Jean, 198
Kapelevich, Alexander L., 96
Kaplan, Michael L., 167
Kaplan, S. G., 243
Karshner, Gary, 90
Kasper, Martin, 203, 204
Kaul, R., 250
Kazufumi, Suzuki, 169
Keefe, Anthony, 189
Keller, Sharon S., 219
Keller, T. M., 33, 54
Kelley, Marcey, 226
Kelly, M. J., 78
Kennedy, Ken, 212
Kennedy, S. W., 92
Kercel, S. W., 100
Kerr, Yann, 114
Kerschen, T. J., 222
Key, Jeffrey R., 167
Khaldi, Abdelkader, 113
Kiessler, Peter, 231
Kigawa, Seiichiro, 20
Kikuchi, T., 1, 8
Killpack, M. O., 262
Kim, Suhwan, 76
Kim, Won-Yong, 135
Kim, Y. K., 75
King, Quinten M., 202
Kinler, C. J., 66
Kinzelbach, Wolfgang, 102
Kirkpatrick, Ronald C., 248
Kiser, J. D., 53
Kiserow, Douglas, 63
Kishiro, J., 242
Kitamura, K., 26
Klacka, B., 58
Kleb, William L., 88
Klein, Leo, 203, 204
Klein, M. B., 100
Kleinberg, Jon, 228
Klemenz, Christine, 249
Kline, Jared A., 254
Knapen, Johan H., 266
Knapp, Charles E., 247
Knezevich, D. Y., 30
Knize, Randall J., 77
Knobbe, E. T., 50
Ko, M. K. W., 161
Koch, Steven E., 167
Koenig, J., 32
Koester, C., 39
Koga, R., 79
Kohler, Keisha, 188
Koli, Bi Zueli, 110
Kolka, Margaret A., 202
Koontz, Linda D., 73
Korgager, Ernst, 127
Korzus, Edward, 191
Kouadio, Yao Bertin, 110
Kouame, Fernand Koffi, 116, 118
Kourgli, Assia, 113
Koussoube, Youssouf, 116
Kovach, M., 20
Kovach, M. P., 33
Kovacs, M., 94
Kowall, Neil W., 182
Kowbel, W., 53
Kozaitis, Samuel P., 83
Kozlowski, L. J., 82
Kozub, S., 237
Kryder, Mark H., 214
Kuech, Thomas F., 250
Kumer, J. B., 161
Kuo, C. C., 216
Kurdila, Andrew J., 237
Kurihara, S., 168
Kuzina, L., 195
Kuznetsov, G., 237

L

Lacy, Jack, 263
LaFrance, Gaetan, 119
Lagouarde, Jean-Pierre, 114
Lam, David M., 206
Lamb, H. H., 37
Landauer, M. R., 130
Landi, E., 241
Lane, Pat, 24
Lang, J., 53
Lansing, M. D., 20, 31
Lanyi, Janos F., 189
Lasm, Theophile, 118
Laubscher, Bryan E., 91
Laughlin, R. B., 184
Lavenu, Francois, 119
Lawless, K., 98
Lawrence, T., 20
Le Bihan, T., 41
Leach, William B., 68
Leavitt, R. P., 92
Lee, Gordon, 5
Lee, Howard, 12
Lee, J., 33
Lee, J. K. J., 42
Lee, Kang N., 49
Lee, Michael, 247
Lee, Sang C., 25
Legner, H. H., 31
Lehr, K., 133
Leighton, T. G., 86, 239
Leith, E. N., 91
Lemire, Kenneth R., 132
Lemsanni, Abdellah, 107
Lessard, Charles S., 199
Lester, Luke F., 95
Lethe, E., 70
Lethe, Eric, 63
LeToan, Thuy, 114
Li, C. W., 49
Li, Jian-Zhong, 245
Li, Q., 248
Li, Victor, 216
Lian, Qiming, 96
Liang, S., 184
Libera, Matthew R., 46
Lichvar, Robert, 136
Lick, W., 131
Lin, H. T., 49
Lin, Huang-Chin, 27
Lin, Jian, 99
Lin, Ping-Ru, 27
Lin, Shi-Hong, 27
Lin, Sue-Hwa, 181
Lin, Yuh-Lang, 167
Lin,Yuh-Yi, 102
Lindbaum, A., 41
Lindner, Douglas, 78
Lindsey, Randall L., 80
Linnartz, Jean P., 263
Linsey, G., 62
Liou, William W., 209, 210
Little, J. W., 92
Littman, Michael L., 232
Litvin, Faydor L., 96
Liu, D. D., 3
Liu, Feng-Jun, 209, 210
Liu, Xuedong, 176
Livesey, N. J., 161
Llinas, James, 225
Lloyd-Hart, M., 266
Lo, Medou, 121
Lockwood, Dennis W., 220
Lombardi, J. L., 53
Long, Charles E., 171
Loni, A., 248
Looper, M. D., 79

Lopez, Juan J., 42
Lorenz, J. C., 135
Lovesey, S. W., 237
Lucas, Joseph, 63
Lucas, M. L., 92
Luey, K. T., 59
Luke, A., 64
Lumley, John, 89
Lyons, Timothy, 194

M

Macek, J. H., 240
Machesky, M. L., 36
Mackie, William, 79
Madenci, Erdogan, 29
Maes, M. J., 43
Magagi, Ramata, 119
Maher, A., 64
Mahlman, Jerry D., 165
Maidanik, G., 82
Main, J. A., 244
Maldonado, Fernando, 249
Malone, T., 43, 44
Malozemoff, A., 248
Malpert, John H., 48
Mangus, J. P., 106, 107
Marisch, Jim, 213
Marker, Timothy R., 24
Marks, Robert, 187
Marshak, William P., 4
Marshall, D., 31
Martin, J. W., 244
Martin, Stephen D., 90
Marty, Dave, 243
Marusich, T. D., 104
Marya, M., 41
Maslanik, James, 167
Masui, K., 9
Mattes, G. L., 106
Matthew, William T., 197
Matthews, Roger, 199
Mattie, David R., 66
Mattison, P., 40
Maupin, Patrick, 110
Mauritz, Kenneth A., 48
Mauzy, Rebecca P., 222
Mayeaux, B., 33
Mayorov, Oleg Y., 196
Mayson, Wendall, 226
Mazumder, Pinaki, 77
McAllister, Kimberly A., 191
McAshan, M., 240
McCarthy, K. P., 79
McCaul, Eugene W., Jr., 169
McClennen, W. H., 262
McCoy, J. D., 47
McCoy, T., 42
McCullough, E. T., 55
McDonald, K., 251
McDowell, D., 42
McElory, S., 45
McGill, P., 52
McGinnis, Kelly A., 178
McIver, K., 32
McKayle, Camille, 213, 253
McKechnie, T., 246
McLevige, W., 81
McMahon, T., 266
McMahon, W. M., 31, 33
McNeil, J., 131
McQuaid, Michael J., 36
McWesler, Mary, 4
Means, Robert W., 230
Meckstroth, Gregory L., 259
Mederbal, Khalladi, 113
Meehan, James W., 209
Mehl, Wolfgang, 108
Mehta, Unmeel, 6
Mejiritski, Alexander, 48
Melancon, J. M., 65
Melbye, Mads, 187
Mell, Peter, 264
MellorCrummey, John, 212
Melosh, Henry J., 179
Melton, D. M., 60
Meltzer, M., 39
Meng, Fan-Chang, 216
Mergenthaler, J. M., 161
Mering, Catherine, 125
Mermagen, William H., Sr, 6
Merzouk, Abdel Aziz, 118
Metiu, Horia, 29
Metroke, T. L., 50
Meyer, Robert A., 229
Meyyappan, M., 247
Mikawa, Tetsuya, 168
Mikulka, Peter J., 209
Miles, Melvin H., 46
Miller, H., 246
Milos, F. S., 18
Mir, Pablo F., 263
Mish, W. H., 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 162, 163, 164, 165
Mistretta, J., 34
Mitchell, Brian J., 134
Mokhnache, Ammar, 135
Monette, D., 51
Montroy, J. T., 82
Moore, B., 262
Moore, Gary, 256, 257, 258
Moore, Jim, 243
Moore, T. E., 269
Moorman, Jeffrey W., 47
Moran, Mark, 136
Moran, Patrick J., 217
More, K. L., 49
Morehouse, David H., 193
Mori, Y., 242
Morita, T., 1
Morris, Damon, 188
Morris, Paul, 253
Moskalenko, V., 195
Mouafo, Dieudonne, 124
Mougey, Edward H., 198
Mougin, Eric, 123
Mulkern, Thomas J., 64
Muller, Etienne, 113
Muller, Fabrice, 111
Mulligan, A. C., 23
Mullin, Amy S., 27
Munakata, Nobuo, 179
Muraoka, K., 9
Murokh, A., 94
Murphy, Charles H., 6
Muza, Stephen R., 194
Myers, Thomas M., 168

N

Nahorna, A. M., 206
Naik, R., 62
Nakamichi, J., 1
Namkung, Min, 89
Ndiaye, Ibrahima, 110
Ndubizu, Chuka C., 40
Neckers, Douglas C., 48
Neergaard, L., 44
Nelson, Christopher D., 200
Nelson, John G., 46
Nemanich, Robert J., 79
Nemat-Nasser, Sia, 103
Nesbitt, Fred L., 268
Nettles, A., 61
New, Michael, 189
Newman, J. W., 101
Nguyen, H. G., 229
Nguyen, Steven P., 64
Nichols, D. K., 79
Nicholson, Wayne L., 179

Niedermeyer, M., 21
Nimitz, J. S., 25, 55, 56, 69
Ning, C. Z., 245
Ninomiya, T., 4
Nishida, Toshikazu, 237
Noguchi, Y., 28
Noll, Keith S., 268
Novak, Howard, 51
Novak, S. W., 248
Ntasin, Louis, 231
Numes, A. C., Jr., 97
Nusca, Michael J., 36
Nuttall, A. H., 233
Nyoungui, Andre Ndi, 111

O

Oaks, Edwin V., 197
Obaldia, Nicanor, 188
Ockerbloom, John, 220
OConnor, David, 92
Ocuna, M. H., 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165
OFarrell, J. M., 90
Ogilvie, K. W., 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165
Ogloza, Albert A., 92
Ojard, G., 62
Okazaki, Kenji, 168
Olenin, Mihael V., 196
Olivas, J. D., 41
Olivas, Nicholas L., 91
Oliver, Carey, 186
Olsen, B. D., 58
Olson, D. L., 41
Olver, K. A., 92
Opila, Elizabeth J., 49
Orford, Keith, 176
Ouaga, Hubert NDjafa, 115
Ovchinnikov, Y. N., 211
Owada, Hiromi, 131
Owen, T. E., 10
Owens, T., 40
Owens, Tom, 63
Owre, Sam, 219
Ozer, Andre, 109

P

Pace, Nicholas, 171
Paidhungat, Madan, 177
Paik, Sun M., 89
Palmer, D. A., 36
Palsha, Andrea, 129
Panda, B., 39
Pandori, Mark, 185
Pandya, S., 2
Pantazis, Dimos, 120
Papaefthymiou, Marios C., 76
Parasuraman, Raja, 209
Parhi, K. K., 71
Park, Chul, 6
Park, John W., 183
Parker, Arthur J., 68
Parker, Robert G., 99
Parsa, Z., 240
Partridge, Savannah C., 182
Pasko, Vladimyr V., 205
Patil, Suresh S., 200
Patrick, Brian, 243
Patterson, B., 58
Pattison, T. R., 218, 229
Patton, Debra J., 4
Patton, R. D., 34
Peatross, Michelle J., 68
Pedersen, Keith, 215
Pedley, M. D., 33
Peiffer, Mark, 193
Pellmar, T. C., 130
Pendleton, Yvonne J., 268
Pentikis, John, 208
Perkins, S., 211
Peters, W., 20
Petersen, Gregg E., 72
Peterson, Thomas M., 68
Petitcolas, Fablen A., 261
Petley, G. W., 239
Pfeffer, W. T., 126
Phillips, M. P., 229
Phillips, S., 22
Phulpin, Thierry, 119
Piccione, Dino, 208
Piekutowski, A. J., 265
Pinkerton, S. D., 79
Pinkus, Alan R., 244
Pinto, James, 167
Piran, R., 266
Pittman, C. U., Jr., 34
Pizzillo, Thomas J., 72
Platzbecker, M. R., 10
Plawsky, J. L., 49
Pleskach, V., 237
Plon, Sharon, 186
Plotkin, Serge, 74
Plucinski, J., 54
Pohorille, Andrew, 189
Poland, R., 262
Polevoy, Gordon, 193
Polissar, Nayak L., 199
Politzer, Peter, 24
Ponomarenko, V., 195
Ponomarenko, V. M., 206
Ponomarenko, Victor M., 196
Popovic, M., 242
Pouchin, Thomas, 109
Pouet, B., 100
Pratz, E., 60
Prendergast, M. T., 66
Press, Michael F., 182
Prince, Frank A., 12
Prince, M., 20
Prinzel, Lawrence J., III, 209
Pritzl, Barton J., 267
Privman, Vladimir, 251
Prunier, V., 248
Pulik, A., 195

Q

Quackenbush, Schuyler R., 263
Quarzeddine, Mountra, 121

R

Ragkousi, Katerina, 178
Ragon, Scott, 78
Raharison, Lea Jacqueline Rahaijaona, 117
Rakotoniaina, Solofoarisoa, 108
Raley, R., 22
Raley, Randy, 51
Rambidis, Anastasios X., 218
Ramesh, R., 82
Ramierson, Tokinomena Aimbelontsiry, 117
Rangaswamy, Muralidhar, 73
Rao, M. V. V. S., 247
Rao, N. N. S., 75
Ratsimbazafy, Jean Bruno, 108
Reda, Daniel C., 87
Reddy, R. G., 45
Redmond, J. M., 244
Reed, B., 22
Reibman, Amy, 263
Rempfer, Dietmar, 89
Reynolds, W. R., 253
Rhatigan, Jennifer L., 66
Rich, Daniel H., 243
Richards, Paul G., 135
Richeson, Jeff, 247

Rieckhoff, T. J., 90
Rigali, M., 32, 53
Rigali, M. J., 23
Rigas, Elias J., 64
Riley, M., 45, 94
Risley, Glenn E., 68
Rivest, Ronald L., 261
Rizzi, G., 52
Roberta, James M., 177
Roberts, J. K., 33
Roberts, K., 20
Rock, Paul B., 194
Rodriguez, J. M., 161
Roedig, Erich, 196, 206
Rogers, D. K., 54
Rognon, Pierre, 110
Rood, Bob, 243
Rose, Michael, 193
Rosenfeld, M., 191
Rosetti, James B., 83
Ross, Elden, 84
Ross, H. R., 22
Ross, Jeffrey S., 185
Ross, K. M., 66
Rottach, D., 47
Roush, Ted L., 268
Routley, J. G., 68
Rowland, Martin A., 188
Rowley, Karla B., 200
Royer, Alain, 108
Ruiz, Carlos E., 132
Rupert, J. K., 75
Russell, C., 98
Russell, S. S., 20, 31
Ryan, R. S., 11

S

Sagers, N., 39
Sahin, Aysegul A., 176
Sakuda, M., 242
Salamo, Gregory J., 185
Salvail, P., 221
Samarasinha, Nalin H., 267
Sambanis, Konstantinos, 224
Sanders, T., 42
Sandholt, Inge, 121
Sanneman, Paul, 12
Santee, M. L., 161
Santee, William R., 197
Sarmiento, Charles, 7
Sartwell, B. D., 50
Sasa, S., 4
Sassaman, Brian L., 23
Sathyaprakash, B. S., 166
Sato, J. D., 176
Saunders, C. R., 262
Savadogo, Alain Nindaoua, 116
Savage, Paul B., 25
Savane, Issiaka, 114
Saviolakis, George A., 198
Sawchuk, Alexander A., 216
Scerbo, Mark W., 209
Schmidt, George, 247
Schmidt, Henry J., 221
Schneier, Bruce, 261
Schroers, J., 44
Schulman, Lawrence S., 251
Schutzenhofer, L. A., 11
Schwartz, H. R., 79
Scott, J. A., 210, 211
Scribner, Dean A., 230
Scrivani, A., 52
Sellschopp, J., 172
Seong, Younho, 225
Sery, A., 237
Setlow, Barbara, 177, 178
Setlow, Peter, 177, 179
Shah, S., 250
Shaha, Patrick J., 225
Shakula, A., 195
Shan, W., 250
Shankar, Natarajan, 219
Sharma, S. P., 247
Shea, D., 134
Sheeren, David, 120
Shenoliker, Shirish, 186
Sheplak, Mark, 237
Sheriff, Don D., 199, 200
Shields, Peter G., 178
Shimomura, Tsutomu, 261
Shindel, H. L., 106, 107
Shipman, William C., 103
Short, Jeffrey J., 3
Shorter, Jeffrey A., 168
Shu, Chi-Wang, 239
Shular, D. A., 49
Sickles, Edward A., 181
Sidwell, D., 32
Sigal, I. M., 211
Simmons, M. A., 92
Sinclair, Scott E., 199
Singer, R., 262
Singler, R., 31
Small, Mark G., 197
Smara, Youcef, 119, 122
Smiej, Mohammed-Faouzi, 107
Smith, Carolyn L., 173
Smith, D. A., 57
Smith, Horace A., 267
Smith, James, 247
Smith, L. S., 79
Smithers, G., 250
Smithers, G. A., 49
Smolka, Scott A., 230
Snouffer, Jacqueline P., 259
Snyder, James H., 263
Sokhin, Alexander, 205
Somma, Janine, 123
Sommer, Stefan, 108
Song, J. J., 250
Sopori, Mohan L., 180
Spichiger, Rodolphe, 114
Spohnholtz, T., 32
Sprecher, Steven, 136
Staab, Janet E., 202
Stacey, W. M., 246
Stagliano, S., 26
Stanley, D. C., 25
Stapor, W. J., 79
Starke, Jeffrey A., 36
Starkey, Diane, 215
States, R. J., 248
Steffen, Konrad, 167
Steinman, Dave, 226
Stenger-Smith, John D., 46
Stepanenko, A. V., 206
Stephan, R., 62
Stephens III, Robert L., 213
Stesikova, E., 50
Stewart, W. F., 56
Stinger, Jeffrey D., 177
Stock, Stuart R., 83
Stoltzfus, J. M., 43
Stolz, Robert, 213, 253
Storey, Robson F., 48
Strehmel, Bernd, 48
Stropki, M., 22
Stucke, B., 22
Sturgis, B. R., 10
Su, Hui-Chen, 102
Su, Wen-Sheng, 228
Suits, M., 20
Sullins, Alan D., 48
Sullivan, Jerry L., 238
Summers, David P., 190
Sun, Ne-Zheng, 87
Sutaria, M., 23, 53
Sweigart, Allen V., 267
Swets, John A., 228
Swihart, J. J., 27
Swindell, J. E., 253
Sylvia, M., 55
Szabo, Barna A., 104

Szary, P., 64
Szczesniak, M. M., 40
Szostak, Jack W., 189

T

Tabazadeh, A., 161
Takacs, Lawrence L., 165
Takaki, R., 1
Takayama, K., 242
Tam, Wvi H., 84
Tamayama, M., 1
Tang, L., 3
Tankeev, S. G., 232
Task, Harry L., 244
Tatem, Patricia A., 40
Taylor, B. N., 99
Taylor, William R., 128, 129
Teefy, Dennis, 129
Telling, M. T. F., 240
Tennant, W. E., 82
Thebaud, Gilles, 122
Thibeault, Brian, 78
Thiel, Richard A., 227
Thio, Y. C. Francis, 247
Thomas, A. M., 106
Thomas, D., 69
Thomas, D. K., 84
Thomas, James H., 223
Thompson, W., 59
Thornton, T. N., 104
Tien, Tseng Ying, 46
Tillery, S., 20
Timoulali, Youssef, 109
Tin, C. C., 251
Toerge, John, 193
Tokuno, M., 168
Tonye, Emmanuel, 111, 121
Torres, P., 43
Toscano, William B., 207
Toure, Augustin Tiyegbo, 110
Tremaine, A., 94
Tremback, Craig J., 168
Trimble, L. E., 106, 107
Trivelpiece, Alvin W., 260
Trock, Bruce J., 175
Trottier, Troy, 79
Tsai, Meng-Hao, 102
Tsai, Ming-Chieh, 228
Tsai, Mu-Kai, 77
Tsai, Yao-Tsung, 77
Tsao, S. S., 78
Tsong, I. S., 37
Tsou, K. T., 53
Tsuchiya, M., 8
Tsuzaki, M., 26
Tumer, Kagan, 217
Turbini, Laura J., 83
Turbyfill, K. Ross, 197
Turchi, Peter J., 248
Turksoyu, Fatih, 76

U

Uht, J. C., 59

V

Vaidyanathan, R., 23, 32, 53
Valenzuela, P. R., 28
Valiev, R. Z., 42
Varus, Vasiliy, 194
Varus, Vassily, 203
Varys, V., 196
Vatsa, Veer N., 88
Vaughn, T. P., 70
Velankar, Sachin, 64
Verhage, Joseph M., 97
Vernik, R. J., 218, 229
Vickers, J., 69
Vickers, J. H., 31
Vining, Sue, 213
Voemel, C., 212
VonTersch, Brad, 230
Vorburger, T. V., 245
Voth, Gregory A., 35
Vovkodav, Nikolay N., 203

W

Wake, M., 242
Walish, J., 32, 53
Walker, J. L., 20, 31
Wallace, H. B., 72
Wallentine, V., 264
Walsh, Sawn M., 64
Walter, R. F., 91
Wang, Alice, 224
Wang, Jung-Hua, 228
Wang, L., 34
Wang, Ten-See, 67
Wang, X. J., 94
Wang, Xiao-Fan, 190
Wanzenberg, R., 240
Ward, D. R., 47
Warner, J., 80
Warren, Wayne H., Jr., 255
Waters, S. B., 49
Watkins, P. M., 252
Watson, Karen M., 194
Watson, M. D., 250
Watson, Velvin R., 214
Wayda, Michael E., 200
Weber, B. L., 58
Weber, Christiane, 124, 125
Wegener, Michael, 244
Wehlburg, J. C., 244
Wellman, Mark, 136
Wenman, D. W., 41
Werchan, Paul M., 200
Wesolowski, D. J., 36
Westall, James, 212
Westray, Mark, 188
Wetzel, Eric D., 28
Wheeler, Kraig A., 37
Wheelock, Margaret, 190
Whelan, L. A., 57
Whitaker, A., 133
White, Andrew L., 7
White, P. R., 239
White, V. R., 100
Whittenberger, J. D., 44
Whitworth, C. R., 262
Whorton, Mark S., 67
Wijewarnasuriya, P. S., 81
Wilbur, Mickey Joe D., 81
Wilbur, Scott D., 174
William, Myron T., 198
Williams, Frederick W., 68
Williams, J. R., 251
Williams, Mark, 126
Willner, Alan, 216
Wilson, Kristin, 192
Wimmer, J., 49
Wincheski, Russell A., 89
Wing, Jeannette M., 220
Wise, S., 223
Wiseman, Roger, 191
Withers, J. C., 53
Wolpert, David H., 217
Wood, J. R., 106
Wood, William A., 88
Woodcock, Al, 235
Woods, C., 94
Woods, Donald E., 178
Woods, S. S., 56
Worthy, Mark C., 236
Wrenn, G., 61

X

Xu, Rong-Hui, 200

Y

Yakovlev, Andrei Y., 183
Yamine, Nasser El, 107
Yang, G. G., 91
Yarlagadda, S., 32
Yasuda, Hiroaki, 168
Yatsenko, V., 196
Yatsenko, Valentine, 205
Yauch, David, 199
Yegnanarayana, B., 259
Yi, H. C., 57
Yoo, Sung M., 89
Youmans, Douglas G., 93
Youssef, Hussein, 12

Z

Zakrzwski, C. M., 7
Zakrzwski, Charles, 12
Zalevski, Anna, 209
Zamfir-Bleyberg, M., 264
Zarka, Joseph, 103
Zarras, Peter, 46
Zavada, J. M., 248
Zavoianu, Florea, 115, 125
Zerhouni, Elias A., 241
Zernow, Louis, 127
Zerr, Benoit, 112
Zeyada, Y., 9
Zhang, G. Y., 64
Zhu, Yunshan, 219
Zimmerman, Curtis, 12
Zimmerman, F., 246
Zook, L., 22