National Aeronautics and
Space Administration
Langley Research Center

Scientific and Technical
Information Program Office

Scientific and Technical Aerospace Reports

STAR

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NASA STI Program ... in Profile

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- TECHNICAL MEMORANDUM. Scientific and technical findings that are of preliminary or specialized interest, e.g., quick release reports, working papers, and bibliographies that contain minimal annotation. Does not contain extensive analysis.
- CONTRACTOR REPORT. Scientific and technical findings by NASA-sponsored contractors and grantees.
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Introduction

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

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

STAR includes citations to Research & Development (R&D) results reported in:

- NASA, NASA contractor, and NASA grantee reports
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- Translations
- NASA-owned patents and patent applications
- Other U.S. Government agency and foreign patents and patent applications
- Domestic and foreign dissertations and theses

The NASA STI Program

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

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

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

For more information on the most up to date NASA STI, visit the STI Program's website at http://www.sti.nasa.gov.

NASA STI Availability Information

NASA Center for AeroSpace Information (CASI)

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

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

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National Technical Information Service (NTIS)

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

The Federal Depository Library Program (FDLP)

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

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

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

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Subject Term Index

Personal Author Index

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS

A Biweekly Publication of the National Aeronautics and Space Administration

VOLUME 42, DECEMBER 31, 2004

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*.

20040201564 Lawrence Livermore National Lab., Livermore, CA

Quarterly Report

McCallen, R.; Salari, K.; Ortega, J.; Browand, F.; May 15, 2003; In English

Report No.(s): DE2004-15007679; UCRL-ID-153421; No Copyright; Avail: National Technical Information Service (NTIS)

This report consists of summaries of the activities and accomplishments during this second quarter reporting period for each of the consortium participants.

NTIS

Organizations; Reports

02
AERODYNAMICS

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

20040201121 Air Force Flight Test Center, Edwards AFB, CA USA

Expanding a Flutter Envelope Using Data From Accelerating Flight: Application to the F-16 Fighter Aircraft

Harris, Charles A., Author; Jan. 2004; 139 pp.; In English

Report No.(s): AD-A427364; AFFTC-PA-04062; No Copyright; Avail: CASI; A07, Hardcopy

Due to the destructive nature of flutter, flutter testing is a mandatory requirement for certification of both civilian and military aircraft. However, along with the complexity of newer aircraft, the time and cost associated with flutter testing has increased dramatically. Considering that many of the test techniques and analysis methods used to perform flutter testing date back to the 1950s and 1960's it may be time to take a fresh look at how flutter testing can best be accomplished. This thesis revisits flutter testing techniques and proposes an alternative to traditional flutter testing. The alternative uses flight test data from an aircraft that is performing an acceleration to clear the flutter envelope of the aircraft. Four academic issues arise from this new test approach. 1) Are frequencies and damping affected by the acceleration of the aircraft? 2) Can parameter identification algorithms extract frequency and damping values from the time varying data? 3) Can the vibration response at airspeeds (or Mach numbers) beyond which the aircraft has accelerated be anticipated? 4) What formal criteria can be used to determine when the aircraft needs to end the acceleration and terminate the test point? The academic contribution of this thesis is to address these issues. It is shown that although the frequencies and damping values do change the change is so small that it is irrelevant. It is also shown that by taking small windows of data, within which the change in parameters is small, it is possible to accurately identify parameters from the time varying data. Finally it is shown that at least in principal parameters can be predicted using data from sub-critical airspeeds, and that testing can be discontinued before an unstable flight condition is reached.

DTIC

F-16 Aircraft; Fighter Aircraft; Flight Tests; Flutter; Jet Aircraft

20040201276 Georgia Tech Research Inst., Atlanta, GA USA

AVIA: Adaptive Virtual Aerosurface

Parekh, D., Author; Glezer, A., Author; Allen, M., Author; Crittenden, T., Author; Birdsell, E., Author; Apr. 2004; 32 pp.; In English

Contract(s)/Grant(s): F49620-98-1-0503

Report No.(s): AD-A427728; AFRL-SR-AR-TR-04-0558; No Copyright; Avail: CASI; A03, Hardcopy

One can change the effective shape of a surface without any change in its physical moldlines through the transient injection of momentum to control unsteady flow phenomena, such as separation. This research program consists of a system level evaluation of the potential benefits and costs of active flow control as applied to UAVs for separation control, development of innovative actuator concepts, and proof-of-concept experiments showing aerodynamic effectiveness. System-level benefits include increased gust margin, reduced takeoff field length, increased payload capacity, and greater maneuverability. Actuator research has resulted in two major innovations: the use of pulsed/ modulated waveforms to increase the effectiveness of synthetic jet actuators and the development of compact, high power, combustion-driven actuator modules. The general performance of the combustion actuators are characterized in isolation, embedded in cross-flows up to M=0.7, and integrated on a two-dimensional wing model. In addition, since conventional machining would not be suitable for low-cost, large volume production, a simpler, MEMS-based, batch fabrication

DTIC

Actuators; Adaptation; Aerodynamics; Control Surfaces

20040201289 Air Force Test Pilot School, Edwards AFB, CA USA

Air Data System Calibration of F-16B S/N 92-0457 (Project TRUE Phoenix)

Griffin, Brian D., Author; Dickson, Scott A., Author; DiGiacomo, Jason T., Author; Harmer, Paul K., Author; Grimes, Gregory A., Author; Jun. 2004; 116 pp.; In English

Report No.(s): AD-A427766; AFFTC-TIM-04-01; No Copyright; Avail: CASI; A06, Hardcopy

This report presents the results of a limited air data system calibration on F-16B S/N 92-0457. The position error corrections, total pressure error. total air temperature probe recovery factor, and angle of attack effects were determined though flight test and are presented in this report, Testing began on 7 April and was completed on 30 April 2004 after eight missions.

DTIC

Air Data Systems; Calibrating; Information Systems

20040201579 Swedish Defence Research Establishment, Stockholm, Sweden

Use of Data from Virtual Air Combat Simulations in Combat Assessments at Theatre Level

Mossberg, K.; Jan. 2004; 120 pp.; In English

Report No.(s): PB2005-100636; FOI-R-1113-SE; No Copyright; Avail: CASI; A06, Hardcopy

This report discusses whether data registered in virtual air combat simulations at the Swedish Air Combat Simulation Center (FLSC) can be used for combat assessments in models at theatre level. Data registered in 75 simulations at the FLSC was analyzed to determine whether any information about the desired relationships between parameters could be extracted. Since the simulations analyzed were conducted for the purpose of training air squadrons, the input parameters were not varied in a balanced way and many background factors were not documented. However, even if the data is not sufficient for making assessments at higher levels, estimated values of the number of fighters shot down, duration times and fuel consumption can be used. The design of simulations specifically aimed at producing data required for assessments at theatre level is discussed in the report. The work presented was done in partial fulfillment of the requirements for the Degree of MSc in Military Operational Research at the Royal Military College of Science (RMCS), University of Cranfield.

NTIS

Combat; Data Simulation; Military Technology

03
AIR TRANSPORTATION AND SAFETY

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

20040201054 Naval Postgraduate School, Monterey, CA USA

Exploring the Feasibility of the Virtual Environment Helicopter System (VEHELO) for Use as an Instructional Tool for Military Helicopter Pilots

Kulakowski, W. W., Author; Sep. 2004; 159 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427217; No Copyright; Avail: Defense Technical Information Center (DTIC)

The Chromakeyed Augmented Virtual Environment (ChrAVE) system was initially developed to validate the feasibility of using embedded trainers for helicopter simulation. The ChrAVE Helicopter Simulation System was an initial attempt to produce an effective tool to suit a common yet important need. That need was the lack of an available simulator. That need becomes critical while military helicopter pilot is deployed away from the continental USA (CONUS) in support of worldwide operations. There has always been a deficiency in maintaining the level of pilot proficiency while away from CONUS. While deployed aboard ship or overseas the only available training platform available is the actual aircraft. The aircraft is an expensive option but provides the only means by which deployed pilots can maintain an acceptable level of proficiency and readiness. This thesis continues with the development of the ChrAVE implementation of the VEHELO and achieves a more useful and updated configuration of the system. This thesis also validates the possible capability of the modified system to support instructional level of training versus the proficiency level addressed in earlier work.

DTIC

Computer Assisted Instruction; Flight Simulation; Helicopters; Military Helicopters; Virtual Reality

20040201068 Naval Postgraduate School, Monterey, CA USA

Using Commercial Aviation Information Systems in Operational Support Airlift Decision Support Systems

Kubik, Charles P., II, Author; Sep. 2004; 87 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427259; No Copyright; Avail: Defense Technical Information Center (DTIC)

Air travel within the Department of Defense (DoD) has the potential of being reinvented due to the disruptive technology of microjets. These smaller, more efficient aircraft will be able to provide cost effective point to point travel to their users. Along with this new way of travel comes the challenge of managing the customer requests, large networks of jets, personnel and support activities. Decision Support Systems (DSS) can help manage these networks by attempting to create optimized scheduling solutions for routing aircraft, crews and logistical support needed to successfully operate in this new environment. The opportunity exists for the DoD's private aircraft operation, the Joint Operational Support Airlift Center (JOSAC), to utilize some of the same system features used in commercial operations such as NetJets to improve operations. This thesis will analyze the use of commercial air operator strategies and DSS 's to be used in JOSAC to improve operational effectiveness. It will look to add new capabilities and processes used in commercial DSS 's along with the implementation of the disruptive technology, microjets. Some of the potential benefits include improved operational performance, solutions to scheduling inefficiencies and improved mission readiness. With these improvements the potential for a military microjet operation in the future is a real possibility.

DTIC

Airline Operations; Commercial Aircraft; Cost Effectiveness; Decision Support Systems; Information Systems; Support Systems

20040201161 Army Research Lab., Adelphi, MD USA

Initial Experiment in Using a Powered Parafoil for Employment of Intelligence, Surveillance, and Reconnaissance (ISR) Unattended Ground Sensors (UGS)

Kolodny, Michael A., Author; Oct. 2004; 24 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427422; ARL-TR-3347; No Copyright; Avail: Defense Technical Information Center (DTIC)

Experiments were run by the U.S. Army Research Laboratory at Yuma Proving Ground, AZ, on 10 and 12 June 2004 to obtain an initial assessment of the viability of using a powered parafoil as an unmanned air vehicle for employment of Future Combat System intelligence, surveillance, and reconnaissance unattended ground sensors (UGS). These experiments were conducted as an adjunct to the testing of the parafoil for the Special Operations Command Wind-Supported Air Delivery

System program. Three flights were flown which dispensed UGS mass mook-ups. Two of the flights used manually release UGS while the third flight was operated autonomously. The experiment were designed to give an initial quick look assessment of the dispersions that might be expected in UGS parafoil employment. The initial assessment indicates that the powered parafoil is a viable air deliver platform. Control of the UGS release is good and dispersions in landing areas are minimal. Maximum dispersion for a drop of three nodes was about 7 m from the centroid of the landing locations. Dispersions were typically less than 3 m.
DTIC
Intelligence; Parafoils; Reconnaissance; Surveillance

20040201164 Air Force Flight Test Center, Edwards AFB, CA USA
Air Force Academy Glider Spin Recovery Validation and Crosswind Operation Investigation (Project ZEUS)
Fischer, Jack D., Author; Roethe, Kevin J., Author; Visser, Cornelis G., Author; Lane, Joshua A., Author; Morgan, Chad M., Author; Jun. 2004; 64 pp.; In English
Report No.(s): AD-A427426; AFFTC-TIM-04-02; No Copyright; Avail: CASI; A04, Hardcopy

This report presents the results of Project ZEUS, a validation of spin recovery procedures and evaluation of crosswind takeoffs and landings. USAF Test Pilot School (TPS) Class 03B validated the generic U.S. Air Force Academy (USAFA) spin recovery procedure for two cross country gliders, the Duo Discus (TG-15A) and the Discus-2b (TG-15B). Landings in crosswind conditions up to 20 knots were evaluated. The 94th FTS, USAFA, with support from ASC/YT, requested this testing. A total of 80 test sorties were flown at Edwards AFB, CA from 8 to 27 April, 2004.
DTIC
Armed Forces (United States); Gliders; Universities; Wind Direction

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*.

20040200982 NASA Langley Research Center, Hampton, VA, USA
Positioning System Accuracy Assessment for the Runway Incursion Prevention System Flight Test at the Dallas/Ft. Worth International Airport
Quach, Cuong C.; December 2004; 82 pp.; In English
Contract(s)/Grant(s): WU 23-728-60-30
Report No.(s): NASA/TM-2004-213506; L-19062; No Copyright; Avail: CASI; A05, Hardcopy

NASA/Langley Research Center collaborated with the Federal Aviation Administration (FAA) to test a Runway Incursion Prevention System (RIPS) at the Dallas Fort Worth International Airport (DFW) in October 2000. The RIPS combines airborne and ground sensor data with various cockpit displays to improve pilots' awareness of traffic conditions on the airport surface. The systems tested at DFW involved surface radar and data systems that gather and send surface traffic information to a research aircraft outfitted with the RIPS software, cockpit displays, and data link transceivers. The data sent to the airborne systems contained identification and GPS location of traffic. This information was compared with the own-ship location from airborne GPS receivers to generate incursion alerts. A total of 93 test tracks were flown while operating RIPS. This report compares the accuracy of the airborne GPS systems that gave the own-ship position of the research aircraft for the 93 test tracks.
Author
Airborne Equipment; Position (Location); Runways; Accident Prevention; Aerospace Safety; Flight Tests; Accuracy; Airports

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*.

20040200980 NASA Langley Research Center, Hampton, VA, USA, Army Research Lab., Hampton, VA, USA
The Influence of Mesh Density on the Impact Response of a Shuttle Leading-Edge Panel Finite Element Simulation
Jackson, Karen E.; Fasanella, Edwin L.; Lyle, Karen H.; Spellman, Regina L.; November 2004; 32 pp.; In English
Contract(s)/Grant(s): WU 23-376-70-30-07
Report No.(s): NASA/TM-2004-213501; ARL-TR-3337; L-19059; No Copyright; Avail: CASI; A03, Hardcopy

A study was performed to examine the influence of varying mesh density on an LS-DYNA simulation of a rectangular-shaped foam projectile impacting the space shuttle leading edge Panel 6. The shuttle leading-edge panels are fabricated of reinforced carbon-carbon (RCC) material. During the study, nine cases were executed with all possible combinations of coarse, baseline, and fine meshes of the foam and panel. For each simulation, the same material properties and impact conditions were specified and only the mesh density was varied. In the baseline model, the shell elements representing the RCC panel are approximately 0.2-in. on edge, whereas the foam elements are about 0.5-in. on edge. The element nominal edge-length for the baseline panel was halved to create a fine panel (0.1-in. edge length) mesh and doubled to create a coarse panel (0.4-in. edge length) mesh. In addition, the element nominal edge-length of the baseline foam projectile was halved (0.25-in. edge length) to create a fine foam mesh and doubled (1.0- in. edge length) to create a coarse foam mesh. The initial impact velocity of the foam was 775 ft/s. The simulations were executed in LS-DYNA version 960 for 6 ms of simulation time. Contour plots of resultant panel displacement and effective stress in the foam were compared at five discrete time intervals. Also, time-history responses of internal and kinetic energy of the panel, kinetic and hourglass energy of the foam, and resultant contact force were plotted to determine the influence of mesh density. As a final comparison, the model with a fine panel and fine foam mesh was executed with slightly different material properties for the RCC. For this model, the average degraded properties of the RCC were replaced with the maximum degraded properties. Similar comparisons of panel and foam responses were made for the average and maximum degraded models.
Author

Finite Element Method; Impact Velocity; Simulation; Foams; Projectiles; Carbon-Carbon Composites; Space Shuttles

20040200996 Advancia Corp., Oklahoma City, OK, USA, Civil Aerospace Medical Inst., Oklahoma City, OK, USA
Availability of Passenger Safety Information for Improved Survival in Aircraft Accidents
Cosper, Donna K.; McLean, Garnet A.; November 2004; 19 pp.; In English
Contract(s)/Grant(s): FAA-AM-B-01-PRS-93
Report No.(s): DOT/FAA/AM-04/19; No Copyright; Avail: CASI; A03, Hardcopy

The Federal Aviation Administration (FAA) has set goals to be proactive regarding airline passenger education. One of the strategic goals is to identify, develop, and conduct research to improve methods, procedures, and technologies for increasing survival in aircraft accidents. In support of the FAA goals, this study identified safety- and survival-related information currently available to the flying public, providing an opportunity for estimating the general educational level of the typical air traveler. The information available to typical airline passengers was obtained through a survey of air-travel information resources, including all material available from 15 major and 25 minor airlines flying in U.S. airspace. Additional sources were found using an exhaustive search of Internet Web sites, books, periodicals, and journal articles of government agencies, aviation training programs, educational and academic sources, aircraft manufacturers, consultants, U.S. military, corporations, and non-profit companies. An array of important factors was investigated: travel preparation, prohibited goods, in-flight 'things-to-know,' medical information, safety concerns, emergency aircraft operations, emergency procedures, post-emergency survival-related topics, airport requirements, and international travel information. The results reveal serious inadequacies in the availability of safety information for airline passengers, indicating that reaching the goal of assured air traveler safety and survival in emergencies is problematic but amenable to significant improvement. To increase the probability that air travelers will survive in emergencies, substantially improved safety and survival information needs to be implemented and made available through a well- constructed passenger education program.
Author

Aircraft Safety; Safety; Training Aircraft; Information Management; Flight Safety

20040201002

Prediction of Jet Noise With Suppression Devices

Bhat, Thonse R. S.; Proceedings of the Jet Noise Workshop; November 2001, pp. 667-684; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Dr. Bhat presented an overview of the various prediction models used by Boeing. Bhat explained that the current suite of prediction tools has issues and limitations. Boeing s in-house, semi-empirical model for subsonic problems assumes three different noise source regions: 1) primary-secondary shear layer, 2) secondary-ambient shear-layer, and 3) mixed-ambient shear-layer. The sound pressure level is a function of the source strength, Strouhal number, velocity, mass flow, frequency, emission angle, and area ratio. Boeing s in-house, semi-empirical model for supersonic problems (JN8C5 code) assumes four different noise sources: 1) primary internal, 2) primary external, 3) mixed, and 4) shock-associated. The comparison between the model prediction and the test data indicated good agreement. In summary, the Boeing models are semi-empirical and are developed mainly from model-scale test databases. As such, the models applicability is limited to the envelope defined by the test database - deviating too far from that envelope may lead to erroneous predictions. Dr. Bhat emphasized the need for a tool that can be used to predict noise from mixers for realistic geometries and flow conditions.

Author

Jet Aircraft Noise; Sound Pressure; Noise Prediction (Aircraft); Noise Generators

20040201018 Pratt and Whitney Aircraft Group, East Hartford, CT, USA

Physics of Jet Noise Suppression: Industry Perspective on Prediction Methods, Future Direction/Needs

Lord, Wesley K.; Proceedings of the Jet Noise Workshop; November 2001, pp. 615-630; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

The physics of jet noise supression is presented with an emphasis on an industries' perspective on prediction methods and future directions.

CASI

Jet Aircraft Noise; Noise Prediction (Aircraft); Noise Reduction; Industries

20040201021 NASA Glenn Research Center, Cleveland, OH, USA

Source Identification and Location Techniques

Weir, Donald; Bridges, James; Agboola, Femi; Dougherty, Robert; Proceedings of the Jet Noise Workshop; November 2001, pp. 479-506; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Mr. Weir presented source location results obtained from an engine test as part of the Engine Validation of Noise Reduction Concepts program. Two types of microphone arrays were used in this program to determine the jet noise source distribution for the exhaust from a 4.3 bypass ratio turbofan engine. One was a linear array of 16 microphones located on a 25 ft. sideline and the other was a 103 microphone 3-D 'cage' array in the near field of the jet. Data were obtained from a baseline nozzle and from numerous nozzle configuration using chevrons and/or tabs to reduce the jet noise. Mr. Weir presented data from two configurations: the baseline nozzle and a nozzle configuration with chevrons on both the core and bypass nozzles. This chevron configuration had achieved a jet noise reduction of 4 EPNdB in small scale tests conducted at the Glenn Research Center. IR imaging showed that the chevrons produced significant improvements in mixing and greatly reduced the length of the jet potential core. Comparison of source location data from the 1-D phased array showed a shift of the noise sources towards the nozzle and clear reductions of the sources due to the noise reduction devices. Data from the 3-D array showed a single source at a frequency of 125 Hz. located several diameters downstream from the nozzle exit. At 250 and 400 Hz., multiple sources, periodically spaced, appeared to exist downstream of the nozzle. The trend of source location moving toward the nozzle exit with increasing frequency was also observed. The 3-D array data also showed a reduction in source strength with the addition of chevrons. The overall trend of source location with frequency was compared for the two arrays and with classical experience. Similar trends were observed. Although overall trends with frequency and addition of suppression devices were consistent between the data from the 1-D and the 3-D arrays, a comparison of the details of the inferred source locations did show differences. A flight test is planned to determine if the hardware tested statically will achieve similar reductions in flight.

Author

Jet Aircraft Noise; Bypasses; Noise Reduction; Linear Arrays

20040201022 Defence Evaluation Research Agency, Pyestock, UK

Source Identification and Location Technique: The Use of Azimuthal Microphone Correlation to Determine the Lateral Distribution of Mixing Noise Sources in a Round Jet

Harper-Bourne, Marcus; Proceedings of the Jet Noise Workshop; November 2001, pp. 543-559; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

The Lighthill acoustic analogy applied to microphone correlation continues to be useful in the development of source location/diagnostic tools at both models and full scale. The extension of polar correlation to azimuthal correlation has been demonstrated for measurement of lateral (radial) source distributions. The application of the method to a round subsonic small scale air jet in an anechoic chamber has successfully identified the main noise producing region in the centre of the shear layer consistent with our current understanding of jet mixing noise. This result also supports the validity of the lighthill analogy when small lateral scales and isotropy in the lateral plain are assumed. The potential use of the method on coaxial jets has been illustrated.

Derived from text

Azimuth; Jet Mixing Flow; Microphones; Correlation; Aeroacoustics

20040201024

Source Identification and Location Technique: Using a Phased Array

Bhat, Thonse R. S.; Proceedings of the Jet Noise Workshop; November 2001, pp. 507-541; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Dr. Bhat presented results from the use of a phased array system. Sample results from the application of this system to the determination of airframe noise source locations. A detailed summary of beamforming theory was presented. The conclusion of this summary was that 'if the array is well designed and the steering vectors are correctly computed, then the plot (the beamform map) will have peaks corresponding to the true sources, with the peak heights equal to the source strength (magnitude squared).' Results from the application of phased arrays to scale model tests, at Glenn Research Center, of separate flow nozzles were presented. These small scale tests were for geometries and noise reduction concepts similar to those tested during the engine test described by Mr. Weir of Honeywell. Three array configurations were used during these small scale tests. Each of the arrays were purported to have their own advantages. A large 7 arm logarithmic spiral array was used to determine source density both axially and vertically. This array was described as working best between 1000 and 8000 Hz. A small 7 arm logarithmic spiral was used to determine source location in two dimensions over a frequency range of 8000 to 50000 Hz. A linear sideline array was also used. This array provided source location along the jet axis over a frequency range of 1000 to 50000 Hz. Results from these tests indicated that, at low frequencies, a single source exists at several diameters downstream of the nozzle exit. The location of this did not seem to move with frequency. At higher frequencies a second source appeared near the nozzle exit. This source appeared to be less sensitive to power setting and flight Mach number than the downstream source.

Author

Aerodynamic Noise; Aircraft Noise; Phased Arrays; Beamforming; Noise Generators

20040201025 Georgia Inst. of Tech., Atlanta, GA, USA

Give Evidence Where Theory has Correctly Predicted Jet Noise

Ahuja, Krish; Proceedings of the Jet Noise Workshop; November 2001, pp. 699; In English; See also 20040200997; No Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Dr. Ahuja presented historical data from his Ph.D. dissertation relative to shock weakening in supersonic jets. Specifically he discussed the principle of the Inverted Velocity Profile (IVP). His objective was to demonstrate that even for a complex suppressor nozzle it is possible to predict noise using simple scaling assumptions from Lighthill s theory. Ahuja computed a low frequency prediction for an IVP suppressor and performed the same calculation for the high frequency. The predictions matched the data very well. Ahuja postured that there are many different schemes, but they all revolve around the same line of thinking.

Author

Jet Aircraft Noise; Velocity Distribution; Gas Jets; High Frequencies; Supersonic Jet Flow

20040201026

Physics of Jet Noise Suppression

Harper-Bourne, Marcus; Proceedings of the Jet Noise Workshop; November 2001, pp. 701-719; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Mr. Harper-Bourne presented results on passive (offset primary nozzle, coaxial elliptic nozzles) and active (harmonic acoustic forcing) approaches for jet noise suppression. Harper-Bourne s presentation utilized areas of DERA s jet exhaust noise R&D activity to give evidence where theory has correctly predicted jet noise. Results from the offset primary nozzle indicated some noise reduction at various angles to the jet axis. These results also illustrated how noise propagation with coaxial jets can affect the results. Results from the coaxial elliptic nozzles showed effects of noise refraction. Harper-Bourne presented data from the harmonic forcing of twin jets at Mj = 0.9 and Tj = 850K. Acoustic predictions of the near-field of twin jets were made using a line source model based on the acoustic analogy and compared to the data with and without harmonic forcing. The results indicated that the measured increase in broadband noise observed with acoustic forcing was accompanied by approximately 50% shortening of the axial source distribution. Refraction effects not included in the analogy were significant in the near field shadow regions of the twin jets studied.

Author

Noise Reduction; Jet Aircraft Noise; Jet Exhaust; Coaxial Nozzles

20040201063 Naval Postgraduate School, Monterey, CA USA

Frequency and Polarization Diversity Simulations for Urban UAV communication and Data Links

Pala, Fatih, Author; Sep. 2004; 135 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427243; No Copyright; Avail: Defense Technical Information Center (DTIC)

The purpose of this research was to examine the effects of frequency, and polarization on radio wave propagation in urbanized areas for unmanned aerial vehicle (UAV) data links, and command and control. The transmission from a UAV operating over a small city was simulated using the Urbana Wireless Toolset. Parameters that were varied include frequency, antenna polarization, UAV altitude, and building materials. Multiple reflections and diffractions were included in the simulation. In each case signal contours were generated at discrete frequencies over a 50 MHz bandwidth. It was observed that the signal levels varied up to over the bands at a fixed observation point due to frequency-dependent reflection and diffraction.

DTIC

Communication Networks; Data Links; Drone Vehicles; Frequency Shift; Reception Diversity; Simulation

20040201067 Naval Postgraduate School, Monterey, CA USA

Inlet Distortion Generation for a Transonic Compressor

Papamarkos, Ioannis, Author; Sep. 2004; 72 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427258; No Copyright; Avail: Defense Technical Information Center (DTIC)

A single-stage transonic research compressor and test rig are to be used to obtain data on the effect of inlet flow distortion on compressor (and therefore engine) stall. Auxiliary injection was examined as a technique for generating distortion in inlet stagnation pressure, or temperature, or to simulate the more complex effects of engine, steam ingestion from a catapult launch. Engineering analyses were developed and programmed in EES to relate inlet conditions to the compressor characteristics, for both pressure and temperature distortion. An injection duct area of 8% was selected to limit the required heater power. A CFD analysis was carried out to predict the compressor inlet flow field and hence position the injection duct exit. It was found that a broad range of distortion parameters could be generated by simply ducting (and heating) atmospheric air (or steam) through and auxiliary inlet throttle valve.

DTIC

Compressors; Distortion; Fighter Aircraft; Jet Aircraft; Transonic Compressors

20040201085 Naval Postgraduate School, Monterey, CA USA

Analysis of the Vertical Takeoff and Landing Unmanned Aerial Vehicle (VTUAV) in Small Unit Urban Operations

Cason, Roman K., Author; Sep. 2004; 92 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427297; No Copyright; Avail: Defense Technical Information Center (DTIC)

The Marine Corps has recently embarked on the development of a Vertical Takeoff and Landing Unmanned Aerial Vehicle (VTUAV) to replace the aging Pioneer Unmanned Aerial Vehicle (UAV) system. This thesis examines the critical elements this platform must possess to effectively support small units operating in urban environments. The author addresses this issue by creating and exploring an agent-based simulation of a platoon conducting an urban patrol in a setting similar to those currently being encountered in Iraq. The platoon utilizes the VTUAV as an intelligence-gathering asset. The author designed an experiment to generate data from the simulation scenario, and then used multiple regression analysis and regression trees to relate the UAV capabilities to the patrol's operational effectiveness. The results suggest that the effectiveness of a VTUAV

is greatly influenced by noise in the urban warfare environment. He uses a loss function, along with the regression models, to identify UAV configurations that improve operational effectiveness, yet are robust to uncertainties about civilian and insurgent behavior. The VTUAV must have high communication capability, as well as accurate sensing, to perform well across a range of environmental conditions. (6 tables, 27 figures, 23 refs.)
DTIC
Aerial Reconnaissance; Combat; Drone Vehicles; Pilotless Aircraft; Simulation; Support Systems; Vertical Landing; Vertical Takeoff; Vertical Takeoff Aircraft; Warfare

20040201100 Dayton Univ. Research Inst., OH USA
Research on Advanced Nondestructive Evaluation (NDE) Methods for Aerospace Structures
Boehnlein, Thomas, Author; Fox, Jeffrey, Author; Frock, Brian, Author; Klosterman, Edward, Author; Ko, Ray, Author; Mar. 2004; 118 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F33615-98-C-5217; Proj-4349
Report No.(s): AD-A427336; UDR-TR-2004-00026; AFRL-ML-WP-TR-2004-4237; No Copyright; Avail: Defense Technical Information Center (DTIC)

Efforts were conducted to develop nondestructive acoustic and energy-dispersive x-ray spectroscopy techniques for quantitative determination of residual stress and depth-wise residual stress gradients in aerospace materials. Cross-correlation techniques were studied for precise determination of acoustic velocity as a function of frequency. Studies were conducted using eddy-current techniques with GMR sensors to determine their capabilities for detection and monitoring hidden corrosion in multi-layer aerospace structures. Nonlinear acoustic and eddy-current techniques with GMR sensors were used to optimize the retrogression and reaging process in AA7075-T6. Experimental eddy-current data was acquired to aid in development of a model of the eddy-current corrosion-characterization process. ATR-FTIR spectroscopy combined with White Light Interference Microscopy was studied for monitoring corrosion-preventive coatings. X-ray CT was used to monitor 3D corrosion growth. Acoustic emission was studied for its potential for nondestructively monitoring metalworking processes. Small projects were initiated in vehicle health monitoring.
DTIC
Acoustic Microscopes; Aerospace Systems; Aircraft Structures; Corrosion; Corrosion Prevention; Fretting; Nondestructive Tests; Residual Stress

20040201102 European Unmanned Vehicle Systems Association, Paris, France
Furthering the Introduction of UAVs/ROA into Civil Managed Airspace
VAN Blyenburgh, Peter, Author; Sep. 2003; 12 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427338; No Copyright; Avail: Defense Technical Information Center (DTIC)

Briefing charts from presentation on furthering the introduction of unmanned aerial vehicles into civil managed airspace.
DTIC
Airspace; Civil Aviation; Remotely Piloted Vehicles

20040201104 Dassault Aviation, Saint-Cloud, France
UAV Safety Objectives and Weight Categories
Sep. 2003; 10 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427341; No Copyright; Avail: Defense Technical Information Center (DTIC)

Briefing charts from presentation on the safety objectives and weight categories of unmanned aerial vehicles.
DTIC
Drone Vehicles; Safety

20040201105 Atlas Elektronik G.m.b.H., Bremen, Germany
Airworthiness Considerations for UAVs
Wohlers, Klaus, Author; Sep. 2003; 27 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427342; No Copyright; Avail: Defense Technical Information Center (DTIC)

Briefing charts from presentation offering a general overview about the approach to a UAV system under regulations for operation, airspace and certification.
DTIC
Aircraft Reliability; Drone Vehicles

20040201106 European Unmanned Vehicle Systems Association, Paris, France
Furthering The Introduction Of UAVs/ROA Into Civil Managed Airspace. UCARE Programme Update
VAN Blyenburgh, Peter, Author; Sep. 2003; 14 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427343; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the UCARE program's efforts to further the introduction of unmanned aerial vehicles into civil managed airspace.
DTIC
Airspace; Civil Aviation; Regulations; Remotely Piloted Vehicles

20040201109 Association for Unmanned Vehicle Systems, Dayton, OH USA
AUVSI Mission Statement. 1972 - 2002: Advancing Unmanned Systems for 30 Years
Sep. 2003; 40 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427346; No Copyright; Avail: Defense Technical Information Center (DTIC)
The mission of AUVSI is to promote and support the unmanned systems community through communication, education and leadership.
DTIC
Drone Vehicles

20040201110 European Unmanned Vehicle Systems Association, Paris, France
B-HUNTER UAV. Program update, recent flight experience and progress in ATM Euro UVS UAV 2002 Conference
Sep. 2003; 21 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427347; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the B-HUNTER UAV program, including recent flight experiences and progress.
DTIC
Conferences; Drone Vehicles; Experience; Progress; Systems Engineering

20040201111 Joint Aviation Authorities, Sussex, UK
Joint JAA/EUROCONTROL Task-Force on UAVs
Morier, Yves, Author; Sep. 2003; 15 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427348; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts on presentation by the joint JAA(Joint Aviation Authorities) and EUROCONTROL task force on UAVs.
DTIC
Air Traffic Control; Drone Vehicles

20040201112 Yamaha Motor Co. Ltd., Iwata, Japan
Civil UAV Applications in Japan and Related Safety & Certification
Sato, Akira, Author; Sep. 2003; 25 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427349; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on civil UAV applications in Japan and related safety and certification considerations.
DTIC
Certification; Drone Vehicles; Helicopters; Japan; Safety

20040201113 Royal Netherlands Air Force, Volkel, Netherlands
The Certification of the SPERWER-RNLA UAV System
Verbeek, Dick A., Author; Sep. 2003; 18 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427351; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the certification of the SPERWER-RNLA UAV system.
DTIC
Aircraft Reliability; Certification; Drone Vehicles

20040201114 Royal Netherlands Army, The Hague, Netherlands
Sperwer After S/A TC. Military Aviation Requirements; An Approach to Address the New RNLA UAV Domain
VAN Dijke, J., Author; Sep. 2003; 17 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427352; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation by the Royal Netherlands Army on the Sperwer UAV, including military aviation requirements and an approach to address the new RNLA UAV domain.
DTIC
Drone Vehicles; Netherlands

20040201115 Delegation Generale de l'Armement, Paris, France
Integration into Civil Airspace Airworthiness and Safety
Glasgall, Laurent, Author; Sep. 2003; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427353; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts of presentation on the integration of UAVs into civil airspace and considerations of airworthiness and safety.
DTIC
Aircraft Reliability; Airspace; Civil Aviation; Drone Vehicles; France; Safety

20040201116 Civil Aviation Authority, Redhill, UK
Aircraft Airworthiness Standards For Civil Unmanned Air Vehicle Systems
Whittaker, Cliff, Author; Sep. 2003; 37 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427354; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on aircraft airworthiness standards for civil unmanned air vehicles systems.
DTIC
Aircraft Reliability; Civil Aviation; Drone Vehicles

20040201119 Aeronautical Systems Div., Wright-Patterson AFB, OH USA
Global Hawk Program Update
Hicks, Kerry, Author; Sep. 2003; 27 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427359; ASC-02-1348; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the progress in the development of the U.S. Air Force UAV Global Hawk.
DTIC
Drone Vehicles; Surveillance

20040201124 European Aeronautic Defence and Space Co., Munich, Germany
EURO HAWK Project Overview
Sep. 2003; 16 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427369; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on a EURO HAWK project overview; an airborne system with stand-off capability for wide-area intelligence, surveillance and reconnaissance meeting European NATO countries' ISR requirements; which is based on Northrop Grumman's Global Hawk UAV platform.
DTIC
Drone Vehicles; Surveillance

20040201131 Ministry of Defence, Paris, France
French MALE UAV Program
Sep. 2003; 18 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427378; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts of presentation on French UAV programs, including SIDM CONOPS, French Air Force imagery architecture, and future French MALE UAV program.
DTIC
Drone Vehicles; Males; Surveillance

20040201132 Ministry of Defence, Paris, France
French Interim MALE UAV Program
Monsterleet,, Author; Caron, J., Author; Sep. 2003; 18 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427381; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the French MALE UAV program.
DTIC
Drone Vehicles; Males; Surveillance

20040201133 Ministry of Defence, Paris, France
Tactical UAV's in the French Army
Henry, Pierre-Yves, Author; Sep. 2003; 31 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427383; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts on presentation of tactical UAV's in the French Army.
DTIC
Drone Vehicles; Surveillance

20040201134 Delegation Generale de l'Armement, Paris, France
Open & Evolutive UAV Architecture
Sep. 2003; 17 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427384; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the open and evolutive architecture of UAVs.
DTIC
Architecture (Computers); Drone Vehicles

20040201136 Delegation Generale de l'Armement, Paris, France
Views on Mini UAVs & Mini UAV Competition
Mathurin, Rene, Author; Sep. 2003; 14 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427386; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on views of miniature UAVs and mini-UAV competition.
DTIC
Competition; Drone Vehicles; Miniaturization

20040201137 Royal Australian Air Force, Canberra, Australia
Airborne Surveillance for Land Operations
Overend, Dean, Author; Sep. 2003; 13 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427387; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on Australian Defence Force Airborne Surveillance for Land Operations.
DTIC
Aerial Reconnaissance; Drone Vehicles; Surveillance

20040201139 North Atlantic Treaty Organization, Capellen, Luxembourg
Logistic Support For Common Used UAV'S. Example: Drone CL-289
Bockelmann, Peter, Author; Sep. 2003; 36 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427389; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the logistics support needed for UAVs, with the example of the CL-289.
DTIC
Drone Vehicles; Logistics Management; Surveillance

20040201141 Ministry of Defence, Sweden
Ugglan Update
Brodd, Per, Author; Sep. 2003; 19 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427391; No Copyright; Avail: Defense Technical Information Center (DTIC)

Briefing charts from presentation on the development, operational effectiveness, lessons learned and evaluation of the Swedish Ugglan UAV.
DTIC
Drone Vehicles

20040201143 Yamaha Motor Co. Ltd., Iwata, Japan
The RMAX Helicopter UAV
Sato, Akira, Author; Sep. 2003; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427393; No Copyright; Avail: Defense Technical Information Center (DTIC)
In Japan, chemical spraying by manned helicopter was started in 1958, nowadays it has spread throughout Japan. But residents who live near paddy rice field have began to complain of using 'manned helicopter', because the agricultural chemical drifts to their houses. Looking at the Japanese farming industry, because of the aging of the work force and lack of a younger generation of successors, it has been more and more difficult for farm workers to engage in heavy labor for pest control. In light of this situation, Yamaha Motor Co. LTD began developing industrial-use, unmanned helicopters in the 1980s. In 1990 we delivered the first unmanned helicopter for crop dusting. Among a total of 1,565 unmanned helicopters, 1,220 units of Yamaha unmanned helicopter have been sold and are in use as of October 2001, in Japan. There are two reasons why unmanned helicopters have become popular in Japan. First, the unmanned helicopter has such performance that farmers can control it easily and spray paddy fields effectively. Second, the unmanned helicopters are safely operated in Japan. The Japanese government has made numerous standards and an operator licensing system. In adding to this, Yamaha provides its own training system for operators and servicemen. Based on this unmanned helicopter, we have developed an autonomous flight control system. Because our autonomous, unmanned helicopter has succeeded in observation roles at erupting volcanoes, the Japanese government and other industries have began to be attracted to the operation of unmanned helicopters.
DTIC
Helicopters; Remotely Piloted Vehicles

20040201145 NATO Air Force Armaments Group, Brussels, Belgium
Review of UAV Procurement Activities in NATO
Sep. 2003; 9 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427395; No Copyright; Avail: Defense Technical Information Center (DTIC)
No abstract available
Drone Vehicles; North Atlantic Treaty Organization (NATO); Procurement

20040201147 Civil Aviation Authority, Redhill, UK
Integration of UAVS into UK Airspace
Lee, Matt, Author; Sep. 2003; 24 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427397; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the integration of UAVs into UK airspace. The aim of this presentation is to inform the conference of the ongoing work by DAP to integrated UAVs into all classes of UK airspace.
DTIC
Airspace; Drone Vehicles

20040201149 Perceptronics, Inc., Tel Aviv, Israel
Simulation and Realism = Efficiency
Sep. 2003; 23 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427403; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the benefits of simulation for the training of UAV operation.
DTIC
Drone Vehicles; Education; Flight Simulation; Simulation

20040201176 Ministry of Defence, London, UK
Watchkeeper TNA Issues
Hassall, Harry, Author; Sep. 2003; 32 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427448; No Copyright; Avail: Defense Technical Information Center (DTIC)

Briefing charts from presentation on issues of training needs analysis(TNA) for the Watchkeeper UAV.
DTIC
Drone Vehicles; Education; Surveillance

20040201177 Aircraft Armaments, Inc., Baltimore, MD USA
Shadow 200 TUAV Schoolhouse Training
Sep. 2003; 16 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427449; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the schoolhouse training method for the Shadow 200 TUAV.
DTIC
Drone Aircraft; Education

20040201178 European Aeronautic Defence and Space Co., Munich, Germany
Open & Interoperable UAV System Architecture
Sep. 2003; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427450; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on an open and interoperable system architecture for UAVs.
DTIC
Architecture (Computers); Drone Vehicles

20040201179 BAE Systems, Melbourne, Australia
ANSER Technologies - UAV Applications
Yelland, Brad, Author; Sep. 2003; 23 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427451; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts for presentation on UAV applications for ANSER technologies.
DTIC
Drone Vehicles; Navigation

20040201180 Remote Services Ltd., Northwood, UK
The Certification of Lighter-Than-Air UAV Systems
Clot, Andre J., Author; Sep. 2003; 25 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427452; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the certification of AIRSCAN, lighter-than-air(LTA) UAV systems.
DTIC
Airships; Certification; Remotely Piloted Vehicles

20040201181 General Atomics Aeronautical Systems, Inc., San Diego, CA USA
Predator B: The Multi-Role UAV
Sep. 2003; 21 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427459; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the Predator B; a multi-role UAV.
DTIC
Drone Vehicles; Predators; Remotely Piloted Vehicles; Surveillance

20040201182 Department of National Defence, Ottawa, Ontario Canada
Canadian Forces Project Land Force ISTAR (Intelligence, Surveillance, Target Acquisition and Reconnaissance)
Connell, David, Author; Sep. 2003; 20 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427464; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation of the Canadian Forces' Project Land Force Intelligence, Surveillance, Target Acquisition and Reconnaissance.
DTIC
Canada; Drone Vehicles; Intelligence; Reconnaissance; Surveillance; Target Acquisition

20040201183 Atlas Elektronik G.m.b.H., Bremen, Germany
Electronic Warfare. ESM and ECM Over the Battlefield
Hastedt, Ralf, Author; Sep. 2003; 16 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427465; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on electronic countermeasures and electronic support measures available on UAV platforms.
DTIC
Drone Vehicles; Electronic Countermeasures; Electronic Warfare

20040201184 Program Manager Unmanned Aerial Vehicle Systems, Redstrone Arsenal, AL USA
Program Update: Army Unmanned Aerial Vehicle Systems
Fitch, Jeff, Author; Sep. 2003; 13 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427467; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on updates in the research and development of Army UAV systems.
DTIC
Pilotless Aircraft; Remotely Piloted Vehicles

20040201189 Atlas Elektronik G.m.b.H., Bremen, Germany
Autonomous Navigation & Collision Avoidance System For The Nearchos UAV
Valavanis, Kimon, Author; Sep. 2003; 33 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427480; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the autonomous navigation and collision avoidance system for the NEARCHOS UAV.
DTIC
Autonomous Navigation; Collision Avoidance; Drone Vehicles; Flight Control

20040201192 Aeronautical Systems Div., Wright-Patterson AFB, OH USA
Predator Program Overview
DeCou, Stephen, Author; Sep. 2003; 15 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427484; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the research and development of the Air Force's Predator UAV.
DTIC
Drone Vehicles; Predators; Surveillance

20040201208 Defence Science and Technology Organisation, Victoria, Australia
Composite Replacement Panel Strain Survey (CRPSS) - Test Plan
Callus, Paul, Author; Harper, Anthony, Author; Jul. 2004; 36 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427512; DSTO-TN-0550; DODA-AR-013-090; No Copyright; Avail: Defense Technical Information Center (DTIC)
The Defence Science and Technology Organisation in collaboration with the Cooperative Research Centre for Advanced Composite Materials, is developing the capability to replace metallic aircraft panels with those manufactured from advanced fibre composites. This is known as the Composite Replacement Panel Technology (CRPT). One step toward airworthiness certification of the CRPT is a validated capability to predict strain within a composite replacement panel (CRP) and the aircraft sub-structure. The strain data required for this validation shall be obtained in the Composite Replacement Panel Strain Survey (CRPSS). In the CRPSS, the strains within a demonstrator CRP installed on a F-111C aircraft shall be measured during a Cold Proof Load Test to be conducted at RAAF Base Amberley in June 2004. This report describes the procedures to be used for the CRPSS,
DTIC
Composite Structures; Fiber Composites; Fighter Aircraft; Jet Aircraft; Panels; Replacing; Surveys

20040201226 Joint Test and Evaluation, Fallon, NV USA
Joint Unmanned Aerial Vehicles Joint Test & Evaluation
Rogers, Roy, Author; Sep. 2003; 16 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427544; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on joint research and development efforts into unmanned aerial vehicles by the various branches of the USA armed forces.
DTIC
Drone Vehicles; Evaluation; Pilotless Aircraft; System Effectiveness

20040201228 European Aeronautic Defence and Space Co., Munich, Germany
SAR for UAVs: Status, Technologies, Trends
Hoelzl, Herbert, Author; Wergin, Alexander, Author; Wiedenmann, Rainer, Author; Sep. 2003; 28 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427552; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the application of synthetic aperture radar(SAR) to the UAV platform.
DTIC
Drone Vehicles; Surveillance; Synthetic Aperture Radar; Targets; Trends

20040201229 Societe d'Applications Generales d'Electricite et de Mecanique, Paris, France
TUAVS in Europe: Future Orientations; from Tactical to Multimission UAVs
Sep. 2003; 10 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427554; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the development of tactical unmanned aerial vehicles in Europe.
DTIC
Drone Vehicles

20040201231 Elbit Systems Ltd., Israel
Silver Arrow Ground Control Station: the UNIVERSAL CONCEPT
Yam, Oron, Author; Sep. 2003; 20 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427558; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the systems engineering of the Silver Arrow Ground Control Station.
DTIC
Drone Vehicles; Ground Based Control; Silver; Surveillance

20040201234 Kentron, South Africa
UAVs In Controlled Airspace- The South African Perspective
Sep. 2003; 12 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427567; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts of presentation on the development and application of UAVs in South Africa.
DTIC
Africa; Air Traffic; Airspace; Drone Vehicles; Republic of South Africa

20040201235 Elbit Systems Ltd., Israel
UAV Mission Trainer
Toren, Itai A., Author; Sep. 2003; 44 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427569; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts for presentation on a UAV mission trainer.
DTIC
Drone Vehicles; Education; Training Devices

20040201236 University of Southern California, Marina del Rey, CA USA

Real-Time MARBLES: A Scheme for Adaptive Distributed Resource Allocation

Frank, Martin, Author; Szekely, Pedro, Author; Jan. 2001; 68 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F49620-01-1-0341

Report No.(s): AD-A427580; AFRL-SR-AR-TR-04-0527; No Copyright; Avail: CASI; A04, Hardcopy

The MARBLES project was established to study algorithms for coordinating swarms of Unmanned Combat Aerial Vehicles (UCAVs). Critical problems included (a) the scalability of the algorithms to very large swarm sizes, and (b) the robustness of the algorithms against the sudden total failure of participating UCAVs. Scope. The effort focused on evaluating the algorithms in a simulated environment for the UCAVs; some of the scheduling technology was also applied to flight scheduling for AV8-B Harrier aircraft of Marine Air Group 13 in Yuma, AZ.

DTIC

Avionics; Flight Simulation; Real Time Operation; Resource Allocation

20040201279 RAND Corp., Santa Monica, CA USA

Test and Evaluation Trends and Costs for Aircraft and Guided Weapons

Fox, Bernard, Author; Boito, Michael, Author; Graser, John C., Author; Younossi, Obaid, Author; Jan. 2004; 212 pp.; In English

Contract(s)/Grant(s): F49642-01-C-0003

Report No.(s): AD-A427733; RAND/MG-109-AF; No Copyright; Avail: CASI; A10, Hardcopy

As military systems have become more complex, testing has become more time consuming and costly. A number of efficiencies have been proposed and implemented, such as increasing use of modeling and simulation and combining developmental and operational testing. How have these approaches worked in practice? And do traditional metrics for estimating the cost of testing still apply? This study addressed these issues by examining system-level testing for selected fixed-wing aircraft, missiles and guided munitions programs. The actual times and costs appear to be largely in step with the increasing complexity of the systems and test programs, so the proportion of development costs that the testing represents has not changed markedly. Although the available data are not sufficient to isolate the effects of discrete initiatives, some, such as modeling and simulation and combined testing, have empirically demonstrated their value on a variety of programs. The authors provide cost estimating methodologies and reference information on the programs they studied.

DTIC

Cost Estimates; Costs; Evaluation; System Effectiveness; Trends

20040201293 Space and Naval Warfare Systems Command, San Diego, CA USA

Evaluation of 'Q' in an Electrically Small Antenna in Prolate Spheroidal Coordinates

Adams, R. C., Author; Hansen, P. M., Author; Sep. 2004; 30 pp.; In English

Report No.(s): AD-A427775; TD-3188; No Copyright; Avail: CASI; A03, Hardcopy

This document describes the energy distribution within an electrically small antenna. Chu (1948) derived expressions for the 'Q' of an omnidirectional antenna whose entire structure is enclosed within a sphere. Many authors have extended this technique. Because the sphere is not conformal to the structure of most linear polarized antennas, much energy is not accounted for. If the structure is surrounded by an ellipsoid of revolution, the fit is much better. Prolate spheroidal coordinates are expected to provide a much better description for a linearly polarized antenna. We derive expressions for the electromagnetic field and the Poynting vector for vertically and horizontally polarized antennas. From the expressions, we calculate the Q of an electrically small antenna. We can derive an analytic expression for the value of Q for the leading term. The leading term is a product of the inverse of the cube of the dimensionless wave number (product of the wave number and half the distance between foci of the ellipse) and a factor that depends only upon the shape. This result is reformulated so that as the shape changes, the volume and wave number remain constant.

DTIC

Coordinates; Electromagnetic Fields; Ellipsoids; Prolateness

20040201297 Army Aeromedical Research Lab., Fort Rucker, AL USA

The Effect of a Monocular Helmet-Mounted Display on Aircrew Health: A cohort Study of Apache AH Mk1 Pilits Two-Year Baseline Review

Rash, Clarence E., Author; van de Pol, Corina, Author; Crowley, John S., Author; Ranchino, Daniel J., Author; Isaak, Melissa L., Author; Sep. 2004; 274 pp.; In English

Contract(s)/Grant(s): Proj-879

Report No.(s): AD-A427797; USAARL-2004-18; No Copyright; Avail: CASI; A12, Hardcopy

This is the first interim report for the study titled The Effect of a Monocular Helmet-Mounted Display on Aircrew Health: A Cohort Study of Apache AH Mk 1 Pilots. The principal aim of this occupational health study is to determine if the use of the monocular Integrated Helmet and Display Sighting System (IHADSS) helmet-mounted display (HMD) in the British Army's Apache AH Mk 1 attack helicopter has any long-term effect on visual performance. Additional information concerning other unique problems of the Apache AH Mk 1 aircrew is elicited as a secondary objective. This study is a collaborative effort between the British Army and the U.S. Army and is conducted under the auspices of The Technical Cooperative Program (TTCP), Subgroup U, Technical Panel 7 (Human Factors in the Aviation Environment).
DTIC
Attack Aircraft; Flight Crews; Helmet Mounted Displays; Military Helicopters

20040201439 NASA Langley Research Center, Hampton, VA, USA
NASA's Aeronautics Vision
Tenney, Darrel R.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 5-55; In English; See also 20040201420; No Copyright; Avail: CASI; A04, Hardcopy

Six long-term technology focus areas are: 1. Environmentally Friendly, Clean Burning Engines. Focus: Develop innovative technologies to enable intelligent turbine engines that significantly reduce harmful emissions while maintaining high performance and increasing reliability. 2. New Aircraft Energy Sources and Management. Focus: Discover new energy sources and intelligent management techniques directed towards zero emissions and enable new vehicle concepts for public mobility and new science missions. 3. Quiet Aircraft for Community Friendly Service. Focus: Develop and integrate noise reduction technology to enable unrestricted air transportation service to all communities. 4. Aerodynamic Performance for Fuel Efficiency. Focus: Improve aerodynamic efficiency,structures and materials technologies, and design tools and methodologies to reduce fuel burn and minimize environmental impact and enable new vehicle concepts and capabilities for public mobility and new science missions. 5. Aircraft Weight Reduction and Community Access. Focus: Develop ultralight smart materials and structures, aerodynamic concepts, and lightweight subsystems to increase vehicle efficiency, leading to high altitude long endurance vehicles, planetary aircraft, advanced vertical and short takeoff and landing vehicles and beyond. 6. Smart Aircraft and Autonomous Control. Focus: Enable aircraft to fly with reduced or no human intervention, to optimize flight over multiple regimes, and to provide maintenance on demand towards the goal of a feeling, seeing, sensing, sentient air vehicle.
Derived from text
Environmental Surveys; Exhaust Emission; Noise Reduction; Fuel Contamination; Weight Reduction; Automatic Control

20040201459 Bundesministerium der Verteidigung, Bonn, Germany
The Load on the Spinal Cord of Helicopter Pilots from Biomechanical Orthopedic Occupational Anthropometric and Vibrational Perspectives
Schumpe, Guenter; Klose, Joachim; Steffney, Gerhard; Jan. 1995; 83 pp.; In German
Report No.(s): AD-A427619; BMVG-FBW-95-4; No Copyright; Avail: CASI; A05, Hardcopy

The research results discussed in this report explain to what extent the design of helicopter seats affects helicopter pilots' spinal cord symptoms. Problems are traced to leaning forward with the upper body and contortions of the right shoulder in order to manipulate the control column (joystick). The problems are not related to seat design. Since handling the control column is an essential feature of piloting a helicopter, even an optimally designed seat won't eliminate the symptoms. The authors recommend simulator testing of the impact of decentrally vs. Centrally located steering columns and electronic steering as an alternative to mechanical steering.
DTIC
Anthropometry; Biodynamics; Helicopters; Human Factors Engineering; Loads (Forces); Orthopedics; Seats; Spinal Cord; Steering; Vibration

20040201460 Swiss Air Force UAV, Switzerland
ADS 95 RANGER Flight - Campaign National Exhibition EXPO 02
Sep. 2003; 10 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427549; No Copyright; Avail: Defense Technical Information Center (DTIC)

Briefing charts from presentation on the results of the Swiss Air Forces's ADS 95(Aufklaerungsdrohne) national flight campaign.
DTIC
Drone Vehicles; Military Operations; Switzerland

20040201461 Swiss Air Force UAV, Switzerland
ADS 95 RANGER: Training and Lessons Learned
Sep. 2003; 15 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427547; No Copyright; Avail: Defense Technical Information Center (DTIC)
Briefing charts from presentation on the Swiss Air Force's development of unmanned aerial vehicles, including: prerequisites; types of operators; training and formation; mission simulator-technical aspects and training aspects; experience/lessons learned; and questions.
DTIC
Drone Vehicles; Education

06
AVIONICS AND AIRCRAFT INSTRUMENTATION

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

20040200974 NASA Ames Research Center, Moffett Field, CA, USA
Intelligent Automation Approach for Improving Pilot Situational Awareness
Spirkovska, Lilly; January 12, 2004; 12 pp.; In English
Contract(s)/Grant(s): WBS 21-302-05-11
Report No.(s): NASA/TM-2004-212845; No Copyright; Avail: CASI; A03, Hardcopy
Automation in the aviation domain has been increasing for the past two decades. Pilot reaction to automation varies from highly favorable to highly critical depending on both the pilot's background and how effectively the automation is implemented. We describe a user-centered approach for automation that considers the pilot's tasks and his needs related to accomplishing those tasks. Further, we augment rather than replace how the pilot currently fulfills his goals, relying on redundant displays that offer the pilot an opportunity to build trust in the automation. Our prototype system automates the interpretation of hydraulic system faults of the UH-60 helicopter. We describe the problem with the current system and our methodology for resolving it.
Author
Situational Awareness; Aircraft Instruments; Display Devices; Helicopters; Expert Systems; Aircraft Pilots

20040201554 Wichita State Univ., Wichita, KS, USA
Shield Degradation Effects of Loosened Connector Backshells of Aircraft Wiring Harnesses
O'Loughlin, J. B.; Skinner, S. R.; Oct. 2004; In English
Report No.(s): PB2005-100543; No Copyright; Avail: National Technical Information Service (NTIS)
Backshells of aircraft wiring harness connectors were loosened by percent torque and by degree turns to study the degrading effects on the electrical characteristics of the shielding these connectors provide. For the two types of backshells studied, both became visually loose before any significant increase in harness loop resistance was measured. Therefore, careful visual inspection can detect and pinpoint the source of shield degradation before a significant increase in electrical shield loop resistance is measurable. However, a check for backshell visual looseness and hand looseness is only possible if the wiring harness connector backshells are visually and physically accessible on the aircraft. Otherwise, loop resistance measurements on any accessible part of the harness, performed by a skilled operator, can detect shield degradation but cannot pinpoint the location or source of the problem. Due to the variance found in the test results between the two different types of backshells studied in this report, a further study is recommended in order to recommend maintenance procedures for a wide variety of aircraft connector backshells. In addition to electrical loop resistance measurement techniques used to indicate the looseness of a connector backshell, visually loose and hand loose methods are also explicitly defined and studied in this report.
NTIS
Connectors; Maintenance; Position (Location)

07
AIRCRAFT PROPULSION AND POWER

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

20040201001 Georgia Inst. of Tech., Atlanta, GA, USA
Acoustic-Analogy-Based Jet Noise Prediction for Suppressor Nozzles
Ahuja, Krish; Proceedings of the Jet Noise Workshop; November 2001, pp. 595-603; In English; See also 20040200997; No Copyright; Avail: CASI; A02, Hardcopy

The slides examine the inverted velocity profile (IVP), explanation of the mechanism by Dosanjh and colleagues, shock weakening in supersonic jets and the principle of IVP noise reduction, low and high frequency prediction for an inverted velocity profile suppressor, and prediction of mixing noise of inverted velocity profile suppressor.
CASI
Acoustics; Analogies; Noise Prediction; Suppressors; Jet Aircraft Noise

20040201006 Defence Evaluation Research Agency, Pyestock, UK
Noise Sources: Use of Turbulence Space-Time Correlations in Lighthill's Equation Analyzed With Respect to a Fixed Frame of Reference
Harper-Bourne, Marcus; Proceedings of the Jet Noise Workshop; November 2001, pp. 401-426; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

The study measured overall and filtered two-point space-time correlations of u(sub 1) and u(sub 1, exp 2) in the mixing region of a round, low speed jet. The fixed frame coherence and associated decay scales were determined as a function of strouhal number for the longitudinal, radial and azimuth separation coordinates.Using Lighthill's acoustic analogy, the data were analyzed with respect ot a fixed frame of reference. They were shown to yield levels of convective amplification in keeping with jet noise measurements. A methodology for predicting near-field noise was derived by combining the fixed frame model of mixing noise with source location measurement. In the fixed frame model, mach wave radiation was encompassed as a limiting case of jet mixing noise with the radiation efficiency being unity at the mach angle.
Derived from text
Aeroacoustics; Aerodynamic Noise; Electromagnetic Radiation; Jet Aircraft Noise; Noise Measurement; Predictions

20040201007 Rolls-Royce Allison, Indianapolis, IN, USA
Finding Internal Excess Jet Noise Source Characteristics by Varying Free-Jet Speed
Mengle, Vinod G.; Proceedings of the Jet Noise Workshop; November 2001, pp. 571-594; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

The objectives of the study are to develop a method to study the excess noise of forced mixers by using far-field SPL data with varying free-jet speeds and to understand the spectral and directivity characteristics of excess noise of forced mixers.
Derived from text
Free Jets; Jet Aircraft Noise; Noise Generators

20040201017 Rolls-Royce Allison, Indianapolis, IN, USA
Vorticity Dynamics and Its Relation to Jet Noise Reduction in Chevrons
Mengle, Vinod G.; Proceedings of the Jet Noise Workshop; November 2001, pp. 653-665; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

The slide presentation addresses motivation for the study, pictures of inwardly and alternately flipping core chevrons, observation from plume data for both inwardly and alternately flipped chevrons, and extensions.
CASI
Jet Aircraft Noise; Noise Reduction

20040201019 NASA Glenn Research Center, Cleveland, OH, USA
Validation of a High-Order Compact Code for Nonlinear Flows About Complex Geometric
Hixon, Ray; Mankbadi, R. R.; Proceedings of the Jet Noise Workshop; November 2001, pp. 951-965; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

The slides review computational requirements for nozzle exhaust flow and noise calculations and the current numerical method, validation of prefactored compact scheme on CAA benchmark problems, a curvilinear grid performance test of gust response of a Joukowski airfoil, airfoil surface RMS pressure distribution and far field noise radiation results for Joukowski airfoil in a vortical gust, boundary distance study for Joukowski airfoil problem, and performance of ICOMP parallel Macintosh cluster.
CASI
Boundaries; Airfoils; Nozzle Flow; Performance Tests; Sound Waves

20040201033 Florida State Univ., Tallahassee, FL, USA
Deficiencies of the Acoustic Analogy Approach
Tam, Christopher; Proceedings of the Jet Noise Workshop; November 2001, pp. 605-611; In English; See also 20040200997; No Copyright; Avail: CASI; A02, Hardcopy

Lighthill's Acoustic Analogy has been the dominant theory of jet aeroacoustics for almost fifty years. Prof. Tam claimed that, except for the U8 scaling formula (which was derived by dimensional analysis), the Acoustic Analogy approach has not been particularly successful in predicting jet noise and pointed to a number of its attributes that he considered to be deficiencies and weaknesses.
Author
Aeroacoustics; Analogies; Jet Aircraft Noise

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)*.

20040201138 RAND Corp., Santa Monica, CA USA
How Much Is Enough? Sizing the Deployment of Baggage Screening Equipment by Considering the Economic Cost of Passenger Delays
Shaver, Russell, Author; Kennedy, Michael, Author; Shirley, Chad, Author; Dreyer, Paul, Author; Sep. 2004; 118 pp.; In English
Report No.(s): AD-A427388; RAND/DB-410-RC; No Copyright; Avail: CASI; A06, Hardcopy

We begin by giving some background on the problem we are addressing, including a summary of our prior work in this area and what we recommended to the government in March 2002. We then describe our findings from this work, connecting it to the prior work and pointing toward a new set of recommendations. We lead the reader through the steps of the analysis, starting with how we calculated the various baggage-scanning delays, how those delays were translated into passengers choosing to arrive at the airports earlier than otherwise necessary, and how that behavior is ultimately reflected in additional cost to the nation's economy. This briefing is relatively long because a number of important sensitivities need to be addressed.
DTIC
Baggage; Bags; Costs; Deployment; Economics; Passengers; Terminal Facilities

20040201142 RAND Corp., Santa Monica, CA USA
How Much Is Enough? Sizing the Deployment of Baggage Screening Equipment to Minimize the Cost of Flying. Executive Summary
Shaver, Russell, Author; Kennedy, Michael, Author; Shirley, Chad, Author; Dreyer, Paul, Author; Sep. 2004; 43 pp.; In English
Report No.(s): AD-A427392; RAND/DB-412-RC; No Copyright; Avail: CASI; A03, Hardcopy

Prior to 9/11 there were repeated and widely publicized examples of contraband (e.g., guns or knives) passing through the carry-on baggage screening stations without being detected. Even though the terrorists of 9/11 did not take banned weapons onto the hijacked aircraft (box cutters were permitted at the time), the call for better screening of all baggage was an immediately reaction. In response to the 9/11 attacks against the World Trade Center and the Pentagon, Congress mandated that all bags carried onto aircraft be inspected for various contraband (e.g., bombs). Inspection stations already existed for carry-on luggage, but baggage checked at the ticket counter was inspected only on international flights. Assessments by RAND and others indicated that even under optimistic assumptions, an inadequate number of machines would be available by

December 2002 (see Reference 1). Moreover, the anticipated growth in demand for travel over this decade would likely result in substantial passenger delays at the airports. To avoid such delays in the future, the size of the Electronic Detection System (EDS) acquisition would need to be nearly double the original estimate made immediately after 9/11. And because airports were never designed with security needs in mind, additional infrastructure would be needed to accommodate the new equipment at many airports.
DTIC
Baggage; Bags; Costs; Deployment; Terminal Facilities

20040201190 RAND Corp., Arlington, VA USA
Near-Term Options for Improving Security at Los Angeles International Airport
Stevens, Donald, Author; Schell, Terry, Author; Hamilton, Thomas, Author; Mesic, Richard, Author; Brown, Michael S., Author; Sep. 2004; 62 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427481; No Copyright; Avail: Defense Technical Information Center (DTIC)

Commissioned by Los Angeles World Airports (LAWA), this study examines near-term options for reducing the terrorist threat to LAX. Although the study has considered many possible terrorist threats and responses, the study results presented here focus on actions that can be taken at LAX to reduce the terrorist threat. We have not attempted a review of the overall effectiveness of Transportation Security Administration (TSA) procedures nor have we considered general national antiterrorist strategy. Terrorism is a complex international problem; here we are examining it only from LAWA's point of view. Terrorism has long been a serious problem for the air transportation system of the USA and the world. We note that of 5,347 deaths that have resulted from terrorist attacks on civil aviation since 1980, only 195 occurred in attacks on airports themselves, as opposed to aircraft. LAX is one of the safest places in Los Angeles. It was one of the first airports to implement baggage screening procedures, an on-site bomb squad, high police presence, a distributed terminal layout, and large numbers of bomb-sniffing dogs. Despite this high level of security, there are good reasons to believe that LAX is viewed by at least some terrorists as a particularly attractive target. Since 1974, LAX has been the site of two bombings, two attempted bombings, and one gun attack. In meeting the terrorist threat, we find that the problem is how to influence the behavior of an unpredictable enemy. The logical structure of the problem is similar to that of preventing nuclear war, which RAND has studied extensively over many years. The solution is to shape the situation so that in any scenario the outcomes from the terrorists point of view will be unsatisfactory.
DTIC
Airports; Security

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*.

20040191590 ISRO Satellite Centre, Peenya, Bangalore, India
Journal of Spacecraft Technology, Volume 14, No. 2
Thyagarajan, K., Editor; Jain, Y. K., Editor; Narayana, K. Badari, Editor; Sastry, S. V. K., Editor; Sridhar, M. S., Editor; Martin, Kamalini, Editor; Venkateswaralu, A., Editor; July 2004; ISSN 0971-1600; 60 pp.; In English; See also 20040191591 - 20040191596; Copyright; Avail: Other Sources

The Journal of Spacecraft Technology is a biannual publication of ISRO Satellite Centre, Bangalore, India. It is devoted exclusively to research and development in the fields of space and spacecraft technology and is meant for circulation amongst the professionals in the field. The contents of Volume 14, Number 2, July 2004 include: Development and Evaluation of Down Trimming of Thick Film Printed Resistors for Space Applications, Real-Time Measurement of E(sub b)/N(sub o) Ratio Received from the Satellite: Mathematical Analysis and Practical Implementation, Generation of Harmonics Due to Multipactor in Co-axial Geometry, Mega-Errors in Micro-Strain Measurement, Flexible Mode Frequency Tracking using Phase-Locked Loop, and A New Method for Enhancing Azimuth Extent of Imaging for Space Borne Sliding Spotlight SAR. Derived from text
Harmonics; Phase Locked Systems; Printed Resistors; Strain Measurement; Signal Analysis; Azimuth

20040196370 Starcraft Boosters, Inc., Canyon Lake, TX, USA

Space Transportation for a Lunar Resources Base (LRB)

Davis, Hubert P.; Space Resources Roundtable VI; 2004, pp. 16; In English; See also 20040196346

Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

This is a report of a work in progress. So far as the author is presently aware, this topic has not been previously addressed. Proprietary work by NASA or others may, however, exist that address similar topics. This work assumes that a base near the South Pole of our Moon will be established for the purpose of exploiting the resources of the Moon; principally the water ice that many believe was discovered by the Clementine and Lunar Prospector satellites. The ice is of particular value as, with the aid of the ample solar resource available nearby, it may become an essentially limitless source of oxygen / hydrogen propellants for continued visitation to and expansion of the base and for the support of additional space exploration missions, including human exploration of Mars. This work placed a total 129 tons initial base for both the in-crater and crater rim installations, as well as a 90 tons 'marshalling yard' at the Earth-Moon L-1 libration point. For launch services, the results of an in-house Shuttle-Derived Heavy Lft Launch Vehicle study were used. It is called Aquila. This vehicle can deliver over 50 tons to low Earth orbit from the Kennedy Space Center, using a combination of Space Shuttle and Delta IV-Heavy components.

Author (revised)

Space Transportation; Lunar Bases; Lunar Craters

20040196375 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Minimizing Launch Mass for ISRU Processes

England, C.; Hallinan, K. P.; Space Resources Roundtable VI; 2004, pp. 19; In English; See also 20040196346

Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

The University of Dayton and the Jet Propulsion Laboratory are developing a methodology for estimating the Earth launch mass (ELM) of processes for In-Situ Resource Utilization (ISRU) with a focus on lunar resource recovery. ISRU may be enabling for both an extended presence on the Moon, and for large sample return missions and for a human presence on Mars. To accomplish these exploration goals, the resources recovered by ISRU must offset the ELM for the recovery process. An appropriate figure of merit is the cost of the exploration mission, which is closely related to ELM. For a given production rate and resource concentration, the lowest ELM - and the best ISRU process - is achieved by minimizing capital equipment for both the ISRU process and energy production. ISRU processes incur Carnot limitations and second law losses (irreversibilities) that ultimately determine production rate, material utilization and energy efficiencies. Heat transfer, chemical reaction, and mechanical operations affect the ELM in ways that are best understood by examining the process's detailed energetics. Schemes for chemical and thermal processing that do not incorporate an understanding of second law losses will be incompletely understood. Our team is developing a methodology that will aid design and selection of ISRU processes by identifying the impact of thermodynamic losses on ELM. The methodology includes mechanical, thermal and chemical operations, and, when completed, will provide a procedure and rationale for optimizing their design and minimizing their cost. The technique for optimizing ISRU with respect to ELM draws from work of England and Funk that relates the cost of endothermic processes to their second law efficiencies. Our team joins their approach for recovering resources by chemical processing with analysis of thermal and mechanical operations in space. Commercial firms provide cost inputs for ELM and planetary landing. Additional information is included in the original extended abstract.

Author (revised)

In Situ Resource Utilization; Lunar Resources; Launch Vehicles; Weight Reduction

20040200963 NASA, Washington, DC, USA

To Boldly Go: The Universe Now and Beyond

NASA Administrator's Seminar Series; [2004]; 2 pp.; In English; 2 hrs., 1 min. playing time, in color, with sound; No Copyright; Avail: CASI; V04, Videotape-VHS

Dr. France Cordova, NASA's Chief Scientist opened this, the third session in the NASA Administrator's Seminar Series, by asking the following question: 'What would be a bold and aspiring agenda for America's next era in space?' It aimed at answering the following questions: What do we know about the universe? How do we know it? (Dr. Cordova also mentioned that the first seminar was about the definition of cellular life and how to recognize it, and featured as speakers, Dr. Lynn Margoles and Dr. Leslie Orgle.) Administrator Daniel S. Goldin was introduced; he welcomed the attendees, and remarked that NASA personnel have a critical need to explain to Congress and the public why a space program is important. Congress and the public pay for the space programs. Therefore the programs' importance cannot remain in the sole domain of scientists. The first speaker, Dr. Vera Ruben of the Department of Terrestrial Magnetism at the Carnegie Institute of Washington, was

introduced as an art historian expert in cosmology and an observational astronomer. Dr. Ruben brought up a number of questions regarding the substance, location, and origin of dark matter, radiation, galaxies, and the lumpy structure of galaxies in space, as well as the age and density of our universe. The next speaker was Dr. Bohdan Paczynski, a theoretical astrophysicist from Princeton University's Department of Astrophysical Sciences. The final speaker, Dr. Linda Schale is a cosmologist from the University of Texas at Austin. She was said to be a 'paleontologist of the human mind' who tries 'to understand mechanisms people use to understand the world'. The concluding discussion centered on why NASA scientists don t communicate better with people who are not highly educated. This is a big concern because to continue its work, NASA needs to communicate the importance of its goals to the average person. Additional information is included in the original extended abstract.
Author (revised)
NASA Space Programs; Space Exploration; Education

20040201273 Naval War Coll., Newport, RI USA
U.S. Space Power: The Achilles Heel of America's Economic Well-Being
Crosier, Clinton E., Author; May 2004; 27 pp.; In English
Report No.(s): AD-A427676; No Copyright; Avail: CASI; A03, Hardcopy

Today, the USA is more dependent on space capabilities, both militarily and economically, than any other country in the world.1 And, our dependence is growing at an exponential rate. However, just as with any leading edge technology or revolutionary capability, the cost is significant and budgets are limited. Consequently, it is critical that our space forces are properly prioritized, sized, and balanced with respect to national strategy and force planning to ensure we have the required capabilities to meet our national objectives. Our dependence on space assets for national defense receives the vast majority of attention. However, American's are rapidly becoming more and more reliant on space systems as part of the nation's critical economic infrastructure, and most American's don't even realize it. Further, the vulnerability of U.S. space systems to enemy/terrorist attack is growing with the proliferation of technology, is also widely unknown, and represents a critical weakness in the U.S. economic infrastructure. The purpose of this paper therefore, is to: 1) analyze our vital national economic interests and the strategic importance of our space capabilities; 2) demonstrate that current space forces are improperly programmed to fully meet their designated requirements in support of national interests; 3) demonstrate that the results of this deficiency could prove catastrophic; and 4) provide prescriptive solutions to rectify the 'strategic gap' between national interests and space capabilities.
DTIC
Aerospace Systems; Economics

13
ASTRODYNAMICS

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

20040201080 Naval Postgraduate School, Monterey, CA USA
Optimal Trajectory Reconfiguration and Retargeting for the X-33 Reusable Launch Vehicle
Shaffer, Patrick J., Author; Sep. 2004; 151 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427279; No Copyright; Avail: Defense Technical Information Center (DTIC)

This thesis considers the problem of generating optimal entry trajectories for a reusable launch vehicle following a control surface failure. The thesis builds upon the work of Dr. David Doman, Dr. Michael Oppenheimer and Dr. Michael Bolender of the Air Vehicles Directorate, Air Force Research Lab Dayton Ohio. The primary focus of this work is to demonstrate the feasibility of inner loop reconfiguration and outer loop trajectory retargeting and replanning for the X-33 reusable launch vehicle (RLV) following the imposition of a control surface failure. The trajectory generation model employs path constraints generated by an AFRL trim deficiency algorithm coupled with an inner loop control allocator and aerodynamic database that captures the full 6-DOF vehicle aerodynamic effects while utilizing an outer loop 3-DOF model. The resulting optimal trajectory does not violate the trim deficiency constraints and provides additional margins for trajectories flown during failure conditions. The footprints generated by the thesis show that contemporary footprint analysis for vehicles experiencing control surface failures are overly optimistic when compared to those footprints that consider vehicle aerodynamic stability and realistic landable attitudes at the threshold of the landing runway. The results of the thesis also show the performance

reductions resulting from decoupling the inner and outer loop and that trajectories can be generated to the landing runway without using a region of terminal area energy management.
DTIC
Launch Vehicles; Trajectories; X-33 Reusable Launch Vehicle

14
GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

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

20040196379 Old Dominion Univ., Norfolk, VA, USA
Toward a Sustainable Mars Infrastructure
Ash, Robert L.; Space Resources Roundtable VI; 2004, pp. 9; In English; See also 20040196346; Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Currently, there are four nuclear electric power-generating units operating on Mars (pairs of radioisotope thermal generators, now generating a little of 70 W each, located at the VL-1 and VL-2 landing sites), one small dusty solar array (Sojourner) and two somewhat larger solar arrays-one each for the Mars Rovers Spirit and Opportunity--in use currently. In addition, there are two Viking Landers, three robotic rovers with landers and scientific instruments, numerous aeroshells with associated entry gear, and a variety of crashed landers (Mars 2, Mars 3, Mars 6, Mars Polar Lander, and Beagle) strewn about the Mars landscape. Electric power on the Mars surface is in short supply, but electric power will be the key for developing a robust infrastructure capable of supporting human explorers. This talk will utilize the author's more than 25-year involvement with engineering system designs focused on the utilization of extraterrestrial resources, in order to frame the issues related to evolving a sustainable infrastructure on a planetary body that is too far from Earth for teleoperation and too far from the Sun to rely completely on Solar power. The talk will discuss some early work and its legacy, in the context of major increases in distributed computational power, component miniaturization and other advances. In order to build up a capability to return humans from the Martian surface, an unmanned landing and return site with significant levels of on-demand electric power is needed critically, but budgetary constraints and relatively short mission-planning horizons, along with the severe constraints that result from locking-in a landing site, will make such a determination and selection extremely difficult to justify. The author is beginning to collaborate with Old Dominion University's National Center for System of Systems Engineering, examining in situ resource utilization in the context of Moon, Mars and Beyond planning and those implications will be discussed.
Author
In Situ Resource Utilization; Mars Surface; Mars (Planet); Nuclear Electric Power Generation; Systems Engineering

20040196383 NASA Glenn Research Center, Cleveland, OH, USA
Granular Materials and Risks In ISRU
Behringer, Robert P.; Wilkinson, R. Allen; Space Resources Roundtable VI Program and Abstracts; 2004, pp. 10; In English; See also 20040196346; Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Working with soil, sand, powders, ores, cement and sintered bricks, excavating, grading construction sites, driving off-road, transporting granules in chutes and pipes, sifting gravel, separating solids from gases, and using hoppers are so routine that it seems straightforward to execute these operations on the Moon and Mars as we do on Earth. We discuss how little these processes are understood and point out the nature of trial-and-error practices that are used in today's massive over-design. Nevertheless, such designs have a high failure rate. Implementation and extensive incremental scaling up of industrial processes are routine because of the inadequate predictive tools for design. We present a number of pragmatic scenarios where granular materials play a role, the risks involved, what some of the basic issues are, and what understanding is needed to greatly reduce the risks. This talk will focus on a particular class of granular flow issues, those that pertain to dense materials, their physics, and the failure problems associated with them. In particular, key issues where basic predictability is lacking include stability of soils for the support of vehicles and facilities, ability to control the flow of dense materials (jamming and flooding/unjamming at the wrong time), the ability to predict stress profiles (hence create reliable designs) for containers such as bunkers or silos. In particular, stress fluctuations, which are not accounted for in standard granular design

models, can be very large as granular materials flows, and one result is frequent catastrophic failure of granular devices. Author

Granular Materials; Planetary Bases; Mars Surface

20040201529 NASA Johnson Space Center, Houston, TX, USA

Facilities

Extended Duration Orbiter Medical Project; [1999], pp. 7-1 - 7-4; In English; See also 20040201524; No Copyright; Avail: CASI; A01, Hardcopy

An expansion of medical data collection facilities was necessary to implement the Extended Duration Orbiter Medical Project (EDOMP). The primary objective of the EDOMP was to ensure the capability of crew members to reenter the Earth's atmosphere, land, and egress safely following a 16-day flight. Therefore, access to crew members as soon as possible after landing was crucial for most data collection activities. Also, with the advent of EDOMP, the quantity of investigations increased such that the landing day maximum data collection time increased accordingly from two hours to four hours. The preflight and postflight testing facilities at the Johnson Space Center (JSC) required only some additional testing equipment and minor modifications to the existing laboratories in order to fulfill EDOMP requirements. Necessary modifications at the landing sites were much more extensive.

Author

Flight Crews; Landing Sites; Research Facilities; Ground Handling; Space Shuttles; Ground Operational Support System

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*.

20040201069 Naval Postgraduate School, Monterey, CA USA

Optimizing Coverage and Revisit Time in Sparse Military Satellite Constellations: A Comparison of Traditional Approaches and Genetic Algorithms

Pegher, Douglas J., Author; Parish, Jason A., Author; Sep. 2004; 145 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427260; No Copyright; Avail: Defense Technical Information Center (DTIC)

Sparse military satellite constellations were designed using two methods: a traditional approach and a genetic algorithm. One of the traditional constellation designs was the Discoverer II space based radar. Discoverer II was an 8 plane, 24 satellite, Low Earth Orbit (LEO), Walker constellation designed to provide high-range resolution ground moving target indication (HRR-GMTI), synthetic aperture radar (SAR) imaging and high resolution digital terrain mapping. The traditional method designed 9-ball, 12-ball, 18-ball, and 24-ball Walker constellations. The genetic algorithm created constellations by deriving a phenotype from a triploid genotype encoding of orbital elements. The performance of both design methods were compared using a computer simulation. The fitness of each constellation was calculated using maximum gap time, maximum revisit time, and percent coverage. The goal was to determine if one design method would consistently outperform the other. The genetic algorithm offered a fitness improvement over traditional constellation design methods in all cases except the 24-ball constellation where it demonstrated comparable results. The genetic algorithm improvement over the traditional constellations increased as the number of satellites per constellation decreased. A derived equation related revisit time to the number of ship tracks maintained.

DTIC

Algorithms; Genetic Algorithms; Military Spacecraft; Satellite Constellations; Systems Engineering

20040201083 Naval Postgraduate School, Monterey, CA USA

The International Space Station Comparative Maintenance Analysis(CMAM)

Soldon, Brian T., Author; Sep. 2004; 77 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427287; No Copyright; Avail: Defense Technical Information Center (DTIC)

The following thesis describes the current model (the Reliability and Maintainability Assessment Tool RMAT) used by NASA and related prime contractors for the forecasting of Orbital Replacement Unit (ORU) failure rates and associated maintenance demands for the International Space Station (ISS). A new model (the Comparative Maintenance Analysis Tool CMAM) is introduced and developed for replicating some of the basic functionality of RMAT in order to provide a comparative look at RMAT results. The CMAM program, developed in Visual Basic.net and dynamically linked to a Microsoft

ACCESS database, focuses on a representative set of critical Orbital Replacement Units (ORUs that represent key items that require both internal and external maintenance in both pressurized and un- pressurized storage) and generated failure rate data for each critical ORU. The results of the CMAM model are then compared with the failure rates generated by RMAT program for the same set of critical ORUs. These two independently developed sets of data are then analyzed against historic failure rates for these ISS parts. The results of this analysis are used to conduct a sensitivity analysis of both the CMAM and RMAT programs in order to help identify the primary contributing factors behind divergence issues between forecasted / predicted failures and associated maintenance from actual (historical) failure rates. Recommendations are provided, based upon the results of the comparison, with respect to the sensitivity of RMAT to changes in certain input parameters, as well as on the feasibility of implementing CMAM as a comparative tool for use by both NASA and Boeing L&M personnel for the purpose of RMAT sensitivity analysis, as well as use in initial operational planning for optimizing ORU stocking levels while awaiting more comprehensive RMAT results.
DTIC
International Space Station; Maintenance; Space Stations

20040201088 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Analytical Solution for Low-Thrust Minimum Time Control of a Satellite Formation
Seo, John S., Author; Sep. 2004; 268 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427301; AFIT/DS/ENY/04-04; No Copyright; Avail: Defense Technical Information Center (DTIC)

Satellite formations or distributed satellite systems provide advantages not feasible with single satellites. Efficient operation of this platform requires the use of optimal control of the entire satellite formation. While the optimal control theory is well established, only a very simple dynamical system affords an analytical solution. Any practical optimal control problem solves the resulting two-point boundary value (TPBV) problem numerically. The relative satellite dynamics using Hill's coordinate system and approximations made by Clohessy and Wiltshire, combined with body-fixed thruster control, result in a linearized dynamic system. This dissertation provides the analysis for the minimum time satellite formation control by decoupling the in-plane motion from the out-of-plane motion. While the out-of-plane motion is fully analytic, the in-plane motion is only semi-analytic. The TPBV problem is transformed to solving simultaneous nonlinear equations for the critical control switching times, resulting in an open-loop, bang-bang controller.
DTIC
Artificial Satellites; Evolution; Natural Satellites

16
SPACE TRANSPORTATION AND SAFETY

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

20040200975 NASA Langley Research Center, Hampton, VA, USA
Structural Health Management for Future Aerospace Vehicles
Prosser, W. H.; Allison, S. G.; Woodard, S. E.; Wincheski, R. A.; Cooper, E. G.; Price, D. C.; Hedley, M.; Prokopenko, M.; Scott, D. A.; Tessler, A., et al.; [2004]; 16 pp.; In English; 2nd Australasian Workshop on Structural Health Monitoring, 16-17 Dec. 2004, Melbourne, Australia; No Copyright; Avail: CASI; A03, Hardcopy

Structural Health Management (SHM) will be of critical importance to provide the safety, reliability and affordability necessary for the future long duration space missions described in America's Vision for Space Exploration. Long duration missions to the Moon, Mars and beyond cannot be accomplished with the current paradigm of periodic, ground based structural integrity inspections. As evidenced by the Columbia tragedy, this approach is also inadequate for the current Shuttle fleet, thus leading to its initial implementation of on-board SHM sensing for impact detection as part of the return to flight effort. However, future space systems, to include both vehicles as well as structures such as habitation modules, will require an integrated array of onboard in-situ sensing systems. In addition, advanced data systems architectures will be necessary to communicate, store and process massive amounts of SHM data from large numbers of diverse sensors. Further, improved structural analysis and design algorithms will be necessary to incorporate SHM sensing into the design and construction of aerospace structures, as well as to fully utilize these sensing systems to provide both diagnosis and prognosis of structural integrity. Ultimately, structural integrity information will feed into an Integrated Vehicle Health Management (IVHM) system that will provide real-time knowledge of structural, propulsion, thermal protection and other critical systems for optimal

vehicle management and mission control. This paper will provide an overview of NASA research and development in the area of SHM as well as to highlight areas of technology improvement necessary to meet these future mission requirements.
Author
Safety; Structural Analysis; Aerospace Vehicles; Aerospace Systems; Data Systems; Detection

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*.

20040191593 ISRO Satellite Centre, Peenya, Bangalore, India
Flexible Mode Frequency Tracking using Phase-Locked Loop
Sarma, Santanu; Maharana, P. K.; Agrawal, V. K.; Journal of Spacecraft Technology, Volume 14, No. 2; July 2004, pp. 37-45; In English; See also 20040191590; Copyright; Avail: Other Sources

This paper describes the design of Phase-Locked Loop (PLL) to track frequency of flexible mode signals in flexible satellites. The phase detector of the PLL is associated with a 1ow-pass filter whose specifications are developed based on the frequency of the flexible modes. Subsequently, the filter order is designed with the desired suppression. The control loop filter is designed to force the phase error to zero enabling convergence to the actual modal frequency without steady state error. Simulation studies show tracking of frequency uncertainty up to +/- 50% deviations with noisy signals with PLL designed for 30% uncertainty in frequency. Further the design is robust enough to track the frequency of damped flexible mode with good accuracy in presence of noise and other undesired signal. A robust design has been achieved meeting the desired performance goals.
Author
Artificial Satellites; Phase Locked Systems; Flexible Spacecraft; Phase Detectors

20040191708 NASA, Washington, DC, USA
X-37 Flight Demonstrator Project: Capabilities for Future Space Transportation System Development
Dumbacher, Daniel L.; [2004]; 8 pp.; In English; International Astronautical Federation, 7 Oct. 2004, Vancouver, Canada
Report No.(s): IAC-04-V-6.05; No Copyright; Avail: CASI; A02, Hardcopy

The X-37 Approach and Landing Vehicle (ALTV) is an automated (unmanned) spacecraft designed to reduce technical risk in the descent and landing phases of flight. ALTV mission requirements and Orbital Vehicle (OV) technology research and development (R&D) goals are formulated to validate and mature high-payoff ground and flight technologies such as Thermal Protection Systems (TPS). It has been more than three decades since the Space Shuttle was designed and built. Real-world hardware experience gained through the multitude of X-37 Project activities has expanded both Government and industry knowledge of the challenges involved in developing new generations of spacecraft that can fulfill the Vision for Space Exploration.
Author
Space Transportation System; Unmanned Spacecraft; X-37 Vehicle; Automatic Control; Orbital Maneuvering Vehicles

20040200981 NASA Langley Research Center, Hampton, VA, USA
Frequency Weighted H2 Control Design for the Glovebox Integrated Microgravity Isolation Technology (g-LIMIT)
Calhoun, Philip C.; Hampton, R. David; November 2004; 16 pp.; In English
Contract(s)/Grant(s): WU 23-979-20-10
Report No.(s): NASA/TM-2004-213502; L-19057; No Copyright; Avail: CASI; A03, Hardcopy

The acceleration environment on the International Space Station (ISS) exceeds the requirements of many microgravity experiments. The Glovebox Integrated Microgravity Isolation Technology (g-LIMIT) has been built by the NASA Marshall Space Flight Center to attenuate the nominal acceleration environment and provide some isolation for microgravity science experiments. The g-LIMIT uses Lorentz (voice-coil) magnetic actuators to isolate a platform, for mounting science payloads, from the nominal acceleration environment. The system utilizes payload-acceleration, relative-position, and relative-orientation measurements in a feedback controller to accomplish the vibration isolation task. The controller provides current commands to six magnetic actuators, producing the required experiment isolation from the ISS acceleration environment. The

present work documents the development of a candidate control law to meet the acceleration attenuation requirements for the g-LIMIT experiment platform. The controller design is developed using linear optimal control techniques for frequency-weighted H2 norms. Comparison of performance and robustness to plant uncertainty for this control design approach is included in the discussion. System performance is demonstrated in the presence of plant modeling error.
Author
Control Systems Design; Frequency Control; International Space Station; Vibration Isolators; Microgravity

19
SPACECRAFT INSTRUMENTATION AND ASTRIONICS

Includes the design, manufacture, or use of devices for the purpose of measuring, detecting, controlling, computing, recording, or processing data related to the operation of space vehicles or platforms. For related information see also *06 Avionics and Aircraft Instrumentation*; for spaceborne instruments not integral to the vehicle itself see *35 Instrumentation and Photography*; for spaceborne telescopes and other astronomical instruments see *89 Astronomy*.

20040200734
Calibration Experiment of All-sky Electrostatic Analyzer
Miyake, Wataru; Yamazaki, Atsushi; Review of the National Institute of Information and Communications Technology; March/June 2004; Volume 50, Nos. 1/2, pp. 167-178; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

Electrostatic analyzers have been widely used for measuring the energy and incident angle distribution of space plasma on board the spacecraft. The measurement enables us to derive the flow velocity, density, and temperature of plasma, to detect the large-scale disturbances in space, and to forecast the space weather. An electrostatic analyzer with all-sky field of view has been developed for the L5 mission and the proto-type model is calibrated by a ground facility. The results demonstrate a fair agreement with the numerical model calculations and its capability of the space plasma measurement on board 3-axis stabilized spacecraft such as the L5 mission.
Author
Spacecraft Electronic Equipment; Electrostatic Probes; Calibrating

23
CHEMISTRY AND MATERIALS (GENERAL)

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

20040196376 Colorado School of Mines, Golden, CO, USA
The Application of Self-propagating High Temperature (Combustion) Synthesis (SHS) for In-Space Fabrication and Repair
Zhang, Xiaolan; Yi, Hu Chun; Guigne, Jacques Y.; Mannerbino, A.; Moore, John J.; Space Resources Roundtable VI; [2004], pp. 51; In English; See also 20040196346; Copyright; Abstract Only; Available from CASI only as part of the entire parent document

Self-propagating high temperature synthesis (SHS), also called combustion synthesis, is an extremely versatile, rapid and energetically favorable process: the energy needed to sustain the process coming fiom the chemical energy of the exothermic reaction mix. SHS can be used to synthesize, repair and join a wide range of advanced materials, filly dense or with controlled porosity (20-90%), in low vacuum, low and microgravity environments, and in oxygen-free or oxygenated (including a C02) environments. As such, these engineered SHS reaction systems can be designed to take advantage of the ambient environment, rendering an extremely high degree of process versatility and flexibility. center for the Commercial Application of Combustion in Space (CCACS) at Colorado School of Mines, and GuignC Space Systems Inc. (GSSI) has developed SHS technologies that are capable of producing net- and near-net-shaped components, and to join both similar and dissimilar materials such as intermetallics, metals, ceramics and composites. materials with examples that include acoustic damping materials for rocket engines, joining of components, shuttle wing repair, and mineral sterilization. In particular, the application of this technology for in-space fabrication and repair will be highlighted. A research team based in Golden, Colorado comprising materials scientists from the The paper will discuss the application of SHS to fabricate and repair a wide range of materials with examples that include acoustic damping materials for rocket engines, joining of components, shuttle wing repair, and mineral

sterilization. In particular, the application of this technology for in-space fabrication and repair will be highlighted.
Author
Combustion Synthesis; High Temperature; Self Propagation; Aerospace Systems; Exothermic Reactions

20040201053 Advanced Asphalt Technologies, LLC, Sterling, VA, USA
Evaluation of Indirect Tensile Test (IDT) Procedures for Low-Temperature Performance of Hot Mix Asphalt
Christensen, D. W.; Bonaquist, R. F.; 2004; 66 pp.; In English
Report No.(s): PB2005-101363; NCHRP-530; No Copyright; Avail: CASI; A04, Hardcopy

This report presents the findings of a research project to evaluate the use of the indirect tensile creep and strength test procedures in AASHTO Standard Method of Test T322-03 in mixture and structural design methods for hot mix asphalt. The report will be of particular interest to pavement design and materials engineers in state highway agencies, as well as to materials suppliers and paving contractor personnel who are responsible for the design and evaluation of hot mix asphalt mixtures and pavements.
NTIS
Asphalt; Tensile Tests; Low Temperature; Structural Design

20040201107 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
The Physical Understanding of the Use of Coatings to Mitigate Hypervelocity Gouging Considering Real Test Sled Dimensions
Szmerekovsky, Andrew G., Author; Sep. 2004; 447 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427344; AFIT/DS/ENY/04-06; No Copyright; Avail: Defense Technical Information Center (DTIC)

A dimensional analysis with accompanying numerical investigation is conducted. A simplified model of the real test sled is created that allows test sled dimensions to be converted to a numerical model for analysis. The dimensional analysis is used as a means of directly applying the numerical results to real test sled conditions. Similarity principles are studied and tested by comparing the results from scaled numerical models. Strain rate and other time dependent parameters are not scaled, but the effect of these parameters may be quantified and studied further. The dimensional analysis also provides a comprehensive approach to the test sled system by providing parameters whose affect on the final solution may be studied and quantified. The scaling parameters may also be used to determine which quantities must be modified so that results apply. Time and length scales for studying the problem are also determined using the dimensional analysis process. The use of coatings in mitigating damage to materials under high energy impact is also studied. The research is directed toward a scientific approach in determining the potential advantage of specific coatings acting under shock loading conditions and understanding the physics behind these advantages. Friction and heat generation effects are considered for rails with and without a coating.
DTIC
Hypervelocity Impact; Sleds

20040201265 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany
Herstellung and Untersuchung con (Ba,Sr)TiO3-Duennschichten fuer zukuenftige hochintegrierte Halbleiterspeichr (Manufacture and Testing of (Ba, Sr)TiO3 Thin Layers for Future Highly Integrated Semiconductor Storage)
Hornik, Karl, Author; Mar. 2001; 108 pp.; In English; In German
Report No.(s): AD-A427657; No Copyright; Avail: CASI; A06, Hardcopy

This study is concerned with the morphological and electrical qualities of thin mixed crystal systems in (Ba,Sr) TiO3 layers that were shed out of the gas phase through metal-organic chemical vapor deposition. Influence parameters, such as field and temperature, layer thickness, stoichiometry, and electrode materials, as well as manufacturing conditions, are discussed. An essential difficulty that arose from this investigation involved the employment of mixed crystal systems as a non-transient relaxation streams in a short time frame and discusses present physical mechanisms. High frequency experiments rounded out the tests on non-conductor relaxation.
DTIC
Crystals; Organometallic Compounds; Semiconductors (Materials); Vapor Deposition

20040201420 NASA Langley Research Center, Hampton, VA, USA

National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1

Prior, Edwin J., Compiler; Jacobs, James A., Compiler; Edmonson, William, Compiler; Wilkerson, Amy, Compiler; September 2004; 569 pp.; In English; 18th Annual National Educators' Workshop, 19-22 Oct. 2003, Hampton, VA, USA; See also 20040201421 - 20040201447

Contract(s)/Grant(s): WU 23-772-30-HA

Report No.(s): NASA/CP-2004-213243/PT1; L-18386A/PT1; No Copyright; Avail: CASI; A24, Hardcopy

The 18th Annual National Educators Workshop [NEW:Update 2003] was a part of NASA Langley s celebration of the Centennial of Controlled, Powered Flight by Orville and Wilbur Wright on December 17, 1903. The conference proceedings from NEW:Update 2003 reflect the Flight 100 theme by first providing a historic perspective on the remarkable accomplishments of the Wright Brothers. The historical perspective set the stag for insights into aeronautics and aerospace structures and materials now and into the future. The NEW:Update 2003 proceedings provide valuable resources to educators and students in the form of visuals, experiments and demonstrations for classes/labs at levels ranging from precollege through college education.

Author

Aircraft Structures; Research and Development; Technologies; Flight Control; Education

20040201421 Maury High School, Norfolk, VA, USA

Turning Students on to Material Science in High Schools

Bushey, Duane R.; Crider, Roger; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 129-154; In English; See also 20040201420; No Copyright; Avail: CASI; A03, Hardcopy

This viewgraph presentation proposes a strategy for teaching materials science to high school students. The strategy includes activities which students can perform to better understand solids, metals, ceramics and glass, polymers, and composites.

CASI

Materials Science; Education; Students

20040201469 NASA Langley Research Center, Hampton, VA, USA

National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2

Prior, Edwin J., Compiler; Jacobs, James A., Compiler; Edmonson, William, Compiler; Wilkerson, Amy, Compiler; September 2004; 552 pp.; In English; 18th Annual National Educators' Workshop, 19-22 Oct. 2003, Hampton, VA, USA; See also 20040201470 - 20040201503

Contract(s)/Grant(s): WU 23-772-30-HA

Report No.(s): NASA/CP-2004-213243/PT2; L-18386B/PT2; No Copyright; Avail: CASI; A24, Hardcopy

The 18th Annual National Educators Workshop [NEW:Update 2003] was a part of NASA Langley s celebration of the Centennial of Controlled, Powered Flight by Orville and Wilbur Wright on December 17, 1903. The conference proceedings from NEW:Update 2003 reflect the Flight 100 theme by first providing a historic perspective on the remarkable accomplishments of the Wright Brothers. The historical perspective set the stag for insights into aeronautics and aerospace structures and materials now and into the future. The NEW:Update 2003 proceedings provide valuable resources to educators and students in the form of visuals, experiments and demonstrations for classes/labs at levels ranging from precollege through college education.

Author

Education; Materials Science; Aircraft Structures; Flight Control

20040201470 NASA Langley Research Center, Hampton, VA, USA

Polymeric Materials Resistant to Erosion by Atomic Oxygen

Kiefer, Richard L.; Thibeault, Sheila A.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 523-543; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

Polymer-matrix composites are ideally suited for space vehicles because of high strength to weight ratios. The principal

component of the low earth orbit (LEO) is atomic oxygen. Atomic oxygen causes surface erosion to polymeric materials. Polymer films with an organometallic additive showed greater resistance to atomic oxygen than the pure polymer in laboratory experiments and in the OPM/MIR experiment. In MISSE, the film with the organometallic additive was still intact after the pure film had completely eroded.
Author
Surface Properties; Polymer Matrix Composites; Optical Properties; Organometallic Compounds

20040201477 California Univ., Davis, CA, USA
Experiments in X-ray Powder Diffraction
Meier, Mike; Foo, Kit; Kirchhofer, Rita; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 949-965; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

Four experiments in x-ray diffraction covering basics, common and advanced techniques. Each builds upon the previous, ends with a capstone exercise, and asks the student to interpret a diffraction pattern that deviates greatly from what was expected. Also, we use the diffractometer as the student's first analytical instrument. It is relatively easy to use and understand and helps teach data collection/sampling, the use of filters and standards, and factors effecting energy and angular resolution, all of which are common to many other instruments.
Author
X Ray Diffraction; Quantitative Analysis; Residual Stress; Diffraction Patterns; Diffractometers

20040201481 Norfolk State Univ., VA, USA
Microwave Controlled Paper Actuator
Song, Kyo D.; Golembiewski, Walter; Kim, Jae-Hwan; Chu, Sang-Hyun; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 697-704; In English; See also 20040201469; No Copyright; Avail: CASI; A02, Hardcopy

An experimental study of an electroactive paper actuator driven by microwaves is presented in this paper. A proof of concept experiment using paper materials has been set up and demonstrated using microwaves. The smart paper actuator system driven by microwaves may have applications, such as bio-mimic flying objects and micro air vehicles (MAV).
Author
Actuators; Electromagnetic Wave Transmission; Signal Generators; Microwaves; Mechanical Engineering

20040201483 Purdue Univ., Richmond, IN, USA
Ferro-Magnetic Materials and Tests
Kozak, Michael J.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 789-792; In English; See also 20040201469; No Copyright; Avail: CASI; A01, Hardcopy

It is often assumed that all stainless steels have the same degree of attraction to a magnet. This is not the case. There are five basic classes of stainless steel [1]. They are classed by their microstructure and are; austenitic, ferritic, martensitic, duplex, and precipitation hardened. Austenitic stainless steels are usually not magnetic unless they have been significantly cold worked [2]. The four other types of stainless steels typically all exhibit significant attraction to a magnet. Coins of different currencies and face values can be made of different metals. Coins from the USA are non magnetic unless they have been altered [3]. Foreign coins are sometimes magnetic, especially German ones [4]. Magnetic coins usually contain iron. Besides iron, other elements such as cobalt, nickel, and gadolinium show strong magnetic forces [5]. Coins containing these elements may also be magnetic.
Author
Austenitic Stainless Steels; Ferromagnetic Materials; Metals

20040201487 Norfolk State Univ., VA, USA
Electrochemistry in the Study of Materials
Rowe, H. Alan; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 783-788; In English; See also 20040201469; No Copyright; Avail: CASI; A02, Hardcopy

There are many examples of electrolytic experiments in the literature. Many of these procedures suffer from poor adhesion

of the electroplated material to the electrodes. In most of these cases the mass of metal deposited cannot be accurately determined so there are large errors in subsequent calculations. The procedure described here improves upon these methods by shaping and pretreating the electrode surface. zinc cathode usually contains areas of potential mechanical stress where the strip or wire was cut or bent, or has sharp edges, etc. These areas may have a electric field different that the rest of the surface frequently resulting in long irregular strands of metal being deposited at these locations, adversely affecting the uniform deposition of metal needed for accurate analysis. This problem can be reduced by removing as many stress points as possible (rounding corners, using different shape electrodes, etc) and by gently treating (no abrasives) the electrode surface with a weak organic acid and lightly polishing. We have found that is the electrode to be coated is briefly treated as the anode, this greatly reduces the formation of the long fibers and results in the acquisition of very good data.
Author
Electrochemistry; Faraday Effect; Electrolysis; Electroplating; Zinc

20040201494 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA
Bubble Trouble
Prior, Sandra L.; Prior, Christopher N.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 545-551; In English; See also 20040201469; No Copyright; Avail: CASI; A02, Hardcopy

Density is the mass per unit volume of any substance, including liquids. The density of a material helps to distinguish it from other materials. Since mass is usually expressed in grams and volume in cubic centimeters, density is expressed in grams/cubic centimeter. For example, you have two balls, a basketball and a bowling ball, and both are the same size. Since the bowling ball is heavier than the basketball, you know that it has to be more dense, since they both take up the same amount of space overall. The density of a liquid determines whether the liquid will sink or float on water. A good example of this is Italian salad dressing in which the salad oil is floating on top of the vinegar. The density of vinegar is similar to water. The density of the oil is lighter than water therefore the oil floats on top of the vinegar. The density of a gas is the mass per a unit volume of a given gas relative to that of air. It is usually expressed as grams per liter (g/L) at a specific temperature. [Note that gas density is slightly more complex than discussing solid/liquid density since gas volume is very responsive to temperature and pressure.] Vapor density is slightly different from gas density in that it simply indicates how many times the vapor of a substance is heavier than air. It does not have a unit and it is written as a number followed by air = 1 in parentheses. Vapor density is calculated by dividing the molar mass of a substance with that of air where the molar mass of air is equal to 29 g/mol. It is often necessary to know whether a gas and/or the vapors of a hazardous substance are heavier than air. Heavier gases/vapors can accumulate in low spots whereas lighter gases/vapors will rise and disperse. Heavier gases/vapors present a particular hazard because of the way in which they accumulate. For example, vapors of a flammable liquid that are heavier than air can present a flashback fire hazard. They travel along low spots away from the flammable liquid source. If they encounter an ignition source at some distance away, the vapor will ignite and follow its path back to the flammable liquid source, similar to a fuse on a stick of dynamite. Toxic gases can accumulate and poison workers; non toxic gases may displace air and cause suffocation. Knowing the density of a substance can also lead to useful applications. For example, carbon dioxide, which is heavier than air, is used to extinguish fires. Carbon dioxide smothers a fire by forming a blanket of gas on top of the fire and pushing out the air. Without air, the fire cannot burn. Density measurements are an important analytical technique in a variety of applications as well. The condition of an automobile storage battery can be judged by measuring the density of the electrolyte, which is a sulfuric acid solution. As the battery discharges the acid combines with the lead in the battery plates to form insoluble lead sulfate, decreasing the density of the solution. The density is measured with an instrument, a hydrometer, by observing the level at which a calibrated body floats in a sample of the solution. Medicine has many uses for density too. Some examples include tests on body fluids such as blood and urine. An unusually low density in blood may indicate anemia. Certain diseases can increase the salt level in urine and thus the urine density. This experiment focuses on scientific observation of gas/vapor density behaviors. We do this by filling a container with a certain amount of gas and observing if rises or falls. In this demonstration, a soap bubble serves as the container. Some gases, such as helium and hydrogen, have a density that is less than the density of air, so soap bubbles filled with lighter gases will rise. The speed with which they rise is an indication of just how much lighter the gas of interest is than air. You will note that the helium filled bubbles will rise very quickly. Other gases, such as carbon dioxide or nitrogen, have a density that is heier than air, so soap bubbles filled with these gases will fall to the ground. Theoretically, bubbles filled with air should remain suspended in air indefinitely since their densities are the same. But air-filled soap bubbles will eventually fall to the ground due to the added weight of their containers, the soap bubbles.
Author
Gas Density; Vapors; Electrolytes; Toxicity; Bubbles

20040201502 Purdue Univ., West Lafayette, IN, USA

Decision-Making by Weighted-Rating

Widener, Edward L.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 967-972; In English; See also 20040201469; No Copyright; Avail: CASI; A02, Hardcopy

Souvenir Letters (6) which spell PURDUE are to be stored in a rack (acrylic or wood) and used as a desk decoration, or individually as paper-weights. Each letter would be formed as a block having attractive color and weight. But low cost and high price are pluses. Casting in the MET142 Foundary Lab was our preferred process to make the 5 prismatic shapes for 6 letters. Our PURDUE LETTERS project involved several MET/CIMT classes in the Mechanical Engineering Technology Department. Applied Materials and Processes MET 141 included decision-making by weighted-rating calculations. My fall 1999 class found the logical material for casting block letters in yellow brass.

Author

Materials Selection; Metals; Ceramics; Polymers; Mechanical Engineering; Acrylic Resins

20040201541 Cincinnati Univ., OH, USA

Characteristics of Spilled Oils, Fuels, and Petroleum Products, 2A, Dispersant Effectiveness Data for a Suite of Environmental Conditions: The Effects of Temperature, Volatilization, and Energy

Sorial, G.; Chandrasekar, S.; Weaver, J. W.; Sep. 2004; 88 pp.; In English; See also PB2004-101169

Report No.(s): PB2005-101443; No Copyright; Avail: CASI; A05, Hardcopy

Chemical dispersants are used in oil spill response operations to enhance the dispersion of oil slicks at sea as small oil droplets in the water column.Due to the complexity of chemical and physical interactions between spilled oils, dispersants and the sea, an empirical approach to characterizing the interaction between the dispersant and oil slick may provide a useful or practical approach for including dispersant action in a model. The main objective of this research is to create a set of empirical data on three oils and two dispersants that has the potential for use as an input to the ERO3S model. These data are intended to give an indication of the amount of dispersal of these oils under certain conditions.The US EPA is developing an improved dispersant testing protocol, called the baffled flask test (BFT), which is a refinement of the swirling flask test. Use of this protocol was the basis of the experiments conducted in this study. The variations in the effectiveness of dispersants caused by changes in oil composition, dispersant type, and the environmentally related variables of temperature, oil weathering, and rotational speed of the BFT were studied. The three oils tested were South Louisiana Crude Oil (SLC), an Alaska North Slope Crude (Prudhoe Bay Crude Oil, PBC), and Number 2 fuel oil (2FO). The two dispersants with the highest effectiveness scores under certain test conditions reported earlier were selected for this study. A factorial experimental design was conducted for each of the three oils for four factors: volatilization, dispersant type, temperature and flask speed.

NTIS

Oil Slicks; Dispersing; Environment Effects

24
COMPOSITE MATERIALS

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

20040191591 ISRO Satellite Centre, Peenya, Bangalore, India

Mega-Errors in Micro-Strain Measurement

Potdar, Prasanna A.; Veenaranjini, S. M.; Singh, Gajbir; Journal of Spacecraft Technology, Volume 14, No. 2; July 2004, pp. 27-37; In English; See also 20040191590; Copyright; Avail: Other Sources

The objective of this study is to investigate the influence of a strain gauge's self-stiffness on its measurement accuracy when the substrate is highly flexible. For this purpose rectangular sandwich panels with Carbon Fibre Reinforced Plastic (CFRP) face-skin and aluminium honeycomb core are considered. The study also aims to study the effect of dimples in the faceskin of sandwich constructions on the accuracy of strain measurement. Highly refined finite element models of the rectangular sandwich plates along with strain gauges at different locations are developed. An averaging procedure is developed to predict the strain gauge output. Errors due to averaging and flexibility/stiffness of strain gauge/substrate etc. are studied in detail.

Author

Strain Measurement; Sandwich Structures; Honeycomb Cores; Carbon Fiber Reinforced Plastics; Strain Gages; Finite Element Method

20040191595 ISRO Satellite Centre, Peenya, Bangalore, India

Development and Evaluation of Down Trimming of Thick Film Printed Resistors for Space Applications

Darukesha, B. H. M.; Venkatesh, V.; Kanthimathinathan, T.; Batra, Arun; Journal of Spacecraft Technology, Volume 14, No. 2; July 2004, pp. 1-4; In English; See also 20040191590; Copyright; Avail: Other Sources

This paper presents a novel process of down trimming of thick film printed resistors used in Hybrid Micro Circuit (HMC)s for various subsystems of spacecraft. The process is standardized and the theory of segregation/redistribution of composite material is presented in this paper. Down-trimmed resistors are tested and characterized for their stability, TCR, VCR, current crowding, noise etc. and are found to perform very well. The process enables flexibility in the HMC layout design and minimizes production wastage and the problem of non-uniform current crowding experienced in up-trimmed resistors. The process uses Birox(R) resistor past and 1.064 micron laser. The development could be a major breakthrough in the field.
Author

Composite Materials; Printed Resistors; Thick Films; Hybrid Circuits

20040201035 Minnesota Univ., Minneapolis, MN, USA

New Polymer Electrolyte Cell Systems

Smyrl, William H.; Owens, Boone B.; Mann, Kent; Pappenfus, T.; Henderson, W.; December 16, 2004; 2 pp.; In English Contract(s)/Grant(s): NRA-00-GRC-1; Proj. 1696-518-6625; No Copyright; Avail: CASI; A01, Hardcopy

PAPERS PUBLISHED: 1. Pappenfus, Ted M.; Henderson, Wesley A.; Owens, Boone B.; Mann, Kent R.; Smyrl, William H. Complexes of Lithium Imide Salts with Tetraglyme and Their Polyelectrolyte Composite Materials. Journal of the Electrochemical Society (2004), 15 1 (2), A209-A2 15. 2. Pappenfus, Ted M.; Henderson, Wesley A.; Owens, Boone B.; Mann, Kent R.; Smyrl, William H. Ionic-liquidlpolymer electrolyte composite materials for electrochemical device applications. Polymeric Materials Science and Engineering (2003), 88 302. 3. Pappenfus, Ted R.; Henderson, Wesley A.; Owens, Boone B.; Mann, Kent R.; and Smyrl, William H. Ionic Conductivity of a poly(vinylpyridinium)/Silver Iodide Solid Polymer Electrolyte System. Solid State Ionics (in press 2004). 4. Pappenfus Ted M.; Mann, Kent R; Smyrl, William H. Polyelectrolyte Composite Materials with LiPFs and Tetraglyme. Electrochemical and Solid State Letters, (2004), 7(8), A254.
Derived from text

Composite Materials; Electrolytic Cells; Solid Electrolytes; Transferred Electron Devices; Lithium; Ion Currents

20040201422 Advanced Ceramics Research, Inc., Tucson, AZ, USA

Carbon Nanotube Reinforced Polymers for Radiation Shielding Applications

Thibeault, S., Technical Monitor; Vaidyanathan, Ranji; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 207-231; In English; See also 20040201420 Contract(s)/Grant(s): NAS1-02102; No Copyright; Avail: CASI; A03, Hardcopy

This viewgraph presentation provides information on the use of Extrusion Freeform Fabrication (EEF) for the fabrication of carbon nanotubes. The presentation addresses TGA analysis, Raman spectroscopy, radiation tests, and mechanical properties of the carbon nanotubes.
CASI

Carbon Nanotubes; Fabrication; Extruding; Nanocomposites

20040201480 Naval Academy, Annapolis, MD, USA

Behavior of Composites: Effects of Fiber Type and Content or Can We Break Something Today?

Joyce, Peter J.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 613-653; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

Contents include the following: Textbook composites. Tension, compression and shear testing. Effect of type and orientation. Fiber density and volume fraction determination. Mechanical testing of vacuum bag cured composites. Wet layup and autoclave curing/vacuum bagging demo. Vacuum sealant tape. ASTM standard database. search. Compute specific tensile strength.
CASI

Fiber Volume Fraction; Textbooks; Tensile Strength; Data Bases

20040201484 National Inst. of Standards and Technology, Gaithersburg, MD, USA

The Impact of Interfacial Adhesion on the Strain-to-Failure of Clay/Epoxy Nanocomposites

Kim, Jae-Hyun; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 851-862; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

In this paper a simple methodology is present for detecting the onset of debonding in clay based nanocomposites. The procedure is based on the constant illumination of the test specimen as it is subjected to tensile deformation by sequential step-strains. After each step-strain, an image of the specimen is taken along its gauge length using a digital camera, with the image being stored in the computer for later analysis using image analysis software. Test results from a nanocomposite containing a weak interface between the clay and matrix indicates that interface debonding begins to occur above 1% strain, as evidenced by a reduction in the transmitted light through the specimen with increasing strain. Based on related research, the darkening of the specimen was interpreted as clay-matrix debonding. In contrast to the approximately 11% failure strain of the base epoxy resin, the nanocomposite specimen with the weak interface failed at 3.6% strain. Using the surface treatment technology advanced in the development of nylon-clay nanocomposites, interfacial adhesion between the clay and matrix was achieved through the establishment of covalent bonds between the acid groups on the treated clay surface and the epoxide group of the resin. As a result, the darkening of the specimen above 1% strain was suppressed. However, the strain-to-failure of this strong interface clay nanocomposite was less than the weak interface nanocomposite (approximately 1.6% strain). The incomplete exfoliation of the clay and non-optimized curing between the clay platelets are believed to be responsible for this reduction in failure strain.

Author

Nanocomposites; Debonding (Materials); Adhesion; Failure Analysis; Montmorillonite; Interfacial Energy; Clays; Epoxy Compounds

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INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY

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

20040200957 NASA Johnson Space Center, Houston, TX, USA

Purification Procedures for Single-Wall Carbon Nanotubes

Gorelik, Olga P.; Nikolaev, Pavel; Arepalli, Sivaram; May 2001; 64 pp.; In English

Contract(s)/Grant(s): NAS9-19100

Report No.(s): NASA/CR-2000-208926; S-874; No Copyright; Avail: CASI; A04, Hardcopy

This report summarizes the comparison of a variety of procedures used to purify carbon nanotubes. Carbon nanotube material is produced by the arc process and laser oven process. Most of the procedures are tested using laser-grown, single-wall nanotube (SWNT) material. The material is characterized at each step of the purification procedures by using different techniques including scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDS), transmission electron microscopy (TEM), Raman, X-ray diffractometry (XRD), thermogravimetric analysis (TGA), nuclear magnetic resonance (NMR), and high-performance liquid chromatography (HPLC). The identified impurities are amorphous and graphitic carbon, catalyst particle aggregates, fullerenes, and hydrocarbons. Solvent extraction and low-temperature annealing are used to reduce the amount of volatile hydrocarbons and dissolve fullerenes. Metal catalysts and amorphous as well as graphitic carbon are oxidized by reflux in acids including HCl, HNO3 and HF and other oxidizers such as H2O2. High-temperature annealing in vacuum and in inert atmosphere helps to improve the quality of SWNTs by increasing crystallinity and reducing intercalation.

Author

Carbon Nanotubes; Purification; Thermogravimetry; Scanning Electron Microscopy; Transmission Electron Microscopy; Nuclear Magnetic Resonance; Liquid Chromatography

20040201042 Illinois Univ., Chicago, IL, USA

A Numerical Investigation of the Extinction of Low Strain Rate Diffusion Flames by an Agent in Microgravity

Puri, Ishwar K.; [2004]; 1 pp.; In English

Contract(s)/Grant(s): NNC04GA13G; No Copyright; Avail: CASI; A01, Hardcopy

Our goal has been to investigate the influence of both dilution and radiation on the extinction process of nonpremixed flames at low strain rates. Simulations have been performed by using a counterflow code and three radiation models have been included in it, namely, the optically thin, the narrowband, and discrete ordinate models. The counterflow flame code OPPDIFF was modified to account for heat transfer losses by radiation from the hot gases. The discrete ordinate method (DOM) approximation was first suggested by Chandrasekhar for solving problems in interstellar atmospheres. Carlson and Lathrop developed the method for solving multi-dimensional problem in neutron transport. Only recently has the method received attention in the field of heat transfer. Due to the applicability of the discrete ordinate method for thermal radiation problems involving flames, the narrowband code RADCAL was modified to calculate the radiative properties of the gases. A non-premixed counterflow flame was simulated with the discrete ordinate method for radiative emissions. In comparison with two other models, it was found that the heat losses were comparable with the optically thin and simple narrowband model. The optically thin model had the highest heat losses followed by the DOM model and the narrow-band model.
Author
Fires; Microgravity; Radiative Heat Transfer; Extinction; Premixed Flames; Narrowband

20040201096 Army Research Lab., Aberdeen Proving Ground, MD USA
Spall Strength of Tungsten Carbide
Dandekar, Dattatraya P., Author; Sep. 2004; 28 pp.; In English
Contract(s)/Grant(s): Proj-AH43
Report No.(s): AD-A427318; ARL-TR-3335; No Copyright; Avail: Defense Technical Information Center (DTIC)

Spall strength of a hot-pressed tungsten carbide manufactured by Cercom Inc. referred to as CER-WC. is determined by performing plane shock wave experiments as a function of shock-induced compressive stress and its duration. Shock-induced stress varied between 3.5 and 24 GPa. The duration of shock-induced stress. i.e.. pulse with. ranged from 0.35 to 1.13 mus. These experiments showed that CER-WC retained substantial spall strength to 24 GPa. i. e.. around 3x the value of the Hugoniot elastic limit. Spall strength of CER-WC was not significantly influenced by the pulse-width of shock-induced compression. Spall strength of CER-WC decreased from a value of 2.06 +/- 0.04 to 1.22 + 0.38 GPa as shock-induced stress increased from 3.4 to 24 GPa.
DTIC
Shock Waves; Tungsten Carbides

20040201123 Desert Research Inst., Reno, NV USA
Geochemical and Physical Characteristics of Iraqi Dust and Soil Samples
McDonald, Eric V., Author; Caldwell, Todd, Author; Oct. 2004; 63 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): W911NF-04-1-0194
Report No.(s): AD-A427368; 6310-653-4560; ARO-47075.2-EV-II; No Copyright; Avail: Defense Technical Information Center (DTIC)

This study quantified physical and chemical characteristics of dust derived from soils sampled in Iraq. Recognizing that weapons jamming could be related to physical and chemical properties of dust, the Desert Research Institute (DR!) was commissioned by the Army Research Office to undertake an analysis of a limited number of Iraqi dust samples collected during the period 27 March - 8 April 2004 by an onsite geologist of the U.S. Army Corps of Engineers. The purpose of this study is to describe the physical and chemical properties of sampled Iraqi dust, to analyze how this dust reacts with gun lubricants used in Iraq, and to develop recommendations for additional testing that would contribute to resolving the gun-jamming problem experienced by U.S. soldiers. Given the importance of Iraqi dust in its potential to impact military equipment and operations, desert environmental parameters are critical to design tests that reflect real-world conditions-especially conditions most likely to compromise use of critical equipment in harsh desert environments. Analytical results describing physical and chemical properties of the Iraqi dust samples provide scientific guidance for the next steps in solving dust-related problems.
DTIC
Chemical Properties; Dust; Environmental Surveys; Geochemistry; Sampling; Soil Sampling; Soils

20040201128 California Univ., Irvine, CA USA
Design of Nanoscale Polymeric Materials With Transition Metal Catalysis
Guan, Zhibin, Author; Sep. 2004; 7 pp.; In English
Contract(s)/Grant(s): DAAD19-01-1-0686
Report No.(s): AD-A427375; ARO-42395.1-CH-H; No Copyright; Avail: Defense Technical Information Center (DTIC)

The ARO grant provided partial support to the research efforts in PI's laboratory on development of highly efficient catalytic syntheses of polymeric materials having complex topologies and functionalities from simple commercial olefinic monomers. In the past three years, we have made significant progress in both developing new polymeric materials and designing new catalysts. Specifically, the following accomplishments were achieved in this laboratory: (1) successfully demonstrated a new strategy of one-pot synthesis of hyperbranched polymers via direct free radical polymerization of commercial divinyl monomers by using a cobalt chain transfer catalyst; (2) developed a highly efficient one-pot synthesis of amphiphilic dendritic molecular nanocarriers that can be used for drug delivery and scaffold for multivalent ligands; (3) developed new NAP based and bisazaferrocene ligands for late transition metal polymerization catalysts; and (4) developed a novel family of cyclophane-based late transition metal complexes that are highly active and stable catalysts for olefin polymerization.
DTIC
Alkenes; Catalysis; Complex Compounds; Transition Metals

20040201140 Delaware Univ., Newark, DE USA
Tools for Condensed Phase Computational Chemistry
Szalewicz, Krzysztof, Author; Oct. 2004; 20 pp.; In English
Contract(s)/Grant(s): DAAD19-03-1-0061
Report No.(s): AD-A427390; ARO-45238.1-CH-CF; No Copyright; Avail: CASI; A03, Hardcopy
The workshop developed recommendations for those computational chemistry tools best suited to attack research problems in properties of energetic molecules - individually and in condensed phases. A small, international group of experts presented their work and discussed current tools of computational chemistry in the context of the Army program of energetic material design. These experts, chosen for their specific skills, came from Europe and the US.
DTIC
Computational Chemistry

20040201202 Army Engineer Research and Development Center, Vicksburg, MS USA
Phosphorus Loading and Compositional Characteristics in Eight-Mile Run Watershed, Wisconsin
James, William F., Author; Eakin, Harry L., Author; Barko, John W., Author; Mar. 2004; 11 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427500; ERDC-WQTN-PD-14; No Copyright; Avail: CASI; A03, Hardcopy
The purpose of this research was to describe and quantify biologically labile and refractory phosphorus runoff in Eight-Mile Run, a small watershed in west-central Wisconsin that is impacted by dairy livestock management. BACKGROUND: There is a need to manage eutrophication problems in Corps of Engineers receiving waters by reducing losses of soils and associated soluble nutrients (primarily phosphorus) in intensively managed agricultural land-use sellings that are hydrologically sensitive to runoff. In many agricultural watersheds, livestock is contained in relatively small areas for long periods of time, leading to overgrazing and loss of perennial cover, disruption of the soil surface, and the buildup of nutrients in the soil via manure incorporation that can become a source to receiving waters during runoff events. Bank erosion and decimation of adjacent buffer strips by livestock that is allowed to forage along tributaries can flirther exacerbate soil and nutrient erosion and runoff. To forecast the impacts of watershed rehabilitation and Best Management Practices (BMPs) on hydraulic and nutrient loadings, models need to be refined to address the impacts ofvarious land-use practices such as livestock production and management on concentrations and loads of sediment and important nutrients like nitrogen and phosphorus in rivers and streams draining watersheds. The objectives of this study were to examine phosphorus (P) loads and P compositional charac- teristics for a small tributary (Eight-Mile Run) impacted by a dairy livestock operation. Fractionation procedures were used to identify biologically labile (i.e., recyclable via chemical transformations or directly available for biological uptake) and refractory (i.e., unavailable for biological uptake and subject to permanent burial) species of phosphorus running off the watershed that can have an impact on water quality conditions and eutrophication of receiving waters in the basin.
DTIC
Phosphorus; Watersheds

20040201225 Nebraska Univ., Lincoln, NE USA
Advanced Nanostructured Magnetic Materials
Sellmyer, D. J., Author; Skomski, R., Author; Liu, Y., Author; Oct. 2004; 7 pp.; In English
Contract(s)/Grant(s): F49620-01-1-0342
Report No.(s): AD-A427543; AFRL-SR-AR-TR-04-0548; No Copyright; Avail: CASI; A02, Hardcopy

A combined experimental and theoretical investigation of advanced nanostructured magnetic materials has been carried out. Novel physical systems have been synthesized and studied including: hard/soft nanocomposites, magnetic nanowires, thermally processed multilayer films, and nanoparticle-assembled composites. Emphasis has been focused on exchange coupling at grain boundaries, incoherent magnetization reversal, and magnetization dynamics. The design of nanomagnets with controlled properties has been emphasized, and unprecedented advances have been made in high-temperature permanent magnets, high-coercivity nanocluster magnets, and hard and soft magnetic nanotubes prepared with chemical methods.
DTIC
Magnetic Materials

20040201244 Puerto Rico Univ., Mayaguez, Puerto Rico
Organic Glasses and Crystals for Miniature Electro-Optic Devices: Synthesis, Characterization, and Applications
Fernandez, Felix E., Author; Timofeeva, Tanja, Author; Sarkisov, Sergey S., Author; Oct. 2004; 104 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F49620-01-1-0561
Report No.(s): AD-A427606; AFRL-SR-AR-TR-04-0555; No Copyright; Avail: CASI; A06, Hardcopy

A high-level computational analysis of two-photon absorbing derivatives of piperidone and cyclohexanone was carried out. Obtained data were compared with the experimental results. The molecular cross-section of the two-photon absorption of these compounds, as high as 3000x10(exp -50) cu cm s/photon at nanosecond pumping, makes then promising nonlinear materials for optical limiting in near-infrared region. They also exhibit an intense two-photon exciting fluorescence, of the same order as that of Phodamine B. In addition, these compounds have previously demonstrated strong anticancer effect. Both features combined in a single compound also open the way for more efficient treatment of cancer. Characterization of the infrared absorption spectrum of the solutions of fullerene C(sub 60) with 2-cyclooctylamino-5- nitropyridinee additive known as COANP has been performed with the focus on possible bonding with the amino-group of the additive. No occurrence of such bonding was found at normal conditions. Also no change of optical absorption in visible region and optical limiting of fullerene due to chemical bonding with the additive was detected even for a molar proportion of the additive to fullerene approaching 200:1. A miniature electro-optic (E-O) modulator that comprises a Fabry-Perot (F-P) etalon integrated with an optical fiber was theoretically analyzed. The estimations indicated that the finesse of the F-P cavity is a highly critical factor in achieving low driving voltage of the modulator. Thin films of E-O polymers LD-3 and polyimide were prepared using spin casting technique followed by corona poling. The electro-optic coefficient r(sub 33) was measured and found to be between 3 and 5 pm/V.
DTIC
Characterization; Crystals; Cyclic Compounds; Electro-Optics; Glass; Miniaturization; Optical Properties; Photons

20040201277 Wyoming Univ., Laramie, WY USA
Nanoscale Surface Chemistry of Intermetallic Inclusions at Aluminum Alloy Surfaces
Buttry, Daniel A., Author; Oct. 2004; 4 pp.; In English
Contract(s)/Grant(s): F49620-01-1-0375
Report No.(s): AD-A427729; AFRL-SR-AR-TR-04-0554; No Copyright; Avail: CASI; A01, Hardcopy

This grant has as its overall objective to understand and manipulate the chemistry at intermetallic particles (IP's) at Al alloy surfaces. The purpose is to control corrosion of alloys that contain such particles. This long range goal is being addressed through four major tasks. These are: 1) use scanning electrochemical microscopy and other imaging techniques to investigate the local cathodic and anodic reactivity of intermetallic inclusions at the alloy surface, 2) investigate dioxygen reduction at the intermetallic inclusions and how to control it, 3) study the use of strongly adsorbing species to poison the reduction of dioxygen at the surfaces of intermetallic particles, and 4) examine the mechanism by which conducting polymers influence the open circuit behavior of these alloys, also with a mind to decreasing the tendency for dioxygen reduction at the intermetallic particles.
DTIC
Aluminum Alloys; Chemical Reactions; Electrochemistry; Inclusions; Intermetallics; Metal Surfaces; Surface Reactions

20040201290 University of Central Florida, Orlando, FL USA
High Birefringence Liquid Crystals for Laser Hardening and IR countermeasure
Wu, Shin-Tson, Author; Sep. 2004; 10 pp.; In English
Contract(s)/Grant(s): F49620-01-1-0377
Report No.(s): AD-A427767; UCF-6501-6057; AFRL-SR-AR-TR-04-0566; No Copyright; Avail: CASI; A02, Hardcopy

A fast-switching and scattering-free phase modulator using polymer network liquid crystal (PNLC) is demonstrated at **=l.55 um for laser beam steering application. The strong polymer network anchoring greatly reduces the visco-elastic coefficient of the liquid crystal. As a result, the PNLC response time is improved by -300X, although the threshold voltage is increased by -25X. Computer simulation results agree with experiments well.
DTIC
Birefringence; Countermeasures; Lasers; Liquid Crystals; Optical Countermeasures

20040201546 Lawrence Livermore National Lab., Livermore, CA
Experimental EOS and Chemical Studies of High-Pressure Detonation Products and Product Mixtures
Zaug, J. M.; Fried, L. E.; Crowhurst, J. C.; Hansen, D. W.; Howard, W. M.; Jul. 01, 2002; 14 pp.; In English
Report No.(s): DE2004-15002364; No Copyright; Avail: Department of Energy Information Bridge
We present equation of state results from impulsively stimulated light scattering (ISLS) experiments conducted in diamond anvil cells on pure supercritical fluids, and supercritical fluid mixtures. We have made measurements on fluid H20 (water), CH20 (formaldehyde), and CH30H (methanol). Sound speeds measured through ISLS have allowed us to refine existing potential models used in the EXP6 detonation product library. The refined models allow us to more accurately assess the chemical composition at the Chapman-Jouget (C-J) state of common explosives. We predict that water and formaldehyde are present in appreciable quantities at the C-J state of HMX, RDX, and NM. Methanol is predicted to be present only in trace quantities at the C-J state. In the case of methanol, chemical decomposition and phase separation was observed at high temperatures. We are developing micro-FTIR and Raman techniques to determine the chemical composition of the phase separated detonation products.
NTIS
Chemical Composition; Detonation

20040201548 Lawrence Livermore National Lab., Livermore, CA
Corrosion Behavior of Alloy 22 in Oxalic Acid and Sodium Chloride Solutions
Day, S. D.; Whalen, M. T.; King, K. J.; Hust, G. A.; Wong, L. L.; Jun. 24, 2003; 26 pp.; In English
Report No.(s): DE2004-15007541; No Copyright; Avail: Department of Energy Information Bridge
Nickel based Alloy 22 (N06022) is extensively used in aggressive industrial applications, especially due to its resistance to localized corrosion and stress corrosion cracking in high chloride environments. The purpose of this work was to characterize the anodic behavior of Alloy 22 in oxalic acid solution and to compare its behavior to sodium chloride (NaC1) solutions. Standard electrochemical tests such as polarization resistance and cyclic polarization were used. Results show that the corrosion rate of Alloy 22 in oxalic acid solutions increased rapidly as the temperature and the acid concentration increased. Extrapolation studies show that even at a concentration of 10(sup -4) oxalic acid, the corrosion rate of Alloy 22 would be higher in oxalic acid than in 1 M NaCl solution. Alloy 22 was not susceptible to localized corrosion in oxalic acid solutions. Cyclic polarization tests in 1 M NaCl showed that Alloy 22 was susceptible to crevice corrosion at 90 degrees Celsius but was not susceptible at 60 degrees Celsius.
NTIS
Corrosion; Corrosion Resistance; Stress Corrosion Cracking; Nickel Alloys

20040201551 Lawrence Livermore National Lab., Livermore, CA
Prediction of Halocarbon Toxicity from Structure: A Hierarchical QSAR Approach
Gute, B. D.; Balasubramanian, K.; Geiss, K.; Basak, S. C.; Apr. 11, 2003; 34 pp.; In English
Report No.(s): DE2004-15007793; No Copyright; Avail: Department of Energy Information Bridge
Mathematical structural invariants and quantum theoretical descriptors have been used extensively in quantitative structure-activity relationships (QSARs) for the estimation of pharmaceutical activities, biological properties, physicochemical properties, and the toxicities of chemicals. Recently our research team has explored the relative importance of various levels of chemodescriptors, i.e., topostructural, topochemical, geometrical, and quantum theoretical descriptors, in property estimation. This study examines the contribution of chemodescriptors ranging from topostructural to quantum theoretic calculations up to the Gaussian STO-3G level in the prediction of the toxicity of a set of twenty halocarbons. We also report the results of experimental cell-level toxicity studies on these twenty halocarbons to validate our models.
NTIS
Toxicity; Drugs; Quantitative Analysis

20040201552 Arizona State Univ., Tempe, AZ, USA

Understanding Olivine CO(2) Mineral Sequestration Mechanisms at the Atomic Level: Optimizing Reaction Process Design

McKelvy, M. J.; Bearat, H.; Chizmeshya, A. V. G.; Nunez, R.; Carpenter, R. W.; Aug. 2003; In English

Report No.(s): DE2004-822896; No Copyright; Avail: National Technical Information Service (NTIS)

Carbonation of Mg-rich minerals offers an intriguing candidate carbon sequestration process technology, which can provide large-scale CO(sub 2) disposal. Such disposal bypasses many long-term storage problems by (1) providing containment in the form of mineral carbonates that have proven stable over geological time, (2) generating only environmentally benign materials, and (3) essentially eliminating the need for continuous site monitoring. The primary challenge for viable process development is reducing process cost. This is the primary focus of the CO(sub 2) Mineral Sequestration Working Group managed by Fossil Energy at DOE, which includes members from the Albany Research Center, Los Alamos National Laboratory, the National Energy Technology Laboratory, Penn State University, Science Applications International Corporation, and the University of Utah, as well as from our research group at Arizona State University.

NTIS

Carbon Dioxide; Minerals

20040201566 Lawrence Livermore National Lab., Livermore, CA

Molecule-Specific Imaging Analysis of Carcinogens in Breast Cancer Cells Using Time-of-Flight Secondary Ion Mass Spectrometry

Quong, J. N.; Knize, M. G.; Kulp, K. S.; Wu, K. J.; Aug. 19, 2003; In English

Report No.(s): DE2004-15007729; UCRL-JC-151797; No Copyright; Avail: National Technical Information Service (NTIS)

Imaging time-of-flight secondary ion mass spectrometry (TOF-SIMS) is used to study the localization of heterocyclic amines in MCF7 line of human breast cancer cells. The detection sensitivities of a model rodent mutagen, 2-amino-1-methyl-6-phenylimidazo pyridine (PhIP) were determined. Following an established criteria for the determination of status of freeze-fracture cells, the distribution of PhIP in the MCF7 cells are reported.

NTIS

Image Analysis; Molecules; Carcinogens; Cells (Biology)

20040201568 Westinghouse Savannah River Co., Aiken, SC, USA

Finite Element Analysis Enhancement for B-25 Container Dynamic Compaction

Gong, C.; Jones, W. E.; Sep. 2002; In English

Report No.(s): DE2004-806919; WSRC-TR-2002-00353; No Copyright; Avail: National Technical Information Service (NTIS)

The document describes initial structural finite element modeling for dynamic compaction of B-25 containers buried in Engineered Trench number 1 at the U.S. Department of Energy's Savannah River Site (SRS), Aiken, South Carolina. Dynamic compaction is the practice of dropping a heavy weight to compact material that has been placed in the subsurface for disposal. B-25s placed in Engineered Trench number 1 contain low-level radioactive waste. Dynamic compaction of buried B-25s is an option that could mitigate subsidence of the cap that is eventually constructed over an engineered trench disposal site. The objective of numerical modeling of the Engineered trench system was to evaluate the response of B-25 Containers to dynamic compaction, eventually incorporating dynamic compaction behavior with various degrees of B-25 corrosion. Understanding the structural behavior of buried B-25s over time is important for anticipating and dealing with subsidence. Subsidence may compromise the long-term integrity of the caps placed over the buried waste to limit downward water and contaminant movement through the material.

NTIS

Radioactive Wastes; Contaminants; Corrosion

26
METALS AND METALLIC MATERIALS

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

20040201101 Michigan Univ., Ann Arbor, MI USA
Nondestructive Evaluation (NDE) Technology Initiatives Program (NTIP). Delivery Order 0041: Advanced Processing of Novel Ni-Based Single Crystal Alloys
Pollock, Tresa M., Author; Jan. 2004; 13 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F33615-97-D-5271; Proj-4349
Report No.(s): AD-A427337; AFRL-ML-WP-TR-2004-4226; No Copyright; Avail: Defense Technical Information Center (DTIC)

The overall objective of this program was to define new nickel-base superalloy single crystal compositions with improved properties compared to current commercial alloys. In addition to improved properties, these alloys would be amenable to processing by new single crystal liquid metal cooling processes. Alloys were subjected to a range of microstructural characterization, non-destructive evaluation and mechanical and physical property evaluations. Some compositions with improved properties relative to current 'Generation 3' single crystal alloys were identified.
DTIC
Mechanical Properties; Nickel Alloys; Nondestructive Tests; Single Crystals

20040201199 Colorado School of Mines, Golden, CO USA
Positive Effects of Hydrogen on the Plasticity of 2 1/4 Cr-1Mo Steel
Zander, D., Author; Maroef, I., Author; Olson, D., Author; Eliezer, D., Author; Nov. 2002; 5 pp.; In English
Contract(s)/Grant(s): DAAD19-01-1-0377
Report No.(s): AD-A427496; ARO-41922.13-MS; No Copyright; Avail: CASI; A01, Hardcopy

Steel (2 1/4 Cr-1Mo) and, for comparison, Armco iron were hydrogenated electrochemically in glycerine-phosphoric acid (2:1) electrolyte at 55 deg C. The microstructure was studied by optical microscopy and transmission electron microscopy. Compression tests at elevated temperatures of 650 deg C showed minor changes in the compressive stress for hydrogenated Armco iron, whereas a tremendous decrease of 50% of the compressive stress in 2 1/4 Cr-1Mo steel after hydrogenation was observed, which would improve the formability during processing. Our investigations indicate that the increase in plasticity of 2 1/4 Cr-1Mo steel strongly depends on the amount of hydrogen, as well as the strain rate, which can be explained by the difference in the mobility of dislocations. The positive effects of hydrogen on the plasticity at higher temperatures and the possible mechanisms which led to the distinct decrease in the compressive stress of 2 1/4 Cr-lMo steel in comparison to iron are discussed in detail taking into account dynamic recovery as well as recrystallization.
DTIC
Deuterium; Plastic Properties; Steels

20040201200 Colorado School of Mines, Golden, CO USA
Mutual Effects of Hydrogenation and Deformation in Ti-Nb Alloys
Zander, D., Author; Olson, D. L., Author; Eliezer, D., Author; Feb. 2002; 9 pp.; In English
Contract(s)/Grant(s): DAAD19-01-1-0377
Report No.(s): AD-A427497; ARO-41922.6-MS; No Copyright; Avail: CASI; A02, Hardcopy

Alloying of Ti-based alloys with hydrogen is used to modify the microstructure and improve mechanical properties. In this study, hydrogen charging was performed electrochemically in a 2:1 glycerin- phosphoric acid electrolyte at high fugacities. This research investigated in detail, by means of X-ray diffraction, scanning electron microscopy (SEM), transmission electron microscopy (TEM), thermal desorption spectroscopy (TDS), and microhardness tests, the influence of hydrogen at high fugacities on the phase stability, desorption behavior, and microhardness in Ti-Nb (20 to 45 wt pct Nb) alloys before and after deformation. Hydrogenation of Ti-Nb was found to exhibit a significant effect on the phase stability as well as the microhardness of Ti-Nb alloys. Hydrogenation of Ti -20 wt pct Nb led to precipitation of (Ti,Nb)Hx in the metastable alpha' matrix. In Ti-Nb alloys with 40 or 45 wt pct niobium, hydrogen stabilized the bcc beta phase, but destabilized the hcp angular frequency phase. With increasing hydrogen content, an expansion of the lattice constant of the beta phase occurred, followed by the formation of (Ti,Nb)Hx. The influence of hydrogen on the microhardness of Ti-40 wt pct Nb and Ti-45 wt pct Nb shows only a minor effect, whereas Ti-20 wt pct Nb exhibits significant softening in response to hydrogen charging up to 3000 ppm. The TDS showed that deuterium desorption strongly depends on the niobium content and the deformation

treatment prior to or after charging. The observed results should provide further insight on the mutual effects and the resulting micromechanism of hydrogenation and deformation in Ti-Nb alloys.
DTIC
Deformation; Hydrogenation; Titanium Alloys

20040201206 Colorado School of Mines, Golden, CO USA
Effective Use of Weld Metal Hydrogen Trapping and Advance Diffusible Hydrogen Sensing
Olson, David L., Author; Park, Yeong-Do, Author; Jan. 2004; 40 pp.; In English
Contract(s)/Grant(s): DAAD19-01-1-0377
Report No.(s): AD-A427507; CSM-MT-CWJCR-004-026; ARO-41922.25-MS; No Copyright; Avail: CASI; A03, Hardcopy

The development of an advance measuring apparati for diffusible hydrogen content based on electronic, optical and magnetic property measurements was investigated. The effort was to develop a rapid and accurate determination for both steel weld metal diffusible hydrogen content and its distribution. This investigation used the instrumentation acquired by the DURIP grant program. Thermoelectric (Seebeck) coefficient measurements are used to assess hydrogen content in higher strength low alloy steel, nickel-aluminum bronze, austenitic stainless steel, and hydrogen storage alloys. The thermoelectric power coefficient was also used to assess the soluble nitrogen content and nitride content in nitrogen strengthened structural steels. The role of hydrogen to assist high temperature forming (deformation) was investigated in ferrous and refractory alloys. The investigation sought a mechanistic understanding for the significant reduction of compressive stress to hot form hydrogen charged ferrous alloys and refractory alloys. Efforts were made to transfer the demonstrated effectiveness of weld metal hydrogen trapping, which results from investigation on rare earth additions to steel weld metal to lower the weld diffusible hydrogen content, to commercial welding practice and consumable products.
DTIC
Detection; Diffusion; Hydrogen; Steels; Trapping

20040201272 Northwestern Univ., Evanston, IL USA
Predicting Aspects of Mechanical Behavior via Fundamental Electronic Structure Characteristics of Homogeneous Phases and Intrinsic Interfaces
Freeman, Authur J., Author; Feb. 2004; 9 pp.; In English
Contract(s)/Grant(s): F49620-01-1-0166
Report No.(s): AD-A427674; AFRL-SR-AR-TR-04-0549; No Copyright; Avail: CASI; A02, Hardcopy

To fulfill the great potential of intermetallic alloys for high temperature structural applications, it is necessary to understand the mechanisms controlling their mechanical behavior on the microscopic level, including such key phenomena as dislocation structure and mobility. We focused on the mechanical behavior of homogeneous intermetallics with L1(sub 2) and B2 structures and on two-phase gamma/gamma' alloys. Based on highly-accurate total energy calculations and large-scale Peierls-Nabarro modeling, the relation between electronic structure, phase stability and dislocation structure was investigated in the context of yield stress temperature anomaly (YSA) phenomena, which play a key role in high temperature applications of intermetallic alloys. The superdislocation structure in Ni3Al, Ni3Ge and Fe3Ge was studied and the lack of a yield stress temperature anomaly in Fe3Ge explained. The energetics of the interaction of the ?100! edge and screw dislocation in NiAl with different kinds of impurities (Ti, V, Cr, Mn, Zr, Mo, Si, Ge and Ga) was studied and the nature of the 'extra' solid solution hardening effect caused by d-element impurities was understood. The origin of the 'small' and 'large' rhenium effects in Cr-Re alloys was investigated and their mechanisms were proposed. The interfacial strength of NiAl/Mo eutectic interfaces was studied and the detrimental effect of the misfit dislocations on it, leading to the interface debonding, was established. The connection between the low temperature yield stress anomaly in Pt3X alloys with a structural instability rather than with features of the dislocation structure in the L1(sub 2) phase was demonstrated. The dislocation structure and character of the yield stress temperature dependence in Ir-based L1(sub 2) alloys was predicted. The dislocation structure and energetics in B2 Co-base intermetallics was determined and slip modes operating in these alloys explained.
DTIC
Electron States; Electronic Structure; Intermetallics; Mechanical Properties; Predictions; Thermal Stresses; Yield Strength

20040201431 College of Western New England, Springfield, MA, USA
Experimental Excursions in Dielectric and Magnetic Materials
Masi, James V.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 423-441; In English; See also 20040201420; No Copyright; Avail: CASI; A03, Hardcopy

There is a great deal of interest in the fundamental and applied aspects of dielectric spectroscopy (DS) of polymeric materials. Fundamental investigations of the dielectric response yield a wealth of information about different molecular motions and relaxation processes in non-polar dielectrics, ferroelectrics, and polymers, as well as the cure processes and quality control of thermosets and thermoplastics. DS is performed over a wide frequency range, from 10-5 Hz to 1011 Hz, where polymers, dielectrics, and ferroelectrics respond to an applied electric field. This enables the researcher to relate the observed dielectric response to low frequency and/or high frequency phenomena. Industrial interest in dielectric and electrical properties of polymers, dielectrics, and ferroelectrics has increased due in large part to the increased use of these materials in electronic devices, optoelectronic switches, printed circuitry, microwave circuits, batteries, power devices, fuel cells, and many other applications.
Derived from text
Dielectric Properties; Magnetic Materials; Quality Control

20040201471 Loyola Coll., Baltimore, MD, USA
Manufacturing Stranded Components in Brittle Materials Using Wollaston Wire
Goddard, Michelle; Pond, Robert B., Jr.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 563-575; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

Brittleness is a material condition of limited ductility in certain metals and alloys, plastics, and ceramics. For metals and alloys, brittle behavior is manifested in certain crystal structures with limited slip systems that cause the material to fracture at comparatively low strain values. Different alloying elements and inclusions also influence the structure and ductility of metals and alloys. Foreign atoms and particles inhibit dislocation movement during plastic deformation and therefore lead to early fracture. Certain metals and alloys are inherently brittle; they fracture at relatively low strain values, and do not perform well under tensile loads. As a result, brittle metals do not withstand large amounts of cold work during forming operations. Manufacturing processes for brittle materials may be multi-step and costly. Despite processing difficulties, many brittle alloys remain of interest for use in engineering applications. Most of the superconducting alloys are brittle; likewise, superelastic alloys and alloys that show the shape memory effect are often brittle. The shape memory effect is a phenomenon in which a specimen is deformed in a low temperature martensite phase and upon heating to a critical temperature, regains the shape of its parent phase. Shape memory alloys are currently used and have the potential for great advancements in bio-medical and industrial applications. However, processing difficulties prohibit large-scale availability of some of these alloys, especially in wire form. Wire drawing operations typically require a succession of annealing heat treatments, which counteract loss of ductility due to the work hardening in the alloys. An inherently brittle alloy requires more annealing steps to survive the drawing process without breakage than ductile alloys. Each additional processing step increases the cost of manufacturing. Our research is concerned with engineering a new and cost effective technique to overcome the limitations of brittleness and to draw these alloys into wire form.
Author
Alloying; Brittle Materials; Brittleness; Ductility; Shape Memory Alloys; Wire

20040201498 NASA Langley Research Center, Hampton, VA, USA
Materials on MISSE
Thibeault, Sheila A.; Kiefer, Richard L.; Kim, Myung-Hee Y.; Anderson, Richard A.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 893-913; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

Activities for Material International Space Station Experiment (MISSE) are: Investigate and develop improved thin films concepts for durability, radiation shielding, and electrostatic control. Characterize films for mechanical and other materials properties. Compile and report data after retrieval and analysis. Ultimate proof of the performance in the space environments.
Derived from text
Thin Films; Fabrication; Mechanical Properties; Data Acquisition; Electrostatics

20040201549 Lawrence Livermore National Lab., Livermore, CA
Effects of Grain Boundary Constraint on the Constitutive Response of Tantalum Bicrystals
Ziegler, A.; Campbell, G. H.; Kumar, M.; Stoelken, J. S.; Apr. 08, 2003; 12 pp.; In English
Report No.(s): DE2004-15007724; No Copyright; Avail: Department of Energy Information Bridge

The role of grain boundary constraint in strain localization, slip system activation, slip transmission, and the concomitant

constitutive response was examined performing a series of uniaxial compression tests on tantalum bicrystals. Tantalum single crystals were diffusion bonded to form a (011) twist boundary and compressed along the direction. The resulting three-dimensional deformation was analyzed via volume reconstruction. With this, both, the effective states of stress and strain over the cross-sectional area could be measured as a function of distance from the twist boundary, revealing a highly constrained grain boundary. Post-test metallurgical characterization was performed using Electron Back-Scattered-Diffraction (EBSD). The results, a spatial distribution of slip patterning and mapping of crystal rotation around the twist-boundary was analyzed and compared to the known behavior of the individual single crystals. A rather large area near the grain boundary revealed no crystal rotation.
NTIS
Grain Boundaries; Tantalum; Crystals

20040201550 Lawrence Livermore National Lab., Livermore, CA
Electronic Structure of Lanthanum calcium Oxoborate LaCa(4)O(BO(3)(3)
Nelson, A. J.; van Buuren, T.; Willey, T. M.; Bostedt, C.; Adams, J. J.; Jun. 26, 2003; In English
Report No.(s): DE2004-15007736; UCRL-JC-152151; No Copyright; Avail: National Technical Information Service (NTIS)
Lanthanum calcium oxoborate (LaCOB) is a nonlinear optical material that belongs to the calciumrare-earth (R) oxoborate family, with general composition CaRO(BO(sub 3)) (sub 3) (R(sup 3+)= La, Sm, Gd, Lu, Y). X-ray photoemission, photoabsorption and resonant fluorescence were applied to study the electronic structure and surface chemistry of this material. High resolution photoemission measurements on the valence band electronic structure and La 3d and 4d, Ca 2p, B 1s and O 1s core lines were used to evaluate the surface and near surface chemistry. Element specific density of unoccupied electronic states in LaCOB were probed by x-ray absorption spectroscopy (XAS) at the La 3d (M4, 5-edge), La 4d (N4,5-edge), B 1s and O 1s (K-edges) absorption edges. Soft x-ray fluorescence was used to further examine valence band states associated with spectral differences noted in the absorption measurements. These results provide the first measurements of the electronic structure and surface chemistry of this rare-earth oxoborate.
NTIS
Calcium; Lanthanum; Chemical Reactions

20040201560 Nuclear Waste Technical Review Board, Washington, DC, USA
Proceedings from an International Workshop on Long-Term Extrapolation of Passive Behavior
Sagues, A. A.; DiBella, C. A. W.; Jul. 2001; 120 pp.; In English; International Workshop on Long-Term Extrapolation of Passive Behavior, 19-20 Jul. 2001, Arlington, VA, USA
Report No.(s): PB2005-101607; No Copyright; Avail: CASI; A06, Hardcopy
No abstract available
Corrosion; Extrapolation; Spent Fuels

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*.

20040196358 NASA Glenn Research Center, Cleveland, OH, USA
Granular Materials and Risks in ISRU
Behringer, Robert P.; Wilki8nson, R. Allen; Space Resources Roundtable VI; 2004, pp. 10; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy
Working with soil, sand, powders, ores, cement and sintered bricks, excavating, grading construction sites, driving off-road, transporting granules in chutes and pipes, sifting gravel, separating solids from gases, and using hoppers are so routine that it seems straightforward to execute these operations on the Moon and Mars as we do on Earth. We discuss how little these processes are understood and point out the nature of trial-and-error practices that are used in today s massive over-design. Nevertheless, such designs have a high failure rate. Implementation and extensive incremental scaling up of industrial processes are routine because of the inadequate predictive tools for design. We present a number of pragmatic scenarios where granular materials play a role, the risks involved, what some of the basic issues are, and what understanding is needed to greatly reduce the risks. This talk will focus on a particular class of granular flow issues, those that pertain to dense materials, their physics, and the failure problems associated with them. In particular, key issues where basic predictability is

lacking include stability of soils for the support of vehicles and facilities, ability to control the flow of dense materials (jamming and flooding/unjamming at the wrong time), the ability to predict stress profiles (hence create reliable designs) for containers such as bunkers or silos. In particular, stress fluctuations, which are not accounted for in standard granular design models, can be very large as granular materials flows, and one result is frequent catastrophic failure of granular devices.
Author
Sands; Cements; Granular Materials; Powder (Particles); Soils; Minerals

20040201158 George Washington Univ., Washington, DC USA
Relaxation of Kevlar Braided Cords
Fete, Russell B., Author; Jun. 2004; 87 pp.; In English
Report No.(s): AD-A427417; CI04-650; No Copyright; Avail: CASI; A05, Hardcopy

NASA uses Kevlar Aramid Fiber in constant strain applications in the form of braided cord. Questions about its behavior in load relaxation with variables including time, temperature, humidity, initial and re-tensioning loads are probed by this report, beginning with a literature review. Testing was performed at NASA Goddard SFC to attempt to resolve unanswered questions. The results are demonstrative of three important findings: 1) The first is that the initial relaxation phase is generally log-linear. 2) The second finding of this phase of testing is an average relaxation rate (Beta) of- 0.0151%/log(t) with a standard deviation of +/-0.0021. 3) The third finding is that the primary relaxation phase represents a 41% higher relaxation rate than the secondary phase. Kevlar exhibits load relaxation at a rate (Beta) of approximately 0.0110 +/- .0027%/ log(t) after preconditioning or primary relaxation. Kevlar's secondary relaxation generally fits a log-linear relaxation model as expected from the literature. The data experienced a short recovery period after reloading and transferring the load to the load cell, which may be traced to material, and/or environmental effects. In general, the data exhibited a wide scatter and several highly erratic responses, which indicate that precisely modeling this material may be impossible.
DTIC
Cordage; Kevlar (Trademark); Plastics; Polyamide Resins; Synthetic Fibers

20040201243 Norfolk State Univ., VA USA
A Center for Organic Photonic Materials Research
Sun, Sam, Author; Oct. 2004; 68 pp.; In English
Contract(s)/Grant(s): F49620-01-1-0485
Report No.(s): AD-A427601; AFRL-SR-AR-TR-04-0563; No Copyright; Avail: CASI; A04, Hardcopy

A Center for Organic Photonic Materials Research (COPMR) was established at Norfolk State University (NSU). Novel and high efficiency optoelectronic and nano structured polymeric materials are the main research focus. Specifically, during the performance period, a series of -DBAB- type of block copolymers, where D is a conjugated electron donating block, A is a conjugated electron withdrawing acceptor block, and B is a non conjugated and flexible bridge unit, have been designed, synthesized and characterized. It was found that the photoconductivity of the synthesized -DBAB- type block copolymers was much better then the simple donor/acceptor blends under identical conditions. This was attributed mainly to the improvement in spatial domain for photo induced charge separation and transportation. Energy level domain optimizations have also been analyzed using classic electron transfer theory. These materials can be potentially developed to fabricate inexpensive, lightweight and flexible plastic' solar cells. Additionally, a new photo crosslinkable nonlinear optical polymer system has also been developed that may provide a photolithographic alternative for polymeric electro-optical modulator device fabrication.
DTIC
Electro-Optics; Nonlinear Systems; Optical Equipment; Organic Materials; Photons

20040201434 Virginia Commonwealth Univ., Richmond, VA, USA
Electrospinning: A Simple Technology with a Big Impact
Pawlowski, Kristin J.; Wnek, Gary E.; Bowlin, Gary L.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 263-269; In English; See also 20040201420; No Copyright; Avail: CASI; A02, Hardcopy

Current research in the authors laboratories is focused on the processing of synthetic and biological polymers to create materials with tailored properties and functions for applications in medicine and nanotechnology. This motivation has rekindled interest in electrospinning, a fiber processing technique capable of generating fibers with diameters ranging from about 50 nanometers to 10 microns. These fibers can be used to fabricate ordered structures for various applications including tissue engineering scaffolds, clothing, drug delivery, and filtration. In electrospinning, polymer solutions or melts are deposited

as continuous fibers that collect and form fibrous mats. A schematic of the electrospinning system is shown. The fibers are derived by charging a liquid versus a ground a short distance away. The charged liquid is attracted to the ground electrode of opposite polarity and, eventually, forms a fiber jet as the electric field strength exceeds the surface tension of the solution. The basic elements of a laboratory electrospinning system are simply a high voltage supply, ground electrode/fiber collector, source electrode, and a solution or melt to be spun. In the example described below, EVOH is electrospun from solution in isopropanol and water. EVOH has shown potential as a tissue engineering scaffold through cell culturing experiments with fibroblast and smooth muscle cells.
Derived from text
Fibers (Mathematics); Electric Field Strength; Ethylene; Vinyl Polymers; Nanotechnology

20040201478 Southridge High School, Kennewick, WA, USA
Electric-Powered Radio-Controlled Airplanes as Flying Composites
Bunnell, L. Roy; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 973-977; In English; See also 20040201469; No Copyright; Avail: CASI; A01, Hardcopy

Demonstrate electric-powered flight, illustrate the crucial role of composites in its success.
Author
Aircraft Models; Radio Control; Composite Materials

20040201485 Loyola Coll., Baltimore, MD, USA
Locating Breakpoints in a Discontinuous Polynomial Function
Kangham, Kyle M.; Pond, Robert B., Jr.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 553-561; In English; See also 20040201469; No Copyright; Avail: CASI; A02, Hardcopy

The analytical techniques used to find breakpoints in a piecewise discontinuous polynomial function were first intended to analyze residual plastic strain data obtained from tensile bars pulled to failure. The data was taken using laser micrometers to measure diameter and relative axial position and later converted to strain versus relative position using the constant volume relationship for crystal plasticity. The strain versus relative position graph appears to be a piecewise discontinuous polynomial function. We are interested in finding the breakpoints in the strain versus position data because these breakpoints appear to be critical strains. James Bell, professor at Johns Hopkins University first identified critical strains. He began his studies in dynamic crystal plasticity during the early 1950 s when he examined strain behavior of symmetrical rod impact specimens. Bell identified that the plastic strain region of these specimens is not continuous and he defined the breakpoints in plastic behavior as critical strains. Bell also stated that the critical strains are 'independent of stress, particle velocity, ambient temperature, strain rate, specific crystal structure, purity and type of metal' and are found in all polycrystalline materials (Bell). Bell first found these critical strains occurred at strains equal to 2/3n/2, where n is equal to 0,2,4,6,8,10, 13, and 18 (Bell). Subsequent research by R. B. Pond, Jr. concluded that critical strains occurred in dynamically loaded, symmetric impact bars at strains equal to 2/3n/4, for which n equaled many integers. Our recent research with tensile bars suggests that critical strains occur at values equal to 2/3n/8 for all integer values n in ordinary tensile specimens. Our studies were conducted within the Loyola College Hauber Fellowship Program, an undergraduate research program that funds Loyola College summer research students. The U.S. Army at Aberdeen Proving Ground in turn supported our Hauber program.
Author
Plastic Properties; Deformation; Strain Rate; Stress-Strain Relationships; Polynomials; Crystal Structure

20040201499 Old Dominion Univ., Norfolk, VA, USA
Progress Toward Dynamic Color Responsive 'Chameleon' Fiber Systems
Gregory, Richard V.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 915-947; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

The present results indicated: New Applications to Fibers and Films. New Molecules and Polymers Synthesized for Emission Applications to Fibers and Films. New Fiber Lasing Polymers. Existing Photonic Polymer Morphological Modifications to Tune Emission spectra. Solution Processing Model.
CASI
Color; Fibers; Polymeric Films

20040201500 NASA Langley Research Center, Hampton, VA, USA

Regolith Materials

Thibeault, Sheila A.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 983-1011; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

Contents include the foloving: 1. In-Situ Resource Utilization. Using regolith. 2. In-Space Manufacturing. Fabricating materials. 3. Radiation Protection Methods. Developing habitat concepts. 4. Radiation Physics. Measuring radiation transmission.

CASI

Regolith; Manufacturing; Radiation Protection; Radiation Measurement

20040201508 Naval Surface Warfare Center, Indian Head, MD USA

Swell Ratio Tester Report FY 2003

Gamba, Ralph; Sep. 2004; 36 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427277; IHTR 2654; No Copyright; Avail: Defense Technical Information Center (DTIC)

This study examined the results of the SRT-1, and compared with the current sol-gel method of determining crosslink density at IHDIV/NSWC. We compared ease of use, time, material use, and the data from the two methods. This report provides the results of the comparison of the Swell Ratio Tester (SRT) with the current sol-gel method of determining swell ratio and crosslink density of polymers.

DTIC

Density; Polymers; Sol-Gel Processes; Crosslinking

20040201543 Virginia Transportation Research Council, Charlottesville, VA

Evaluation of High Performance Concrete Pavements in Newport News and Hampton, Virginia

Ozyildirim, C.; Nov. 2004; In English

Report No.(s): PB2005-101573; VTRC 05-R7; No Copyright; Avail: National Technical Information Service (NTIS)

This study evaluated the properties of three high performance concrete mixtures placed in a jointed plain concrete paving project on I-64 in Newport News, Virginia, to reduce the shrinkage and improve the flexural strength of the concrete. Two mixtures contained ground-granulated blast furnace slag with 2-inch and 1-inch nominal maximum size (NMS) aggregate, and the third mixture contained Class F fly ash with 1-inch NMS aggregate. Air-entrained paving concretes with satisfactory strength, low permeability, and dimensional stability were prepared using concretes with Class F fly ash or slag and 1-inch or 2- inch NMS aggregates. Slipform pavers satisfactorily placed these concretes. The test sections were in excellent condition after six winters based on a visual survey. Falling weight deflectometer data indicated a better load transfer with the larger aggregate size with everything else being equal. The study also evaluated the maturity method in the continuation of the project on I-64 in Hampton, Virginia. In the Hampton portion, a Class F fly ash mixture with the 1-inch NMS aggregate was used.

NTIS

Aggregates; Fly Ash; Slags; Furnaces; Concretes

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*.

20040191589 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Results of an Advanced Development Zero Boil-Off Cryogenic Propellant Storage Test

Plachta, David; November 2004; 14 pp.; In English; The 40th Joint Propulsion Conference and Exhibit cosponsored by AIAA, ASME, SAE, and ASEE, 11--14 Jul. 2004, Fort Lauderdale, FL, USA; Original contains color and black and white illustrations

Contract(s)/Grant(s): WBS-22-800-59-04

Report No.(s): NASA/TM-2004-213390; E-14898; AIAA Paper 2004-3837; No Copyright; Avail: CASI; A03, Hardcopy

A zero boil-off (ZBO) cryogenic propellant storage concept was recently tested in a thermally relevant low-earth orbit

environment, an important development in the effort to apply this concept to flight projects. Previous efforts documented the benefits of ZBO for launch vehicle upper stages in a low-earth orbit (LEO). Central to that analysis is a ZBO Cryogenic Analysis Tool that estimates the performance of each component and the ZBO system. This test is essential to the validation of that tool, and was the first flight representative configuration tested in a thermally representative environment. The test article was comprised of a spherical 1.4 m diameter insulated propellant tank, with a submerged mixer, a cryogenic heat pipe, flight design cryocooler, and a radiator. All were enclosed in a thermal shroud and inserted into and tested in a vacuum chamber that simulated an LEO thermal environment. Thermal and pressure control tests were performed at sub-critical LN2 temperatures and approximately 2 atmospheres pressure. The cold side of the ZBO system performed well. In particular, the heat pipe performed better than expected, which suggests that the cryocooler could be located further from the tank than anticipated, i.e. on a spacecraft bus, while maintaining the desired efficiency. Also, the mixer added less heat than expected. The tank heating rate through the insulation was higher than expected; also the temperatures on the cryocooler hot side were higher than planned. This precluded the cryocooler from eliminating the boil-off. The results show the cryocooler was successful at removing 6.8 W of heat at approximately 75 K and 150 W of input power, with a heat rejection temperature of 311 K. The data generated on the ZBO components is essential for the upgrade of the ZBO Cryogenic Analysis Tool to more accurately apply the concept to future missions.
Author
Cryogenic Cooling; Propellant Storage; Low Temperature Tests

20040200716 Yale Univ., New Haven, CT, USA
Computational and Experimental Study of Energetic Materials in a Counterflow Microgravity Environment
Takahashi, Fumiaki, Technical Monitor; Urban, David, Technical Monitor; Smooke, M. D.; Parr, T. P.; Hanson-Parr, D. M.; Yetter, R. A.; Risha, G.; [2004]; 22 pp.; In English
Contract(s)/Grant(s): NCC3-718; No Copyright; Avail: CASI; A03, Hardcopy

Counterflow diffusion flames are studied for various fuels flowing against decomposition products from solid ammonium perchlorate (AP) pellets in order to obtain fundamental understanding of composite propellant flame structure and chemistry. We illustrate this approach through a combined experimental and numerical study of a fuel mixture consisting of C2H4 CO + H2, and C2H2 + C2H4 flowing against solid AP. For these particular AP-fuel systems, the resulting flame zone simulates the various flame structures that are ex+ to exist between reaction products from Ap crystals and a hydrocarbon binder. As in all our experimental studies, quantitative species and temperature profiles have been measured between the fuel exit and AP surface. Species measured included CN, NH, NO, OH, N2, CO2, CO, H2, CO, HCl, and H2O. Temperature was measured using a thermocouple at the exit, spontaneous Raman scattering measurements throughout the flame, OH rotational population distributions, and NO vibrational population distributions. The burning rate of AP was also measured as a function of strain rate, given by the separation distance between the AP surface and the gaseous hydrocarbon fuel tube exit plane. This distance was nominally set at 5 mm, although studies have been performed for variations in separation distance. The measured 12 scalars are compared with predictions from a detailed gas-phase kinetics model consisting of 86 species and 531 reactions. Model predictions are found to be in good agreement with experiment and illustrate the type of kinetic features that may be expected to occur in propellants when AP particle size distributions are varied. Furthermore, the results constitute the continued development of a necessary database and validation of a comprehensive model for studying more complex AP-solid fuel systems in microgravity. Exploratory studies have also been performed with liquid and solid fuels at normal gravity. Because of melting (and hence dripping) and deep thermal wave penetration into the liquid, these experiments were found feasible, but not used for obtaining quantitative data. Microgravity experiments are needed to eliminate the dripping and boiling phenomena of these systems at normal gravity. Microgravity tests in the NASA Glenn 2.2 second drop tower were performed (1) to demonstrate the feasibility of performing propellant experiments using the NASA Glenn microgravity facilities, (2) to develop the operational procedures for safe handing of the energetic materials and disposal of their toxic combustion by-products and (3) to obtain initial measurements of the AP burning rate and flame structure under microgravity conditions. Experiments were conducted on the CH4/AP system previously studied at normal gravity using a modified design of the counterflow burner and a NASA Glenn Pig Rig, i.e., one of the existing drop rigs for general-purpose usage. In these experiments, the AP burning rate was measured directly with a linear variable differential transducer (LVDT) and video imaging of the flame structure was recorded ignition was achieved by hot wires stretched across the AP surfaces. Initial drop tower combustion data show that with the same burner separation distance and flow conditions of the normal gravity experiments, the AP burning rate is approximately a factor of two lower. This difference is likely a result of radiation effects,

but further tests with longer test times need to be conducted to verify that steady state conditions were achieved under microgravity conditions.
Author
Microgravity; Ammonium Perchlorates; Htpb Propellants; Counterflow; Composite Propellants

20040201258 Naval War Coll., Newport, RI USA
Geopolitical Dilemmas of China's Growing Thirst for Oil
Eckel, Mark E., Author; Mar. 2004; 35 pp.; In English
Report No.(s): AD-A427639; No Copyright; Avail: CASI; A03, Hardcopy

The dilemmas of China's growing thirst for oil are numerous. The increasing use of oil is inevitable and the trend cannot be controlled by China's leaders. For China to grow economically and for its people to prosper, oil consumption must increase. If China's leaders do not encourage economic growth and the Chinese people do not prosper, the political ramifications will be adverse. There is already growing political unrest and widespread demonstrations, some violent, by laid-off workers--to be competitive in the world market, former state owned enterprises are shedding workers. There are severe environmental problems, pollution is ruining the quality of life in many affected areas. The growing consumption of oil in the transportation sector will worsen pollution, especially in the large cities. There are geopolitical ramifications: China will have%to reconsider its relations with Middle Eastern countries that supply ever increasing amounts of their oil. China must strive for economic and military stability in the region. If China dedicates resources to upgrade its military to protect the sealanes and other transportation routes for oil, it will take valuable assets away from needed improvements to infrastructure and will add to tensions regionally and with the USA. Regional players and the USA are valuable trading partners. A military conflict will result in a disruption of oil supply for China, which will cause a shock to China's economy that would be very unpopular politically. As China opens their economy, political power is decentralizing, shifting to those centers that are prospering from world trade. This is threatening the authoritarian government.
DTIC
China; Oils

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*.

20040196368 BAE Systems Analytical Solutions, Inc., Huntsville, AL, USA
Synthesis of Sol-Gel Precursors for Ceramics from Lunar and Martian Soil Simulars
Sibille, L.; Gavira-Gallardo, J. A.; Hourlier-Bahloul, D.; Space Resources Roundtable VI; 2004; 1 pp.; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Recent NASA mission plans for the human exploration of our Solar System has set new priorities for research and development of technologies necessary to enable a long-term human presence on the Moon and Mars. The recovery and processing of metals and oxides from mineral sources on other planets is under study to enable use of ceramics, glasses and metals by explorer outposts. We report initial results on the production of sol-gel precursors for ceramic products using mineral resources available in martian or lunar soil. The presence of SiO2, TiO2, and Al2O3 in both martian (44 wt.% SiO2, 1 wt.% TiO2, 7 wt.% Al2O3) and lunar (48 wt.% SiO2, 1.5 wt.% TiO2 16 wt.% Al2O3) soils and the recent developments in chemical processes to solubilize silicates using organic reagents and relatively little energy indicate that such an endeavor is possible. In order to eliminate the risks involved in the use of hydrofluoric acid to dissolve silicates, two distinct chemical routes are investigated to obtain soluble silicon oxide precursors from lunar and martian soil simulars. Clear solutions of sol-gel precursors have been obtained by dissolution of silica from lunar soil similar JSC-1 in basic ethylene glycol (C2H4(OH)2) solutions to form silicon glycolates. Similarly, sol-gel solutions produced from martian soil simulars reveal higher contents of iron oxides. Characterization of the precursor molecules and efforts to further concentrate and hydrolyze the products to obtain gel materials will be presented for evaluation as ceramic precursors.
Author
Materials Recovery; Space Processing; In Situ Resource Utilization; Lunar Soil; Sol-Gel Processes

20040196381 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Extraction of Oxygen from the Martian Atmosphere

England, C.; Space Resources Roundtable VI; 2004, pp. 18; In English; See also 20040196346

Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

A mechanical process was designed for direct extraction of molecular oxygen from the martian atmosphere based on liquefaction of the majority component, CO2, followed by separation of the lower-boiling components. The atmospheric gases are compressed from about 0.007 bar to 13 bar and then cooled to liquefy most of the CO2. The uncondensed gases are further compressed to 30 bar or more, and then cooled again to recover water as ice and to remove much of the remaining CO2. The final gaseous products consisting mostly of nitrogen, oxygen, and carbon monoxide are liquefied and purified by cryogenic distillation. The liquefied CO2 is expanded back to the low-pressure atmosphere with the addition of heat to recover a majority of the compression energy and to produce the needed mechanical work. Energy for the process is needed primarily as heat to drive the CO2-based expansion power system. When properly configured, the extraction process can be a net producer of electricity. The conceptual design, termed 'MARRS' for Mars Atmosphere Resource Recovery System, was based on the NASA/JSC Mars Reference Mission (MRM) requirement for oxygen. This mission requires both liquid oxygen for propellant, and gaseous oxygen as a component of air for the mission crew. With single redundancy both for propellant and crew air, the oxygen requirement for the MRM is estimated at 5.8 kg/hr. The process thermal power needed is about 120 kW, which can be provided at 300-500 C. A lower-cost nuclear reactor made largely of stainless steel could serve as the heat source. The chief development needed for MARRS is an efficient atmospheric compression technology, all other steps being derived from conventional chemical engineering separations. The conceptual design describes an exceptionally low-mass compression system that can be made from ultra-lightweight and deployable structures. This system adapts to the rapidly changing martian environment to supply the atmospheric resource to MARRS at constant conditions.

Author

In Situ Resource Utilization; Mars Atmosphere; Oxygen

20040196385 Physical Sciences, Inc., San Ramon, CA, USA

Solar Energy Utilization for In-Situ Resource Utilization

Nakamura, T.; Space Resources Roundtable VI; 2004, pp. 34; In English; See also 20040196346

Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Physical Sciences Inc. (PSI) has been developing the Optical Waveguide (OW) system for solar energy utilization. In this system, solar radiation is collected by the concentrator which transfers the concentrated solar radiation to the OW transmission line. The OW transmission line transports the solar radiation to the location of solar energy utilization. Applications of this system include: material processing, plant lighting and power generation in space. Since 1988, the author and his colleague have been working on development of the Optical Waveguide (OW) Solar Power System with funding from Air Force Astronautics Laboratory. The work undertaken in this program includes theoretical and experimental investigation of key components of the OW system, and conceptual design, performance analysis and survivability evaluation of the OW Solar Power. Subsequently, Physical Sciences Inc. (PSI) has been developing the OW System for utilization of solar energy in space as well as on the ground. The first embodiment of the OW system discussed above was implemented for lunar material processing with funding from NASA/JSC (SBIR Phase I and II). In this program, we developed an engineering prototype of the solar energy system for thermochemical reduction of lunar oxide. The product oxygen is to be used as a propellant for space transportation. Figure 1 shows a photo of the ground test model of the OW solar energy system developed in this program. The system consists of three major components: the concentrator, the solar power transmission line, and the thermal reactor.

Author

Optical Waveguides; Solar Energy Conversion; Energy Technology

20040196386 sysRAND Corp., Parker, CO, USA

Lunar and Martian Fiberglass as a Versatile Family of ISRU Value-Added Products

Rodriguez, Gary; Space Resources Roundtable VI; 2004, pp. 38; In English; See also 20040196346

Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Lunar Regolith consists principally of silicates, in some cases as volcanic or impact glasses. We continue to contend that silicon is more versatile in application than all of the other Lunar-available elements combined and shouldn't end up in Lunar slag-heaps and instead should be the fundamental building block for a wide range of value-added products in a CisLunar economy. Fabrication of silicate glasses are conventional industrial processes and anticipated tensile strength of glass made under hard vacuum is an order of magnitude greater than glass produced in atmosphere containing water vapor. The logic

employed in our reasoning includes the fact that any In Situ Resource Utilization (ISRU) effort is going to yield copious masses of silicon oxides which can be used in bulk as conventional glass products or, after further separation, can be synthesized as Silicon and Silicon-Carbide Fullerenes for more exotic applications. Additionally, mechanical wrapping of Silicon Webbing could prove to be more practical and durable and a lot less brittle than attempting large-scale hot glass molding of structural components.
Author
In Situ Resource Utilization; Moon; Silicates; Cislunar Space; Manufacturing; Glass; Regolith

31
ENGINEERING (GENERAL)

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

20040191715 NASA, Washington, DC, USA
Risk Analysis
Morring, Frank, Jr.; Aviation Week and Space Technology; December 13, 2004; Volume 161, No. 23, pp. 26-27; In English; Copyright; Avail: Other Sources

A National Academies panel says the Hubble Space Telescope is too valuable ;or gamblingon a long-shot robotic mission to extend its service life, and urges Directly contradicting Administrator Sean O'Keefe, who killed a planned fifth shuttle servicing mission to the telescope on grounds it was too dangerous for a human crew in the post-Challenger environment, the expert committee found that upgrades to shuttle safety actually should make it less hazardous to fly to the telescope than it was before Columbia was lost. Risks of a telescope-servicing mission are only marginally greater than the planned missions to the International Space Station (ISS) O'Keefe has authorized, the panel found. After comparing those risks to the dangers inherent in trying to develop a complex space robot in the 39 months remaining in the Hubble s estimated service life, the panel opted for the human mission to save one of the major achievements of the American space program, in the words of Louis J. Lanzerotti, its chairman.
Author
Hazards; Hubble Space Telescope; Risk; Robotics; Space Missions

20040201292 Lamont-Doherty Geological Observatory, Palisades, NY USA
Integrated Study of Seismic and Infrasonic Signals From Sources in Southern Siberia, Eastern Kazakhstan and Western China
Richards, Paul G., Author; Kim, Won-Young, Author; Hagerty, Mike, Author; Khalturin, Vitaly, Author; Rautian, Tatyana G., Author; Oct. 2004; 68 pp.; In English
Contract(s)/Grant(s): DSWA01-97-C-0156; Proj-4698
Report No.(s): AD-A427771; DTRA-TR-01-38; No Copyright; Avail: CASI; A04, Hardcopy

Our Final Report has two parts. The first part is a draft of a paper, submitted for publication, entitled 'A study of small magnitude seismic events during 1961-1989 on and near the Semipalatinsk Test Site, Kazakhstan.' In this paper, we have estimated origin time and assigned magnitude for 31 previously undocumented underground nuclear tests and for 19 of these 31 have obtained locations based on seismic signals. The second part is a draft of a paper, submitted for publication, entitled 'Infrasound Detection of Large Mining Blasts in Kazaktstan.' In this paper, we describe infrasonic observations recorded since October, 1997, at the Kurchatov Observatory in Kazakstan from large mining blasts in Kazakstan and Siberia.
DTIC
China; Infrasonic Frequencies; Kazakhstan; Nuclear Explosions; Siberia

20040201441 Maryland Univ., College Park, MD, USA
Thermal Conductivity: A Small Apparatus to Introduce the Concept
Martinez-Miranda, Luz J.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 285-290; In English; See also 20040201420; No Copyright; Avail: CASI; A02, Hardcopy

Thermal conductivity is important in electronic applications, especially in the miniaturized devices in use today, because the material used to move heat away from the device, and avoids any damage or malfunction that would arise if the device is heated in excess of its operating temperature. Sometimes one does not want heat to travel to other part of the device, and

uses a heat sink. Another important application is in the space industry, where one wants to keep the area where people are at room temperature while the outside of the ship is either at very cold temperatures (like in an airplane) or at very high temperatures (like in the shuttle). In this experiment, the students will measure the thermal conductivity of three materials, aluminum, copper and glass. Using Al as reference, they will measure the power dissipated dQ/dt across the slab based on the rate of change of temperature as a function of position. The students then will estimate the heat transfer, dQ at specific time intervals, dt, for Al. Based on the number they obtain for Al, they will calculate the thermal conductivity and heat transfer for glass and Cu.
Author
Thermal Conductivity; Operating Temperature; Miniaturization; Malfunctions; Heat Transfer; Damage; Heat Measurement

20040201486 Virginia Univ., Charlottesville, VA, USA
The Virginia Middle School Engineering Education Initiative: Designing Engineering Teaching Kits (ETKs) for Middle Schools
Richards, Larry G.; Bart-Smith, Hilary; Laufer, Gabriel; Chasiotis, Ioannis; Humphrey, Joseph A. C.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 777-782; In English; See also 20040201469; No Copyright; Avail: CASI; A02, Hardcopy

The University of Virginia has undertaken a major project to design, implement, test, and distribute Engineering Teaching Kits (ETKs) for use in middle school science and math courses. A new senior design course sequence for fourth year Mechanical Engineers allowed over 30 students to participate in this project. Six ETKs are currently being developed: submersible vehicles, gels and brain perfusion, simple machines, solar car design, design for sustainability, and engineering materials. Each will emphasize the engineering design approach to problem solving. Every team has a faculty advisor from Engineering, a representative from the Education School, and a middle school teacher providing advice and assistance.
Author
Design Analysis; Education; Engineers; Problem Solving; Underwater Vehicles

20040201503 Air Force Office of Scientific Research, Bolling AFB, Washington, DC, USA
Air Force Basic Research in Materials and Structures
Jones, Walter F.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 739-761; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

Contents include the following: Air Force Office Of Scientific Research (AFOSR) orchestrates the air force basic research program with universities, industry, other government organizations, and AFRL technical directorates (TDs). Revolutionary capabilities. Effect-multiplied. Transformation. AFOSR with the Air Force Research Laboratory (AFRL). Office of scientific research: Structures, hypersonics, plasma dynamics, material design, turbulence, miniaturization. Cooperative control. Giologically-inspired concepts. Dragonfly station keeping and altitude control.
CASI
Military Technology; Miniaturization; Research and Development; Stationkeeping; Turbulence

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*.

20040191592 Indian Space Research Organization, Ahmedabad, India
Real-Time Measurement of E(sub b)/N(sub o) Ratio Received from the Satellite: Mathematical Analysis and Practical Implementation
Jain, P. K.; Pal, S.; Pandharipande, V. M.; Journal of Spacecraft Technology, Volume 14, No. 2; July 2004, pp. 5-17; In English; See also 20040191590; Copyright; Avail: Other Sources

This article provides the mathematical analysis of the method along with the derivation of the mathematical model of the long-loop PLL and nonlinear equations used for the on-line estimation of the E(sub b)/N(sub o) ratios. Design considerations and practical implementation of the method in a multi-mission remote sensing satellite ground station along with various

unpublished and practically measured test results have also been included.
Author
Ground Stations; Mathematical Models; Real Time Operation; Satellite Observation; Phase Locked Systems

20040191594 Indian Space Research Organization, Ahmedabad, India
A New Method for Enhancing Azimuth Extent of Imaging for Space borne Sliding Spotlight SAR
Misra, Tapan; Journal of Spacecraft Technology, Volume 14, No. 2; July 2004, pp. 47-57; In English; See also 20040191590; Copyright; Avail: Other Sources

The present paper describes a processing method for extending azimuth coverage for a space borne SAR operating in sliding spotlight mode. There are two major difficulties in processing such data, namely the large range cell migration (RCM) and the rapidly changing Doppler rate along the azimuth. This method assumes that the complete azimuth stretch will be processed in different blocks. Majority of RCM will be corrected in time domain by bulk RCM correction and corresponding phase compensation will convert the data to a strip-map one. However, in the resultant strip map data, the Doppler rate drifts along the azimuth and the drift is prominent as one moves away from spot centre. A re-sampling mechanism, applicable in both time and frequency domain, depending upon the matched filter domain, is suggested which enables strip map processing over a block of data with linearly drifting Doppler rate.
Author
Synthetic Aperture Radar; Azimuth; Doppler Effect; Radar Range

20040200717 National Inst. of Information and Communications Technology, Japan
Review of the National Institute of Information and Communications Technology, Volume 50, Nos. 1/2
March/June 2004; ISSN 1349-3191; 201 pp.; In Japanese; See also 20040200718 - 20040200735; Copyright; Avail: Other Sources

The articles in this issue cover: optical pulses, atom optics and lithography, superconductive oscillators and detectors, optical modulators, quantum information processing, quantum-correlated twin beams, quantum dot lasers, thin films, nano-gate transistors, SQUID, light beams, optical image storage, laser communication, multiplexing, optical data processing, wind profile measurement by coherent doppler lidar, and an electrostatic analyzer for space plasmas.
Author
Communication Equipment; Electronic Equipment; Optical Communication; Photonics

20040200719
Study on Laser Communications Demonstration Equipment at the International Space Station
Arimoto, Yoshinori; Review of the National Institute of Information and Communications Technology; March/June 2004; Volume 50, Nos. 1/2, pp. 117-124; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

This paper summarizes the result of a mission analysis and a feasibility study on the Laser Communications Demonstration Equipment (LCDE) to be attached to the International Space Station. LCDE is to demonstrate the capability of high-speed optical link, whose bit-rate is 2.5Gbps, with a ground station. The development program, however, was stopped in February, 2003 due to overrun of the development cost and delay of the launch date.
Author
International Space Station; Optical Communication; Laser Applications

20040200725
Optical Modulators for Photonic Sideband Management
Kawanishi, Tetsuya; Izutsu, Masayuki; Review of the National Institute of Information and Communications Technology; March/June 2004; Volume 50, Nos. 1/2, pp. 37-47; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

In this paper, we presented our recent works on development of optical modulators and subsystems. The modulators have new functions, such as optical frequency shift, modulation by radio-frequency-signal, etc, in addition to conventional ON/OFF keying. The target of our works is to provide particular functions for novel systems, such as radio-on-fiber system, optical packet switching, etc.
Author
Light Modulation; Communication Equipment; Optical Communication

20040200731 National Inst. of Information and Communications Technology, Japan

High-Spectral Density Multiplexing Transmission and Photonic Mixing for Millimeter-Wave-Band Radio-on-Fiber Systems

Kuri, Toshiaki; Yamashita, Tsukasa; Toda, Hiroyuki; Kitayama, Ken-Ichi; Review of the National Institute of Information and Communications Technology, Volume 50, Nos. 1/2; March/June 2004, pp. 125-131; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

Two system architectures based on dense wavelength division multiplexing (DWDM) for millimeter-wave-band (mm-wave-band) radio-on-fiber (ROF) systems are described. One architecture consists of a wavelength multiplexer and demultiplexer with arrayed waveguide gratings (AWGs) for optical-frequency-interleaved DWDM ROF transmission. The other architecture is based on a photonic down-conversion technique that is used in DWDM ROF systems. A 25-GHz-spaced, 60-GHz-band DWDM ROF transmission with photonic downconversion is experimentally demonstrated.

Author

Wavelength Division Multiplexing; Photonics; Millimeter Waves

20040200732

Wind Profile Measurements by Coherent Doppler Lidar

Mizutani, Kohei; Itabe, Toshikazu; Sishii, Shoken; Sasano, Masahiko; Aoki, Tetsuo; Asai, Kazuhiro; Sato, Atsushi; Review of the National Institute of Information and Communications Technology; March/June 2004; Volume 50, Nos. 1/2, pp. 157-166; In English; See also 20040200717; Copyright; Avail: Other Sources

Global wind profiling by a space-borne Doppler lidar with an eye-safe laser is expected to bring big progress in numerical weather prediction and the studies on global climate modeling. NICT (CRL) has been conducting studies on the lasers for the space-borne coherent Doppler lidar to observe wind and aerosol profiles and developing the algorithm for the wind profiling through ground based and airborne wind observations by a coherent Doppler lidar. We are also making studies on systems aimed at a demonstration of the global wind profiling by the space-borne coherent Doppler lidar.

Author

Optical Radar; Doppler Radar; Meteorological Radar; Coherent Radar; Satellite-Borne Radar

20040200735

Ultra-fast Optical Processing Technology and its Application to Photonic Network

Wada, Naoya; Kubota, Fumito; Review of the National Institute of Information and Communications Technology; January 2004; Volume 50, Nos. 1/2, pp. 141-152; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

Ultra-high speed all-optical label processing methods are proposed and experimentally demonstrated. These methods dramatically increase the label processing capability. Optical packet switch (OPS) systems and networks based on OPS nodes are expressed as an application of optical processing technologies. First 40Gbit/s/port OPS prototype with all-optical label processor, optical switch, optical buffer, and electronic scheduler is expressed. The feasibility of OPS networks is verified by experimental demonstrations.

Author

Optical Data Processing; Photonics; Optical Communication

20040200965 NASA Johnson Space Center, Houston, TX, USA

Final Report of the Haystack Orbital Debris Data Review Panel

Barton, David K.; Brillinger, David; McDaniel, Patrick; Pollock, Kenneth H.; El-Shaarawi, A. H.; Tuley, Michael T.; February 1998; 60 pp.; In English

Report No.(s): NASA-TM-1998-4809; No Copyright; Avail: CASI; A04, Hardcopy

The Haystack Orbital Debris Data Review Panel was established in December 1996 to consider the adequacy of the data on orbital debris gathered over the past several years with the Haystack radar, and the accuracy of the methods used to estimate the flux vs. size relationship for this debris. The four specific issues addressed for the Panel were: 1. The number of observations relative to the estimated population of interest 2. The inherent ambiguity between the measured radar cross section (RCS) and the inferred physical size of the object 3. The inherent aspect angle limitation in viewing each object and its relationship to object geometry 4. The adequacy of the sample data set to characterize the debris population's potential geometry. Further discussion and interpretation of these issues, and identification of the detailed questions contributing to them, are discussed in this report.

Derived from text

Space Debris; Data Processing; Radar Tracking

20040201056 Naval Postgraduate School, Monterey, CA USA

Sidelobe Canceller Jamming Using Hot-Clutter

Goktun, Sargun, Author; Oruc, Ercan, Author; Sep. 2004; 129 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427221; No Copyright; Avail: Defense Technical Information Center (DTIC)

Coherent Sidelobe Cancellation (CSLC) is a coherent processing technique that has the potential of reducing noise jamming through the antenna side lobes. Present CSLCs have the capability of reducing the noise jamming by 25 to 35 dB. The maximum number of side lobe jammers that can be handled by a CSLC is equal to the number of auxiliary antennas. The performance of CSLC is governed by nonlinear stochastic differential equations that are not solvable by analytic means. Therefore this thesis employs simulation techniques to solve these equations. The CSLC becomes saturated as the number of jammers in different directions exceeds the number of loops. Jammer multipath adds an additional degree of freedom for each multipath signal that has a direction different than that of the main jammer. The objective of this thesis was to determine the effect that these multipath or hot clutter signals have on a CSLC. It was found that hot clutter produced substantial degradations on single, double and triple CSLCs. The effect was most pronounced for single cancellers where multipath with a magnitude of 1% of the jamming signal reduced the cancellation ratio by 18 dB. Comparable numbers for double and triple cancellers were 11 dB.

DTIC

Clutter; Jamming; Sidelobe Reduction

20040201057 Naval Postgraduate School, Monterey, CA USA

Wireless Tool Kit For Hand Held Devices

Baalaji, Venkateshwaraiyer S., Author; Sep. 2004; 93 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427226; No Copyright; Avail: Defense Technical Information Center (DTIC)

Wireless networks can be broadly classified into two types infrastructure based networks and ad hoc networks. The former uses fixed base stations (infrastructure) which are responsible for coordinating communication between the mobile hosts (nodes). These base stations are interconnected by wired back bones, whereas mobile nodes communicate with the base station through the wireless media. The latter one consists of mobile nodes which communicate with each other through wireless medium without any fixed infrastructure. Hence there is no centralized infrastructure that takes care of the routing of information among the participants in the network. There has been a growing interest in ad hoc network in recent years as mobile devices have become more powerful and are capable of processing data like their desktop counterparts. When such a capability is available these devices should be able to share information among them without reliance on existing network infrastructure. Mobile devices are self configurable into either infrastructure or ad hoc mode. Protocols and software have been developed to enable mobile devices to connect to an infrastructure node, where as the same is not the case in the ad hoc environment. Host mobility causes frequent and unpredictable topological changes in a wireless environment. Finding and maintaining routes in ad hoc networks is a non trivial task. This thesis will develop software components that will enable communication in an ad hoc network. These components could be used to build collaborative services in such an ad hoc (802.11) wireless environment.

DTIC

Communication Networks; Kits; Protocol (Computers); Wireless Communication

20040201074 Naval Postgraduate School, Monterey, CA USA

Leveraging the National Guard's Existing Information Technology Infrastructure to Bridge the Incident Response Digital Divide

Picard, Stephan, Author; Sep. 2004; 109 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427265; No Copyright; Avail: Defense Technical Information Center (DTIC)

One of the greatest challenges facing the USA after a concerted terrorist attack is that of coordinating response from the myriad of resources available to the incident commander. During this crisis the daunting task facing the Information Technology (IT) community is to bring a myriad of disparate systems and their relevant traffic together to provide the incident commander a picture of what is happening on the ground a common operating picture and then to push that picture up to the decision makers at the state and federal levels. This thesis will examine current organizational structures missions and IT architectures within the USA Department of Homeland Security USA Northern Command and the USA National Guard. In addition this thesis will propose that one solution to bridge the divide between the disparate agencies that may respond to an emergency such as a natural disaster or a terrorist Weapon of Mass Destruction (WMD) may lie within the National Guard. With its unique role as a state militia and a federal warfighter the National Guard is particularly well positioned to bridge this

divide by augmenting its existing networks and incident response communications capabilities.
DTIC
Command and Control; Communication Networks; Information Systems; Voice Communication

20040201077 Naval Postgraduate School, Monterey, CA USA
An Evaluation of Management Techniques for SONET/SDH Telecommunication Networks
Lim, Wee S., Author; Sep. 2004; 75 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427271; No Copyright; Avail: Defense Technical Information Center (DTIC)

A study of SONET network management applications and the load they impart to the network is conducted to provide a better understanding of the capability of various management approaches. In this study, a SONET network is set up in the Advanced Networking Laboratory of the Naval Postgraduate School using four Cisco ONS 15454s. Next, two Element Management Systems, the Cisco Transport Controller and the Cisco Transport Manager, are deployed onto the SONET network. Subsequently, the network traffic of the Element Management Systems is captured and analyzed using a packet analyzer. Link utilization of the two tools is computed using the first order statistics of the captured traffic distributions. In addition, the Hurst parameter is estimated using the variance index plot technique (which uses higher orders statistics of the modeled distributions) to determine the captured traffic's degree of self similarity. Finally, the calculated utilization is extrapolated to obtain the link utilization for 2500 network elements (the maximum number supported by the Cisco Transport Manager). The result obtained is useful in determining the maximum number of network elements (Cisco ONS 15454s) that the Cisco Transport Manager can support from a network loading point of view.
DTIC
Controllers; Evaluation; Management Methods; Optical Communication; System Effectiveness; Telecommunication

20040201086 Naval Postgraduate School, Monterey, CA USA
High Speed Internet Access Using Cellular Infrastructure
Chatziioannidis, Ioannis, Author; Sep. 2004; 131 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427298; No Copyright; Avail: Defense Technical Information Center (DTIC)

The way that the Internet is accessed has changed dramatically in recent years. In addition to wire line connections such as dial-up, xDSL, cable modems, and optical fiber, wireless implementations are gaining market share based on technologies such as WiFi, WiMAX, MBWA, and satellite and cell phone networks. This thesis provides an overview of Internet access through cellular networks, and especially through the GSM, GPRS, and UMTS networks. Chapter 2 examines the cellular evolution, following the path from first generation (1G) to third generation (3G) and fourth generation (4G) systems. Chapter 3 analyzes the most widespread cellular networks (i.e., GSM, GPRS, UMTS) focusing on their air interface architecture, design, and modulation schemes. It also presents research on cellular data networks, such as VPN, IPv6, and VoIP. Chapter 4 reviews the most popular high-speed mobile internet services, including AT&T wireless, Cingular Wireless, Verizon Wireless, Sprint, Nextel, and T-Mobile. The Cingular Wireless network is tested in terms of speed and reliability by providing Internet access to a laptop through a mobile phone. The analysis shows that, depending on cellular network availability, throughput varied from 5 to 25 Kbps and Round Trip Time (RTT) averaged about 1 second. Also, TCP Timestamps and the Explicit Congestion Notification (ECN) were implemented at the end hosts, thus increasing performance. Chapter 5 discusses performance issues for modern cellular networks, such as RTT and some TCP options. Chapter 6 compares the cellular data Internet connection to wired connections such as dial-up and xDSL/ Cable and with wireless broadband technologies such as satellite, WiFi, WiMAX, and MBWA. The author concludes that as of July 2004, the 2.5G cellular data networks are a reasonable solution for anyone who needs Internet access anywhere that a cell signal is available, and who can afford its high cost. (13 tables, 75 figures, 100 refs.)
DTIC
Broadband; Communication Networks; High Speed; Internets; Wireless Communication

20040201094 Integrated Wave Technologies, Inc., Fremont, CA USA
Air Force Dual-Use Science and Technology Two-Way Voice-To-Voice Translator
McCune, Timothy, Author; Sep. 2004; 30 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-02-2-0050; Proj-459E
Report No.(s): AD-A427316; AFRL-IF-RS-TR-2004-259; No Copyright; Avail: Defense Technical Information Center (DTIC)

This project demonstrated hardware and software technology to produce a miniature two-way voice translator capable of

operating in high noise environments. This effort built upon Integrated Wave Technology's work with a miniaturized one-way translator. This involved adding separate audio channels for second microphones and speakers. Separate channels allow the circuit board to process the input from the interviewer's microphone and to play audio directly to the interviewee. The system was designed to be hand held or pocket-mounted (for eyes-free, hands-free operation), to consume a fraction of a watt of power, and to work in high background noise with high accuracy. Speaker independence for the Arabic language was also a goal of this research. There was marginal success due to limited amounts of speech for building universal templates in this language. The accuracy and utility of this device has been demonstrated and documented in this report.
DTIC
Background Noise; Research and Development; Speech Recognition; Technologies; Translating

20040201173 Naval Postgraduate School, Monterey, CA USA
A Comparison of Timing Methods in Orthogonal Frequency Division Multiplexing (OFDM) Systems
Oz, Ersoy, Author; Sep. 2004; 197 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427440; No Copyright; Avail: Defense Technical Information Center (DTIC)

Orthogonal frequency division multiplexing (OFDM) is being used by wireless local area network (WLAN) standards, such as IEEE 802.11a, and wireless metropolitan area network (MAN) standards, such as IEEE 802.16a. OFDM is a very efficient communications scheme for wireless ADHOC networks. However, the wireless environment causes inter-symbol interference (ISI) and inter-carrier interference (ICI). Estimating the starting point of an OFDM symbol must be handled efficiently and effectively to reduce the errors. OFDM must be time synchronized to prevent inter-symbol interference (ISI) and inter-carrier interference (ICI). Many techniques exist to realize timing synchronization in OFDM systems. In this thesis, the need for timing synchronization, the timing errors, and the performance of different techniques under a variety of mobile channel models (indoor and outdoor) are investigated, and simulation performance results for each technique under different channel models are presented.
DTIC
Frequency Division Multiplexing; Orthogonality; Synchronism; Wireless Communication

20040201187 Louisiana State Univ., Baton Rouge, LA USA
Enhancing the Quality of Routing (QOR) in DataCentric Sensor Networks
Kanna, Rajgopal, Author; Oct. 2004; 26 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-02-1-O198; DARPA ORDER NO. J058; Proj-SENS
Report No.(s): AD-A427474; AFRL-IF-RS-TR-2004-234; No Copyright; Avail: Defense Technical Information Center (DTIC)

This final status report describes the outcome of the project titled 'Enhancing the Quality of Routing (QoR) in Datacentric Sensor Networks 'in support of AFRL and DARPA carried out by the participants from Louisiana State University during the reporting period. The purpose of the project was to develop new models for reliable length and energy-constrained routing in sensor networks that takes the quality of routing paths (measured in terms of its energy-effects on individual sensors) into account. The project utilized the following participants from Louisiana State University: Dr. Rajgopal Kannan and Dr. S. Sitharama Iyengar along with one graduate student, Miss. Lydia Ray, employed as a research assistant. The organization of this report follows the guidelines as set forth in the CDRL.
DTIC
Computer Networks; Game Theory

20040201216 Army Research Lab., Aberdeen Proving Ground, MD USA
Initial Assessment of the Manpower Requirements for the Army Airborne Command and Control System (A2C2S) System Operator Via the Improved Performance Research Integration Tool (IMPRINT)
Havir, Thomas J., Author; Durbin, David B., Author; Oct. 2004; 41 pp.; In English
Report No.(s): AD-A427527; ARL-TR-3317; No Copyright; Avail: Defense Technical Information Center (DTIC)

The Army airborne command and control system (A2C2S) is an airborne C2 system that commanders will use to command and control units engaged in military operations ranging from humanitarian support and homeland security through high-intensity conflict. The A2C2S will allow the commander and staff to quickly traverse the battlefield while exercising command and control over forces in joint, interagency, and multinational environments. The U.S. Army Training and Doctrine Command System Manager-battle Command (TSM-BC) requested the U.S. Army Research Laboratory's Human Research and Engineering Directorate to perform an IMPRINT analysis to determine the manpower requirements for the A2C2S system

operator. The model was constructed with engineering estimates of the reliability data for the system, and the wartime scenario was based on the operational mission profile for the system. The model was executed ten times as the baseline and ten times with stressors including temperature, humidity, mission-oriented protective posture level, sleepless hours, and noise. The model results indicated that they system operator man-hour requirement was 2056.7 hours per A2C2S. This time consisted of maintenance man-hours required to perform unscheduled maintenance and mission time since the system operator is required to participate as a member of the A2C2S during missions. Based on the results of this model, one system operator is required for each A2C2S to adequately perform unscheduled maintenance and to participate as a member of the A2C2S during missions. Several opportunities for future research are available to complement the findings in this report. As system development continues and more accurate RAM (reliability, availability, maintainability) data become available, the model should be revised to reflect the most current data.
DTIC
Command and Control; Manpower; Military Operations

20040201509 Nippon Telegraph and Telephone Public Corp., Tokyo, Japan
NTT Technical Review, Volume 2, No. 11
Wada, Masato, Editor; Fukuda, Kenichi, Editor; Shibata, Tsugumichi, Editor; Tamechika, Emi, Editor; Sadakata, Toru, Editor; Ida, Minoru, Editor; Iwata, Hideyuki, Editor; Yamaguchi, Haruhito, Editor; Kusaka, Takayoshi, Editor; Tajima, Kimihiro, Editor, et al.; November 2004; ISSN 1348-3447; 79 pp.; In English; See also 20040201510 - 20040201522; Copyright; Avail: Other Sources

The topic for this issue is recent trends in electromagnetic compatibility technologies, with a special feature on next-generation core network technologies.
CASI
Electromagnetic Compatibility; Networks; Communication Networks; Telecommunication

20040201510 Nippon Telegraph and Telephone Public Corp., Musashino, Japan
Formant Analysis System for Realtime Electromagnetic Interference Source Discrimination
Ishiyama, Fumihiko; Murakawa, Kazuo; Yamane, Hiroshi; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 12-17; In English; See also 20040201509; Copyright; Avail: Other Sources

We studied a formant analysis system that extracts characteristic frequencies of acoustic noise generated by telecommunication equipment as a result of electromagnetic interference. Our realtime formant analysis system is based on linear predictive coding and digital signal processors. We checked the system's technical conditions for formant analysis and found that characteristic frequencies could be obtained even when the signal-to-noise ratio of the waveform was -5 dB.
Author
Electromagnetic Interference; Noise (Sound); Signal Analyzers; Signal Processing; Systems Analysis

20040201511 Nippon Telegraph and Telephone Public Corp., Atsugi, Japan
Development of Automated Optical Fiber Cross-connect Equipment
Mizukami, Masato; Makihara, Mitsuhiro; Inagaki, Shuichiro; Sasakura, Kunihiko; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 63-67; In English; See also 20040201509; Copyright; Avail: Other Sources

We have developed automatic optical fiber cross-connect equipment that provides automatic cross-connection among any of 200 pairs of input and output optical fibers using a fiber-handling robot. This equipment allows the cross-connection and management of optical fibers in networks in intelligent buildings and optical access networks to be performed by remote control. It eliminates the need for manual cross-connection and decreases the operating cost.
Author
Optical Fibers; Optical Communication; Communication Networks

20040201516 Nippon Telegraph and Telephone Public Corp., Atsugi, Japan
lO-Gbit/s Wireless Link Technology Using the 120-GHz Band
Nagatsuma, Tadao; Hirata, Akihiko; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 58-62; In English; See also 20040201509; Copyright; Avail: Other Sources

The appearance of high-speed, large-capacity information-processing devices is driving the need for ultrahigh-speed wireless communications that can achieve nearly instantaneous transfer of large amounts of data. This article introduces a

120-GHz, millimeter-wave wireless link capable of lO-Gbit/s data transmission, which is a full order of magnitude faster than existing wireless communications technologies.
Author
Wireless Communication; Data Transmission; High Speed; Photonics

20040201520 Nippon Telegraph and Telephone Public Corp., Atsugi, Japan
Ultrafast Multifunctional CMOS LSI with 12.5-Gbit/s Transceiver
Kawamura, Tomoaki; Ohtomo, Yusuke; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 54-57; In English; See also 20040201509; Copyright; Avail: Other Sources

We have developed ultrafast CMOS LSI (complementary metal oxide semiconductor large-scale integration) technology that can be used to produce ultrafast transmitting/receiving circuits (including signal receiver circuits and logic circuits) that have comfortable operating margins even at speeds as high as 12.5 Gbit/s. This technology can be used to implement ultrafast multifunctional LSIs that are needed for the efficient processing of high-volume communications. We have used it to fabricate an ultrafast multifunctional CMOS LSI in which the functions necessary for testing and evaluating LSIs that transmit and receive signals at 10 Gbit/s or above are integrated into a single chip.
Author
Transmitter Receivers; Transmission; Circuits; High Speed; Large Scale Integration

20040201522 Nippon Telegraph and Telephone Public Corp., Musashino, Japan
Multilayer Service Network Architecture for Next-generation Core Network
Kurimoto, Takashi; Kojima, Hisashi; Inoue, Ichiro; Urushidani, Shigeo; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 30-36; In English; See also 20040201509; Copyright; Avail: Other Sources

A new multilayer service network architecture is proposed. In this network, which consists of edge and core nodes, an optical path is autonomously established between edge nodes, and traffic is transferred directly to enable a large amount of traffic to be carried. This technique is called 'optical path cut-through control'. An integration technique called multilayer correlation is also described. This function enables dynamic provision and restoration of the connectivity of multiple layers working in concert with each network layer. A multilayer service network will be shared by multiple service networks having different address spaces and different operating policies.
Author
Optical Paths; Networks; Architecture (Computers); Broadband

20040201539 Washington State Univ., Seattle, USA, Washington State Dept. of Transportation, Seattle, WA, USA
Algorithms for Estimating Mean Vehicle Speed Using Uncalibrated Traffic Management Cameras
Schoepflin, T. N.; Dailey, D. J.; Oct. 2003; 268 pp.; In English
Report No.(s): PB2005-101430; No Copyright; Avail: CASI; A12, Hardcopy

This report documents the second project, in a series of three research projects funded by the Washington State Department of Transportation (WSDOT), that will enable already deployed, uncalibrated CCTV cameras to be used as traffic speed sensors. The principle traffic speed sensors currently deployed by WSDOT are inductance loops; however, in some locations it is impractical or too expensive to install loops. In addition, a large number of un-calibrated cameras are already in place and being used by the traffic management operators to qualitatively assess traffic both on the freeway and on arterials. These projects will leverage the existing cameras to provide a quantitative measurement of traffic speed similar to that which can be obtained using loops and suitable for use in the Traffic Management System (TMS) without installing loops in the roadway. The implementation of this research will culminate with software that creates an automated system compatible with the existing TMS. This system will leverage the existing camera investment to create a new set of speed sensors that increases the geographic extent of the TMSs quantitative surveillance capabilities. In the second phase, reported on here, roadway features are used to augment the camera calibration. This overcomes the occlusion problem, or apparent blending together of small vehicles as seen in the far field of the camera images, that existed in the first phase. Activity maps, fog lines, and vanishing points are a few of the additional features used, and the details of these algorithms are described in this report. These results have also been peer reviewed and published.
NTIS
Cameras; Closed Circuit Television; Algorithms; Estimating

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*.

20040191596 ISRO Satellite Centre, Peenya, Bangalore, India

Generation of Harmonics due to Multipactor in Co-axial Geometry

Nagesh, S. K.; Revanasiddiah, D.; Shastry, S. V. K.; Journal of Spacecraft Technology, Volume 14, No. 2; July 2004, pp. 19-25; In English; See also 20040191590; Copyright; Avail: Other Sources

Secondary electron resonance or multipactor is a persistent problem in microwave space systems. The phenomenon is basically an RF breakdown, which leads, among other things, to the generation of harmonics and intermodulation products. The present paper gives an analysis of harmonic generation in a co-axial system. The waveform associated with the multipactor current source has been determined. Using the Runge Kutta Fehlberg approach for solving the nonlinear differential equation governing the motion of electrons in the RF field. This current source has been employed in a circuit simulation software for estimating the harmonic levels. For a typica1 case, wherein the percentage of power dissipation due to multipactor is around 9%, the amplitude level of the second harmonic is about 16 dB below that of the fundamental frequency.

Author

Electrons; Radio Frequencies; Circuits; Intermodulation; Microwave Equipment

20040196365 Pratt and Whitney Aircraft, USA

Power Lander for Support of Long-Term Lunar Presence

Joyner, Russ; Rodriguez, Gary; Space Resources Roundtable VI; 2004, pp. 24; In English; See also 20040196346

Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Emerging industrial base and the consequent sustained manned Lunar presence will require consistent high power capacities. This paper proposes a first iteration design of a flyable electric power platform which could serve as an enabler of Lunar Development and Exploration. It is intended to support a small facility solo or an emerging industrial base as part of a grid. Lunar Missions, Habitats and Facilities stand to benefit from an expected decade of non-stop operation, the economics of scale, Commercial Off-The-Shelf (COTS) availability, standardization of design, and logistical support for Lunar encampments provided by this architecture. The unattended and unmanned vehicle design is to be man- and robotics-serviceable after delivery by current and proposed heavy-lift boosters. Design continuity within a family of systems will improve reliability through 'lessons learned'' in the field. Further, various configurations of the proposed scalable architecture will provide reference platforms for the indigenous construction of similar power plant facilities from in-situ Lunar resources (ISRU). The baseline design should be directed towards those materials available on the Moon and expected to be manufacturable on-site within the first decade of operation.

Author

Lunar Exploration; Lunar Resources; Electric Current; Power Supplies

20040200730

Research on Superconductive Oscillators and Detectors at Terahertz Frequency Regions

Kawakami, Akira; Uzawa, Yoshinori; Review of the National Institute of Information and Communications Technology; March/June 2004; Volume 50, Nos. 1/2, pp. 25-35; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

Development of generating and detecting technology in the THz frequency region is an important subject for high-speed telecommunication technology in the future. Recently, it is necessary to develop THz-band oscillators and detectors in the field of globe environment measurements and radio physics. We have developed superconducting Josephson array oscillators and low-noise SIS mixers for THz-band solid oscillator and highly sensitive detector. In this paper, we show oscillating properties and frequency dependence of output for 650 GHz and 1 THz Josephson array oscillator, and discuss low-noise properties of 800 GHz-band SIS mixers.

Author

SIS (Superconductors); Oscillators; Mixing Circuits; Josephson Junctions

20040201097 State Univ. of New York, Buffalo, NY USA

Robust Adaptive Spread-Spectrum Receivers: SMART Antenna/Space Timer Interference Mitigation Techniques

Batalama, Stella N., Author; Pados, Dimitris A., Author; Sep. 2004; 178 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F30602-00-1-0520; Proj-4519

Report No.(s): AD-A427319; AFRL-IF-RS-TR-2004-260; No Copyright; Avail: Defense Technical Information Center (DTIC)

This work focuses on the problem of adaptive receiver design for direct sequence spread-spectrum wireless communications systems with limited data support dictated by the rapidly changing characteristics of the wireless channel. Both linear and non-linear (neutral network) receiver structures are considered, usually equipped with an antenna array (space-time processing).

DTIC

Receivers; Signal Processing; Spread Spectrum Transmission; Timing Devices

20040201117 Duke Univ., Durham, NC USA

High-Speed Chaos in an Optical Feedback System with Flexible Timescales

Blakely, Jonathan N., Author; Illing, Lucas, Author; Gauthier, Daniel J., Author; Nov. 2003; 8 pp.; In English

Contract(s)/Grant(s): DAAD19-02-1-0223

Report No.(s): AD-A427355; ARO-43758.2-PH; No Copyright; Avail: CASI; A02, Hardcopy

We describe a new optoelectronic device with timedelayed feedback that uses a Mach-Zehnder interferometer as passive nonlinearity and a semiconductor laser as a current-to-optical frequency converter. Band-limited feedback allows tuning of the characteristic time scales of both the periodic and high dimensional chaotic oscillations that can be generated with the device. Our implementation of the device produces oscillations in the frequency range of tens to hundreds of megahertz. We develop a model and use it to explore the experimentally observed Andronov-Hopf bifurcation of the steady state and to estimate the dimension of the chaotic attractor.

DTIC

Chaos; Electro-Optics; Feedback; High Speed

20040201127 University of Southern California, Los Angeles, CA USA

Pulsed Power and Transient Plasmas: Basic Research With Application to Ignition, Emissions, and New Pulsed Power Technology

Gundersen, Martin A., Author; Oct. 2004; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-01-1-0698

Report No.(s): AD-A427374; ARO-42713.1-PH; No Copyright; Avail: Defense Technical Information Center (DTIC)

Scientific progress lies in three areas: Pulsed power, transient plasma ignition, and applications of pulsed power to biology. We report here 1) Progress in studies of SiC pulsed power JFET devices for applications to pulsed power, 2) Significant progress in the application of transient plasma to ignition, with results during the previous year in the ignition of pulse detonation engines, and 3) Significant progress in the study of the effects of nanosecond pulsed electric fields on biological cells, including visualization of intracellular calcium bursts and certain additional processes in Jurkat-T lymphocytes. During the next year we plan to develop advanced pulse generation devices for both biological applications and transient plasma ignition, and conduct further experiments in collaborations with several institutions.

DTIC

Electric Fields; Ignition; Pulse Generators; Research

20040201160 Massachusetts Inst. of Tech., Cambridge, MA USA

Single Electron Transistors

Kastner, Marc A., Author; Oct. 2004; 8 pp.; In English

Contract(s)/Grant(s): DAAD19-01-1-0637

Report No.(s): AD-A427420; ARO-41958.4-EL; No Copyright; Avail: Defense Technical Information Center (DTIC)

A Single Electron Transistor (SET) turns on and off for an electron added to it. Our goal is to better control and understands the physics of SETs in order to make them technologically useful. Our work has shown that the SET behaves like an artificial atom, in that the number of electrons and the energy are both quantized. The goal of our current project is to

measure the electron spin resonance in this artificial atom, when it contains an odd number of electrons. This is an important step in exploring whether one could use SET's for quantum computing.
DTIC
Transistors

20040201165 Massachusetts Univ., Amherst, MA USA
Scalable Real-Time Negotiation Toolkit
Lesser, Victor R., Author; Oct. 2004; 123 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-99-2-0525; DARPA ORDER-H354; Proj-H354
Report No.(s): AD-A427427; AFRL-IF-RS-TR-2004-266; No Copyright; Avail: Defense Technical Information Center (DTIC)

The major technical progress of this effort centered on three different interrelated activities, each of which were critical to the successful building of the software infrastructure necessary to implement an adaptive distributed sensor network. These activities involved the development of a distributed soft, real-time heuristic resource allocation protocol, the development of a domain-independent soft, real time agent architecture, and finally the development of techniques for building and evolving an agent organization. Additionally, the distributed resource allocation protocol led to a new approach to solving distributed constraint satisfaction and optimization problems based on a mediation-based negotiation (partial centralization) with overlapping context and extended views along critical paths for search and communication efficiency. The distributed algorithms developed using this approach, called APO and optAPO have better performance than the best known complete and optimal distributed algorithms - AWC and ADOPT.
DTIC
Algorithms; Computer Programs; Real Time Operation; Resources Management

20040201166 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA USA
Optimization of Electronically Integrated Smart Actuators
Lindner, Douglas K., Author; Guerdal, Zafer, Author; Frecker, Mary, Author; Jul. 2003; 10 pp.; In English
Contract(s)/Grant(s): F49620-01-1-0178
Report No.(s): AD-A427429; AFRL-SR-AR-TR-04-0526; No Copyright; Avail: CASI; A02, Hardcopy

The primary objective of this research is to develop a multidisciplinary optimization methodology for the integrated design of a smart actuator consisting of: (1) an active material that functions as the main transducer, (2) a compliant mechanism that serves as a mechanical amplifier, and (3) drive electronics to provide the electrical power.
DTIC
Actuators; Transducers

20040201174 Naval Postgraduate School, Monterey, CA USA
An Experimental Approach for Studying the Creep Behavior of Thin Film/ Substrate Interfaces
Parks, Carl L., Author; Sep. 2004; 59 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427441; No Copyright; Avail: Defense Technical Information Center (DTIC)

Large shear stresses often develop at the interface between dissimilar materials in microelectronic devices, when they are subjected to thermo-mechanical excursions. These stresses, which typically occur due to thermal expansion mismatch between the adjoining materials, are usually confined near the edges of films. However, for narrow thin film lines, these stresses may exist over a large fraction of the film-substrate interface. When the substrate is subjected to relatively high homologous temperatures, the imposed interfacial shear stress can facilitate diffusionally accommodated interfacial sliding, or interfacial creep. This thesis explores methodologies to measure the kinetics of interfacial creep at model Al thin film/silicon substrate interfaces. A method of sample production which involved diffusion bonding a polished Si substrate to the surface of a thin Al film deposited on a second Si substrate was developed. The resultant sample geometry comprises a Si/Al/Si sandwich, which when loaded edge-wise in compression, allows the Al thin film-Si interfaces to be loaded in shear. By measuring the relative displacements between the two Si substrates, the interfacial displacement rates at varying temperatures and stresses were experimentally determined. In accordance with previous results, the kinetics was given by a diffusional creep law with a threshold stress, and an activation energy representing interfacial diffusion. The activation energy was found to be unusually low, and further experimental and modeling studies are needed to better understand its origin.
DTIC
Creep Properties; Shear Stress; Sliding; Substrates; Thin Films

20040201193 Northwestern Univ., Evanston, IL USA

Self-Assembled Materials Systems and Devices for R-FLICS

Ho, Seng-Tiong, Author; Marks, Tobin J., Author; Sep. 2004; 31 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-00-1-0368

Report No.(s): AD-A427485; ARO-41315.23-EL-DRP; No Copyright; Avail: Defense Technical Information Center (DTIC)

Electro-optic (EO) modulators based on multilayer self-assembled superlattices (SAS) from wet deposition, and from vapor phase deposition have been designed, fabricated, and characterized. Two-step wet chemical protection-deprotection approach for the growth of SAS was used for the fabrication of electro-optic modulators. With this process the SAS film can he grown at a rate of about 40 minutes per bilayer, and it is at least one order of magnitude more rapid than previous three-step deposition method. Novel approaches of self-assembly via vapor phase deposition were investigated for the growth of EO active DTPT, and PEPCOOH thin films. The EO active thin films exhibit strong second harmonic generation and EO modulation effects without external electric field poling. Promising electro-optic materials were used for the grown of EO thin films from vapor phase, and prototype electro-optic modulators were fabricated and tested by integrating the intrinsically acentric self-assembled thin films with low-loss polymeric layers and semiconductor substrates.

DTIC

Electro-Optics; Modulators

20040201205 Hawaii Univ., Honolulu, HI USA

Elastic Properties of Advanced Superhard Thin Films by Surface Brillouin Scattering: Effects of Structure and P-T Environments

Manghnani, Murli H., Author; Zinin, Pavel V., Author; Jan. 2004; 189 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-00-1-0569

Report No.(s): AD-A427506; UH-HIGP/SOEST-FR-2000-2004; ARO-41032.12-MS-H; No Copyright; Avail: CASI; A09, Hardcopy

Recent theoretical predictions of the new superhard materials and production of the new superhard films such as cubic boron nitride (cBN), carbon nitride Beta-C3N4, B4C and chemical vapor deposited (CVD) diamond films have surged considerable interest in mechanical properties of thin hard and superhard films. Their hardness and abrasive qualities, highly valued in applied technology and defense industry, are controlled by their large elastic moduli. Elastic properties of the superhard films need to be determined experimentally because they strongly depend on the synthesis conditions, and they cannot be derived from theoretical considerations and modeling alone. The goals of this project were to determine the elastic properties and microstructure of the new superhard thin (30-500 nm) coatings, such as those based on the B-C-N triangle, by surface Brillouin spectroscopy (SBS), in conjunction with atomic force microscopy, as a function of composition, structure and P-T environments. We focused our research work on thin films that had best mechanical properties. Results of the research conducted have so far resulted in 17 publications.

DTIC

Elastic Properties; Thin Films

20040201211 California Inst. of Tech., Pasadena, CA USA

Monolithic Integration of Microfluidics and Optoelectronics for Biological Analysis

Scherer, Axel, Author; Quake, Stephen, Author; Apr. 2004; 3 pp.; In English

Contract(s)/Grant(s): DAAD19-00-1-0392

Report No.(s): AD-A427520; ARO-41400.1-LS; No Copyright; Avail: CASI; A01, Hardcopy

We have integrated microfluidic structures with optoelectronic lasers in the same device. Very sensitive and ultra-small laser sensors could be connected to fluidic systems by using microfluidic multiplexing technology and replication molded microfluidic chips. The basis of our sensor is a two-dimensional photonic crystal laser with an unusual cavity geometry that permits the introduction of analyte into the highest optical field region. This photonic crystal laser sensor can measure parts per million changes in the refractive index in volumes of several femtoliters, and is the home run' we were looking for. We have used our microfluidic systems to perform a large number of analytical tasks, such as cell sorting, protein synthesis and even polymerase chain reaction (PCR) amplification of DNA. The photonc crystal laser sensors were also tested in different solutions, and their performance was calibrated by using standard index matching fluids, showing a linear response of the lasing frequency with changes in the refractive index. The fluidic delivery system together with the napo-spectroscopy tools developed in this program led to the possibility of interrogating and testing of picoliter volumes of solution with femtoliter sensitivity on compact and robust micro-chips.

DTIC

Bioassay; Crystals; Electro-Optics

20040201227 Massachusetts Inst. of Tech., Lexington, MA USA

Correlation of Nonlinear Distortion in Digital Phased Arrays: Measurement and Mitigation

Rabideau, Daniel J., Author; Howard, L. C., Author; Nov. 2004; 47 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F19628-00-C-0002

Report No.(s): AD-A427551; 101-1037; ESC-TR-2004-086; No Copyright; Avail: CASI; A03, Hardcopy

In a digital array, each receiver performs analog-to-digital-conversion (ADC), with the resulting digital data later combined via digital beamforming techniques. Since ADC is performed prior to beamforming, it is thus theoretically possible to enhance the dynamic-range (DR) of the individual receivers through post-ADC array integration gain. In practice, however, DR enhancement is limited by correlation of the nonlinearities (from receiver to receiver). Worse still, little published data exists on this subject (i.e., suitable for quantitatively assessing the correlation coefficients). This makes it difficult to predict how much DR enhancement will be achieved on real digital arrays. This presentation describes the results of recent experiments involving a four-channel digital receiver system. The system was used to measure the correlation (between receivers) of different types of nonlinear distortion. The measurements quantitatively demonstrate that some nonlinearities are highly correlated. Next, the system was used to evaluate a recently proposed method for decorrelating nonlinear distortion in digital arrays. The measurements show that the mitigation technique is successful in decorrelating some nonlinear signal components.

DTIC

Digital Systems; Distortion; Dynamic Range; Nonlinearity; Phased Arrays; Receivers

20040201238 Texas Technological Univ., Lubbock, TX USA

Coaxial Virtual Cathode Enhancement

Kristiansen, M., Author; Mankowski, J., Author; Oct. 2004; 9 pp.; In English

Report No.(s): AD-A427587; AFRL-SR-AR-TR-04-0551; No Copyright; Avail: CASI; A02, Hardcopy

Traditionally, the radiated microwave frequency in a coaxial vircator is considered to be determined primarily by the virtual cathode oscillation frequency and the electron reflection frequency. In this paper, some experiments showing different results are reported. Particularly, the E-beam is observed to play an important role in the cavity formation. Some possible explanations, including a virtual cavity concept, are proposed. The cavity resonance effect on a coaxial virtual cathode oscillator with different geometries has been investigated in detail. Investigation of the E-beam performance will improve understanding of the interaction between the E-beam and microwaves, which is key for determining the microwave frequency. These results are helpful in optimizing the design of a cylindrical diode to avoid microwave frequency shifting and mode competition.

DTIC

Augmentation; Cathodes; Electrons; Microwave Frequencies; Oscillators

20040201260 Cornell Univ., Ithaca, NY USA

An All-Optical Silicon Nano-Transistor

Lipson, Michal, Author; Nov. 2004; 35 pp.; In English

Contract(s)/Grant(s): F49620-02-1-0396

Report No.(s): AD-A427641; AFRL-SR-AR-TR-04-0567; No Copyright; Avail: CASI; A03, Hardcopy

We provide Silicon with optoelectronic capabilities using highly confined photonic structures. The photonic structures enhance the free carrier injection effect on the Silicon index of refraction, by orders of magnitude. We present experimental demonstration of fast all-optical switching on a silicon photonic integrated device by employing a strong light-confinement structure to enhance sensitivity to small changes in the refractive index. By use of a control light pulse with energy as low as 40 pJ, the optical transmission of the structure is modulated by more than 97% with a time response of 450 ps. We also demonstrate a 20-micrometer-long tunable optical resonator integrated on a silicon-on-insulator waveguide. The microresonator consists of a planar Fabry-Perot microcavity defined by deep Si/SiO2 Bragg reflectors with a high finesse of 11. 2. The device is electrically driven and shows a modulation depth as high as 53% for a power consumption of only 20 mW. The results could enable an all-optical CMOS compatible chip, where all of the devices would be monolithically grown on-chip.

DTIC

Electro-Optics; Photonics; Silicon; Silicon Transistors; Transistors

20040201275 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA USA
Navy Collaborative Integrated Information Technology Initiative (NAVCIITI)
Stutzman, Warren, Author; Habayeb, Rick, Author; Sep. 2004; 88 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): N00014-00-1-0549
Report No.(s): AD-A427682; No Copyright; Avail: CASI; A05, Hardcopy

Final Report for five year NAVCIITI effort on hardware and software configurations of smart antennas, multi-function antennas, secure configurable platform, command & control visualization, visualization and HCI, collaboration workspace, digital ships, mechanically flexible displays, fiber optic LAN, network protocol interoperability, network systems, interoperability, and scheduling and resource management.
DTIC
Command and Control; Information Systems; Navy

20040201278 Michigan Univ., Ann Arbor, MI USA
Protein-Semiconductor Integrated Photoreceivers
Bhattacharya, Pallab, Author; Sep. 2004; 10 pp.; In English
Contract(s)/Grant(s): N00014-03-1-0064
Report No.(s): AD-A427730; No Copyright; Avail: CASI; A02, Hardcopy

Bacteriorhodopsin (bR) is a light harvesting protein in the purple membrane of microorganism called Hallobacterium Salunarum. Its high internal resistance and very small current have limited the possible applications with semiconductors. One possible solution is to apply bR with field effect transistors (FETs) for FETs' high input resistance. We have demonstrated monolithically integrated bR-semiconductor transimpedance amplifer polarization sensitive photoreceivers and phototransceivers with light emitting lasers of the 655nm peak wavelength. The transient nature of the bio-transceiver output is observed to be similar to that of intrinsic bR photoelectric response.
DTIC
Bacteria; Field Effect Transistors; Microorganisms; Photoreceptors; Proteins; Semiconductors (Materials)

20040201430 Norfolk State Univ., VA, USA
Networked Array Circuitry for Power Allocation and Distribution (PAD)
Golembiewski, Walter; Song, Kyo D.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 463-470; In English; See also 20040201420; No Copyright; Avail: CASI; A02, Hardcopy

The first element in the design of a PAD circuit is to construct a power lattice or grid similar to a screen. The power distribution grid will have vertical lines referred to as columns and horizontal lines referred to as rows. These lines are constructed of electrically conducting material. An actuator is placed at the node or intersection of each vertical and horizontal line is shown. Power to each actuator is fed from four directions. Such a system insures power being delivered to a given node if some (max. three) of the cross-links should break or be destroyed. If at least one line remains, power will continue to flow to the actuator. Even if all four break, power would still fed and control all other nodes or actuators in the membrane.
Derived from text
Piezoelectricity; Smart Materials; Field Effect Transistors

20040201433 North Carolina Agricultural and Technical State Univ., Greensboro, NC, USA
An Apparatus for Monitoring the Health of Electrical Cables
Pai, Devdas M.; Tatum, Paul; Pace, Rachel; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 245-256; In English; See also 20040201420; No Copyright; Avail: CASI; A03, Hardcopy

As with most elements of infrastructure, electrical wiring is innocuous; usually hidden away and unnoticed until it fails. Failure of infrastructure, however, sometimes leads to serious health and safety hazards. Electrical wiring fails when the polymeric (usually rubber) insulation material that sheathes the conductor gets embrittled with age from exposure to pressure, temperature or radiation cycling or when the insulation gets removed by the chafing of wires against each other. Miles of such wiring can be found in typical aircraft, with significant lengths of the wiring immersed in aviation fuel - a recipe for an explosion if a spark were to occur. Diagnosing the health of wiring is thus an important aspect of monitoring the health of aging aircraft. Stress wave propagation through wiring affords a quick and non-invasive method for health monitoring. The extent to which a stress wave propagating through the cable core gets attenuated depends on the condition of the surrounding

insulation. When the insulation is in good condition - supple and pliable, there is more damping or attenuation of the waveform. As the insulation gets embrittled and cracked, the attenuation is likely to reduce and the waveform of the propagating stress wave is likely to change. The monitoring of these changes provides a potential tool to evaluate wiring or cabling in service that is not accessible for visual inspection. This experiment has been designed for use in an introductory mechanical or materials engineering instrumentation lab. Initial setup (after procuring all the materials) should take the lab instructor about 4 hours. A single measurement can be initiated and saved to disk in less than 3 minutes, allowing for all the students in a typical lab section to take their own data rather than share a single set of data for the entire class.
Derived from text
Stress Waves; Wire; Electric Current; Failure; Health

20040201438 Norfolk State Univ., VA, USA
Automatic Temperature Control Using LabVIEW to Maintain Comfort Zones
Booker, Annette C.; White, Samuel; Hargrove, Malachi; Copeland, Kyron; Williams, Michael; Basappa, Prathap; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 505-519; In English; See also 20040201420; No Copyright; Avail: CASI; A03, Hardcopy

Temperature control is one of the key factors in maintaining comfort levels in work or residential environments. It is also crucial in several biochemical, metallurgical, and industrial processes. Although there are traditional methods of maintaining control, such as thermostats that use thermocouples to gather information, they are limited because of their crude design and lack of operational accuracy. Ion this work, we use the concept of a feedback control system to achieve accurate temperature control. The system, essentially, consists of a hardware and software integration approach to maintain a desired temperature. The hardware operates as a constant current source driving a feedback operational amplifier circuit whose amplification varies with the value of a thermistor. The output voltage of this system is converted to a digital value by an analog/digital converter card. The software, created in LabVIEW, converts the voltage into a corresponding temperature and is compared with a preset value, which generates a Boolean value. The Boolean value triggers a set of relays which either turns on a heater or a fan, depending on whether the ambient temperature is less than or greater than the preset temperature. This paper will document all results of the testing, observations, challenges, and methods of accomplishing the tasks discussed before.
Author
Automatic Control; Temperature Control; Thermostats; Computer Programs; Feedback Control

20040201482 Norfolk State Univ., VA, USA
Power Loss in Electronic Devices
Smith, Derrick; Sulaiman, Munir; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 705-710; In English; See also 20040201469; No Copyright; Avail: CASI; A02, Hardcopy

In today's ever changing world, technology is also changing. Engineers, designers, and manufactures are the backbone of the technology world. To come up with new ideas and enhancements product or devices, these men and women have to sit and consider all of the functions, parameters, and measurements they desire out of their products or device, they have to think of almost every little obstacle they could face during their products operation. In doing so, a lot of time and energy is spent on the topic concerning Power loss. Power loss is described as the 'losses' in a device due to normal or abnormal operation. There are a variety of effects that Power loss can have on a device, such as wildly varying line voltage before stabilizing, power repeatedly cycles on/off, severe interference occurs when power restored, and/or large surges when power restored. Not only does Power loss have adverse effects on components and devices, but it can also cause damage. These damages can range from prolonged low voltage causing motors to overheat; to on/off cycling may damage power supplies, and even causing large surges at power restoration to damage equipment, relays, and disrupting system operation.
Derived from text
Abnormalities; Augmentation; Damage; Electric Potential; Human Beings; Low Voltage; Lossless Equipment

20040201501 University of Southern Maine, Gorham, ME, USA
Integrating Material Technology and Induction Motor Principles
Marshall, John; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 1013-1023; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

This is a tremendous activity, originally developed by Beakman's World, which I have perfected over the past ten years

of teaching motor principles at the university level. Standard Radio Shack materials can be used. Heavy gauge copper wire is used to fabricate the coil cradle, and the cradle is attached to a standard 'D' size battery with elastic bends. After winding the motor coil, we remove insulation from two locations with sandpaper and assemble the device. When the un-insulated parts of the coil make contact with the cradle, current flows through the coil, making in it into an electromagnet. Since magnets attract, the coil attempts to align itself with the magnet. However, when the coil turns to face the magnet, contact is broken, and the magnetic field collapses. Inertia causes the coil to continue around until contact is reestablished and the process repeats itself. In other words, the motor revolves continuously.
Author
Conductors; Insulation; Enamels; Magnetic Fields; Electromagnets; Induction Motors

20040201521 Nippon Telegraph and Telephone Public Corp., Atsugi, Japan
Measurement Results for Lightning Surge Current on AC Mains Line Connected to Access Network Equipment
Tominaga, Tetsuya; Kato, Jun; Murakawa, Kazuo; Yamane, Hiroshi; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 24-29; In English; See also 20040201509; Copyright; Avail: Other Sources

Malfunctions of power units frequently occur due to lightning surge currents induced on ac mains lines of access network equipment installed at outdoor locations. The cause of such malfunctions is thought to be a circuit breaker in the power unit being tripped unnecessarily by the lightning surge current. To clarify the mechanisms of the malfunctions, we measured the lightning surge current on ac mains lines of access network equipment. The measured waveforms of the lightning surge current were much longer than those of combination waves defined by K.44 of ITU-T, and the occurrence probability of surge currents on ac mains lines was 20 times higher than that on telecommunication lines. This paper presents the measurement results and statistical properties of surge currents and shows the need for lightning surge immunity tests of ac mains lines of access network equipment.
Author
Alternating Current; Lightning; Circuit Breakers; Telecommunication; Surges

20040201544 Ohio State Univ., Columbus, OH, USA, Ohio Dept. of Transportation, Columbus, OH
High Accuracy Dynamic Highway Mapping Using a GPS/INS/CCD System with On-The-Fly GPS Ambiguity Resolution
Grejner-Brzezinska, D. A.; Toth, C.; Sep. 2004; 46 pp.; In English
Report No.(s): PB2005-101577; No Copyright; Avail: CASI; A03, Hardcopy

Conventionally, the road centerline surveys have been performed by the traditional survey methods, providing rather high, even sub-centimeter level of accuracy. The major problem, however, that the Departments of Transportation face, is the safety of the survey crew and the disruptions to the traffic flow, and to a large extent - even inaccessibility of some highways to the surveys crews due to safety hazard. The survey cost also becomes an issue, as due to the traffic and other environmental constraints, these surveys are relatively expensive, while the rate of production is slow, and therefore, frequent updates (re-surveys) are not feasible. This prompted the Ohio Department of Transportation, District 1, to replace the conventional survey by an automated mobile mapping system, which would collect the data while moving at the traffic speeds, ensuring at the same time the safety of the survey personnel.
NTIS
Computer Aided Mapping; Safety; Precision; Global Positioning System

20040201578 National Inst. of Standards and Technology, Gaithersburg, MD
Four-Terminal Current Shunt with Calculable AC Response
Laug, O. B.; Souders, T. M.; Waltrip, B. C.; Aug. 2004; 54 pp.; In English
Report No.(s): PB2005-100324; NIST/TN-1462; No Copyright; Avail: CASI; A04, Hardcopy

The design of a 0.1 Omega, four-terminal current shunt with calculable frequency dependence up to 1 MHz is described. It is intended for use as a standard for current measurements up to 10 A rms with the primary purpose of being able to tie alternating-current measurements to direct-current measurements. The shunt is of the bifilar flat-strip configuration where the effects of self-inductance, skin effect, capacitance, dissipation factor, and eddy-current losses are considered. Contributions of the individual effects, where applicable, are determined by calculation based on geometry and corroborated by differential measurements and finite-element field simulations. The uncertainties due to dimensional and electrical measurement tolerances are computed as well. In addition to the calculable aspects of the shut this technical note provides assembly details of the shunt based on the mechanical drawings made available in the appendix. The practical issues of measuring 4-terminal

shunts with emphasis on dealing with common-mode potentials are discussed. The thermal properties of the current shunt are presented together with some suggestions on reducing the power coefficient of resistance.
NTIS
Alternating Current; Dimensional Measurement; Electrical Measurement; Finite Element Method

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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*.

20040191597 NASA Langley Research Center, Hampton, VA, USA
A Two-Stage Procedure Toward the Efficient Implementation of PANS and Other Hybrid Turbulence Models
Abdol-Hamid, Khaled S.; Girimaji, Sharath S.; November 2004; 19 pp.; In English
Contract(s)/Grant(s): WU 23-781-10-12
Report No.(s): NASA/TM-2004-213260; L-19046; No Copyright; Avail: CASI; A03, Hardcopy

The main objective of this article is to introduce and to show the implementation of a novel two-stage procedure to efficiently estimate the level of scale resolution possible for a given flow on a given grid for Partial Averaged Navier-Stokes (PANS) and other hybrid models. It has been found that the prescribed scale resolution can play a major role in obtaining accurate flow solutions. The first step is to solve the unsteady or steady Reynolds Averaged Navier-Stokes (URANS/RANS) equations. From this preprocessing step, the turbulence length-scale field is obtained. This is then used to compute the characteristic length-scale ratio between the turbulence scale and the grid spacing. Based on this ratio, we can assess the finest scale resolution that a given grid for a given flow can support. Along with other additional criteria, we are able to analytically identify the appropriate hybrid solver resolution for different regions of the flow. This procedure removes the grid dependency issue that affects the results produced by different hybrid procedures in solving unsteady flows. The formulation, implementation methodology, and validation example are presented. We implemented this capability in a production Computational Fluid Dynamics (CFD) code, PAB3D, for the simulation of unsteady flows.
Author
Turbulence Models; Reynolds Averaging; Navier-Stokes Equation; Three Dimensional Models

20040191710 Massachusetts Inst. of Tech., Cambridge, MA
Subduction in an Eddy-Resolving State Estimate of the Northeast Atlantic Ocean
Gebbie, Geoffrey; Jun. 2004; 201 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427075; MIT/WHOI 2004-05; Copyright; Avail: CASI; A10, Hardcopy

Are eddies an important contributor to subduction in the eastern subtropical gyre? Here, an adjoint model is used to combine a regional, eddy-resolving numerical model with observations to produce a state estimate of the ocean circulation. The estimate is a synthesis of a variety of in- situ observations from the Subduction Experiment, TOPEX/POSEIDON altimetry, and the MTI General Circulation Model. The adjoint method is successful because the Northeast Atlantic Ocean is only weakly nonlinear. The state estimate provides a physically-interpretable, eddy-resolving information source to diagnose subduction. Estimates of eddy subduction for the eastern subtropical gyre of the North Atlantic are larger than previously calculated from parameterizations in coarse-resolution models. Furthermore, eddy subduction rates have typical magnitudes of 15% of the total subduction rate. Eddies contribute as much as 1 Sverdrup to water-mass transformation, and hence subduction, in the North Equatorial Current and the Azores Current. The findings of this thesis imply that the inability to resolve or accurately parameterize eddy subduction in climate models would lead to an accumulation of error in the structure of the main thermocline, even in the relatively-quiescent eastern subtropical gyre.
DTIC
Atlantic Ocean; Fluid Mechanics; Resolution; Subduction (Geology); Vortices

20040196364 International Mezzo Technologies, Baton Rouge, LA, USA
Micro-Structured Heat Exchangers and Reactors for ISRU and Energy Conversion
McCandless, A.; Motakef, S.; Guidry, D.; Overholt, M.; Space Resources Roundtable VI; 2004, pp. 32; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

A large fraction of technologies for in-situ resource utilization on the Moon and Mars involves high temperature processes

and catalytic reactions. Conversion of energy from a chemical source is also an important element in both space travel as well as establishment of human habitat in space. Heat exchangers and catalytic reactors with micro-scaled features can provide significant weight and volume reductions compared to currently available systems. We report on development of micro-machined thermal and chemical devices that have surface features of the order of 100 s of microns, over areas of the order of 10 s to 100 s of cm. These devices are fabricated by the LIGA technique, which utilizes X-ray lithography and electroplating to form micro-structures with aspect ratios in the range of 1:10. These micro-structured surfaces provide significant enhancement to heat and mass transfer, and thus allow for miniaturization of thermo- chemical devices.
Derived from text
Heat Exchangers; Microstructure; Energy Conversion; Fabrication

20040200746 NASA Glenn Research Center, Cleveland, OH, USA
Density Fluctuation in Asymmetric Nozzle Plumes and Correlation with Far Field Noise
Panda, J.; Zaman, K. B. M. Q.; The 39th Aerospace Sciences Meeting and Exhibit sponsored by the American Institute of Aeronautics and Astronautics; May 2001; 18 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): WU-704-20-53-00
Report No.(s): NASA/TM-2001-210711; NAS/1.15:2001-210711; E-12644; AIAA Paper 2001-0378; Copyright; Avail: CASI; A03, Hardcopy

A comparative experimental study of air density fluctuations in the unheated plumes of a circular, 4-tabbed-circular, chevron-circular and 10-lobed rectangular nozzles was performed at a fixed Mach number of 0.95 using a recently developed Rayleigh scattering based technique. Subsequently, the flow density fluctuations are cross-correlated with the far field sound pressure fluctuations to determine sources for acoustics emission. The nearly identical noise spectra from the baseline circular and the chevron nozzles are found to be in agreement with the similarity in spreading, turbulence fluctuations, and flow-sound correlations measured in the plumes. The lobed nozzle produced the least low frequency noise, in agreement with the weakest overall density fluctuations and flow-sound correlation. The tabbed nozzle took an intermediate position in the hierarchy of noise generation, intensity of turbulent fluctuation and flow-sound correlation. Some of the features in the 4-tabbed nozzle are found to be explainable in terms of splitting of the jet in a central large core and 4 side jetlets.
Author
Density Distribution; Plumes; Gas Density; Flow Distribution

20040201004 California Univ., Los Angeles, CA, USA
DNS Vorticity Visualizations
Freund, Jonathan; Proceedings of the Jet Noise Workshop; November 2001, pp. 941-949; In English; See also 20040200997; No Copyright; Avail: CASI; A02, Hardcopy

Viewgraphs on Direct Numerical Simulation (DNS) Vorticity Visualizations are presented. The topics include: 1) Far-field Noise; 2) Direct Numerical Simulation (DNS)/Lagrangian Numerical Simulation (LNS); 3) Spectrum; 4) Far-Field Directivity; and 5) Mean flow.
CASI
Direct Numerical Simulation; Vorticity; Scientific Visualization

20040201016 General Electric Aircraft Engines, Cincinnati, OH, USA
Physics of Jet Noise Suppression: The MGB Paradigm
Gliebe, Philip; Proceedings of the Jet Noise Workshop; November 2001, pp. 631-652; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Mr. Gliebe provided qualitative evidence that indicated jet noise suppression trends could be explained by the physics of jet noise in the MGB model. As evidence, results from the NASA Advanced Subsonic Technology (AST) Separate-Flow Exhaust System Noise Reduction Concept Evaluation program were examined. As part of this AST test program, a series of chevrons were added to the trailing edge of the fan and core nozzles. Flow field surveys were performed and acoustic measurements were made. Gliebe noted that the MGB noise prediction for the separate flow nozzle has not yet been performed, 3D CFD RANS solutions are still being computed. The intent of this presentation was to confirm that the ingredients in the MGB model inherently capture the physics of the jet noise problem as evidenced by the test data and to provide an early indication of the expected prediction by the MGB model prediction based on its formulation.
Derived from text
Computational Fluid Dynamics; Jet Aircraft Noise; Mathematical Models; Noise Reduction; Aircraft Engines

20040201167 Army Tank-Automotive Research and Development Command, Warren, MI USA

Determination of Laminar Flame Speed of Diesel Fuel for Use in a Turbulent Flame Spread Premixed Combustion Model

Schihl, Peter, Author; Tasdemir, John, Author; Bryzik, Walter, Author; Jan. 2004; 10 pp.; In English

Report No.(s): AD-A427431; TARDEC-TR-14162; No Copyright; Avail: Defense Technical Information Center (DTIC)

One of the key challenges facing diesel engine system modelers lies in adequately predicting the fuel burning rate profile given the direct relationship between energy release and key performance parameters such as fuel economy, torque, and exhaust emissions. Current state-of-the-art combustion sub-models employed in such system simulation codes rely heavily on empiricism and successful application of such sub-models for new engine designs is highly dependent on past experience with similar combustion systems. One common approach to address this issue is to expend great effort choosing associated empirical coefficients over a range of similar combustion system designs thus improving the potential predictive capability of a given empirical model. But, continual combustion system development and design changes limit the extrapolation and application of such generic combustion system dependent coefficients to new designs due to various reasons including advancements in fuel injection systems, engine control strategy encompassing multiple injections, and combustion chamber geometry. In order to address these very difficult challenges, an extensive effort has been applied toward developing a physically based, simplified combustion model for military-relevant diesel engines known as the Large Scale Combustion Model (LSCM). Recent effort has been spent further refining the first stage of the LSCM two stage combustion model that is known as the premixed phase sub-model. This particular sub-model has been compared with high-speed cylinder pressure data acquired from two relevant direct injection diesel engines with much success based on a user defined parameter referred to as the laminar flame speed by the combustion community. It is a physically significant parameter that is highly dependent on local temperature, pressure, and oxygen concentration but little experimental effort has been spent determining its behavior for diesel fuel due to ignition constraints.

DTIC

Combustion Physics; Diesel Engines; Diesel Fuels; Flame Propagation; Flames; Fuel Injection; Laminar Flow; Premixing; Turbulent Flames

20040201256 Army Cold Regions Research and Engineering Lab., Hanover, NH USA

Sediment Transport Under Ice

Ettema, Robert, Author; Daly, Steven F., Author; Nov. 2004; 61 pp.; In English

Report No.(s): AD-A427634; ERDC/CRREL TR-04-20; No Copyright; Avail: CASI; A04, Hardcopy

An essential feature of alluvial rivers and channels is that their morphology and flow-resistance behavior vary interactively with flow and sediment conditions. Depending on flow magnitude, ice covers modify the interaction, doing so over a range of scales in space and time. This report is an in-depth review of the impacts of river ice covers on sediment transport. The following topics are covered: ice-cover influences on flow distribution; sediment transport by ice (i.e., sediment included in drifting ice); sediment transport under ice; and ice influences on channel morphology. The flow distribution in channels can be substantially modified by river ice. The impacts can include raised water levels, laterally redistributed flow, reduced velocity of secondary currents, and other effects. Drifting ice can be an important transport mechanism for sediment transport, and the known pathways are described. Sediment transport under ice is described in terms of key non-dimensional parameters characterizing the dynamics of flow and sediment interaction. Finally, the extent to which the seasonal formation and breakup of ice perturbs the stability of alluvial channels in regions subject to frigid winters is described.

DTIC

Ice; Sediment Transport

20040201262 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany

Performance of Turbo Jet Engines Under the Influence of Supersonic Flight Disturbances(Leistungsverhalten von turbostrahltriebwerken unter dem einfluss von hyperschallflug-typischen eintrittsstroerungen)

Schmid, Norbert R., Author; Jan. 2000; 191 pp.; In English; In German

Report No.(s): AD-A427650; No Copyright; Avail: CASI; A09, Hardcopy

This engineering dissertation investigates the impact of typical supersonic intake disturbances on the performance of a turbojet engine. Wind tunnel experiments are used to calculate the effects of Mach numbers and Reynold's numbers on a model-sized subsonic diffuser. A simulator is used to find ways to improve the performance of a turbo jet engine under supersonic conditions.

DTIC

Jet Engines; Reynolds Number; Supersonic Flight; Turbojet Engines

20040201268 Princeton Univ., NJ USA

Microwave-Driven Air Plasma Studies for Drag Reduction and Power Extraction in Supersonic Air

Miles, Richard B., Author; Macheret, Sergey, Author; Oct. 2004; 123 pp.; In English

Contract(s)/Grant(s): F49620-00-1-0034

Report No.(s): AD-A427662; No Copyright; Avail: CASI; A06, Hardcopy

Program involving modeling and experiment to explore the utility of plasmas and magnetohydrodynamics (MHD) for aerodynamic applications. Anomalous behavior of shocks on weakly ionized plasmas has been explained in terms of conventional gas dynamics with temperature gradients. Theoretical and computational models have been developed for plasma aerodynamics and nonequilibrium MHD. Models include a new theory of nonequilibrium dissociation and vibrational relaxation and kinetics of plasmas generated by electron beams and high-voltage nanosecond pulses. Aerodynamic steering using plasma energy addition has been explored using the newly developed microwave-driven supersonic plasma wind tunnel. Potential performance of hypersonic MHD devices with electron beam ionization has been outlined. Plasma and MHD control of hypersonic flows and scramjet inlets was studied. On-ramp MHD device with ionization by electron beams was shown to be capable of maintaining the shock-on-lip condition at Mach numbers higher than the design one, while generating net power. For mass capture increase at Mach numbers lower than the design one, a new concept of virtual cowl' was proposed and tentatively studied. In preparation for experimental studies of MHD control of cold-air high-speed flows, ionization by repetitive high-voltage nanosecond pulses was studied theoretically, and a plasma sustained by such pulses was made operational.

DTIC

Drag Reduction; Extraction; Magnetohydrodynamic Generators; Microwaves; Nonequilibrium Flow; Plasmas (Physics)

20040201429 Virginia Commonwealth Univ., Richmond, VA, USA

Novel Methods of Increasing Student Interest in Fluid Mechanics

McLeskey, James T., Jr.; Jordan, Donald A.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 325-333; In English; See also 20040201420; No Copyright; Avail: CASI; A02, Hardcopy

Introductory fluid mechanics can be one of the most intimidating and challenging classes that engineering students take. Because fluid phenomena are so prevalent in everyday life, however, there are numerous opportunities to demonstrate the concepts and equations of fluid mechanics with insightful, and often fun and exciting, classroom demonstrations. In this workshop, we present a number of novel in-class demonstrations that connect the equations of fluid mechanics to everyday phenomena, while making the subject matter more enjoyable for engineering students. Demonstrations include 'The Super Soaker-dump truck' experiment for fluid momentum-force, the 'Bernoulli Vacuum' where the exhaust from a vacuum cleaner is used hold a ping-pong ball firmly in place for the Bernoulli pressure-velocity relationship, 'Drinking Games', a race to see who can achieve the highest Reynolds number in a straw and 'Fluid Mechanics Judo' where the atmospheric pressure on a sheet of newsprint acts as a counter force allowing the instructor to break a large stick. An experimental procedure and comment section is provided for each of the four experiments.

Derived from text

Fluid Mechanics; Momentum; Reynolds Number; Atmospheric Pressure

20040201472 Loyola Coll., Baltimore, MD, USA

Ethanol-Water Phase Diagram

Elban, Wayne L.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 577-593; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

A procedure is described for constructing a partial phase diagram for the ethanol-water system. The water-rich portion of the diagram was investigated for concentrations ranging from 70 to 100 vol% by placing the solutions in an immersion cooler. A digital storage oscilloscope was used to record cooling and subsequent warming curves obtained from continuous-time thermocouple measurements. The imposed cooling rate tended to overwhelm the latent heat of fusion release for the system, making determination of arrests and breaks in the cooling curves (normally used for metallic systems) unreliable. However, the energy balance on warming was much more favorable, allowing slope changes in the resultant curves to be analyzed for temperatures defining the liquidus and solidus lines. The experimental determination of the liquidus line is compared with literature results. In addition heat of fusion correlations are made for melting point and various material families; further, the validity of Richards' rule is assessed.

Author

Phase Diagrams; Liquidus; Solidus; Heat of Fusion; Ethyl Alcohol; Water

20040201495 Purdue Univ., Richmond, IN, USA

An Experiment to Demonstrate Thermal Stress Induced in a Metal Rod

Kozak, Michael J.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 979-982; In English; See also 20040201469; No Copyright; Avail: CASI; A01, Hardcopy

Concepts which cannot be visually demonstrated can sometimes be difficult to grasp. Thermally induced stress can be one of these hard to imagine concepts. The author has developed a simple experiment which demonstrates the loads created when a metal rod, which is constrained on both ends, is subjected to rise in temperature.

Author

Thermal Stresses; Temperature Effects; Loads (Forces); Rods

20040201562 Lawrence Livermore National Lab., Livermore, CA

Validation of Two CFD Urban Dispersion Model using High Resolution Wind Tunnel Data

Chan, S. T.; Stevens, S. E.; Jul. 13, 2001; 12 pp.; In English

Report No.(s): DE2004-15007617; UCRL-JC-142234; No Copyright; Avail: Department of Energy Information Bridge

Numerical modeling of air flow and pollutant dispersion around buildings in the urban environment is a challenging task due to the geometrical variations of buildings and the extremely complex flow created by such surface-mounted obstacles. Building-scale air flows inevitably involve flow impingement, stagnation, separation, a multiple vortex system, and jetting effects in street canyons. Lawrence Livermore National Laboratory (LLNL) and Los Alamos National Laboratory (LANL) have developed two complementary, robust computational fluid dynamics (CFD) models, FEM3MP by LLNL and HIGRAD by LANL, for such purposes. Our primary goal is to support emergency response planning, vulnerability analysis, and development of mitigation strategies for chem-bio agents released in the urban environment. Model validation is vitally important in establishing the credibility of CFD models. We have, in the past, performed model validation studies involving simpler geometries, such as flow and dispersion past a cubical building and flow around a 2-D building array. In this study, wind tunnel data for a 7 x 11 array of cubical buildings are used to further validate our models

NTIS

Boundary Layer Separation; Computational Fluid Dynamics

35
INSTRUMENTATION AND PHOTOGRAPHY

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

20040196378 Japan Aerospace Exploration Agency, Tsukuba, Japan

SELENE Scientific Data Products and their Application to Characterization of Lunar Potential Resources

Matsui, K.; Nakamura, R.; Kato, M.; Takizawa, Y.; Space Resources Roundtable VI; 2004, pp. 30; In English; See also 20040196346; Copyright; Abstract Only; Available from CASI only as part of the entire parent document

SELenogical ENgineering Explorer (SELENE) is a Japanese mission to investigate the origin and evolution of the moon. The 14 scientific instruments will provide massive datasets of great importance not only for science but also for future utilization of the moon. For example, we can completely map the permanently shadowed/illuminated areas around the poles. The terrain camera (TC) can monitor the seasonal variation of the illumination conditions during the SELENE mission period of one year, while Clementine/UVVIS covered only two months. With the high energy resolution, the gamma-ray spectrometer (GRS) will identify the hydrogen emission line if water ice exists in the permanently shadowed areas. TC and the Laser ALTimeter (LALT) will measure the surface topography with the high spatial resolution and accuracy. The global element distribution can be determined by the GRS and X-ray fluorescence spectrometer (XRS). Spectral Profiler (SP) and Multi-band Imager (MI) reveal the mineralogy of lunar surface in detail. In this presentation, we describe the SELENE datasets and discuss their vital role in characterizing the potential resources on the moon.

Author

Lunar Evolution; Cameras; Gamma Ray Spectrometers; Laser Altimeters; Lunar Resources; Lunar Surface

20040200726 National Inst. of Information and Communications Technology, Koganei, Japan

Study for Far-infrared and Faint Light Detection Technology

Fujiwara, Mikio; Akiba, Makoto; Sasaki, Masahide; Review of the National Institute of Information and Communications Technology; March 1, 2004; Volume 50, Nos. 1/2, pp. 47-53; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

To realize a sensitive photodetector, cooling down the device is a effective way because of reducing thermal noise and dark current. Recent space observation satellites have liquid helium cooled detectors. We focus on far-infrared region, in which there are many important research fields. To our knowledge, we are the first to successfully report a direct hybrid two-dimensional detector array in the far-infrared region. Moreover, we are trying to develop an ultra-sensitive photodetector for the application in quantum information field by using cryogenic technology.

Author

Far Infrared Radiation; Radiation Detectors; Photometers

20040200742 NASA Kennedy Space Center, Cocoa Beach, FL, USA

Shuttle Shaping Up

Covault, Craig; Aviation Week and Space Technology; December 13, 2004; Volume 161, No. 23, pp. 24-26; In English; Copyright; Avail: Other Sources

Measures to sharply curtail ana document potentially fatal launch debris similar to that which doomed Columbia and her crew should allow the space shuttle to resume flights as early as May. But it could take up to two years before a fully certified thermal protection system and wing leading edge in-orbit repair capability is ready, shuttle managers say. The overall positive safety tradeoffs, however, are enabling return-to-flight preparations to accelerate this month toward making a serious run at launching the shuttle back to space by spring.

Derived from text

Debris; Launching; Space Transportation System Flights; Thermal Protection

20040201125 California Univ., Los Angeles, CA USA

Toward the Remote Sensing of Bacterial Endospores by Raman Lidar

Brown, Elliott R., Author; Lee, Alan W., Author; Celis, Marie A., Author; Oct. 2004; 11 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-02-1-0250

Report No.(s): AD-A427372; ARO-44144.5-EL; No Copyright; Avail: Defense Technical Information Center (DTIC)

This project has developed a system of biological detection at standoff using Raman lidar, a well-known method of monitoring atmospheric gases and pollutants 1. One application of a biological agent standoff detector would be in the advanced warning of a Bacillus anthracis attack. In this work we explore the feasibility of a Raman lidar system for the remote sensing of biological agents, specifically bacterial endospores.

DTIC

Bacteria; Optical Radar; Raman Spectra; Remote Sensing; Remote Sensors

20040201207 Army Test and Evaluation Command, Aberdeen Proving Ground, MD USA

Standardized UXO Technology Demonstration Site Blind Grid Scoring Record Number 186

Overbay, Larry, Author; Aug. 2004; 60 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): Proj-DTC-8-CO-160-UXO-021

Report No.(s): AD-A427509; ATC-8768; No Copyright; Avail: CASI; A04, Hardcopy

This scoring record documents the efforts of U.S. Army Corps of Engineers Engineering Research and Development Center (ERDC) to detect and discriminate inert unexploded ordnance (UXO) utilizing the YPG Standardized UXO Technology Demonstration Site Blind Grid. The scoring record was coordinated by Larry Overbay and by the Standardized UXO Technology Demonstration Site Scoring Committee. Organizations on the committee include the U.S. Army Corps of Engineers, the Environmental Security Technology Certification Program, the Strategic Environmental Center, and the U.S. Army Aberdeen Test Center.

DTIC

Ammunition; Ordnance; Scoring; Standardization

20040201251 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany

Ein Beitrag zur Kamerafokussierung bei Verschiedenen Anwendungen der Bildverarbeitung (A Contribution About Camera Focusing With Different Applications of Image Processing)

Liao, Bingzi, Author; Jan. 1993; 175 pp.; In German

Report No.(s): AD-A427623; RG-9310082; No Copyright; Avail: CASI; A08, Hardcopy

Given the increasing importance of digital image processing, this engineering dissertation explores automatic focusing techniques. These techniques are required when manual techniques are not sufficiently sensitive or when automatic focusing is a necessary part of the digital image processing system. By using digital image processing it is possible to take advantage of the complete information content of a picture. Two-dimensional pictures can be converted into three-dimensional ones. For a given camera lens, the depth of an object is determined solely through the best focusing position.

DTIC

Cameras; Image Processing

20040201462 Defence Research and Development Canada, Ottawa, Ontario Canada

Micro-Doppler Radar Signatures for Itelligent Target Recognition

Thayaparan, T.; Abrol, S.; Riseborough, E.; Sep. 2004; 73 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427483; DRDC-TM-2004-170; No Copyright; Avail: Defense Technical Information Center (DTIC)

Mechanical vibrations or rotations (micro-motion dynamics) of structures on a target may introduce frequency modulation on the radar return from the target's body. The modulation due to this vibration or rotation is referred to as the micro-Doppler (m-D) phenomenon. In this report, the m-D effect is introduced and the mathematics of micro-Doppler signatures, induced by simple sinusoidal vibrations or rotations, is developed. Simulated results confirm that the mathematical analysis is valid. The m-D features derived from a target's vibrational/rotational motion are extracted by utilizing discrete wavelet transforms. During this process, the time domain radar signal is decomposed into a set of components that are represented by different wavelet scales. The m-D features are extracted by sorting the components that are associated with the vibrational/rotational motions of a target and is achieved by applying the inverse wavelet transform. After the extraction of m-D features, time-frequency analysis is employed to analyze the oscillation and to estimate the motion parameters. The vibration/rotation rate is estimated by taking the autocorrelation of the time sequence data. The findings show that these results have higher precision after the m-D extraction since only vibrational/rotational components are employed. The proposed method of the m-D extraction has been successfully applied to both simulated data and experimental helicopter and human data. The preliminary results clearly demonstrate that the m-D signatures can be observed by radar and suggest that applications of m-D should be investigated and exploited for target detection, classification and recognition. It is recommended %hat the exploitation of micro-Doppler, as a new identification/recognition tool, be undertaken as it could impact all aspects of radar sensing and may enhance the effectiveness of Automatic Target Recognition (ATR) and Automatic Gait Recognition (AGR) techniques. We recommend that

DTIC

Doppler Radar; Radar Signatures; Target Recognition

20040201492 California Univ., Davis, CA, USA

Spreadsheet Applications for Materials Science, X-ray Diffraction and X-ray Radiography

Meier, Mike; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 867-880; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

Spreadsheet Applications for material science is and set of modules designed for use in materials science courses. The modules on X-ray radiography described in this paper are tutorial-type modules which introduces these topics and presents the students with a series of spreadsheet-based exercises. The exercises combine lessons in materials science with programming-type skills that require the student to learn systematic approaches to solving problems.

Author

X Ray Diffraction; Spreadsheets; Radiography

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*.

20040200718 National Inst. of Information and Communications Technology, Japan
Research on Sb-based Quantum Dot Laser
Akahane, Kouichi; Yamamoto, Naokatsu; Ohtani, Naoki; Review of the National Institute of Information and Communications Technology, Volume 50, Nos. 1/2; March/June 2004, pp. 75-80; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

We have developed Sb-based quantum dot lasers operating at 1.3 microns fabricated on GaAs substrates. We introduce here two different methods; one is to use GaAsSb layers for reducing the stress effect on InAs quantum dots, the other is to make InGaSb quantum dots in the laser's active region. The fabricated laser diodes are successfully operating for a wavelength of 1.3 microns at room temperature.
Author
Antimony; Quantum Dots; Semiconductor Lasers

20040200721 National Inst. of Information and Communications Technology, Japan
Trapping and Cooling of Ions for Quantum Information Processing
Hayasaka, Kazuhiro; Uetake, Satoshi; Imajo, Hidetsuka; Review of the National Institute of Information and Communications Technology, Volume 50, Nos. 1/2; March/June 2004, pp. 55-64; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

In quantum networks quantum information is processed by exchanging quantum states between physical systems. We have studied trapping and cooling of ions for quantum information processing to build a prototype of the quantum network. We have found ((Ca-43(+)) as the best candidate for the qubit in the quantum network. The schemes for quantum gate operations and for quantum state transfer with the ion species are discussed. We have developed a ring ion trap and a light source consisting of violet diode lasers for realizing the schemes. We have achieved deterministic coupling of a single ((Ca-43)(+)) to the optical field in a cavity.
Author
Ions; Cooling; Trapping; Semiconductor Lasers

20040201152 Boeing Co., Kirkland AFB, NM USA
LITE Experimental Support II
Gallant, David J., Author; Jul. 2004; 19 pp.; In English
Contract(s)/Grant(s): F29601-00-D-0169; Proj-4866
Report No.(s): AD-A427407; AFRL-DE-PS-TR-2004-1102; No Copyright; Avail: Defense Technical Information Center (DTIC)

This report summarized the technical activity provided under task order 0007 of the SLIDERS contract. This task provided for continued research and development, and on-going operations support for the LITE fiber laser development program.
DTIC
Operations Research; Semiconductor Lasers

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*.

20040196389 Northern Centre for Advanced Technology, Inc., Sudbury, Ontario, Canada
Report on the Construction and Testing of a Bucket Wheel Excavator
Boucher, Dale S.; Richard, Jim; Space Resources Roundtable VI; 2004, pp. 13; In English; See also 20040196346; Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The Northern Centre for Advanced Technologies Inc. (NORCAT), in partnership with Electric Vehicle Controllers Ltd. (EVC), is presently engaged in the development and adaptation of existing mining technologies and methodologies for use extra-terrestrially as precursor and enabling technologies for Situ Resources Utilization (ISRU) and for use as In Situ Support Equipment (ISSE) in support of longer term missions. More specifically, NORCAT, in collaboration with Colorado School of Mines, has developed, constructed, and tested a bucket wheel excavator. The unit is based upon the design developed by CSM's Mike Duke and Tim Muff. The design of the test unit was developed with the CSM design as a guide. Considerations were exercised to facilitate construction and testing of key operational parameters. This yielded some changes in design and operating concepts, which were incorporated where appropriate. In addition, some bottle necks and weak points were identified in the original design. NORCAT engaged Natural Resources Canada (NRCan) to fabricate a lunar regolith simulant from mine tailings that would exhibit some significant similarities to the reported mechanical properties of lunar regolith. The Bucket wheel unit was tested in this simulant in October 2004. This presentation will report some key results of the Bucket wheel re-design.

Author

Analogies; Lunar Mining; Lunar Excavation Equipment; Lunar Resources

20040201269 Universitaet der Bundeswehr, Hamburg, Germany

Studienfuehrer: Fachbereich Maschinenbau - Stand: September 2003(Student Guide: Mechanical Engineering Department - Classes: September 2003)

Sep. 2003; 123 pp.; In German

Report No.(s): AD-A427663; No Copyright; Avail: CASI; A06, Hardcopy

A standard college/university guide for students. There is general information on EGTWA programs, including organizational charts. Included are course descriptions, along with instructors, semester and time. The university is on a tri-semester schedule.

DTIC

Mechanical Engineering; Students

20040201426 California State Univ., Los Angeles, CA, USA

Determination of Parameters in Extrusion Process Using Home-Made Device

Fabris, Neda S.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 453-462; In English; See also 20040201420; No Copyright; Avail: CASI; A02, Hardcopy

Prerequisite Knowledge: Basic knowledge of material forming processes, stresses, strains, power and work in deformation processes. Objective: Visualization of the material flow in extrusion process and influence of the die angle on the required force and power of deformation. Measuring forces in extrusion. Measuring strains using experimental method known as visio-plasticity.

Derived from text

Extruding; Plastic Properties; Deformation

20040201445 Purdue Univ., South Bend, IN, USA

Fishing for the Best Line: Evaluating Polymers Used for Sport Fishing

Leach, Sarah E.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 309-316; In English; See also 20040201420; No Copyright; Avail: CASI; A02, Hardcopy

This viewgraph presentation describes an experiment for students to conduct tensile tests on commercially available fishing lines.

CASI

Tensile Tests; Experimentation; Nylon (Trademark); Fluoropolymers

20040201473 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA, USA

Incorporating Green Engineering in Material Selection and Design

Kampe, S. L.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 711-735; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

Contents include the following: 1. MSE 4055 - Material Selection and Design. MSE required, senior level. Technical elective for ISE, ESM, ME, AOE, Arch, + others. Material Selection as it influences the outcomes of engineering design: in a general sense, and green issues. 2. Methodology. Identification of appropriate material selection indices. Define design objective. Determine constitutive relationship. Separate design needs (extensive) from material response groups (intensive) - 2-D material selection charts in the manner of Ashby. 3. Disclaimers. Illustrative of an approach. Several layers of analysis required. Not a final solution to the complex problem.
Derived from text
Materials Selection; Mechanical Properties

20040201474 Virginia Univ., Charlottesville, VA, USA
Engineering Teaching Kit: Introducing Design with Materials to 8th Grade Students
Chasiotis, I.; Whitehead, M. J.; Goldberg, A. D.; Koehler, D. S.; Ott, D. A.; Walker, M. R.; Maslen, E.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 793-800; In English; See also 20040201469
Contract(s)/Grant(s): NSF ECC-02-30609; No Copyright; Avail: CASI; A02, Hardcopy

This project is part of a new effort in the Department of Mechanical and Aerospace Engineering at the University of Virginia (UVa) assisted by senior undergraduate students to develop ETKs for middle school students. A variety of engineering topics, ranging from submersible vehicles to solar power driven vehicles are pursued. Over 30 undergraduate students are involved divided in teams of 5-6 students. A special course has been put in place to interface the participating undergraduate students with graduate students from UVa s school of education and middle school teachers, and also teach them the basics of K-12 education. This ETK on engineering design and materials will be tested at local schools in the fall of 2003. By using simple materials (ceramics, metals, polymers) and their combinations (composites) 8th grade students are called to complete an engineering project, the design of a model bridge that satisfies a number of specifications.
Author
Mechanical Engineering; Mechanical Properties; Learning

20040201490 Texas A&M Univ., College Station, TX, USA
Use of Cambridge Engineering Selector in a Materials/Manufacturing Course
Griffin, Richard B.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 595-604; In English; See also 20040201469; No Copyright; Avail: CASI; A02, Hardcopy

During the 1998-1999 academic year, Mechanical Engineering at Texas A&M University decided to combine a materials course that included a laboratory and a manufacturing course that contained a laboratory. As part of this activity, we decided to increase the design activity and material selection within the new course. Starting in fall 2002, we made a copy of a materials selection program, CES-4 (Granta Design Limited) available to each student taking the course. A number of activities were devised to help the students become familiar with the program. The culminating activity was for each laboratory group to design a children s playground. They were to select the materials and the manufacturing processes for a playground that could handle 20 to 40 children from the ages of 2 or 3 to about 12 to 13 years old at one time. The Parks and Recreation Departments of both communities wanted the equipment to last 20 to 25 years with minimum maintenance. The application of the CES-4 program to the design will be discussed and examples will be shown.
Author
Materials Selection; Manufacturing; Mechanical Engineering; Selectors

20040201556 Alabama Univ., Birmingham, AL, USA
Diesel Exhaust Treatment Using Catalysts/Zeolites
Peters, R. W.; Clark, S.; Gill, M.; Sep. 2004; 62 pp.; In English
Report No.(s): PB2005-100601; No Copyright; Avail: CASI; A04, Hardcopy

The pollution emitted by diesel engines contributes greatly to America's continuing air quality problems. The objective of this project was to develop and test a catalyst/zeolite system for its ability to effectively treat synthetic diesel exhaust primarily concentrating on the fate of hydrocarbons such as methane (CH4). This project involved proof-of-concept testing in the laboratory. The research project involved the following two major experimental tasks: (1) Identification of appropriate sorbents (e.g., zeolites) and catalysts to develop zeolites impregnated with catalyst(s) to treat diesel exhaust; and (2) perform laboratory studies testing the catalyst/zeolite materials using synthetic diesel exhaust at various temperature conditions and

diesel exhaust flow rates. Results were obtained on the system performance of the catalyst/zeolite system for its ability to degrade synthetic diesel exhaust. Despite the relatively low temperature involved in our study (compared to exhaust temperatures in the 600-800 deg F range from diesel engines), efficiencies typically ranged from -30 percent to -90 percent, depending on the particular combination of catalyst and zeolite involved. Using thermodynamic principles, the removal efficiency was estimated at 750 deg F. At this elevated temperature, removals of nearly 100 percent were estimated. System performance data was in close agreement with concentrations obtained using gas chromatography analyses (performed at The University of Alabama at Birmingham) and cermet micro sensor technology (performed at Argonne National laboratory). Based on the results obtained in this study, this concept involving treatment of diesel exhaust using catalysts/zeolites showed technical merit and is worth pursuing in the development phase.
NTIS
Diesel Engines; Exhaust Gases; Zeolites

38
QUALITY ASSURANCE AND RELIABILITY

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

20040200973 NASA Ames Research Center, Moffett Field, CA, USA
Impact of Variations on 1-D Flow in Gas Turbine Engines via Monte Carlo Simulations
Ngo, Khiem Viet; Tumer, Irem; July 14, 2004; 33 pp.; In English
Contract(s)/Grant(s): 302-10-10
Report No.(s): NASA/TM-2004-212844; No Copyright; Avail: CASI; A03, Hardcopy

The unsteady compressible inviscid flow is characterized by the conservations of mass, momentum, and energy; or simply the Euler equations. In this paper, a study of the subsonic one-dimensional Euler equations with local preconditioning is presented using a modal analysis approach. Specifically, this study investigates the behavior of airflow in a gas turbine engine using the specified conditions at the inflow and outflow boundaries of the compressor, combustion chamber, and turbine, to determine the impact of variations in pressure, velocity, temperature, and density at low Mach numbers. Two main questions motivate this research: 1) Is there any aerodynamic problem with the existing gas turbine engines that could impact aircraft performance? 2) If yes, what aspect of a gas turbine engine could be improved via design to alleviate that impact and to optimize aircraft performance? This paper presents an initial attempt to model the flow behavior in terms of their eigenfrequencies subject to the assumption of the uncertainty or variation (perturbation). The flow behavior is explored using simulation outputs from a customer-deck model obtained from Pratt & Whitney. Variations of the main variables (i.e., pressure, temperature, velocity, density) about their mean states at the inflow and outflow boundaries of the compressor, combustion chamber, and turbine are modeled. Flow behavior is analyzed for the high-pressure compressor and combustion chamber utilizing the conditions on their left and right boundaries. In the same fashion, similar analyses are carried out for the high-pressure and low-pressure turbines. In each case, the eigenfrequencies that are obtained for different boundary conditions are examined closely based on their probabilistic distributions, a result of a Monte Carlo 10,000 sample simulation. Furthermore, the characteristic waves and wave response are analyzed and contrasted among different cases, with and without preconditioners. The results reveal the existence of flow instabilities due to the combined effect of variations and excessive pressures in the case of the combustion chamber and high-pressure turbine. Finally, a discussion is presented on potential impacts of the instabilities and what can be improved via design to alleviate them for a better aircraft performance.
Author
Gas Turbine Engines; Monte Carlo Method; Aerodynamics; Unsteady Flow; Inviscid Flow; Air Flow

20040201040 NASA Ames Research Center, Moffett Field, CA, USA
Case Study of 'Engineering Peer Meetings' in JPL's ST-6 Project
Chao, Lawrence P.; Tumer, Irem; October 19, 2004; 22 pp.; In English
Contract(s)/Grant(s): 303-10-22
Report No.(s): NASA/TM-2004-212842; No Copyright; Avail: CASI; A03, Hardcopy

This design process error-proofing case study describes a design review practice implemented by a project manager at NASA Jet Propulsion Laboratory. There are many types of reviews at NASA: required and not, formalized and informal, programmatic and technical. Standing project formal reviews such as the Preliminary Design Review (PDR) and Critical Design Review (CDR) are a required part of every project and mission development. However, the engineering peer reviews that support teams technical work on such projects are often informal, ad hoc, and inconsistent across the organization. This

case study discusses issues and innovations identified by a project manager at JPL and implemented in 'engineering peer meetings' for his group.
Author
Design Analysis; Mission Planning; Project Management; Quality Control; Aerospace Engineering

20040201491 Purdue Univ., Richmond, IN, USA
An Experiment to Demonstrate Thermal Stress Induced in a Metal Rod
Kozak, Michael J.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 863-866; In English; See also 20040201469; No Copyright; Avail: CASI; A01, Hardcopy

Concepts which cannot be visually demonstrated can sometimes be difficult to grasp. Thermally induced stress can be one of these hard to imagine concepts. The author has developed a simple experiment which demonstrates the loads created when a metal rod, which is constrained on both ends, is subjected to a rise in temperature.
Author
Thermal Stresses; Rods

20040201493 Purdue Univ., Richmond, IN, USA
Using Graphics to Animate Tensile Tests
Kozak, Michael J.; Brattain, Frank K.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 881-885; In English; See also 20040201469; No Copyright; Avail: CASI; A01, Hardcopy

Tensile tests are often used to determine the yield strength and ultimate strength of a material [1]. A sample of a tensile test is often used as a demonstration of material property determination in a strength of materials class. Viewing the tensile test from start to finish makes for an interesting demonstration of the tensile fracture and failure of a material specimen. The failure of the specimen can then be extrapolated by use of example to other mechanical members. This can help the student gain a feeling for the mechanism of tensile failure in mechanical components. Unfortunately the end result of the tensile test usually consists of knowing the initial sample dimensions, the fractured part and pull force versus length information. The authors, wanted to capture the elongation and fracture of the specimen as a dynamic visual image so it might be replayed as an example of how mechanical components react when subjected to an increasing tensile force until fracture occurs. The authors decided to capture 2-D digital information of the specimen in various stages of elongation until fracture and then use the captured electronic data to create a sequence of 2-D images that could then be used to animate the test from start to finish.
Author
Tensile Tests; Yield Strength; Failure; Two Dimensional Models; Three Dimensional Models

39
STRUCTURAL MECHANICS

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

20040200743 NASA Glenn Research Center, Cleveland, OH, USA, Army Research Lab., Cleveland, OH, USA
TF41 Engine Fan Disk Seeded Fault Crack Propagation Test
Lewicki, Daivid G.; Emmerling, William C.; Altobelli, Donald; Seng, Silvia; Frankenberger, Chuck; Fila, Leo; May 2004; 16 pp.; In English; 60th Annual Forum and Technology Display sponsored by the American Helicopter Society, 7-10 Jun. 2004, Baltimore, MD, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS-22-728-30-03; 1L162211A47A
Report No.(s): NASA/TM-2004-213092; NAS/1.15:2004-213092; ARL-TR-3192; E-14567; No Copyright; Avail: CASI; A03, Hardcopy

A cooperative program was conducted between the FAA, U.S. Navy, NASA, and the U.S. Air Force to evaluate crack detection techniques in a seeded fault engine test. The first stage fan of a TF41 engine with a seeded fault was run in a full scale engine test facility. Various disk crack detection systems were installed on the disk and monitored real time. Post-engine-test cycles were accumulated on the TF41 disk in a spin pit to further measure crack growth and disk strain. The crack in the TF41 first stage fan disk grew during the engine test, but significantly less than that predicted from fracture

mechanics analysis. Techniques to detect disk crack using center of mass shift seemed feasible in the engine test environment. Techniques to detect disk crack using blade deflections was not effective in this test due to blade wander.
Author
Crack Propagation; Nondestructive Tests; Jet Engines; Engine Parts; Engine Tests

20040200977 George Washington Univ., Hampton, VA, USA
Validation of Design and Analysis Techniques of Tailored Composite Structures
Jegley, Dawn C., Technical Monitor; Wijayratne, Dulnath D.; December 2004; 85 pp.; In English
Contract(s)/Grant(s): NCC1-03008; WU 23-762-55-TA
Report No.(s): NASA/CR-2004-212650; No Copyright; Avail: CASI; A05, Hardcopy

Aeroelasticity is the relationship between the elasticity of an aircraft structure and its aerodynamics. This relationship can cause instabilities such as flutter in a wing. Engineers have long studied aeroelasticity to ensure such instabilities do not become a problem within normal operating conditions. In recent decades structural tailoring has been used to take advantage of aeroelasticity. It is possible to tailor an aircraft structure to respond favorably to multiple different flight regimes such as takeoff, landing, cruise, 2-g pull up, etc. Structures can be designed so that these responses provide an aerodynamic advantage. This research investigates the ability to design and analyze tailored structures made from filamentary composites. Specifically the accuracy of tailored composite analysis must be verified if this design technique is to become feasible. To pursue this idea, a validation experiment has been performed on a small-scale filamentary composite wing box. The box is tailored such that its cover panels induce a global bend-twist coupling under an applied load. Two types of analysis were chosen for the experiment. The first is a closed form analysis based on a theoretical model of a single cell tailored box beam and the second is a finite element analysis. The predicted results are compared with the measured data to validate the analyses. The comparison of results show that the finite element analysis is capable of predicting displacements and strains to within 10% on the small-scale structure. The closed form code is consistently able to predict the wing box bending to 25% of the measured value. This error is expected due to simplifying assumptions in the closed form analysis. Differences between the closed form code representation and the wing box specimen caused large errors in the twist prediction. The closed form analysis prediction of twist has not been validated from this test.
Author
Aerodynamics; Aeroelasticity; Wings; Finite Element Method; Composite Structures; Design Analysis; Fiber Composites

20040200979 NASA Langley Research Center, Hampton, VA, USA
A Hierarchical Approach to Fracture Mechanics
Saether, Erik; Taasan, Shlomo; November 2004; 29 pp.; In English
Contract(s)/Grant(s): WU 23-762-55-LC
Report No.(s): NASA/TM-2004-213499; L-19061; No Copyright; Avail: CASI; A03, Hardcopy

Recent research conducted under NASA LaRC's Creativity and Innovation Program has led to the development of an initial approach for a hierarchical fracture mechanics. This methodology unites failure mechanisms occurring at different length scales and provides a framework for a physics-based theory of fracture. At the nanoscale, parametric molecular dynamic simulations are used to compute the energy associated with atomic level failure mechanisms. This information is used in a mesoscale percolation model of defect coalescence to obtain statistics of fracture paths and energies through Monte Carlo simulations. The mathematical structure of predicted crack paths is described using concepts of fractal geometry. The non-integer fractal dimension relates geometric and energy measures between meso- and macroscales. For illustration, a fractal-based continuum strain energy release rate is derived for inter- and transgranular fracture in polycrystalline metals.
Author
Fracture Mechanics; Strain Energy Release Rate; Fractals; Fracturing

20040201295 Puerto Rico Univ., Mayaguez, Puerto Rico
Seismic Analysis of Intake Towers Considering Multiple-Support Excitation and Soil-Structure Interaction Effects
Vidot, Aidcer L., Author; Suarez, Luis E., Author; Matheu, Enrique E., Author; Sharp, Michael K., Author; Sep. 2004; 103 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427787; ERDC/GSL TR-04-16; No Copyright; Avail: CASI; A06, Hardcopy

This report investigates the seismic response of intake-outlet towers. The effect of different ground accelerations at the supports of the tower and inspection bridge is examined. The water outside and inside the tower is accounted for by added masses. The accelerations at the bridge support and tower base are obtained from a finite element model of the dam and soil

foundation. The other effect examined is the soil-structure interaction. First, a direct approach based on a finite element model of the tower, bridge, and dam with the earthquake motion applied at the bedrock is used. The second approach uses a frame model of the tower and bridge with springs and dashpots accounting for the soil-structure interaction. This simple model provides reasonable results if adequate values of the torsional spring are used. The effects of the soil-structure interaction proved to be much more important than the multiple support excitation.
DTIC
Earth Movements; Excitation; Soils; Towers

20040201447 NASA Langley Research Center, Hampton, VA, USA
Structures and Materials Competency Vision and Purpose at NASA Langley
Shuart, Mark J.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 93-101; In English; See also 20040201420; No Copyright; Avail: CASI; A02, Hardcopy

Vision: The revolutionary materials and structures technologies developed at NASA Langley Research Center meet the needs of the Aerospace Community and benefit the quality of life on Earth Purpose: Develop and deliver useable research and technology results to meet Agency program objectives and to enable the Agency to develop future aerospace materials and structures
Derived from text
Aerospace Industry; Aircraft Construction Materials; Spacecraft Construction Materials; Structural Analysis

20040201476 Purdue Univ. Calumet, Hammond, IN, USA
Determination of Development Length of Composite Reinforcing Bars in Concrete
Abramowitz, Harvey; Bennett, Ralph E., III; Wright, Joel; Boynak, Dave; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 801-850; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

The objectives are (1) To verify published development length equation for uncoated Fiber Reinforcing Plastic (FRP) rebars; and (2) To determine the effects of a sand and epoxy coating on development lengths of FRP rebars.
Author
Reinforcement (Structures); Concretes; Epoxy Resins

42
GEOSCIENCES (GENERAL)

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

20040191782 NASA Ames Research Center, Moffett Field, CA, USA
Biogeochemical Cycles of Carbon and Sulfur on Early Earth (and on Mars?)
DesMarais, D. J.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The physical and chemical interactions between the atmosphere, hydrosphere, geosphere and biosphere can be examined for elements such as carbon (C) and sulfur (S) that have played central roles for both life and the environment. The compounds of C are highly important, not only as organic matter, but also as atmospheric greenhouse gases, pH buffers in seawater, oxidation-reduction buffers virtually everywhere, and key magmatic constituents affecting plutonism and volcanism. S assumes important roles as an oxidation-reduction partner with C and Fe in biological systems, as a key constituent in magmas and volcanic gases, and as a major influence upon pH in certain environments. These multiple roles of C and S interact across a network of elemental reservoirs interconnected by physical, chemical and biological processes. These networks are termed biogeochemical C and S cycles.
Author
Biogeochemistry; Chemical Reactions; Carbon; Sulfur; Atmospheric Composition; Biosphere; Earth Hydrosphere

20040191820 Arizona State Univ., Tempe, AZ, USA

Visible, Near-, and Thermal Infrared Spectroscopy of Shocked and Hydrothermally Altered Basalt from Lonar Crater, India: Implications for Current and Future Mars Data Sets

Wright, S. P.; Farrand, W. H.; Newsom, H. E.; Misra, S.; Narasimham, V. L.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The surface of Mars likely consists of basalt that has been shock metamorphosed by meteorite impact. A fraction of the Martian soil may be derived from impact produced glass particles and shocked minerals. Alteration processes have likely been involved in the soil formation process, including palagonitization of the glass and aqueous and hydrothermal alteration of the impact materials. Hydrothermal processes may also be partially responsible for the high mobile elements, including S and Cl in the martian fines. Hydrothermal deposits, both impact and volcanic may be important places to look for evidence of life on Mars. These impact related processes would have most important early in Mars history, when the impact rate was highest. Because impact melts and hydrothermal alteration are a product of the target rocks, it is necessary to study these materials at a rare terrestrial impact crater that was emplaced into basalt. In this study, laboratory visible and nearinfrared (VNIR) and thermal infrared (TIR) data of soils, impact melts, and hydrothermally altered basalt from Lonar Crater, India are analyzed in preparation for detecting and sampling similar products with current and future Mars data sets from landers and orbiters. Laboratory spectroscopy of Lonar Crater samples and associated analyses of orbital multispectral images of Lonar Crater may prove useful to the interpretation of VNIR and TIR data from instruments on the surface of or orbiting Mars.

Author

Impact Melts; Mars (Planet); Mars Surface; Metamorphism (Geology); Meteorite Collisions; Meteorite Craters; Impact Damage; Mars Craters; Analogs

20040200989 Field Museum of Natural History, Chicago, IL, USA

[Earth Sciences Research]

[2004]; 7 pp.; In English

Contract(s)/Grant(s): NAG5-1134; No Copyright; Avail: CASI; A02, Hardcopy

contents include the following: 1. Argentina Field Expedition (2004). NASA funds supported joint fieldwork by Peter Makovicky (Dept. of Geology, TFM) and Sebastian Apesteguia (Museo Argentino de Ciencias Naturales, Buenos Aires) in a fossil-rich locality in the Cenomanian Candeleros Formation of northern Rio Negro Province, Argentina. The goal of this fieldwork was to collect small fossil vertebrates, which are abundant in this formation, with a special emphasis on small theropod (casmivorous) dinosaurs. 2. East Greenland Field Expedition (2004). During July-August 2004 the Field Museum led a month long expedition to Jameson Land in East Greenland to collect Triassic-Jurassic aged fossil plants from one of the most productive sites of this age in the world. The project aims include the study of events leading up to catastrophic changes in the biota and atmosphere that occurred about 200 million years ago. 3. Chile Field Expedition (March, 2004). Paleontological reconnaisance of the central Andean main range by helicopter: additional new Cenozoic mammal faunas from Chile. A several thousand sq km swath of the central Andean Cordillera was prospected by helicopter during 2004, permitting rapid survey of large areas in remote or difficult to access regions. This led to the recovery of fossils from several parts of the range, and the identification of sites worthy of future attention. 4. Wyoming Field Expedition (2004). NASA funds supported a three-week field program by Curator of Dinosaurs Peter Makovicky and a crew of Field Museum staff and volunteers at several sites in the Early Cretaceous Cloverly Formation of north-central Wyoming. The nine-member team excavated a number of sites that had been discovered over the preceding two summers.

CASI

Cretaceous Period; Earth Sciences; Geology

43
EARTH RESOURCES AND REMOTE SENSING

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

20040201233 Spot Image Corp., France

SPOT 5/HRS: A Key Source for Navigation Database

Bernard, Marc, Author; Sep. 2003; 22 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427563; No Copyright; Avail: Defense Technical Information Center (DTIC)

Briefing charts from presentation on the applications and benefits of high resolution stereoscopy(HRS) for aerial navigation and digital image databases.
DTIC
Data Bases; High Resolution; Navigation; Stereoscopy

20040201705 NASA Marshall Space Flight Center, Huntsville, AL, USA
Putting Us on the Map: Remote Sensing Investigation of the Ancient Maya Landscape
Sever, Thomas L.; Saturno, William; [2004]; 1 pp.; In English; American Anthropological Association Conference, 17-21 Nov. 2004, San Francisco, CA, USA; No Copyright; Avail: Other Sources; Abstract Only

A common problem for archaeologists studying ancient settlement in the Maya Lowlands is overcoming the dense vegetation in order to obtain an accurate regional perspective of the presence of archaeological sites, their exact locations and their overall extents. Most often this is done by extensive ground surveys in which many individuals chop parallel paths through the vegetation in search of sites. Once a site is found an effort is made to mark its location on a regional map and to explore its perimeter. Obtaining locational information has been made dramatically easier in recent years with the advent of improved Global Positioning Systems (GPS), however the process of initial identification of sites and the determination of their borders is exceedingly labor intensive and has remained relatively unchanged since the beginning of settlement surveys in the region in the 1950 s. Currently, we are revolutionizing settlement survey in the Maya Lowlands by using remotely sensed data from IKONOS, Quickbird, and Eo 1, satellites as well as airborne AIRSAR radar data. The Ancient Maya built their cities, towns and even their smallest hamlets using excavated limestone and lime plasters. We propose that the decay of these structures provides a unique microenvironment for the growth of vegetation as the levels of moisture and nutrition within the ruins vary substantially from those in the surrounding forest. These microenvironmental differences on the ground are likewise represented by compositional differences in the forest canopy both in the species present and in leaf color (representing moisture/nutritional stress) visible through the analysis of high-resolution satellite data. In this way the detailed analysis of forest composition can reveal a detailed picture of the ancient settlements that lie beneath it. Preliminary examinations using this technique have been very successful and we are refining these techniques in order to efficiently comprehend the details of Ancient Maya settlement in the Lowlands.
Author
Remote Sensing; Airborne Radar; Global Positioning System

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*.

20040191588 Auburn Univ., AL, USA
Electrical Transmission on the Lunar Surface, Part 1, DC Transmission
Gordon, Lloyd B.; March 2001; 188 pp.; In English; Original contains black and white illustrations
Contract(s)/Grant(s): NAG3-1055; WU-953-20-0D-00
Report No.(s): NASA/CR-2001-210759/PT1; E-12688/PT1; No Copyright; Avail: CASI; A09, Hardcopy

This report summarizes a portion of the results from a grant at Auburn University to study the electrical and thermal energy management for lunar facilities. Over the past year (June 1989 to May 1990) the following topics have been investigated: June 1989 to November 1989 - Literature survey, assessment of lunar power needs, and overview study of the requirements of a lunar power system; November 1989 to April 1990 - Develop models for the study of dc electrical power transmission lines for the lunar surface; March 1990 to May 1990 - Develop models for the study of ac electrical power transmission lines for the lunar surface. Because of the large amount of information in the model development and application to a wide parameter space this report is being bound separately. This report specifically contains the model development and parameter study for dc electrical power transmission lines. The end of the funding year (May 1990) will conclude with an annual report including the literature survey, the overview of the requirements of a lunar power system, and summaries of the dc and ac models of electrical transmission lines.
Author
Lunar Surface; Electric Power Transmission; Direct Current; Transmission Lines

20040201059 Naval Postgraduate School, Monterey, CA USA

Evaluation and Testing of the Naval Postgraduate School Satellite (NPSAT1) Solar Cell Measurement System

Lo, Benson W., Author; Sep. 2004; 123 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427236; No Copyright; Avail: Defense Technical Information Center (DTIC)

The Naval Postgraduate School Spacecraft Architecture and Technology Demonstration Satellite. NPSATI launching in the fall of 2006, will include a system to measure the performance of new experimental triple- junction solar cells. The measuring circuit in the Solar Cell Measurement System (SMS) is based on a circuit developed at the Naval Postgraduate School many years ago. It will trace the cells' current-voltage (I-V) curves while in orbit. The SMS consists of a radiation-hardened microcontroller that uses a radiation-hardened FPGA to monitor a collection of sensors. A current-sink circuit is used to measure the current and voltage on the test cells. Prior to launch, extensive testing is being performed on the system to ensure proper operation. The tests consist of subjecting solar cells and the measuring circuit electronics under conditions modeling the space environment while taking cell measurements. This thesis presents the mission information, system design, test setup, and test results of the SMS measuring circuit.

DTIC

Satellite Observation; Schools; Solar Cells

20040201122 Northwestern Univ., Evanston, IL USA

Materials for Energy Conversion and Environmental Protection

Chang, R. P., Author; Moncel, Jennifer, Author; Oct. 2004; 39 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-03-1-0364

Report No.(s): AD-A427367; ARO-45469.1-CH-CF; No Copyright; Avail: Defense Technical Information Center (DTIC)

The Pan-American Advanced Studies Institute (PASI) on Materials for Energy Conversion and Environmental Protection was held October 20-29, 2003 in Rio de Janeiro, Brazil. The event welcomed twenty distinguished lecturers and forty graduate and post-doctoral students, half from the US (including Puerto Rico) and half from outside the US (Argentina, Bolivia, Brazil, Canada, Chile, Mexico, Peru, Panama, and Venezuela.) Eight Pan-American student research groups were formed, each with a clearly defined plan to perform collaborative research on a topic related to Fuel Cells and Catalysis for Emissions Control. The innovative program maximized interactive learning. Students were assigned into international teams of five, each led by a US co-leader and a Pan-American co-leader. Teams made contact before the PASI to identify potential research topics based on their common interests. Lecturers from industry, academia, and government mentored the students, helping them set goals, make budgets, and plan effective use of facilities. One-hour technical and policy lectures were followed by 30 minute question- and-answer periods. Each afternoon, students met with lecturers during 90-minute roundtable discussions. Students made their presentations and received feedback regarding project feasibility, budget planning, challenges, and additional methods of approach. Students are currently seeking funding for their proposed collaborative research.

DTIC

Energy Conversion; Environment Protection; Fuel Cells

20040201157 Yale Univ., New Haven, CT USA

Development of Optimized Combustors and Thermoelectric Generators for Palm Power Generation

Gomez, Alessandro, Author; Oct. 2004; 5 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-01-1-0664

Report No.(s): AD-A427416; ARO-42649.1-CH-DRP; No Copyright; Avail: Defense Technical Information Center (DTIC)

The major technical accomplishments for the development of a mesoscale catalytic combustor to be coupled with direct energy conversion modules for electric power production are summarized. Most importantly, clean and efficient combustion of complex hydrocarbon mixtures, such as the notoriously problematic JP-8, has been accomplished. Using gas chromatographic analysis of the exhaust gases, a combustion efficiency on the order of 99% is estimated. The device was successfully coupled to a free piston Stirling engine in preliminary experiments. In addition, fundamental studies were pursued on liquid fuel dispersion by the electrospray technique with both conventional manufacturing techniques and microfabrication, on the chemical kinetics of JP-8 surrogates and on the development of advanced laser diagnostics for JP-8 combustion systems.

DTIC

Combustion; Combustion Chambers; Electric Generators; Electric Power Plants; Energy Conversion; Fuels; Jet Engine Fuels; Jp-8 Jet Fuel; Thermoelectric Generators

20040201218 Georgia Inst. of Tech., Atlanta, GA USA

Hybrid Metal/Electrolyte Monolithic Low Temperature SOFCs

Cochran, Joe, Author; Lee, Jim, Author; Liu, Meilin, Author; McDowell, Dave, Author; Sanders, Tom, Author; Oct. 2004; 140 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAAD19-01-1-0649

Report No.(s): AD-A427529; ARO-42645.1-CH-DRP; No Copyright; Avail: Defense Technical Information Center (DTIC)

The program objective is to develop SOFCs, operating in the 500-700 degrees C range, based on Metal/Electrolyte square cell honeycomb formed by simultaneous powder extrusion of electrolyte and metal interconnects on alternate layers. The alloy interconnect is being formed as an oxide powder mixture which will be reduced to the metal and then co-sintered with the electrolyte during hydrogen thermal treatment. Goals include power density of 5 KW/liter, alternative fuels, designed thermal management, and low fabrication cost. The project is divided into electrolyte/electrode development, fabrication of hybrid and electrolyte monoliths, and thermo-mechanical stress modeling and heat transfer. Honeycomb fuel cells offer a great potential for high-power density and low-cost manufacturing. Also, producing multiple layers simultaneously forms a gas-tight high temperature seal in a single step, minimizing or eliminating difficulties encountered in other designs (planar or tubular) of SOFCs. The unique honeycomb cell geometry, however, poses some challenges in application of electrodes with desired microstructures to the honeycomb channels. However, near the end of the program, success was obtained in reduction and co-sintering of crack free, hermetic SOFC platform with alternating layers of metal interconnect and YSZ electrolyte. The structures were electroded and operated as fuel cells at modest powder levels. In, monolithic, all YSZ, honeycomb fuel cells, power levels of 0. 09 W/sq cm of electrolyte area, 0.30 W/cu cm of call volume, and 0.15 W/g was achieved in the program. DTIC

Electrolytes; Fuel Cells; Low Temperature

20040201288 Clarkson Univ., Potsdam, NY USA

Power Quality Study for Proposed Integrated Power System

Ortmeyer, Thomas H., Author; Pillay, Pragasen, Author; McGrath, Paul, Author; Oct. 2004; 114 pp.; In English

Contract(s)/Grant(s): N00014-01-1-1028

Report No.(s): AD-A427762; No Copyright; Avail: CASI; A06, Hardcopy

The body of this report consists of seven chapters, each of which describes a principal topic of research into shipboard power quality issues. These topics include: Grounding study for bus connected high impedance grounded generators, the potential of a variable frequency, variable voltage generation system for improved efficiency and pulse loading capability, motor starting capability of fixed frequency inverters, the use of wavelet analysis to detect broken rotor bars in induction motors, motor surge characteristics, the use of wavelet analysis to monitor shipboard power system faults, and the investigation of partial discharge in motor windings. This work provides the framework for improvements in the quality and performance of shipboard power systems.

DTIC

Supplying; Systems Integration

20040201442 State Univ. of Southeast Missouri, Cape Girardeau, MO, USA

Significance of Microwaves in the Environment (An Extended Study)

Dahiya, Jai N.; Roberts, J. A.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 271-276; In English; See also 20040201420; No Copyright; Avail: CASI; A02, Hardcopy

This paper is an extension of the work that has been done in the microwave spectroscopy research labs at Southeast Missouri State University and the University of North Texas. Carbon dioxide molecule is a non-polar molecule and as such does not participate in any chemical reaction. The polarization of CO2 is considered to be an extremely important problem for its use to initiate chemical reactions. Microwave technology was used in a previous study to polarize CO2 using x-band radiation between 8.8 - 10.6 GHz. This experiment is extended to higher frequencies and polarization has been achieved for this molecule at other frequencies. In this paper the results for a couple of these microwave frequencies higher than 10.6 GHz are presented.

Author

Microwave Frequencies; Spectroscopy; Carbon Dioxide; Chemical Reactions

45
ENVIRONMENT POLLUTION

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

20040200969 NASA Johnson Space Center, Houston, TX, USA
Johnson Space Center's Role in a Sustainable Future
Ewert, Michael K.; February 2004; 133 pp.; In English
Report No.(s): NASA/TM-2004-212069; No Copyright; Avail: CASI; A07, Hardcopy

NASA scientists and many others are contributing to the growing knowledge of our Earth and its ecosystems. Satellites measure sea level rise, and changes in vegetation and air pollutants that travel between countries and continents. The U.S. federal government seeks to be a leader in environmental sustainability efforts through various Executive Orders and policies that save energy, reduce waste, and encourage less reliance on oil as an energy source. NASA, as an agency that is by nature focused on the future, has much to contribute to these efforts. The NASA mission is 'To understand and protect our home planet, to explore the universe and search for life, to inspire the next generation of explorers as only NASA can.' Pollution prevention, affirmative procurement and sustainable design are all programs that are under way at NASA. But more can be done. By sharing ideas and learning from other organizations as well as from the talented workforce we are a part of, JSC can improve its sustainability performance and spread the benefits to our community.
Author (revised)
Environment Pollution; Aerospace Safety; Research Facilities; Pollution Control

20040201528 NASA Johnson Space Center, Houston, TX, USA
Environmental Health
Pierson, Duane; James, John; Russo, Dane; Limero, Thomas; Beck, Steve; Groves, Theron; Extended Duration Orbiter Medical Project; [1999], pp. 4-1 - 4-12; In English; See also 20040201524; No Copyright; Avail: CASI; A03, Hardcopy

The Environmental Health activity for the Extended Duration Orbiter Medical Project (EDOMP) was formed to develop an overall strategy for safeguarding crew members from potential airborne hazards anticipated on missions of extended duration. These efforts were necessary because of major modifications to the air revitalization system of the U.S. Space Shuttle and an increased potential for environmental health risks associated with longer space flights. Degradation of air quality in the Shuttle during a space flight mission has the potential to affect the performance of the crew not only during piloting, landing, or egress, but also during space flight. It was anticipated that the risk of significant deterioration in air quality would increase with extended mission lengths and could result from: (1) a major chemical contamination incident, such as a thermodegradation event or toxic leak, (2) continual accumulation of volatile organic compounds to unacceptable levels, (3) excessive levels of airborne particles, (4) excessive levels of microorganisms, or (5) accumulation of airborne pathogens.
Author
Space Shuttles; Air Pollution; Air Purification; Air Quality; Flight Crews

20040201540 National Inst. for Occupational Safety and Health, Washington, DC, USA
NIOSH Heath Hazard Evaluation Report: HETA No. 2003-0157-2934, Spirit Mountain Casino, Grand Ronde, Oregon
Apr. 2004; 20 pp.; In English
Report No.(s): PB2005-101431; HETA-2003-0157-2934; No Copyright; Avail: CASI; A03, Hardcopy

The National Institute for Occupational Safety and Health (NIOSH) received a request for a health hazard evaluation from employees at the Spirit Mountain Casino in Grand Ronde, Oregon. In the request, the employees expressed a concern about noise levels generated in the non-smoking casino area and in the children's arcade. To evaluate their exposures, dosimeters were used to collect personal noise exposure data from slot machine attendants, beverage servers, and pit bosses during weekend afternoon and evening hours which were thought to be the busiest periods. Additional dosimeter measurements were made on employees working in the casino's cashier cages, children's daycare and arcade, and on the ground keeping staff. Area noise samples were collected throughout the casino during customer peak and off-peak hours.
NTIS
Health; Noise (Sound); Environmental Surveys; Noise Intensity

20040201557 Environmental Protection Agency, Research Triangle Park, NC
Simulating Urban Air Toxics Over Continental and Urban Scales
Hutzell, W. T.; Luecken, D. J.; Ching, J. K. S.; 2004; In English
Report No.(s): PB2005-100840; EPA/600/A-04/104; NERL-RTP-AMD-04-078; No Copyright; Avail: National Technical Information Service (NTIS)

The US EPA is seeking to improve its National Air Toxics Assessment (NATA). The work computes risks to human health from Hazardous Air Pollutants (HAPs) listed in the Clean Air Act. An essential step is predicting air concentrations of the Hazardous Air Pollutants (HAPs). Currently, a Gaussian plume model makes the predictions. The model may be accurate for local scale effects on ambient concentrations from emitted HAPs that have short atmospheric lifetimes, slow loss rates and no photochemical production. For HAPs such as formaldehyde, acetaldehyde and benzene, several of the assumptions fail. These compounds contribute a large component of the calculated risk based on previous results from the NATA. EPA can then improve its risk assessments by using a model that better simulates the transport and fate of these compounds. The Community Multi-scale Air Quality model (CMAQ) is one candidate. This abstract describes evaluating a version of CMAQ to support future risk assessments.
NTIS
Air Quality; Scale Models

20040201558 Office of Air Quality Planning and Standards, Research Triangle Park, NC
Compliance Demonstration for the Solvent Extraction for Vegetable Oil Production NESHAP
Sep. 2001; 30 pp.; In English
Report No.(s): PB2005-101045; EPA-453/B-04-001; No Copyright; Avail: CASI; A03, Hardcopy

The purpose of this document is to provide an example of how a vegetable oil production process could demonstrate compliance with the solvent extraction for vegetable oil production NESHAP (40 CFR 63, Subpart GGGG). To comply with these NESHAP, staff at affected vegetable oil production processes need to monitor and record three types of information, as listed below: 1. The HAP loss (gallons) from the vegetable oil production process. An example HAP loss inventory log is shown as Table 1 and is described further in Section 2.0. 2. The quantity (tons) of each oilseed type processed at the vegetable oil production process. Example oilseed processed inventory logs are shown as Tables 2A and 2B and are described in Section 3.0. 3. The determination and status of compliance. An example compliance determination and status log is shown as Table 3 and is described in Section 4.0. Note: The example logs in this document are provided only as guidance for staff at vegetable oil production processes. These example logs show how required compliance information can be recorded. This guidance document does not contain instructions for how staff at an affected process must record compliance information. Staff at each vegetable oil production process may develop its own recordkeeping logs, as long as all required information is properly recorded.
NTIS
Oils; Vegetables; Food Processing

20040201559 Nuclear Waste Technical Review Board, Washington, DC, USA
Moving Beyond the Yucca Mountain Viability Assessment. A Report to the US Congress and the Secretary of Energy
Apr. 1999; 18 pp.; In English
Report No.(s): PB2005-101605; No Copyright; Avail: CASI; A03, Hardcopy

The Nuclear Waste Policy Act, as amended (U.S. Congress, 1987), designated the Yucca Mountain site in Nevada as the sole location to be studied for possible development as a repository for the permanent disposal of spent nuclear fuel and high-level radioactive waste. The purposes of the viability assessment (VA) are to summarize the scientific information that has been collected at the site over the last 15 years, present a conceptual design for the repository and its waste packages, estimate how well such a repository would isolate wastes from the human environment, identify the additional studies (and their costs) needed to evaluate the suitability of the site and prepare a license application, and estimate the overall cost of waste disposal at the site. The VA is an evaluation of progress on site characterization at Yucca Mountain and provides the technical basis for deciding whether to continue studying the site.
NTIS
Radioactive Wastes; Waste Disposal

20040201561 McVehil-Monnet Associates, Inc., Englewood, CO, USA
Air Quality and Visibility Impacts of Powder River Basin Coal Mining at Badlands National Park
McVehil, G. E.; Addison, E. L.; Baugues, K. A.; Feb. 2002; 14 pp.; In English
Report No.(s): PB2005-101400; No Copyright; Avail: CASI; A03, Hardcopy

Proposals for expansion of coal mining and coal bed methane production in the Powder River Basin (PRB) frequently require preparation of an Environmental Impact Statement (EIS), which includes a projection of future impacts on air quality at regional National Parks and Wilderness Areas (Class I Areas). Methodologies for assessment of impacts on Air Quality

Related Values (AQRVs) have been recommended by the U.S. Environmental Protection Agency and Federal Land Managers (FLMs) responsible for management of the Parks and Wilderness Areas. These methodologies involve use of a long-range pollutant transport computer model (CALPUFF) to predict pollutant concentrations in the air, and subsequent calculation of the effect on visibility (regional haze) of these pollutant concentrations. Recent EIS analyses have suggested the potential for significant visibility impacts at National Parks from project increases in PRB coal production. The present study was conducted to examine the methodologies and implications for PRB coal mining of current Class I Area visibility analysis. The Class I Area most likely to be affected by PRB pollutant emissions is Badlands National Par, SD, (BNP) approximately 200 kilometers to the southeast. Data on air pollution and visibility at BNP have been collected since 1989. This analysis examined trends in observed pollution and visibility at BNP over recent years, for comparison to trends in PRP air pollutant emissions. The recommended CALPUFF modeling methods were used to predict impacts of coal mining and other pollution-generating activities at BNP over the same time periods. The study objectives were to determine whether mining and other emissions relate to any observed air quality changes at BNP and to analyze how predicted impacts vary with modeling assumptions and input data.
NTIS
Air Quality; Visibility

20040201572 CONSOL Energy, Inc., South Park, PA, USA
Capture and Use of Coal Mine Ventilation Air Methane
Oct. 2003; 20 pp.; In English
Report No.(s): DE2004-823123; No Copyright; Avail: Department of Energy Information Bridge

This is the second semi-annual Technical Progress report under the subject agreement. During the second six months of the project the following items were accomplished: (1) the detailed engineering design was started by MEGTEC Systems, (2) a pre-investigation meeting was held with Mine Safety and Health Administration (MSHA) to discuss the allegations in the 101(c) Petition for Modification of Application of Mandatory Safety Standard, (3) the 101(c) Petition for Modification was withdrawn, although negotiations continue with MSHA, and (4) detailed engineering was started by CONSOL Energy. These aspects of the project, as well as progress on public communications are discussed in detail in this report.
NTIS
Coal; Ventilation

20040201580 Environmental Protection Agency, Research Triangle Park, NC, National Oceanic and Atmospheric Administration, Research Triangle Park, NC, USA
Operational and Diagnostic Evaluation of the Ozone Forecasts by the Eta-CMAQ Model Suite During the 2002 New England Air Quality Study (NEAQS)
Yu, S.; Mathur, R.; Kang, D.; Shcere, K.; Eder, B.; 2004; In English
Report No.(s): PB2005-101223; EPA/600/A-04/108; NERL-RTP-AMD-04-085; No Copyright; Avail: National Technical Information Service (NTIS)

No abstract available
Air Quality; Forecasting

20040201581 Environmental Protection Agency, Research Triangle Park, NC, National Weather Service, Silver Spring, MD, USA, Lockheed Martin Corp., Research Triangle Park, NC, USA
Adaption and Application of the Community Multiscale Air Quality (CMAQ) Modeling System for Real-Time Air Quality Forecasting During the Summer of 2004
Mathur, R.; Pleim, J.; Otte, T.; Schere, K.; Pouliot, G.; 2004; In English
Report No.(s): PB2005-101229; EPA/600/A-04/111; NERL-RTP-AMD-04-089; No Copyright; Avail: National Technical Information Service (NTIS)

In this paper we summarize further enhancements to the Air-Quality Forecasting (AQF) modeling system as well as initial results from its forecast applications during the summer of 2004.
NTIS
Air Quality; Environment Models

20040201582 Environmental Protection Agency, Research Triangle Park, NC
US Mercury Emission Inventory for the Artic Council Action Plan
Rackley, K.; Mobley, D.; Durkee, S.; Engle, M.; Pope, A.; 2003; 10 pp.; In English
Report No.(s): PB2005-101235; EPA/600/A-04/056; NERL-RTP-AMD-03-015B; No Copyright; Avail: CASI; A02, Hardcopy

The Arctic Council, having agreed to act to reduce exposures to a number of priority pollutants in the Arctic region, has initiated a mercury project via the Arctic Council Action Plan (ACAP). The project is led by the Danish EPA with a Steering Group from all eight Arctic countries- Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and USA. The overall project objective is to contribute to a decrease of mercury releases from Arctic countries. This will be accomplished partly by contributing to the development of a common regional framework for an action plan or strategy for the decrease of mercury emissions, and partly by evaluating and selecting one or a few specific point sources for implementation of control measures. It is felt that the decrease of mercury releases from key sources should serve as a demonstration of existing possibilities, giving inspiration to other control measures in the region.
NTIS
Arctic Regions; Contaminants; Exposure

20040201584 McVehil-Monnet Associates, Inc., Englewood, CO, USA
Air Quality and Visibility Impacts of Powder River Bason Coal Mining at Badlands National Park
McVehil, G. E.; Addison, E. L.; Baugues, K. A.; Mar. 2001; In English
Report No.(s): PB2005-101378; No Copyright; Avail: National Technical Information Service (NTIS)
Recent natural resource development proposals for Powder River Basin projects have required preparation of Environmental Impact Statements (EISs). As part of the EIS process, impacts on regional air quality and visibility have been assessed. Current methodology for such assessments, as specified by regulatory agencies and Federal Land Managers, calls for use of the CALPUFF long-range air pollution transport computer model, with specific assumptions and inputs. The CALPUFF model was used to calculate pollutant concentrations and visibility impacts in Badlands National Park from air pollutant emissions in the Powder River Basin and surrounding areas. Simulations were carried out for 1990 and 1997 actual emissions (using 1990 meteorological data for both cases). Results were compared to observations over the period 1989-1998 that were collected at the Badlands National Park IMPROVE monitoring site.
NTIS
Air Pollution; Air Quality; Computerized Simulation

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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*.

20040191781 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Geologic Evolution of Eastern Hellas, Mars: Styles and Timing of Volatile-driven Activity
Crown, David A.; Bleamaster, Leslie F., III; Mest, Scott C.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document
The east rim of the Hellas basin and the surrounding highlands comprise a geologically significant region for evaluating volatile abundance, volatile distribution and cycling, and potential changes in Martian environmental conditions. This region of the Martian surface exhibits landforms shaped by a diversity of geologic processes and has a well-preserved geologic record, with exposures of Noachian, Hesperian, and Amazonian units, as well as spans a wide range in both latitude and elevation due to the magnitude of Hellas basin. In addition, geologically contemporaneous volcanism and volatile-driven activity in the circum-Hellas highlands provide important ingredients for creating habitats for potential Martian life.
Author
Highlands; Mars Environment; Structural Basins; Volcanology; Mars Surface

20040191813 Geological Survey, Flagstaff, AZ, USA
Geology of Layered Sequences in Arabia Terra, Mars
Tanaka, K. L.; Poruznick, T.; Skinner, J. A., Jr.; Hare, T. M.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document
Arabia Terra includes the majority of exposed Noachian cratered materials in the northern hemisphere, which are much less extensive than those of the southern hemisphere. A variety of interpretations have been proposed for the Arabia materials, which exhibit unique topographic, geophysical, surficial, stratigraphic, and compositional characteristics. All or parts of Arabia

Terra have been interpreted to be crater ejecta, volcanic materials, ice and dust accumulations, paleo-polar deposits, and paleo-ocean sediments. New Mars Global Surveyor and Mars Odyssey topography and image data sets permit re-evaluation of how Arabia Terra deposits may be characterized and differentiated. We therefore have begun an investigation with the following objectives: (1) Assess the origin of Arabia Terra materials through time and space, (2) determine what forms of geologic activity and climate controls governed their formation, and (3) ascertain how Arabia materials vary within Arabia itself and with other highland areas. Our preliminary results indicate that Arabia Terra is made up of Noachian, indurated layered deposits and younger, friable layered deposits of Late Noachian to Amazonian age. The change in induration state may be related to drying and/or cooling of the climate that affected induration processes and rates.
Author
Craters; Topography; Geology; Geophysics; Mars Surface

20040191814 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Implications of the Utopia Gravity Anomaly for the Resurfacing of the Northern Plains of Mars
Banerdt, W. B.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Whereas the surface units of the northern plain of Mars generally exhibit ages ranging from late Hesperian to Amazonian, interpretation of precise topographic measurements indicate that the age of the underlying 'basement' is early Noachian, or almost as old as the southern highlands. This suggests that widespread but relatively superficial resurfacing has occurred throughout the northern plains since the end of early heavy bombardment. In this abstract I examine some of the possible implications of the subsurface structure inferred for the Utopia basin from gravity data on the nature of this resurfacing. The large, shallow, circular depression in Utopia Planitia has been identified as a huge impact basin, based on both geological evidence and detailed analysis of MOLA topography. Its diameter (approx. 3000 km) is equivalent to that of the Hellas basin, as is its inferred age (early Noachian). However, whereas Hellas is extremely deep with rough terrain and large slopes, the Utopia basin is a smooth, shallow, almost imperceptible bowl. Conversely, Utopia displays one of the largest (non-Tharsis-related) positive geoid anomalies on Mars, in contrast to a much more subdued negative anomaly over Hellas.
Author
Gravity Anomalies; Mars Surface; Planetary Geology; Topography; Terrain

20040191853 NASA Ames Research Center, Moffett Field, CA, USA
Freshwater Microbialites of Pavilion Lake, British Columbia, Canada: A Limnological Investigation
Lim, D. S. S.; McKay, C. P.; Laval, B.; Bird, J.; Cady, S.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Pavillion Lake is 5.7km long and an average of 0.8 km in width, and is located in Marble Canyon in the interior of British Columbia, Canada. It is a slightly alkaline, freshwater lake with a maximum-recorded depth of 65m. The basin walls of Pavilion Lake are lined with microbialite structures that are oriented perpendicularly to the shoreline, and which are found from depths of 5 meters to the bottom of the photic zone (light levels 1% of ambient; approximately 30m depth). These structures are speculated to have begun formation nearly 11,000 years ago, after the glacial retreat of the Cordilleran Ice Sheet. They are likely a distinctive assemblage of freshwater calcite microbialites, which display micromorphologies possibly related to the ancient Epiphyton and Girvanella classes of calcareous organosedimentary structures.
Author
Lakes; Limnology; Mineral Deposits; Microorganisms

20040200921 Clark (Chuck S.), Atlanta, GA, USA
Mars Crustal Dichotomy and World Maps with Constant Scale Natural Boundaries (CSNB): 'A Creative Approach to Visualizing Subtle Points of Geodesy'
Clark, Chuck S.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 9-10; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

It has long been known that world maps with natural boundaries have an advantage-in- principle over world maps without, because the mind is clouded by meaningless interruptions. World maps with constant scale natural boundaries (CSNB) improves things because in it, peripheries are not grossly distorted in shape, and map edges become recognizable places - a comprehensible overall view boosting scientific intuition. Context is clear in a CSNB map and, if boundaries well-chosen,

clearer still, even on complex planets as Earth (see Fig. 6) and, Figures 1 and 4, Mars. Other contexts for viewing Mars crustal dichotomy in CSNB are identified.
Author
Mars Surface; Planetary Mapping; Dichotomies; Crusts; Boundaries

20040200940 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Ancient Giant Basin/Aquifer System in the Arabia Region, Mars, and Its Influence on the Evolution of the Highland-Lowland Boundary
Dohm, J. M.; Barlow, N. G.; Williams, Jean-Pierre; Ferris, J. C.; Miyamoto, H.; Baker, V. R.; Boynton, W. V.; Strom, R. G.; Rodriguez, Alexis; Fairen, Alberto G., et al.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 13-14; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Ancient geologic and hydrologic phenomena on Mars observed through the magnetic data provide windows to the ancient past through the younger Argyre and Hellas impacts, the northern plains basement and the rock materials that mantle the basement, and the Tharsis and Elysium magmatic complexes (recently referred to as superplumes). These signatures, coupled with highly degraded macrostructures (tectonic features that energetic planet during its embryonic development (0.5 Ga or so of activity) with an active dynamo and magnetosphere. One such window into the ancient past occurs northwest of the Hellas impact basin in Arabia Tern. Arabia Terra is one of the few water-rich equatorial regions of Mars, as indicated I through impact crater and elemental information. This region records many unique characteristics, including predominately Noachian materials, a highland-lowland boundary region that is distinct from other boundary regions, the presence of very few macrostructures when compared to the rest of the cratered highlands, the largest region of fretted terrain on Mars, outflow channels such as Mamers Valles that do not have obvious origins, and distinct albedo, thermal inertia, gravity, magnetic, and elemental signatures.
Author
Aquifers; Planetary Geology; Structural Basins; Mars Surface; Highlands

20040200985 Massachusetts Inst. of Tech., Cambridge, MA, USA
Wind and IMP 8 Solar Wind, Magnetosheath and Shock Data
2004; 1 pp.; In English
Contract(s)/Grant(s): NAG5-13598; No Copyright; Avail: Other Sources; Abstract Only

The purpose of this project was to provide the community access to magnetosheath data near Earth. We provided 27 years of IMP 8 magnetosheath proton velocities, densities, and temperatures with our best (usually 1-min.) time resolution. IMP 8 crosses the magnetosheath twice each 125 day orbit, and we provided magnetosheath data for the roughly 27 years of data for which magnetometer data are also available (which are needed to reliably pick boundaries). We provided this 27 years of IMP 8 magnetosheath data to the NSSDC; this data is now integrated with the IMP 8 solar wind data with flags indicating whether each data point is in the solar wind, magnetosheath, or at the boundary between the two regions. The plasma speed, density, and temperature are provided for each magnetosheath point. These data are also available on the MIT web site ftp://space .mit.edu/pub/plasma/imp/www/imp.html. We provide ASCII time-ordered rows of data giving the observation time, the spacecraft position in GSE, the velocity is GSE, the density and temperature for protons. We also have analyzed and archived on our web site the Wind magnetosheath plasma parameters. These consist of ascii files of the proton and alpha densities, speeds, and thermal speeds. These data are available at ftp://space.mit.edu/pub/plasma/wind/sheath These are the two products promised in the work statement and they have been completed in full.
Author
Solar Wind; Magnetosheath; Solar Terrestrial Interactions

20040201220 NorthWest Research Associates, Inc., Bellevue, WA USA
Ionospheric Measurements in the Wake of Solar Maximum
Andreasen, Angela M., Author; Begenesich, John, Author; Fremouw, Edward, Author; Holland, Elizabeth, Author; Mazzella, Andrew J., Jr, Author; Apr. 2004; 145 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F19628-01-C-0005; Proj-4827
Report No.(s): AD-A427533; NWRA-BECR-04-R274; AFRL-VS-HA-TR-2004-1125; No Copyright; Avail: CASI; A07, Hardcopy

During three years following the solar maximum of the year 2000, NorthWest Research Associates (NWRA) conducted ionospheric measurements at several Air Force research and operational locations and analyzed the data collected thereby. The

measurements were performed using a variety of radiowave techniques, most involving transionospheric radio propagation, and included observations of ionospheric perturbations via high-power transmissions under the High-frequency Active Auroral Research Program (HRRRP). Notable among the instruments employed were the Air Force Ionospheric Measuring System (AN/GMQ-35) and the NWRA ITS10S coherent radio receiving system. The primary measurements were of ionospheric total electron content (TEC) and radiowave scintillation, for describing the ionosphere and its plasma-density structures during this solar epoch and under the perturbing influence of HAARP. Records of TEC were inverted tomographically to produce two-dimensional (altitude vs. latitude) images of plasma density. By these and other means, ionospheric features such as the main F-layer trough and polar patches were characterized for application to Air Force environmental models.
DTIC
Atmospheric Models; Earth Ionosphere; Electron Density (Concentration); Ionospheric Disturbances; Scintillation; Solar Activity Effects; Solar Physics; Wakes

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METEOROLOGY AND CLIMATOLOGY

Includes weather observation forecasting and modification.

20040191703 Hokkaido Univ., Sapporo, Japan
Data Report: Low Temperature Science
2003; ISSN 0385-3683; 80 pp.; In English; In Japanese; Copyright; Avail: Other Sources
Contents include: Meteorological and Oceanographic Observations at Marine Towers on the Okhotsk Sea Coast off Hokkaido, January-December 2003; Distributions of Pack Ice in the Okhotsk Sea off Hokkaido Observed Using a Sea-Ice Radar Network, January - April 2003; Sea Ice Conditions, and Meteorological and Oceanographic Observations at Saroma-ko Lagoon, Hokkaido, October 2002 - December 2003; and Meteorological Data Report at Chaivo, Northern Sakhalin, October 2002 - November 2003.
CASI
Low Temperature Environments; Sea Ice; Hydrometeorology; Climatology; Meteorological Parameters

20040191704 Hokkaido Univ., Sapporo, Japan
Data Report: Low Temperature Science
2002; ISSN 0385-3683; 67 pp.; In English; In Japanese; Copyright; Avail: Other Sources
Contents include: Meteorological and Oceanographic Observations at Marine Towers on the Ofiotsk Sea Coast off Hokkaido, January - December 2002; Distributions of Pack Ice in the Okhotsk Sea off Hokkaido Observed Using a Sea-Ice Radar Network, December 2001 - March 2002; Sea Ice Conditions, and Meteorological and Oceanographic Observations at Saroma-ko Lagoon, Hokkaido, November 2001 - December 2002; and Meteorological Data Report at Chaivo, northern Sakhalin, November 2001 - October 2002.
CASI
Low Temperature Environments; Sea Ice; Climatology; Hydrometeorology; Meteorological Parameters

20040191705 Hokkaido Univ., Sapporo, Japan
Data Report: Low Temperature Science
1999; ISSN 0385-3683; 74 pp.; In English; In Japanese; Copyright; Avail: Other Sources
The following topics are included in this report:Meteorological and Oceanographic Observations at Marine Towers on the Okhotsk Sea Coast of Hokkaido, December 1998 - December 1999;Distributions of Pack Ice in the Okhotsk Sea off Hokkaido Observed Using a Sea-Ice Radar Network, January - April, 1999; Sea Ice Conditions, and Meteorological and Oceanographic Observations at Saroma-ko Lagoon, Hokkaido, December 1998 - November 1999 ; and Observations of Particulate Matter in the Ice of the Sea of Okhotsk and Saroma-koLagoon.
Author
Water Temperature; Sea Ice; Marine Meteorology

20040191706 Hokkaido Univ., Sapporo, Japan
Data Report: Low Temperature Science
2000; ISSN 0385-3683; 84 pp.; In English; In Japanese; Copyright; Avail: Other Sources

Contents include: Meteorological and Oceanographic Observations at Marine Towers on the Okhotsk Sea Coast off Hokkaido, January - December 2000; Distributions of Pack Ice in the Okhotsk Sea off Hokkaido Observed Using a Sea-Ice Radar Network, January - April, 2000; Sea Ice Conditions, and Meteorological and Oceanographic Observations at Saroma-ko Lagoon, Hokkaido, November 1999 - November 2000; and Meteorological Observations at Schmidt, Northern Sakhalin, August 1995 - August 1998.
CASI
Low Temperature Environments; Sea Ice; Hydrometeorology; Climatology; Meteorological Parameters

20040191707 NASA Goddard Space Flight Center, Greenbelt, MD, USA
NASA/GSFC Scanning Raman Lidar Measurements of Water Vapor and Clouds During IHOP
Whiteman, David N.; Demoz, Belay; DiGirolamo, Paolo; Comer, Joe; Wang, Zhien; Lin, Rei-Fong; Evans, Keith; Veselovskii, Igor; January 2004; 4 pp.; In English; SW and ICCP 2004, 9-17 Jul. 2004, Matera, Italy; No Copyright; Avail: CASI; A01, Hardcopy

The NASA/GSFC Scanning Raman Lidar (SRL) participated in the International H2O Project (IHOP) that occurred in May and June, 2002 in the midwestern part of the U.S. The SRL acquired measurements of water vapor, aerosols, cloud liquid and ice water, and temperature for more than 200 hours during IHOP. Here we report on the SRL water vapor and cirrus cloud measurements with particular emphasis being given to the measurements of June 19-20, 2002, which are motivating cirrus cloud model comparison studies.
Author
Optical Radar; Radar Measurement; Raman Spectroscopy; Water Vapor; Cirrus Clouds; NASA Programs

20040191776 Brown Univ., Providence, RI, USA
Degradation of the Dichotomy Boundary: Implications for Mars' Climate Evolution
Head, James W.; Fassett, Caleb I.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

It has long been known that the boundary between the northern lowlands and the southern uplands (the dichotomy boundary) is characterized by both a (generally) distinctive topographic change , as well as characteristic geological units that appear to represent processes of weathering, degradation, and scarp retreat southward. We first examine the nature and distribution of these units in the boundary region. We then discuss how dichotomy modification processes appears to have varied in time and space, and how this might inform our understanding of global climate evolution on Mars.
Author
Mars Environment; Climatology; Topography; Dichotomies; Geology

20040191777 Lunar and Planetary Inst., Houston, TX, USA
Morphology of Drainage Basins as an Indicator of Climate on Early Mars
Stepinski, T. F.; Coradetti, S.; Stepinski, A. P.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Using methods of integral-geometry and neural nets we have shown that drainage basins on Mars and Earth have different morphologies. Using the same techniques on a sample of Andean basins from widely different climates we have demonstrated a correlation between basin morphology and the climate. The only terrestrial basins with morphologies similar to the morphologies of Martian basins are those located in an extremely dry region of the Atacama Desert. This indicates that the dissimilarity between basins on the two planets are caused by climatic differences and points to a dry climate on early Mars.
Author
Drainage; Mars (Planet); Mars Environment; Morphology; Neural Nets; Climatology

20040191779 California Univ., Santa Cruz, CA, USA
Paleo-Earth, Paleo-Mars: Different Planets, Similar Climate Modeling Challenges
Santiago, D. L.; Sloan, L. C.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Introduction: General circulation models (GCMs) for the Earth and Mars have been developing largely in isolation for

the past three decades. While Earth climate models can be tested more rigorously to actual conditions due to the abundance of observational data, both in modern and past climate studies, Mars climate modeling is faced with a greater abundance of unknowns. However, when Earth models are used to look into our planet s deep past, we are faced with challenges similar to those encountered when looking at the climate of another planet. Most importantly, the relative effects of climate forcing mechanisms are unknown for many intervals in Earth s past and for Mars (for example, unknown greenhouse gas (GHG) concentrations, or unknown meridional heat transport levels). Quite often, Earth and Mars GCMs cannot duplicate the climate that is seen in the geologic record; these records include geomorphology on Mars and abundant proxy climate data on Earth. Understanding the processes that govern climate on both planets could benefit by increased dialogue between the Earth and planetary atmospheric modeling communities. Here, some specific comparisons between the models themselves and the particular challenges in each discipline are identified as a starting point for this dialogue.
Author
Mars Environment; Atmospheric Models; Climate Models; Atmospheric General Circulation Models

20040200665 Hokkaido Univ., Sapporo, Japan
Data Report Low Temperature Science
2001; ISSN 0385-3683; 69 pp.; In English; Copyright; Avail: Other Sources

Contents include: Meteorological and Oceanographic Observations at Marine Towers on the Okhotsk Sea Coast off Hokkaido, January - December 2001; Distributions of Pack Ice in the Okhotsk Sea off Hokkaido Observed Using a Sea-Ice Radar Network, January - April, 2001; Sea Ice Conditions, and Meteorological and Oceanographic Observations at Saroma-ko Lagoon, Hokkaido, November 2000 - November 2001; and Meteorological Data Report at Chaivo, Northern Sakhalin, September 2000 - November 2001.
CASI
Low Temperature Environments; Sea Ice; Climatology; Meteorological Parameters

20040200737 Meteorological Satellite Center, Kiyose, Japan
Monthly Report of Meteorological Satellite Center: August 2004
August 2004; In English; In Japanese; Copyright; Avail: Other Sources

The CD-ROM concerning the Monthly Report of the Meteorological Satellite Center (MSC) Contains the observation data derived from the Geostationary Meteorological Satellite (GMS) of Japan and the polar orbital meteorological satellites operated by NOAA. The CD-ROM contains following observation data. Full Disk Earth's Cloud, Cloud Image of Japan and its Vicinity, Cloud Amount, Sea Surface Temperature, Cloud Motion Wind, Water Vapor Motion Wind, Equivalent Blackbody Temperature, OLR (Outgoing Longwave Radiation), Solar Irradiation, Snow and Ice Index, Orbit Data, Attitude Data, VISSR Image Data Catalog, (Cartridge Magnetic Tape (CMT), Micro Film), TOVS (TIROS Operational Vertical Sounder) Vertical Profile of Temperature and Precipitable Water, and TOVS Total Ozone Amount.
Author (revised)
Satellite Observation; Satellite Sounding; Atmospheric Sounding; Meteorological Parameters; Satellite Imagery; Japan

20040200952 Interface Video Systems, Inc., Washington, DC, USA
New Frontiers in Climate Research
May 1, 1995; 2 pp.; In English; 2 hrs., playing time, in color, with sound; No Copyright; Avail: CASI; V04, Videotape-VHS

Dr. France Cordova, NASA's Chief Scientist, chaired this, the fourth seminar in the NASA Administrator's Seminar Series. She introduced NASA Administrator, Daniel S. Goldin, who greeted the attendees, and in his opening remarks said that human beings have a need to understand the what and why of the forces of nature and of people, and the stresses on the planet Earth. The first speaker, Dr. Ellen Mosley-Thompson of Ohio State University discussed the many things that scientists have learned from ice cores obtained in Peru and the Antarctic. The next speaker, Dr. Michael McElroy of Harvard University, is active in environmental research. He noted that insurance companies need to know more about the physics and chemistry of weather in order to avoid bankruptcy; that the greenhouse effect, which is good because it reflects heat, is being changed, and we don't know the rules. In the discussion that followed, Goldin asked if the present technology for measuring circulation of air and water and contents of the atmosphere is worth the cost. Drs. McElroy and Mosley-Thompson noted that the historic record in an ice core is endangered by ice melts; that in the last 10 years we've learned that tropics change; that the water vapor in the tropics is critical right now; that clouds absorb short-wave radiation; and that there is a need to improve measurements of atmospheric contents, the development of models, and the understanding of basic physics. We also need to understand

parameters for detecting climate change, water, water temperature, and be able to provide fundamental information. Additional information is included in the original extended abstract.
Author (revised)
Climatology; Greenhouse Effect; Climate Change; Environment Effects

20040200958 Meteorological Satellite Center, Kiyose, Japan
Monthly Report of Meteorological Satellite Center: July 2004
July 2004; In English; In Japanese; Copyright; Avail: Other Sources

The CD-ROM concerning the Monthly Report of the Meteorological Satellite Center (MSC) Contains the observation data derived from the Geostationary Meteorological Satellite (GMS) of Japan and the polar orbital meteorological satellites operated by NOAA. The CD-ROM contains the following observation data: Full Disk Earth's Cloud, Cloud Image of Japan and its Vicinity, Cloud Amount, Sea Surface Temperature, Cloud Motion Wind, Water Vapor Motion Wind, Equivalent Blackbody Temperature, OLR (Outgoing Longwave Radiation), Solar Irradiation, Snow and Ice Index, Orbit Data, Attitude Data, VISSR Image Data Catalog, (Cartridge Magnetic Tape (CMT), Micro Film), TOVS (TIROS Operational Vertical Sounder) Vertical Profile of Temperature and Precipitable Water, and TOVS Total Ozone Amount.
Author (revised)
Satellite Observation; Satellite Sounding; Atmospheric Sounding; Meteorological Parameters; Satellite Imagery; Japan

20040201041 Meteorological Satellite Center, Kiyose, Japan
Monthly Report of the Meteorological Satellite Center: September 2004
September 2004; In English; In Japanese; Copyright; Avail: Other Sources

The CD-ROM concerning the Monthly Report of the Meteorological Satellite Center (MSC) Contains the observation data derived from the Geostationary Meteorological Satellite (GMS) of Japan and the polar orbital meteorological satellites operated by NOAA. The CD-ROM contains following observation data. Full Disk Earth's Cloud, Cloud Image of Japan and its Vicinity, Cloud Amount, Sea Surface Temperature, Cloud Motion Wind, Water Vapor Motion Wind, Equivalent Blackbody Temperature, OLR (Outgoing Longwave Radiation), Solar Irradiation, Snow and Ice Index, Orbit Data, Attitude Data, VISSR Image Data Catalog, (Cartridge Magnetic Tape (CMT), Micro Film), TOVS (TIROS Operational Vertical Sounder) Vertical Profile of Temperature and Precipitable Water, TOVS Total Ozone Amount.
Author
Satellite Observation; Satellite Sounding; Atmospheric Sounding; Meteorological Parameters; Satellite Imagery; Japan

20040201072 Naval Postgraduate School, Monterey, CA USA
An Assessment of NOGAPS Performance in Polar Forecasting from Sheba Data
Lana, Aaron D., Author; Sep. 2004; 83 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427263; No Copyright; Avail: Defense Technical Information Center (DTIC)

This study evaluates the latest Navy Operational Global Atmospheric Prediction System (NOGAPS) version 4.0 with a comparison to data collected during the Surface Heat Budget of the Arctic (SHEBA) project from October 1997 to October 1998. In particular, three periods from this year long study were the focus and included, a winter, spring, and summer case. For each of these cases the first 24-hour period of the forecasts were analyzed for any bias and root mean square difference from the SHEBA data. NOGAPS had no significant biases in pressure and wind speed. During the winter case, the NOPGAPS surface temperature remained near 28 C while observed temperature varied in response to cloud cover changes and was lower by 5.3 C on the average. During the spring the NOGAPS temperatures had a steady increase from 11 C until reaching the melt season temperature of 0 C 11 days earlier than observed. As a result of too warm a surface and less downwelling longwave radiation, the net longwave flux cooling was greater than observed, by an average of -12.4 Wm-2. The NOGAPS net shortwave radiation was greater than observed by an average of 62 Wm-2 for spring and 22.6 Wm-2 for summer.
DTIC
Arctic Regions; Forecasting; Polar Regions; Wind Velocity

20040201090 Naval Postgraduate School, Monterey, CA USA
Langmuir Circulations in a Coastal Environment During CBLAST
Elge, Murat, Author; Sep. 2004; 124 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427308; No Copyright; Avail: Defense Technical Information Center (DTIC)

Langmuir circulations in a coastal environment at an inner shelf site with strong tidal forcing were examined using a

4-month observation of high-resolution velocity profiles during the ONR-sponsored CBLAST-Low air-sea interaction experiment. Because of their potential contributions to mixing processes in the surface boundary layer, Langmuir circulations are important for naval operations such as ASW, MCM and Amphibious operations in littoral waters. A detection algorithm for upwelling / downwelling velocities due to Langmuir circulations was developed. Analyses focused on long-fetch, unstratified water column conditions with locally developed seas. The observations showed that strong Langmuir circulations greatly reduced water column shear arising from the tidally forced bottom boundary layer, while there was no significant effect from the strong tidal boundary layer on the formation of Langmuir cells. Long fetch conditions had the strongest vertical velocities with Langmuir number 0.1-0.4, while short fetch conditions have weaker vertical velocities with Langmuir number greater than 0.5. Cell vertical velocities were correlated with the water friction velocity, but penetration depths did not depend on forcing mechanisms. Spacing and penetration depths were correlated for increasing wind speed and wave heights whereas this correlation was not seen for constant high wind speed and wave heights.
DTIC
Boundary Layers; Coastal Water; Coasts; Ocean Surface; Turbulence; Water Waves; Wind Velocity

20040201095 Army Cold Regions Research and Engineering Lab., Hanover, NH USA
Severe Winter Weather in the Continental U.S. and Global Climate Cycles
Daly, Steven F., Author; Friddell, Julie E., Author; Jones, Kathleen F., Author; Vuyovich, Carrie M., Author; Oct. 2004; 88 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427317; ERDC/CRREL-TR-04-19; No Copyright; Avail: Defense Technical Information Center (DTIC)
The relationship between severe winter weather in the USA and global climate indices is investigated using data from 1950 to 2002. Winter severity is characterized by accumulated freezing degree-days (AFDDO and damaging freezing rain storms. The first eigenvector of the AFDD anomaly, based on data from 2282 weather stations, shows a pattern in which the entire country tends to be either warmer or colder than average, while the second eigenvector has opposite deviations in the East and West. The relationship between the first three principal component time series and five climate indices, PDO, SOI, PNA, NAO, and Northern Hemisphere temperatures, is investigated using step-wise linear regression. This analysis shows that the most important indices for explaining the annual variation in AFDD are the NAO and PNA. An estimate of the AFDD anomaly for the winter of 2003 using analog years to hindcast the climate indices significantly underestimates the warmth in the West and the cold in the Northeast. The annual variation in the area and path of ice storms is only weakly correlated with the NAO. However, the averages of the SOI and NAO in winter months with ice storms are closer to zero than their averages in winter months without ice storms. This investigation will be extended to other regions of the world to characterize the regional AFDD as well as summer temperature patterns and determine their relationships to global climate cycles.
DTIC
Climatology; Cycles; Meteorological Parameters; Winter

20040201237 Woods Hole Oceanographic Inst., MA USA
Horizontal Variability of Ocean Skin Temperature from Airborne Infrared Imagery
Zaapa, Christopher J., Author; Edson, James B., Author; Oct. 2004; 7 pp.; In English
Contract(s)/Grant(s): N00014-01-10081; Proj-13008100
Report No.(s): AD-A427582; No Copyright; Avail: CASI; A02, Hardcopy
The first objective is to use an airborne infrared imager to produce both overview maps and high-resolution time series of thermal variability over the CBLAST study area. The second objective is to combine these data with measurements by other investigators to determine the extent to which horizontal variability in surface temperature is related to atmospheric and sub-surface phenomena.
DTIC
Image Tubes; Infrared Imagery; Meteorological Parameters; Ocean Surface; Ocean Temperature; Surface Temperature; Variability

20040201240 Atmospheric and Environmental Research, Inc., Lexington, MA USA
Satellite Radiance Data Assimilation: Code Migration to Scalable Architectures
Modica, George, Author; Nerkhorn, Thomas, Author; Jul. 2004; 42 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F19628-00-C-0054; Proj-NAVY
Report No.(s): AD-A427597; AFRL-VS-HA-TR-2004-1147; No Copyright; Avail: CASI; A03, Hardcopy
We developed a highly scalable version of the MM5 4d-Var application. The application consists of a meteorological

analysis code that provides accurate depictions of the state of the atmosphere, has been applied successfully to a large number of cases, and the results have been documented in peer reviewed forums. Prior to this project, this code was optimized for vector computer architectures. By rewriting this code in order to make it 'scale' (i.e., performance increases linearly) as additional CPUs are devoted to the calculations, significant speedups were achieved on the class of computers referred to as Massively Parallel Processors. The 4d-Var technique performs a series of iterations and requires computational power measured in the tens of gigaflops for real-time application. Proven strategies and techniques were employed to develop the scaleable version of this code and to attain the objective performance metrics. Among the coding strategies employed was domain decomposition. A tested, scalable 4d-Var code was delivered, along with user documentation. During the later half of this contract, we investigated the potential impact of optical turbulence data on upper-air data analysis. The task involved the development of additional software for the MM5 4d-Var code and applying it to C(sup 2 sub n) data obtained by AFRL. The preliminary results from that exercise suggest that C(sup 2 sub n) data have the potential to improve upper-atmospheric analyses and the NWP model forecasts made from them.
DTIC
Computer Programs; Data Processing; Forecasting; Meteorological Parameters; Migration; Parallel Processing (Computers); Radiance

20040201542 Sonoma Technology, Inc., Petaluma, CA
Boundary Layer Study in the Western and Central Gulf of Mexico
MacDonald, C. P.; Roberts, P. T.; Lilly, M. R.; Knoderer, C. A.; Miller, D. S.; Oct. 2004; In English
Report No.(s): PB2005-101463; No Copyright; Avail: National Technical Information Service (NTIS)
This report presents the results from the U.S. Department of the Interior, Minerals Management Service (MMS) atmospheric boundary layer (ABL) study. Observations and model predictions from the Gulf of Mexico were analyzed with a focus on better parameterizing the over-water ABL. In addition, the ABL results were used to calculate the transport and dispersion of pollutants in the western and central Gulf of Mexico.
NTIS
Atmospheric Boundary Layer; Atmospheric Models; Gulf of Mexico; Contaminants

20040201555 Connecticut Univ., Storrs, CT, USA
Using Relative Risk Analysis to Improve Connecticut Freeway Traffic Safety under Adverse Weather Conditions
ElDessouki, W. M.; Ivan, J. N.; Anagnostou, E. N.; Sadek, A. W.; Zhang, C.; Oct. 11, 2004; 48 pp.; In English
Report No.(s): PB2005-100595; No Copyright; Avail: CASI; A03, Hardcopy
This report conducts an investigation of a road accident prevention method using Relative Risk Ratio (RRR) analysis, considering the impact of combined weather and hourly traffic flow rate conditions. RRR is used to explore the relationship between accident risk and the combined situation of adverse weather, represented as rain and snow conditions, and hourly traffic flow rates. The findings show that accident risk under adverse weather is higher than under non-precipitation weather, and the highest accident risk occurs under snow conditions. To further evaluate the influence of traffic flow in weather-related accident risk, the authors adopted a method that considers capacity reduction under adverse weather to help explain the difference in accident risk. Exponential regression was used to build RRR models, primarily using V/C ratio as the explanatory variable. The results show that the rate of accidents observed in non-precipitation conditions would be maintained under precipitation conditions if the traffic volume could be reduced according to the reduced capacity.
NTIS
Traffic; Safety

20040201574 Department of Agriculture, Newtown Square, PA, USA
Atlas of Climate Change Effects in 150 Bird Species of the Eastern USA
Matthews, S. N.; O'Connor, R. J.; Iverson, L. R.; Prasad, A. M.; 2004; In English
Report No.(s): PB2005-100109; FSGTR-NE-318; No Copyright; Avail: National Technical Information Service (NTIS)
This atlas documents the current and potential future distribution of 150 common bird species in the Eastern USA. Distribution data for individual species were derived from the Breeding Bird Survey (BBS) from 1981 to 1990. Regression tree analysis was used to model the BBS data as functions of contemporary climate and elevation variables and the current distribution of 68 tree species that occurred in the bird models. The model for each bird species is described. These models were projected onto two scenarios of global climate change. Depending on the global climate model used, as many as 78 bird

species are projected to decrease in abundance by at least 25 percent, while as many as 33 species are projected to increase in abundance by at least 25 percent.
NTIS
Climate Change; Climate Models; Breeding (Reproduction); Birds

20040201576 National Oceanic and Atmospheric Administration, Rockville, MD
Climate Monitoring and Diagnostics Laboratory Summary Report
Schnell, R. C.; Buggle, A. M.; Rosson, R. M.; Sep. 2004; In English
Report No.(s): PB2005-100260; No Copyright; Avail: National Technical Information Service (NTIS)

The Climate Monitoring and Diagnosis Laboratory (CMDL) is located in Boulder, Colorado, with Baseline Observations in Barrow, Alaska; Trinidad Head, California; Mauna Loa, Hawaii; Cape Matatula, American Samoa; and South Pole, Antarctica. It is one of twelve research components within the Office of Oceanic and Atmospheric Research (OAR) of the National Oceanic and Atmospheric Administration (NOAA). CMDL conducts research related to atmospheric constituents capable of forcing change in the climate of the Earth through modification of the atmospheric radiative environment, for example, greenhouse gases and aerosols, and those that can cause depletion of the global ozone layer, e.g. , chlorine- and bromine-containing compounds. The Trinidad Head Observatory was added in April 2002 to provide information on atmospheric composition and air quality in air flowing onto the west coast of the USA. This report is a summary of CMDL activities for calendar years 2002 and 2003. It is the 27th consecutive report issued by this organization and its Geophysical Monitoring for Climatic Change predecessor since formation in 1972. This report is organized into the following major sections: (1) Observatory Operations and Meteorology; (2) Carbon Cycle; (3) Aerosols and Radiation; (4) Ozone and Water Vapor; (5) Halocarbons and other Atmospheric Trace Species; and (6) Cooperative Programs.
NTIS
Atmospheric Composition; Climate Change; Meteorology

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*.

20040191783 NASA Ames Research Center, Moffett Field, CA, USA
Life Detection on the Early Earth
Runnegar, B.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Abstract Only; Available from CASI on CD-ROM only as part of the entire parent document

Finding evidence for first the existence, and then the nature of life on the early Earth or early Mars requires both the recognition of subtle biosignatures and the elimination of false positives. The history of the search for fossils in increasingly older Precambrian strata illustrates these difficulties very clearly, and new observational and theoretical approaches are both needed and being developed. At the microscopic level of investigation, three-dimensional morphological characterization coupled with in situ chemical (isotopic, elemental, structural) analysis is the desirable first step. Geological context is paramount, as has been demonstrated by the controversies over AH84001, the Greenland graphites, and the Apex chert microfossils . At larger scales, the nature of sedimentary bedforms and the structures they display becomes crucial, and here the methods of condensed matter physics prove most useful in discriminating between biological and non-biological constructions. Ultimately, a combination of geochemical, morphological, and contextural evidence may be required for certain life detection on the early Earth or elsewhere.
Author
Chemical Analysis; Fossils; Geochemistry; Life Sciences; Geology

20040191854 Imperial Coll. of Science, Technology and Medicine, London, UK
Cryptoendolith Alteration of Antarctic Sandstone Substrates: Pioneers or Opportunists?
Blackhurst, R. L.; Genge, M. J.; Kearsley, A. T.; Grady, M. M.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Lichen dominated cryptoendolithic communities from the Dry Valleys of Antarctica have been the subject of much research over recent years owing to their potential as analogues of Martian lifeforms. This is primarily owing to the stress tolerant nature of the microorganisms, remarkable adaptive achievements and the similarities between the Antarctic Dry Valley ecosystems and conditions pertaining at the Martian surface. Endolithic microbial communities have a photosynthetic primary producer, so translucent rocks through which sunlight can penetrate are their only suitable substrate. They also favor colonization of rocks which either have a porous structure or are weathered and permeated by fractures, as they are reported not to penetrate the substrate by solution. The predominant rock-colonizing organisms are cryptoendolithic lichens. They form conspicuous multicoloured zones under the surface of the Beacon Sandstones. All zones are produced by filamentous fungi (mycobionts) and unicellular green algae (phycobionts), which together form a symbiotic lichen association.
Author
Lichens; Mineral Deposits; Antarctic Regions; Sandstones; Microorganisms

20040200675 Porto Univ., Portugal
Robust, Real Time People Tracking With Shadow Elimination In Open Environment
Wu, Yeh-Kuang; Hsieh, Ching-Tang; Yang, Ping-Da; ICEIS 2004: Human-Computer Interaction; [2004], pp. 184-185; In English; See also 20040200666; Copyright; Avail: Other Sources

This paper presents a framework to track people using wavelet transform and kalman filter in unconstrained environments. The tracking system is efficient and effective framework by combining the corrections between color and position information as the recognition technique of the feature tracking. The kalman filter is adopted to be the estimator in this system. To make the system more robust, a shadow-removal scheme is devised. Experiments show that the system we proposed achieve optimal performance based on the complicated backgrounds.
Author
Real Time Operation; Kalman Filters; Wavelet Analysis; Tracking (Position)

20040200744 NASA, Washington, DC, USA
Sustaining Life on the Earth
[2004]; 1 pp.; In English; 1 hr., 44 min. playing time, in color, with sound; No Copyright; Avail: CASI; V04, Videotape-VHS

Dr. France Cordova, NASA's Chief Scientist, opened this, the sixth seminar in the Administrator's Seminar Series, by introducing NASA Administrator Daniel S. Goldin. Mr Goldin welcomed the attendees and set the stage for Dr. Cordova's introduction of the first speaker, Dr. Robert Kates of Brown University. Dr. Kates primary concerns are global environmental changes, world hunger, and the size of the population. Human changes, he said, rival the changes of nature. Changes in the size of world population affect the need for more agricultural products, therefore more land for growing food, which leads to deforestation, which affects rainfall, and therefore the water supply which is in increased demand. Human ingenuity can reduce some shortages but generally doesn't keep up with increased demand for life-sustaining essentials. These problems require the concern of intergovernmental organizations, treaties and activities, as well as transnational corporations, and non-governmental and private, volunteer organizations. Next Dr. Diana Liverman of Pennsylvania State University spoke on human interactions regarding climate and society. She considered the effect of changes in land use on climate, using Mexico as an example. Mexicans changed from raising much wheat to raising more fruits and vegetables. This was in response to the demands of the market. The results were more industry, population growth, greater income, drought (because the new crops required more water), and conflicts over water supplies. Dr. Charles Kennel of the Office of Mission to Planet Earth joined Dr.s Cordova, Kates, and Liverman for the question and answer session that followed.
Author
Life Sciences; Earth (Planet); Environment Effects

20040201064 Naval Postgraduate School, Monterey, CA USA
A Linear Physiological Visual-Vestibular Interaction Model for the Prediction of Motion Sickness Incidence
Matsangas, Panagiotis, Author; Sep. 2004; 186 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427247; No Copyright; Avail: Defense Technical Information Center (DTIC)

(maximum 200 words) This thesis proposes a linear model based on human physiology for the explanation of the Motion Sickness Incidence (MSI) data found in previously reported experiments. The major human sensory systems taken into account are vestibular, visual, and the interaction between these two. The model is validated against the previous descriptive model and the corresponding experimental data. The proposed model predicts MSI with adequate precision (less than 5%) in

the frequency range between 0.07 Hz and 0.25 Hz. The difference between the proposed model and the previous descriptive model is increased at the outer frequency regions of the data.
DTIC
Mathematical Models; Motion Sickness; Physiology; Predictions; Vestibules; Visual Signals

20040201066 Naval Postgraduate School, Monterey, CA USA
Adding a Prescription Drug Benefit to Medicare: An Analysis of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003
Jones, Carla D., Author; Sep. 2004; 131 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427252; No Copyright; Avail: Defense Technical Information Center (DTIC)

The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 added an outpatient prescription drug benefit to Medicare. This benefit had been a recurring topic among lawmakers, attempted many times since Medicare was enacted in 1965. The 2003 legislation marked the most significant and expensive overhaul of Medicare since its creation. It occurred at a time of record federal budget deficits and Republican control of Congress and the White House. The major compromise that allowed this legislation to succeed concerned the total funding to be made available, the amount of privatization in the design and administration of the benefit, and the scope of the coverage. This thesis identifies and describes the primary stakeholders involved and their influences on the benefit, including political parties, Congress, the Bush Administration and interest groups, and summarizes previous attempts at similar legislation. Sources include congressional testimony, government cost estimates, legislation, journal articles, and think-tanks. The thesis analyzes the legislative process that produced the Medicare reform and identifies problems and issues resulting from it.
DTIC
Cost Analysis; Cost Effectiveness; Drugs; Medical Services

20040201120 Baylor Coll. of Medicine, Houston, TX USA
Regulated Apoptosis and Immunogene Therapy for Prostate Cancer
Spencer, David M., Author; Apr. 2004; 8 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-03-1-0156
Report No.(s): AD-A427361; No Copyright; Avail: CASI; A02, Hardcopy

The central tenet of this proposal is that methods to effectively trigger apoptosis within prostate tumors can both reduce tumor burden and elicit adaptive immunity, provided a pro-inflammatory environment can be created. Previously created inducible caspases (iCaspases) have been used as the basis of both a prophylactic vaccine and as treatment of pre-existing subcutaneous (sc) and autochthonous TRAMP-derived prostate tumors. While these studies are centered on prostate cancer, they could be extended to other tumor types. The combination of iCaspases and IL-12 can completely eliminate small (less than or equal to 40 cu mm) sc tumors and largely eliminate larger (\h 100 cu mm) tumors while IL-12 alone had minimal effect and iCaspase alone had no significant effect. Anti-tumor efficacy mirrored expansion of anti-tumor cytotoxic T lymphocytes and IFN-gamma-producing cells from splenocytes of vaccinated animals. Further, orthotopic injections into the prostates of tumor-bearing TRAMP mice trigger apoptosis, secondary necrosis and inflammation. Finally, in transgenic animals, the hK2-E3/P, PSA-E2/P and ARR2PB composite promoters are highly active in prostate epithelial cells and largely prostate specific. This work lays the groundwork for an 'off-the-shelf' injectable immunogene therapy that could treat prostate cancer as a neoadjuvant therapy or possible less mutagenic treatment for metastatic disease.
DTIC
Apoptosis; Cancer; Prostate Gland; Therapy

20040201126 Illinois Univ., Chicago, IL USA
Novel Membrane-Associated Targets for Diagnosis and Treatment of Breast Cancer
Mar, Brenton G., Author; May 2004; 11 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-02-1-0411
Report No.(s): AD-A427373; No Copyright; Avail: CASI; A03, Hardcopy

Proteins localized to the cell membrane or secreted show great promise as therapeutic targets and diagnostic markers because of their easy accessibility. However, determining protein localization by traditional methods is a difficult process. A 'feature' of membrane-bound and secreted (MAS) proteins can be exploited to determine their membrane-bound status on a large scale. Because the mRNA transcripts of MAS proteins are translated in polysomes bound to the endoplasmic reticulum (ER), they can be separated from their heavier cytosolic counterparts by sucrose gradient centrifugation. At the end of year

two, we have reproducibly separated the RNA of MCF7 cells into two fractions and hybridized them to Affymetrix microarrays. Using a training set of 881 MAS and cytoplasmic proteins, as annotated from SWIS-PROT, we show that genes with a membrane to cytoplasmic expression ratio over 1.08 are very likely to have MAS localization, with 97% specificity for those genes expressed above a threshold level. Applying these criteria to the remaining unknown and tentative localized genes on the microarray led to the identification of 810 predicted MAS genes. Combined with breast cancer expression and amplicon data, this could allow for the identification of potential novel membrane-bound and secreted drug targets and markers.
DTIC
Breast; Cancer; Diagnosis; Genes; Mammary Glands; Membranes; Proteins; Targets

20040201135 RAND Corp., Santa Monica, CA USA
Quality Indicators for the Management of Diabetes Mellitus for Vulnerable Older Persons
Shekelle, Paul G., Author; Vijan, Sandeep, Author; Aug. 2004; 35 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427385; RAND/WR-187; No Copyright; Avail: Defense Technical Information Center (DTIC)

Diabetes mellitus is one of the most important causes of morbidity and mortality in the USA. It has been among the top ten causes of death for several decades, and it is the leading cause of end stage renal disease and visual loss among individuals under age 65. In 1997, diabetes was responsible for approximately 2.3 million hospital admissions, 14 million hospital days, and 70 million nursing home days. Direct medical expenditures on diabetic care were estimated at $44 million. At Northern California Kaiser, a matched cohort analysis indicated that the annual excess expenditures for diabetic patients totaled $3,500 per person. The prevalence of diabetes rises dramatically with age: More than 10% of persons over age 65 have clinical diabetes. Almost all of these older patients have type II diabetes. Elderly patients are still at risk for the long term complications of diabetes, having an approximately two-fold increased risk for myocardial infarction, stroke, and renal insufficiency, when compared with persons of the same age without diabetes. To date, there has been considerable high quality research on the prevention and management of complications of diabetes. However, most of these data are not specific to elderly patients, and none are specific to individuals age 80 or older. Thus, extrapolation of published data to the vulnerable elderly population is a major challenge for developing quality indicators for this group. A related challenge pertains to the time frame required in order to benefit from the proposed indicators. Many testing and management strategies require a minimum of two to three years (and in some cases, much longer) in order to accrue significant benefits. Therefore, except where noted, all of the quality indicators in this paper are intended for persons who have a life expectancy of at least two to three years.
DTIC
Age Factor; Diabetes Mellitus; Metabolic Diseases

20040201150 RAND Corp., Santa Monica, CA USA
Health Status and Medical Treatment of the Future Elderly
Goldman, Dana P., Author; Shekelle, Paul G., Author; Bhattacharya, Jayanta, Author; Hurd, Michael, Author; Joyce, Geoffrey F., Author; Aug. 2004; 264 pp.; In English
Report No.(s): AD-A427404; TR-169-CMS; No Copyright; Avail: CASI; A12, Hardcopy

The Centers for Medicare & Medicaid Services (CMS) must generate accurate predictions of future spending for planning purposes. To investigate a better method for understanding how medical breakthroughs and demographic trends will affect future Medicare costs, CMS contracted with RAND to develop models to project how changes in health status, disease, and disability among the next generation of elderly will affect future spending.
DTIC
Age Factor; Health; Medical Services

20040201151 National Defense Univ., Washington, DC USA
Toward A National Biodefense Strategy: Challenges and Opportunities
Apr. 2003; 59 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427405; No Copyright; Avail: Defense Technical Information Center (DTIC)

The USA is re-learning an important lesson in the first decade of the 21st century: adversaries may attack the USA, its interests, or those of friends and allies with biological weapons (BW). The last century witnessed the purported use of glanders by the Germans in World War I and the use of dysentery, plague, and typhus by the Japanese in World War II. But biological weapons were not constrained to wartime settings in the last century. The Rajneeshees, a religious cult in Oregon, employed salmonella to advance their own political agenda. States such as Iraq and the former Soviet Union developed wide-ranging

biological warfare capabilities, subnational entities such as Aum Shinrikyo devoted considerable effort and resources to the acquisition of biological agents, and the al Qaeda terror network remains interested in biological capabilities. According to the Director of Central Intelligence, evidence from Afghanistan suggests that al Qaeda was pursuing a 'sophisticated biological weapons research program.' The 21st century opened with the startling use of anthrax spread deliberately through the USA mail system, resulting in 5 dead, at least 17 infected, and more than 30,000 on preventative antibiotics. It also led to substantial disruptions in normal activities, the revision of long-standing procedures, and the expenditure of several billion dollars for decontamination efforts. At present, the intelligence community assesses that 'approximately' a dozen states maintain offensive BW programs and that interest among particular subnational organizations is high. Looking ahead, current trends will be facilitated and made more complex by the ongoing revolution in biotechnology, the continuing spread of dual-use technologies, the potential for diversion or leakage of expertise, evident weaknesses in international accords designed to prevent BW development and use, and the broaching of the perceived moral barrier against use.
DTIC
Biological Effects; Biological Weapons; Decontamination; Defense Program; Detection; Diseases

20040201154 California Univ., Los Angeles, CA USA
Quality Indicators of Continuity and Coordination of Care for Vulnerable Elder Persons
Wenger, Neil S., Author; Young, Roy, Author; Aug. 2004; 27 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427411; No Copyright; Avail: Defense Technical Information Center (DTIC)

Continuity and coordination of care are attributes of medical care that influence its quality. Donabedian describes coordination of care as the process by which the elements and relationships of medical care during any one sequence of care are fitted together in an overall design. Continuity means lack of interruption in needed care, and the maintenance of the relatedness between successive sequences of medical care. A fundamental feature of continuity is the preservation of information about past findings, evaluations and decisions, and the use of these in current management&.Coordination involves the sharing of such information among a number of providers to achieve a coherent scheme of management. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) defines this function as 'matching the patient's needs with the appropriate level and type of medical, health and social services.' The JCAHO national Library of Healthcare Indicators (NLHI) defines continuity as the degree to which the care for the patient is coordinated among practitioners, among organizations and over time. Among the 1997 set of 123 NHLI quality-of-care indicators, 87 included a component representing continuity. Continuity and coordination of care are particularly important for older patients because they are apt to have multiple medical problems which may be treated by several clinicians. The complexity of treating multiple conditions simultaneously requires explicit coordination of care.
DTIC
Coordination; Medical Services

20040201168 Beth Israel Deaconess Medical Center, Boston, MA USA
Integrin-Mediated Stimulation of HIF-1alpha and Angiogenesis in Breast Cancer
Mercurio, Arthur M., Author; Jun. 2004; 22 pp.; In English
Contract(s)/Grant(s): DAMD17-01-1-0154
Report No.(s): AD-A427434; No Copyright; Avail: CASI; A03, Hardcopy

The work performed during this grant has verified and extended our initial hypothesis. Specifically, we have established that the alpha-6 beta-1 integrin facilitates the survival of breast carcinoma cells in hypoxia by a mechanism that involves its ability to activate HIF-1 and stimulate the transcription of VEGF. The second major discovery made from the work funded by the proposal is that another alpha-6 integrin, alpha-6 beta-4, contributes to the survival of breast carcinoma cells by an entirely different mechanism. This mechanism involves the ability of this integrin to regulate the translation of VEGF through the mTOR pathway. This is a very exciting finding for several reasons. VEGF is probably the tip of the iceberg' and there are likely to be several other proteins important for breast carcinoma survival that are regulated by alpha-6 beta-4 -mediated control of mTOR. Another important aspect of this finding is that mTOR was defined as a target of the drug rapamycin and derivatives of rapamycin are being used with success for adjuvant therapy of breast cancer. Collectively, the work funded by this proposal has revealed the importance of the alpha-6 integrins for the survival of breast carcinoma cells and the mechanisms involved. This work provides a solid foundation for additional mechanistic studies, as well as the potential to exploit the pathways we have highlighted as therapeutic targets.
DTIC
Breast; Cancer; Mammary Glands; Stimulation

20040201169 Manchester Univ., UK

A Quantitative MRI Study of Prostate Cancer Before and After Radiation Therapy

Buckley, David L., Author; May 2004; 40 pp.; In English

Contract(s)/Grant(s): DAMD17-00-1-0517

Report No.(s): AD-A427435; No Copyright; Avail: CASI; A03, Hardcopy

The purpose of the study was to examine the influence of external beam radiation on the prostate and prostate cancer using novel quantitative MRI techniques. Twenty-two men, previously diagnosed with prostate cancer, were studied using T1 and T2 relaxation mapping and contrast agent kinetic methods before and after treatment by radiotherapy. The MRI findings will be correlated with biochemical (prostate specific antigen) progression and biopsy results. All 22 patients have been recruited and studied pre-treatment. So far nineteen patients have returned for follow-up MRI. The data is both complete and of a high quality. Data analysis of the pre-treatment phase has provided important and novel information about the microvascular characteristics of prostate cancer. These results have been accepted for publication in the leading radiology journal. Preliminary analysis of the post- treatment data is promising and awaits clinical interpretation.

DTIC

Cancer; Imaging Techniques; Magnetic Resonance; Prostate Gland; Radiation Therapy

20040201170 Tennessee Univ., Knoxville, TN USA

Effect of N-3 and N-6 Polyunsaturated Fatty Acids on Growth and Progression of Prostate Cancer In Vivo

McEntee, Michael F., Author; May 2004; 19 pp.; In English

Contract(s)/Grant(s): DAMD17-00-1-0104

Report No.(s): AD-A427436; No Copyright; Avail: CASI; A03, Hardcopy

There is a strong correlation between dietary fat and mortality attributed to prostatic cancer, but little is known about how this nutrient modifies tumor biology to enhance fatal malignancy. Arachidonic acid (AA) is an n-6 polyunsaturated fatty acid (PUFA), which directly mediates cell signaling and is the substrate for generation of bioactive eicosanoids; AA and eicosanoids regulate cell growth and cell death in a variety of experimental settings. Substitution of n-3 PUFA (i.e. fish oil) for AA significantly reduces tissue AA content and modifies eicosanoid profiles, thereby effecting changes in cell biology. As expected, changes in dietary PUFA content significantly altered the fatty acid profile in early and late stages of prostatic cancer; surprisingly, this was not associated with changes in tumor growth. In contrast, the same dietary enrichment of tissues for n-3 PUFA significantly enhanced the beneficial response to androgen-ablation therapy and delayed conversion (progression) to androgen-independent growth (relapse) in comparison to dietary AA. If these findings hold true in subsequent studies performed in our laboratories and others, modulation of prostatic cancer biology with innocuous dietary intervention could represent a very important adjunct to prostate cancer therapy.

DTIC

Cancer; Fatty Acids; In Vivo Methods and Tests; Prostate Gland

20040201171 Texas Univ., San Antonio, TX USA

B III Tubulin Disulfide Bonds and Drug Resistance: A Novel Approach to the Treatment of Breast Cancer

Chaudhuri, Asish R., Author; Jun. 2004; 18 pp.; In English

Contract(s)/Grant(s): DAMD17-02-1-0585

Report No.(s): AD-A427438; No Copyright; Avail: CASI; A03, Hardcopy

Tubulin, a potential target for chemotherapy, plays an important role in different cellular functions including mitosis and cell division. Tubulin consists of mainly alpha and beta subunits: each subunit exists in several isoforms. The distribution and expression of beta- isoforms differ from tissue to tissue: beta-II and beta-IV are ubiquitously expressed while beta-III expression is restricted to neurons and cancer cells. Moreover, alpha-beta-III has least affinity for anti-tubulin drugs compared to alpha-beta-II and alpha-beta-III tubulin. In this study, we correlated the expression of beta-III tubulin and oxidative stress related to drug resistance in cancer cells. We have established a taxol-resistant BT474 breast cancer cell line (IC50=0.97 nM) from the taxol-sensitive line of BT454 (1C50=0.5 nM). We found that taxol-resistant BT454 cell line experienced higher oxidative stress compared to its sensitive line and the expression of beta-III tubulin was also found significantly elevated in drug-resistant cells. However, the expression of actin and beta-II tubulin remained unchanged. These data therefore, strongly suggest that selective elevation of expression of specific beta-III-tubulin cause development of drug resistance in breast cancer cells and the elevated level of formation of reactive oxygen species might be directly related to drug resistance.

DTIC

Bonding; Breast; Cancer; Chemotherapy; Disulfides; Drugs; Mammary Glands

20040201172 Saint Francis Coll., Loretto, PA USA
Mobile Communication Platform
Bates, James F., Author; Tonkin, Kent P., Author; Laratonda, Anthony J., Author; Sep. 2004; 51 pp.; In English
Contract(s)/Grant(s): DAMD17-02-2-0029
Report No.(s): AD-A427439; No Copyright; Avail: CASI; A04, Hardcopy

Hospitals and health clinics located in rural areas often lack the expertise needed to perform various consults and medical examinations. This situation could be improved through the use of telemedicine and communications technologies. However, quite often, these hospitals and clinics lack the financial and technological resources required to construct a permanent telemedicine suite within their facilities. Therefore, CERMUSA proposed the development of the Mobile Communications Platform (MCP) prototype. The main objective of the project is to improve the delivery of healthcare in under-served areas through the creation of a relocatable telecommunications infrastructure that provides remotely located organizations with the ability to communicate and share information with distant sites. The prototype will utilize existing communications infrastructure to provide services or create its own link to the outside world through satellite technology. Once temporarily installed in the site, the MCP will be used for several purposes including telemedicine consults, information exchange, distributed learning, and emergency communications.
DTIC
Emergencies; Medical Services; Robotics; Rural Areas; Telemedicine

20040201175 Montclair State Coll., Upper Montclair, NJ USA
Analysis and Control of Emergent Dynamics in Epidemiology
Billings, Lora, Author; Sep. 2004; 19 pp.; In English
Contract(s)/Grant(s): DAAD19-03-1-0134
Report No.(s): AD-A427442; ARO-45559.6-MA; No Copyright; Avail: CASI; A03, Hardcopy

The overall objective of this work is to understand information flow on a network through the analogous process of biological disease spread in a noisy environment. Currently, the PI is developing new multi-patch models that address the issue of scalability, where the size of the groupings is determined by the accuracy and scope of the results needed. She has developed a computational tool to predict changes in dynamics due to noise probabilistically. This method numerically approximates the mechanisms of transport in a mathematical space, and provides a way to visualize it using a matrix representation. Commonly, the only data available in the field is the number of infected individuals reported. Using embedding techniques, this data can emulate the dynamics of the full system and be used in our methods. In practice, the PI has successfully compared a stochastic bifurcation in a controlled experiment to a theoretical laser model. The transport tools developed to date allow control of the system by targeting or avoiding high probability regions. The PI has a working algorithm submitted for publication and is planning its implementation in a future experiment.
DTIC
Epidemiology

20040201191 California Univ., Los Angeles, CA USA
Quality Indicators for Quality of Care During Hospitalization for Vulnerable Elder Persons
Kleerup, Eric C., Author; Solomon, David H., Author; Aug. 2004; 29 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427482; RAND/WR-179; No Copyright; Avail: Defense Technical Information Center (DTIC)

Admission to the hospital is a near certainty during the lifetime of vulnerable elders. A hospital stay can be associated with serious declines in health and function and utilization of significant health care resources. This paper aims to describe quality of care indicators for vulnerable elders who are hospitalized. While many of the above conditions, such as congestive heart failure, pressure ulcers, and ischemic heart disease, contain indicators for the quality of hospital care associated with that condition, this paper focuses on general or inter-condition indicators of hospital quality of care.
DTIC
Geriatrics; Medical Services

20040201212 Defence Science and Technology Organisation, Victoria, Australia
Generation of a Gene Expression Cassette to Enable the Rapid Production of DNA Vaccines
Proll, David, Author; Gauci, Penelope J., Author; Jul. 2004; 20 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427521; DSTO-TR-1597; DODA-AR-013-137; No Copyright; Avail: Defense Technical Information Center (DTIC)

Recombinant DNA techniques have been used to engineer a DNA vaccine from a gene derived from Burkholderia pseudomallei. This vaccine was further manipulated to generate a gene expression cassette that can be used to readily generate new DNA vaccines, utilising genetic material from any source. The DNA vaccine was transfected into mammalian cells, grown in vitro, in order to assess the ability of the DNA to provide the cell with the necessary information for it to synthesise the protein encoded within the vaccine. Western blot analysis of these cell extracts resulted in the detection of a protein with a molecular mass predicted for the protein encoded by the DNA vaccine. This evidence suggests that transient transfection of a mammalian cell with the engineered plasmid DNA construct, resulting in the translation of the encoded protein has been successful. This in vitro process effectively mimics that which occurs when the DNA plasmids are used to vaccinate higher mammals.
DTIC
Deoxyribonucleic Acid; Gene Expression; Genetic Engineering; Tape Recorders; Vaccines

20040201213 Army Engineer Research and Development Center, Vicksburg, MS USA
Development of Gene Expression Fingerprints for Identification of Environmental Contaminants Using cDNA Arrays
Inouye, L. S., Author; Ang, C. Y., Author; McFarland, V. A., Author; Sep. 2004; 16 pp.; In English
Report No.(s): AD-A427522; ERDC-TN-DOER-R4; No Copyright; Avail: CASI; A03, Hardcopy

This technical note reports the current status of work being done at the U. S. Army Engineer Research and Development Center (ERDC) to develop cDNA array-based assays that map gene expression from contaminant exposures. Results substantiate that distinct gene expression profiles exist for major contaminant classes such as PARs, PCBs, and PCDD/Fs. Results also indicate that identification of these contaminant mixtures in environmental media is possible by examining their effects on gene expression in mammalian cells. Research at ERDC directed at developing screening assays for contaminated sediments has been applied to extracts of both sediments and the organisms living in them. Several microbial and cell-based in vitro methods are now routinely used for this purpose. These were described, and the possibilities of using cDNA arrays in a screening assay were explored, in a preceding Technical Note (TN-DOER-Cl9, Inouye and McFarland (2001)). Briefly, cDNA arrays allow quantification of gene expression profiles (genes that are 'turned on or off' at a selected time) providing a 'fingerprint' of the sub-cellular responses of the test subject, e. g., cultured human liver cells, to a chemical challenge. While current in vitro tests such as the 101L cell-based assay for dioxin equivalents (TN-DOER-ClO, Ang et al. (2000)) offer inexpensive and rapid screening of one endpoint, cDNA arrays offer the potential for simultaneous screening of multiple endpoints and mixtures of contaminants. The activation of multiple genes related to disruption of normal cell functions, such as apoptosis, tumor suppression, cell proliferation, cell cycles, cytokines, oxidative stress, and more, can be measured in a single exposure using eDNA arrays. The resulting information can provide valuable insights into the toxic modes of action (MOAs) of mixtures of contaminants present in sediments.
DTIC
Complementary Dna; Contaminants; Gene Expression; Genes; Toxicity

20040201214 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Predictors of Symptom Appraisal for Patients with Acute Myocardial Infarction
Dejong, Marla J., Author; An, Kyungeh, Author; Cherrington, Candace C., Author; Moser, Debra K., Author; Nov. 2004; 28 pp.; In English
Report No.(s): AD-A427523; AFIT-CI04-655; No Copyright; Avail: CASI; A03, Hardcopy

This report discusses patients with acute myocardial infarction (AMI). By the use of viewgraphs, the report includes information pertaining to physical symptoms of AMI, delays in seeking treatment, consequences of delaying treatment, perception of symptom seriousness, purpose of symptom appraisal, sample inclusion criteria, outcome variables, data analysis, and clinical implications and conclusions.
DTIC
Myocardial Infarction; Patients; Predictions; Signs and Symptoms

20040201230 Cedars-Sinai Medical Center, Los Angeles, CA USA
NF2 in Hrs-Mediated Signal Transduction
Pulst, Stefan M., Author; Nov. 2003; 6 pp.; In English
Contract(s)/Grant(s): DAMD17-99-1-9548
Report No.(s): AD-A427555; No Copyright; Avail: CASI; A02, Hardcopy

We have identified Hrs (hepatocyte growth factor-regulated tyronsine kinase substrate)as an NF2 binding protein using

the yeast two-hybrid system. Hrs is also known to interact with STAM (signal transduction adapter molecules) Hrs appears to have growth suppressing functions at least in part mediated via binding to STAM with a resulting reduction in DNA synthesis. Progress is discussed in order of the three specific aims that were proposed originally. 1) Regulated overexpression of HRS in rat schwannoma cells results in similar effects as overexpression of schwannomin. This includes growth inhibition, decreased motility and abnormalities in cell spreading (Gutmann et al. 2001). 2) A recently emerging function for Hrs is the sorting of endosomes containing EGR-receptor. We have begun to examine this effect in RT4 cells overexpression Hrs or schwannomin. 3) We have begun to generate mouse embryonic fibroblast cell lines that express schwannomin or HRS under the control of the tet-regulatable promoter. These lines will be used to examine the effects of overexpression of either protein on proliferation and STAT signaling.
DTIC
Genetics; Neoplasms; Proteins; Transferring

20040201248 Bundesministerium der Verteidigung, Bonn, Germany
Diagnose und Therapie von Funktionsstoerungen menschlicher Leukozten nach Bestrahlung (Diagnosis and Therapy of Dysfunctions of Human Leukocytes After Irradiation)
Kaffenberger, W., Author; Van Beuningen, D., Author; Jan. 1999; 191 pp.; In English
Report No.(s): AD-A427614; BMVG-FBWM-99-3; No Copyright; Avail: CASI; A09, Hardcopy

Infections are an important aspect of the hematopoietic syndrome of acute radiation sickness. Pathophysiological infections arc caused by depletions and/ or functional deficiencies of white blood cells as major carriers of cellular immunity. Polymorphonuclear neutrophilic granulocytes (PMN) are important as the first immunological barrier. Experiments were performed with isolated human PMN and with the promyelecytic HL-60 cell line, induced to differentiate along the granulocytic lineage with dimethyl sulfoxid. The respiratory burst reaction was triggered with soluble stimuli and measured flow cytometrically or a chemiluminescence signal with indicator molecules dihydrorhodamine 123 or luminol. The presence of enzymes was postulated, verified with Western blotting, and their activities were inhibited pharmacologically. Lipid 2nd messengers were measured by high-performance liquid chromatography.
DTIC
Diagnosis; Infectious Diseases; Irradiation; Leukocytes; Signs and Symptoms; Therapy

20040201250 RAND Health, Santa Monica, CA USA
Gaps in Public Health Preparedness
Jan. 2004; 4 pp.; In English
Report No.(s): AD-A427620; No Copyright; Avail: CASI; A01, Hardcopy

Is California's public health system prepared for a bioterrorist attack? Or a deadly new infectious disease such as SARS? A RAND Corporation team found that even in California-widely regarded as one of the best-prepared states the level of preparedness ranged from excellent to poor. Californians' level of public health protection depends on the public health jurisdiction in which they happen to live. Imagine that bioterrorists deliberately release an infectious agent such as smallpox, or that a new and deadly virus makes its way into the human population. The public health system should be able to recognize the disease and control its spread. For example, doctors from one or more hospital emergency rooms might call the local public health agency to report a 'suspicious case. (Recognizing the disease quickly is likely to be a challenge. Early stages of smallpox, for example, resemble flu.) Public health officials would analyze the suspicious cases, recognize that an epidemic might be under way, and ensure that samples are sent to an appropriate laboratory. If the disease is confirmed, they would begin isolation, quarantine, and vaccination procedures, and ensure that those in need receive care. They would have to work closely with many others in the community, including law enforcement and first-response personnel, community groups, and health care professionals. Complex as the above tasks are, the list is far from complete. Public health officials would have many other responsibilities as well.
DTIC
Emergencies; Management Methods; Medical Services; Public Health

20040201252 Institut Franco-Allemand de Recherches, Weil am Rhein, Germany
Toedlichkeitsgrenzen fuer Albino-Ratten bei Anwending kleiner Sprengstoffmengen (Morbidity Limits for Albino Rats with the Application of Small Explosives)
Wuesnche, O., Author; Feb. 1963; 30 pp.; In English; In German
Report No.(s): AD-A427624; 2/63; No Copyright; Avail: CASI; A03, Hardcopy

This study reviews experiments on albino rats to determine the impact of very small explosions on survival and biological function. Tabular summaries of the rats' death and injury rates are provided (immediate death, short-term survival, long-term survival, complete survival) based on the size, position, and distance of the explosive. The study also examines and provides microscopoc-scale photographs of pathological changes to the lungs.
DTIC
Albinism; Explosives; Injuries; Lungs; Rats

20040201257 Georgetown Univ. Hospital, Washington, DC USA
The Key Involvement of Poly(ADP-ribosyl)ation in Defense Against Toxic Agents: Molecular Biology Studies
Smulson, Mark, Author; Oct. 2004; 20 pp.; In English
Contract(s)/Grant(s): F49620-01-1-0263
Report No.(s): AD-A427637; AFRL-SR-AR-TR-04-0564; No Copyright; Avail: CASI; A03, Hardcopy

We observed that exposure of rat lung alveolar type II epithelial cells (RLE-6TN) to JP-8 in vitro induces biochemical and morphological markers of apoptotic cell death such as activation of caspase-3, cleavage of poly(ADP-ribose) polymerase, chromatin condensation, release of cytochrome c from mitochondria, and cleavage of genomic DNA. Generation of reactive oxygen species (ROS) and depletion of intracellular reduced glutathione (GSH) also showed to play important roles in the induction of programmed cell death by JP-8. With the use of macroarray analysis, we further demonstrated that human Jurkat T cells exposed to JP-8 manifested pronounced changes in the expression of genes related to the cellular response to oxidative stress or to apoptosis. In contrast, similar analysis with normal human keratinocytes revealed that exposure to JP-8 induced changes in the expression of genes whose products function in detoxification or regulation of cell growth These findings might be relevant to the relative resistance of keratinocytes to JP-8 toxicity and support the notion that the induction of cell death by JP-8 may be cell type specific.
DTIC
Deoxyribonucleic Acid; Molecular Biology; Toxicity

20040201259 Institut Franco-Allemand de Recherches, Saint-Louis, France
Die biologische Wirkung hoher stossfreier Druckbelastung (The Biological Effect of a Shock Free High Pressure Load)
Wuensche, O., Author; Feb. 1964; 25 pp.; In English
Report No.(s): AD-A427640; No Copyright; Avail: CASI; A03, Hardcopy

This study describes experiments on albino rats designed to determine the biological tolerance foe a shock free high pressure load. Rats were subjected to pressure up to 46 atm. The results, which are presented in tabular form, demonstrate that there are interrelationships between pressure level, exposure time, and decompression time that are decisive for the survival rates of the animals. The survival rate declines with pressure level and exposure time. Findings were only preliminary regarding the release of nitrogen bubbles in the caudal vena cava related to decompression sickness.
DTIC
Albinism; Biological Effects; Decompression Sickness; High Pressure; Rats; Shock Loads

20040201261 Alabama Univ., Birmingham, AL USA
Metastasis Genes in Breast Cancer Metastasis to Bone
Welch, Danny R., Author; Jun. 2004; 100 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DADM17-02-1-0541
Report No.(s): AD-A427647; No Copyright; Avail: CASI; A05, Hardcopy

The overall objective is to test the role of BRMS1 in the ability of breast xenografts to metastasize to bone following intracardiac injection. A corollary is that BRMS1-regulated genes, especially osteopontin (OPN) will influence metastasis. Briefly, OPN is thought to be a metastasis promoting gene, while BRMS1 is a metastasis suppressor. Restoration of BRMS1 expression suppressed OPN. Knowing that BRMS1 suppresses metastasis from an orthotopic site to lung and regional lymph nodes (Seraj et al., 2000; Samant et al., 2001; Shevde et al. , 2002), it is not known whether metastasis is suppressed all sites. Since breast cancer spreads most commonly to bone, we will test whether BRMSl and/or molecules regulated by BRMS1 block bone metastasis.
DTIC
Bones; Breast; Cancer; Genes; Mammary Glands; Metastasis

20040201263 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany

Development and Implementation of PC-based Acoustic Analytic Procedures for the Clinical Diagnosis of Neurogenic Speech Defects (Entwicklung und implementierung pc-gestuetzter akustischer analyseverfahren fuer die klinische diagnostik neurogener sprechstoerungen)

Merk, Michael, Author; Jan. 2000; 291 pp.; In English; In German

Report No.(s): AD-A427651; No Copyright; Avail: CASI; A13, Hardcopy

Approximately two percent of the population suffers from brain damage. Some of these cases lead to speech defects. The diagnosis of neurogenic speech defects is a speciality of clinical neuropsychology. The typical approach is subjective. Technical acoustic evaluation procedures are rarely used in diagnosis and therapy. This dissertation describes a 'modular diagnostic system for speech defects' that supports the standard diagnosis of neurogenic speech defects based on the acoustic analysis of the speech signal and the compilation of diagnostic parameters.

DTIC

Brain Damage; Clinical Medicine; Diagnosis; Neurology; Speech Defects; Therapy

20040201264 Jackson (Henry M.) Foundation, Rockville, MD USA

Novel Role of ANX7 of Candidate Tumor Suppressor ANX7 Gene in Prostate Cancer

Srivastava, Meera, Author; Mar. 2004; 21 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-03-1-0107

Report No.(s): AD-A427655; No Copyright; Avail: CASI; A03, Hardcopy

Current attempts to develop more effective therapies for prostate cancer have been focussed on the discovery of new tumor suppressor genes, in hopes of using them for gene therapy. We have recently found that the ANX7 gene, which we discovered and have continued to study in the context of Ca2+ and GTP mediated exocytosis for many years (Creutz et al, 1978; ibid, 1979; Raynal and Pollard, 1994; Caohuy et al, 1996; Srivastava et al, 1996), is defective in 35% of human prostate cancer specimens (Srivastava et al., 2001 a) and 40% of human breast cancer specimens. A detailed analysis of ANX7 levels in hundreds of prostate cancer specimens reveals that expression of this candidate tumor suppressor gene is specifically altered in metastatic and hormone refractory prostate cancers (Srivastava et al., 2001 a). These data therefore, strongly suggest that the ANX7 gene has clinical relevance for prostate cancer in men. This is an important insight because until now the ANX7 gene has never been thought to play such a role (Raynal and Pollard, 1994). In our preliminary studies with metastatic prostate cancer cells in vitro, we find that ANX7 gene therapy causes these cells to undergo apoptosis, or programmed cell death. Therefore our objective in this proposal is to determine the mechanism and the signaling pathway by which the ANX7 gene induces death of prostate cancer cells. The rationale behind this study is the hope that such knowledge will enable us to develop therapies based on the use of the ANX7 gene to treat or prevent prostate cancer. We are best positioned to pursue this work because we not only discovered the ANX7 gene, but have also recently prepared a tumor-prone Anx7 knockout mouse. It has fascinated us that the phenotype of this knockout mouse also includes such a high frequency (20-25%) of spontaneous tumors.

DTIC

Cancer; Prostate Gland; Tumor Suppressor Genes

20040201266 Mount Sinai Hospital, Toronto, Ontario Canada

Cloning and Characterization of Expanded CAG-Repeat Containing Sequence(s): Identification of Candidate Breast Cancer Predisposition Gene(s)

Ozcelik, Hilmi, Author; Jun. 2004; 17 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): DAMD17-02-1-0499

Report No.(s): AD-A427658; No Copyright; Avail: CASI; A03, Hardcopy

Genetic factors have been shown to influence the risk of developing breast cancer. To date only two breast cancer predisposition genes, BRCA1 and BRCA2, have been identified. A wide spectrum of BRCA mutations has been found in breast cancer families. However, in the majority of breast cancer cases BRCA1 or BRCA2 mutations were not detected, suggesting the presence of other breast cancer predisposition genes Trinucleotide repeats are present widely in human genome. Expansions of some trinucleotide repeats have been recognized to be the cause of several genetic disorders. In a previous study using the Repeat Expanded Detection (RED) method, we detected expanded (CAG) repeat of repeat sizes of over 144 in 2.4% of breast cancer cases in a sample of 212 patients. No expansion of this magnitude has been detected in 196 population controls samples. Since RED does not provide information about the location of expanded repeats, it is necessary to clone and localize them. In this stage of the project we have developed and optimized an *efficient cloning and screening strategy using a combination of dynabead enrichment microsatellite isolation protocol and the RepeatArray system. We also validated the

results by sequencing the inserts. We have shown that applying the dynabead enrichment for a second round dramatically increases the percentage of CAG containing clones (around 90%). We have also detected a large GAG/CTG containing fragment of 65 repeats suggesting that our system is able to identify large repeat containing inserts. We have also established RepeatArray technology, which provides the distinction between smell and large repeat containing fragments and provides a high throughput pre-screening tool and eliminates the need for excess sequencing. Currently, we are at the stage of further validation and application of the strategy to breast cancer.
DTIC
Breast; Cancer; Cloning (Biology); Genetic Engineering; Mammary Glands

20040201270 Johns Hopkins Univ., Baltimore, MD USA
Selective Inhibition of T Cell Tolerance as a Means of Enhancing Tumor Vaccines in a Mouse Model of Breast Cancer
Powell, Jonathan D., Author; Jun. 2004; 8 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0402
Report No.(s): AD-A427665; No Copyright; Avail: CASI; A02, Hardcopy

This report of the purpose is to determine if the addition of Go6976 to vaccine protocols will inhibit the re-induction of neu specific tolerance and thus facilitate immune mediated protection against breast cancer. In the Her-2/ neu model of spontaneous breast cancer the immune system of these transgenic mice are tolerant to the neu protein. While immunity to neu can be demonstrated in the neu-transgenic mice (partial breaking of tolerance), this immunity is inadequate in terms of preventing the spontaneous development of tumors and preventing death from tumor challenge. Our experiments involve concomitantly treating mice with the PKC inhibitor Co6976 during tumor vaccine therapy in order to prevent tolerance induction and enhance immunotherapy. In initial experiments death from tumor was delayed by approximately 1 week in treated mice versus untreated controls. Likewise, in a second experiment non of the untreated mice (0/10) demonstrated evidence of neu-specific T cell responses, while 1/10 treated mice demonstrated neu-specific T cells. Importantly, the responder mouse had no evidence of tumor. These initial experiments while not dramatic suggest that the administration of Go6979 can impact immunotherapy. With these initial studies as a guide the major focus now is optimizing the delivery of the drug and vaccine.
DTIC
Breast; Cancer; Immunology; Mammary Glands; Mice; Tumors; Vaccines

20040201281 California Univ., Berkeley, CA USA
Engineering Analysis of a Genetic Switch: Modeling and Simulation Tools
Arkin, Adam P., Author; Nov. 2004; 4 pp.; In English
Contract(s)/Grant(s): N00014-00-1-0758
Report No.(s): AD-A427740; No Copyright; Avail: CASI; A01, Hardcopy

The overall objective of this project was quantitatively explain the extraordinary stability of the lambda-phase lysogen given that the data on the lysis/lysogency switch dynamics didn't seem to be sufficient for explanation. Further, we aimed to explain the differential stability of a number of operator mutants constructed by John Little. Further, in all cases, we wished to explain the threshold response of the induction switch to different exposures to UV light. Then, based on this understanding we aimed to re-engineer this switch with different thresholds, cooperativities and stabilities.
DTIC
Computerized Simulation; Genetics; Mutations

20040201282 Pittsburgh Univ., Pittsburgh, PA USA
Novel Coactivators for Androgen Receptor
DeFranco, Donald B., Author; Apr. 2004; 21 pp.; In English
Contract(s)/Grant(s): DAMD17-02-1-0256
Report No.(s): AD-A427746; No Copyright; Avail: CASI; A03, Hardcopy

The point of contact between the extracellular matrix (ECM) and specific cell surface proteins (i.e. integrins) occurs at specialized structures termed focal adhesions, which include several signal transduction molecules such as focal adhesion kinase (FAK) Intracellular signaling pathways that are responsive to ECM attachment influence cell proliferation and are altered in cancer cells. For example, FAK is overexpressed in invasive and metastatic human tumors. Furthermore, FAK is elevated in metastatic prostate cancers and preferentially associated with tyrosine-phosphorylated paxillin, a direct target of FAK. We have found that in addition to its localization to focal adhesions, paxillin is also present within nuclei and can target

to the nuclear matrix of CV-1 cells, Cultured prostate cancer cell lines and human prostate tissue. Furthermore, paxillin functions as a coactivator for androgen receptor and glucocorticoid receptor via its estrogen receptor and was found to directly interact with the androgen receptor via its carboxyl-terminal LIM domain. Thus, paxillin, a protein that responds to the metastatic state of prostate cancer cells, can directly influence androgen receptor transactivation. Future studies will be directed towards the assessment of ECM effects on this novel nuclear function of paxillin as it relates to androgen action in prostate cancer cells.
DTIC
Cancer; Hormones; Males; Prostate Gland

20040201283 Baylor Coll. of Medicine, Houston, TX USA
Linking Sister Chromatid Cohesion to Apoptosis and Aneuploidy in the Development of Breast Cancer
Pati, Debananda, Author; Jul. 2004; 28 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-01-1-0142; DAMD17-01-1-0143
Report No.(s): AD-A427750; No Copyright; Avail: CASI; A03, Hardcopy

The purpose of this project is to identify effector molecules that act as a link between cell proliferation, cell survival and chromosomes stability. We have hypothesized that chromosomal segregation and apoptotic pathways are linked and have a role in breast cancer. Rad21 is one of the major cohesin subunits that holds sister chromatids together until anaphase, when proteolytic cleavage by separase allows chromosomal separation. Our study demonstrates that in contrast to described functions of Rad21, in chromosome segregation and DNA repair, cleavage of the cohesion protein and translocation of the C-terminal cleavage product to the cytoplasm are early events in the apoptotic pathway that amplify the apoptotic signal in a positive feed back manner by activating more Caspases. Overexpression of the 64 kDa cleavage product results in apoptosis in MCF-7 breast cancer cells. Given the role of hRad21 in chromosome cohesion, the cleaved C-terminal product and its translocation to the cytoplasm may act as a nuclear signal for apoptosis. Furthermore, hRad21 is differentially expressed in human breast tumors and in breast cancer derived cell lines in comparison to normal breast epithelial cells. Future studies will identify the protease that cleaves Rad21 and evaluate hRad21 as a prognostic marker for breast cancer development.
DTIC
Apoptosis; Breast; Cancer; Chromosomes; Cohesion; Mammary Glands

20040201284 Fox Chase Cancer Center, Philadelphia, PA USA
FCCC Institutional Breast Cancer Training Program (FCCC-IBCTP)
Russo, Jose, Author; Jul. 2004; 137 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-00-1-0249
Report No.(s): AD-A427751; No Copyright; Avail: CASI; A07, Hardcopy

The Institutional Breast Cancer Training Program offers to the postdoctoral trainees practical experience in the fields of cellular and molecular biology, drug resistance and targeted immunotherapy, genetic epidemiology and control, psychosocial and behavioral medicine, as well as breast cancer prevention, diagnosis, and treatment. During the fourth year of the grant awarded we have been implementing the training phase of the program by monitoring each of the individual projects. The trainees have been attending at least one general lecture a week from those offered by the Fox Chase Cancer Center and a special seminar targeted to the formation of the trainees addressing critical subjects in breast cancer. We have established a half-day seminar twice a year in which the trainees present their work. In this last year of the program that ends in June 30 of 2004 we have requested and additional six months extension for allowing the completion of the program of those trainees that started in January 1, 2003. During this period the main emphasis has been and will be the data collection, analysis and preparation of abstracts and manuscripts.
DTIC
Breast; Cancer; Chromosomes; Education; Mammary Glands; Medical Science

20040201285 New York Hospital-Cornell Medical Center, New York, NY USA
RAR Beta: Actions in Prostate Cancer
Zhuang, Yong, Author; Apr. 2004; 9 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0037
Report No.(s): AD-A427753; No Copyright; Avail: CASI; A02, Hardcopy

I have previously identified some RARbeta targets genes. In the past year, I carried out actinomycin D experiments and determined that the RAR-beta targets genes are transcriptionally regulated by RAR-beta2. In addition, I have shown that

RAR-beta selective agonists and RXR agonists synergistically induce RAR-beta2 target genes in F9 wild-type cells. I also showed that ELF3, one of RAR-beta target genes, was up-regulated by RA in normal human prostate epithelial cells, but not in human prostate tumor cells.
DTIC
Cancer; Genes; Prostate Gland

20040201287 University of South Florida, Tampa, FL USA
The Role of AKT2 in Human Breast Cancer
Yuan, Zeng-Qiang, Author; Jun. 2004; 22 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAMD17-01-1-0397
Report No.(s): AD-A427759; No Copyright; Avail: CASI; A03, Hardcopy

During past year, I have focused my attention on AKT2 regulation of MST1 pathway and the effort of AKT2-interaction protein, APBP/APalphaB, on AKT2 signaling. MST1 is a member of STE20 like kinase and has been shown to induce apoptosis through its cleavage, activation and nuclear translocation. I have shown that AKT2 interacts with and phosphorylates MST1 at threonine-120, resulting to inhibition of MST1 cleavage and nuclear translocation. Thus, AKT2 abrogates MST1-induced apoptosis. AKT2-interaction protein, APBP/APalphaB, mediates AKT2 activation of p21-activated kinase 1(PAK1) pathway to induce cell survival.
DTIC
Breast; Cancer; Genetics; Mammary Glands

20040201296 California Inst. of Tech., Pasadena, CA USA
Genomics and Proteomics: A Signal Processor's Tour
Vaidyanathan, P. P., Author; May 2004; 35 pp.; In English
Contract(s)/Grant(s): N00014-99-1-1002
Report No.(s): AD-A427792; No Copyright; Avail: CASI; A03, Hardcopy

The theory and methods of signal processing are becoming increasingly important in molecular biology. Digital filtering techniques, transform domain methods, and Markov models have played important roles in gene identification, biological sequence analysis, and alignment. This paper contains a brief review of molecular biology, followed by a review of the applications of signal processing theory. This includes the problem of gene finding using digital filtering, and the use of transform domain methods in the study of protein binding spots. The relatively new topic of noncoding genes, and the associated problem of identifying ncRNA buried in DNA sequences are also described. This includes a discussion of hidden Markov models and context free grammars. Several new directions in genomic signal processing are briefly outlined in the end.
DTIC
Genome; Signal Analyzers; Signal Processing

20040201298 California Univ., Berkeley, CA USA
Nanogap Biomolecular Junction
Lee, Luke P., Author; May 2004; 36 pp.; In English
Contract(s)/Grant(s): F49620-03-1-0367
Report No.(s): AD-A427808; AFRL-SR-AR-TR-04-0565; No Copyright; Avail: CASI; A03, Hardcopy

The overall goal of this work is to develop the capability to create platforms with a small array that will be able to sense and identify a wide range of chemicals using real-time measurements to determine both the dynamics of biomolecular reactions as well as quantitative differences in binding characteristics. The specific goals of this project are to develop and understand the physiochemical mechanisms of a nanogap dielectric biosensor that has recently been demonstrated at BSAC. These devices, which are fabricated using standard CMOS technology, have the potential to serve as biomolecular junctions because their size reduces electrode polarization effects regardless of frequency. This junction technology is essentially a 'biology-to-digital' converter system that enables real time conversion of biomolecular dielectric signals into digital information. Preliminary work using nanogap sensors to sense biomolecular binding has demonstrated a four order of magnitude increase in sensitivity over existing fluorescence techniques. Because sensors based on nanoscale gaps have not existed before, in order to exploit their capabilities in a sensor array, it will be critical to increase our understanding of their performance and to develop the tools required to integrate them into a sensor platform. Toward this goal, a series of experimental and modeling tasks are proposed that will investigate the physiochemical characteristics of the nanogap

junctions. During this process, the nanogap junctions will also provide insight into fundamental biomolecular physics and processes applicable to other DARPA/ DSO programs.
DTIC
Biochemistry; Dielectrics; Digital Systems

20040201299 Maryland Univ., Baltimore, MD USA
Intracellular Mechanism and Clinical Significance of TRAIL in Prostate Cancer
Srivastava, Rakesh, Author; Feb. 2004; 61 pp.; In English
Contract(s)/Grant(s): DAMD17-02-1-0087
Report No.(s): AD-A427811; No Copyright; Avail: CASI; A04, Hardcopy

We assessed the influence of sequential treatment of ionizing radiation followed by TRAIL on intracellular mechanisms of apoptosis of prostate tumor cells in vitro and in vivo. Prostate normal and cancer cells were exposed to irradiation and TRAIL. Four to six-week old athymic nude mice were injected s.c. with PC-3 tumor cells. Tumor bearing mice were exposed to irradiation and TRAIL, either alone or in combination, and tumor growth, apoptosis and survival of mice were examined. Irradiation significantly augmented TRAIL- induced apoptosis in prostate cancer cells through up-regulation of death receptor DR5, Bax and Bak, and induction of caspase activation. Dominant negative FADD and p53 siRNA inhibited the synergistic interaction between irradiation and TRAIL. The pretreatment of cells with irradiation followed by TRAIL significantly enhanced more apoptosis than single agent alone or concurrent treatment. Irradiation sensitized TRAIL-resistant LNCaP cells to undergo apoptosis. The sequential treatment of xenografted mice with irradiation followed by TRAIL induced apoptosis through activation of caspase-3, induction of Bax and Bak, and inhibition of Bcl-2, and completely eradicated the established tumors with enhanced survival of nude mice. The sequential treatment with irradiation followed by TRAIL can be used as a viable option to enhance the therapeutic potential of TRAIL in prostate cancer.
DTIC
Cancer; Clinical Medicine; Ionizing Radiation; Irradiation; Prostate Gland

20040201300 Baylor Coll. of Medicine, Houston, TX USA
Small Molecules That Suppress IGF-Activated Prostate Cancers
Uesugi, Motonari, Author; Apr. 2004; 13 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0228
Report No.(s): AD-A427813; No Copyright; Avail: CASI; A03, Hardcopy

Elevated serum levels of insulin-like growth factor 1 (IGFl) have been found in prostate cancer patients, and IGFl-related signal transduction is thought to be an important factor in the development of prostate cancers. The goals of this project are to discover small organic molecules that suppress IGF-activated prostate cancers by cell-based screening and to analyze their action mechanisms. We have been taking a unique two-step approach to discovering such molecules: we first examine the phenotypic effects of chemical library members (10,000 divergent drug-like compounds) on the insulin-induced adipogensis and, by using the adipogenesis profile, we then identify organic compounds that suppress TGF- mediated growth of prostate cancer cells. Our hypothesis is that some of the compounds that block the insulin-induced adipogenesis suppress IGF-stimulated proliferation of malignant prostate cancers. In the first year of funding, we discovered, from the pool of chemicals that blocked insulin-induced adipogenesis, the drug-like compound we call 125B11 that suppress lGFI-dependent growth of prostate cancer cells but not serum-dependent growth. We are currently working on its mechanisms of action.
DTIC
Cancer; Insulin; Molecules; Organic Compounds; Prostate Gland

20040201301 Maryland Univ., Baltimore, MD USA
Ultra-Sensitive Detection of Prion Protein in Blood Using Isothermal Amplification Technology
Constantine, Neil T., Author; Jul. 2004; 95 pp.; In English
Contract(s)/Grant(s): DAMD17-03-1-0362
Report No.(s): AD-A427814; No Copyright; Avail: CASI; A05, Hardcopy

The detection of the pathologic prion protein that is Implicated in transmissible spongiform encephalopathies (TSEs) is necessary to diagnose the disease. Presently, the Western Blot or ELISA are used to test the brain stem in cattle for the presence of pathologic prion (PrP(exp Sc)) after Proteinase K (PK) digestion of normal, cellular prion (PrP(exp c)) before admission of these animals Into the food chain. An animal in the end stages of disease (40 -72 weeks after infection) will be detected by these methods; however, an infected animal will not be detected by these methods during preclinical stages of prion

infection (1-20 weeks). The RNA-polymerase immunodetection method (RAPID) is a technique whereby the exponential amplification ability of the PCR is coupled to the detection of proteins by antibodies in an enzyme linked immunosorbent assay (ELISA) format using magnetic beads. It is similar to the immuno-PCR method except that the final step of nucleic acid amplification is by RNA polymerase during isothermal incubation. For the IPCR, the final step of nucleic acid amplification is by Taq polymerase using a 2- temperature cycle Incubation. As a starting platform using microwell plates as the solid format, we have been able to show that real-time Immuno-PCR (IPCR) detects recombinant hamster PrP(exp c) down to 0.1-1.0 femtogram/mL concentrations. Recombinant hamster PrP(exp c), as well as PK-digested scrapie infected hamster brain homogenates diluted from 10(exp -1) to 10(exp-6) exhibited a quantitative dose response. The methods we use In real-time IPCR will now be modified for use with a magnetic bead solid format and RNA polymerase isothermal amplification.
DTIC
Amplification; Blood; Blood Volume; Brain Stem; Clinical Medicine; Infectious Diseases; Magnetic Fields; Proteins

20040201446 Advanced Ceramics Research, Inc., Tucson, AZ, USA
Plasti-Bone[tm]: A Proprietary, New Class of Bone Implants for Tissue Engineering
Vaidyanathan, Ranji; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 103-127; In English; See also 20040201420; No Copyright; Avail: CASI; A03, Hardcopy

This viewgraph presentation analyzes the market for bone implants, addresses the shortcomings of current technology for bone implant tissue engineering, and proposes polymer ceramic composites as a solution. The presentation addresses the ability of new tissues to grow around a Plasti-Bone implant. Finally the presentation proposes a marketing strategy for this technology.
CASI
Tissue Engineering; Implantation; Bones; Polymer Matrix Composites; Ceramic Matrix Composites

20040201479 Norfolk State Univ., VA, USA
Security Access Using Facial Recognition
Mullins, Marcia; White, Opal; William, Michael; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 669-686; In English; See also 20040201469; No Copyright; Avail: CASI; A03, Hardcopy

This research is aimed at developing a facial recognition system that can be used to control access to a secure area. Security measures around the world are becoming more complex and technically advanced. Those who wish to gain access to information protected by familiar security devices, such as swipe cards and personal identification numbers, are slowly figuring out how to beat these systems. The question now arises, 'What security measures are reliable enough to allow access when needed, but still assure that the person gaining access to the information is, indeed, the correct individual?' Facial Recognition, a division of biometrics, specifically, uses the location and measurements of certain unique facial features of an individual to determine identity. The advantage of facial recognition over other biometric techniques is that it is not obtrusive and is passive, that is, facial recognition does not require the entering of the human body, such as lasers for retinal scans, and does not require that a person be aware of the action.
Derived from text
Biometrics; Security; Position (Location); Scanners; Face (Anatomy); Identities

20040201524 NASA Johnson Space Center, Houston, TX, USA
Extended Duration Orbiter Medical Project
Sawin, Charles F., Editor; Taylor, Gerald R., Editor; Smith, Wanda L., Editor; Brown, J. Travis, Technical Monitor; [1999]; 294 pp.; In English; See also 20040201525 - 20040201537
Report No.(s): NASA/SP-1999-534; No Copyright; Avail: CASI; A13, Hardcopy

Biomedical issues have presented a challenge to flight physicians, scientists, and engineers ever since the advent of high-speed, high-altitude airplane flight in the 1940s. In 1958, preparations began for the first manned space flights of Project Mercury. The medical data and flight experience gained through Mercury's six flights and the Gemini, Apollo, and Skylab projects, as well as subsequent space flights, comprised the knowledge base that was used to develop and implement the Extended Duration Orbiter Medical Project (EDOMP). The EDOMP yielded substantial amounts of data in six areas of space biomedical research. In addition, a significant amount of hardware was developed and tested under the EDOMP. This hardware was designed to improve data gathering capabilities and maintain crew physical fitness, while minimizing the overall impact

to the microgravity environment. The biomedical findings as well as the hardware development results realized from the EDOMP have been important to the continuing success of extended Space Shuttle flights and have formed the basis for medical studies of crew members living for three to five months aboard the Russian space station, Mir. EDOMP data and hardware are also being used in preparation for the construction and habitation of International Space Station. All data sets were grouped to be non-attributable to individuals, and submitted to NASA s Life Sciences Data Archive.
Author
Life Sciences; Space Transportation System Flights; Physiology; Neurology; Medical Science

20040201527 NASA Johnson Space Center, Houston, TX, USA
Effects of space flight on locomotor control
Bloomberg, Jacob J.; Layne, Charles S.; McDonald, P. Vernon; Peters, Brian T.; Huebner, William P.; Reschke, Millard F.; Berthoz, Alain; Glasauer, Stefan; Newman, Dava; Jackson, D. Keoki; Extended Duration Orbiter Medical Project; [1999], pp. 5.5-1 - 5.5-57; In English; See also 20040201524; No Copyright; Avail: CASI; A04, Hardcopy

In the microgravity environment of spaceflight, the relationship between sensory input and motor output is altered. During prolonged missions, neural adaptive processes come into play to recalibrate central nervous system function, thereby permitting new motor control strategies to emerge in the novel sensory environment of microgravity. However, the adaptive state achieved during spaceflight is inappropriate for a unit gravity environment and leads to motor control alterations upon return to Earth that include disturbances in locomotion. Indeed, gait and postural instabilities following the return to Earth have been reported in both U.S. astronauts and Russian cosmonauts even after short duration (5- to 10-day) flights. After spaceflight, astronauts may: (1) experience the sensation of turning while attempting to walk a straight path, (2) encounter sudden loss of postural stability, especially when rounding corners, (3) perceive exaggerated pitch and rolling head movements during walking, (4) experience sudden loss of orientation in unstructured visual environments, or (5) experience significant oscillopsia during locomotion.
Author
Space Flight; Locomotion; Physiology; Body Kinematics

52
AEROSPACE MEDICINE

Includes the biological and physiological effects of atmospheric and space flight (weightlessness, space radiation, acceleration, and altitude stress) on the human being; and the prevention of adverse effects on those environments. For psychological and behavioral effects of aerospace environments, see *53 Behavioral Sciences*. For the effects of space on animals and plants see *51 Life Sciences*.

20040191712 NASA Johnson Space Center, Houston, TX, USA
A Probability Model of Decompression Sickness at 4.3 Psia after Exercise Prebreathe
Conkin, Johnny; Gernhardt, Michael L.; Powell, Michael R.; Pollock, Neal; October 2004; 104 pp.; In English
Contract(s)/Grant(s): NCC9-58
Report No.(s): NASA/TP-2004-213158; S-952; Copyright; Avail: CASI; A06, Hardcopy

Exercise PB can reduce the risk of decompression sickness on ascent to 4.3 psia when performed at the proper intensity and duration. Data are from seven tests. PB times ranged from 90 to 150 min. High intensity, short duration dual-cycle ergometry was done during the PB. This was done alone, or combined with intermittent low intensity exercise or periods of rest for the remaining PB. Nonambulating men and women performed light exercise from a semi-recumbent position at 4.3 psia for four hrs. The Research Model with age tested the probability that DCS increases with advancing age. The NASA Model with gender hypothesized that the probability of DCS increases if gender is female. Accounting for exercise and rest during PB with a variable half-time compartment for computed tissue N2 pressure advances our probability modeling of hypobaric DCS. Both models show that a small increase in exercise intensity during PB reduces the risk of DCS, and a larger increase in exercise intensity dramatically reduces risk. These models support the hypothesis that aerobic fitness is an important consideration for the risk of hypobaric DCS when exercise is performed during the PB.
Author
Decompression Sickness; Physical Exercise; Ergometers

20040200739 Institute of Space Medico-Engineering, Beijing, China
Space Medicine and Medical Engineering, Volume 17, No. 5
Wei, Jin-He, Editor; Chen, Shan-Guang, Editor; Su, Shuang-Ning, Editor; Jiang, Shi-Zhong, Editor; Wang, Xian-Min, Editor; Liu, Xin-Min, Editor; Su, Hong-Yu, Editor; Bai, Jing, Editor; Sun, Xi-Qing, Editor; Ma, Ai-Jun, Editor, et al.; October 15, 2004; ISSN 1002-0837; 80 pp.; In English; In Chinese
Report No.(s): CN-11/2774/R; Copyright; Avail: Other Sources

Contents include the following: Effects of Active Fractions from Lycopus Lucidus L. Fo4 on Platelet Aggregation and Thrombus Formation (In English). A classification on human factor accident/incident of China civil aviation in resent twelve years(In English). Gray Characteristic Analysis of Microtubules in Cardiac Myocytes (In English). Effects of Chinese Herb Compound on Myocardial SDH,ATP-ase and Energy Reserves in Tail- suspended Rats. Role of ROK in Contraction of Rat Femoral Arteries after 14 d Tail Suspension. Effect of Intermittent Normobaric Hypoxia Training on Heart Rate Variability. Measurement of Tissne Tension and Ventilation Resistance in Eustachiam Tube Opened by Positive Pressure in Respiratory Tract and the Study on Mechanism of Ventilation. Discussion of Naive Bayesian Algorithm in Prognosis Prediction of Primary Liver Cancer. An Algorithm Study on Telecardiogram Diagnosis Based on Multivariate Autoregressive Model and Two-lead ECG Signals. Stochastic Resonance in Weak Signal Detection by Sensory Systems through. Design and Field Calculation of Coil Array for Functional Magnetic Stimulation. A Simulation Facility for Low Temperature Water Surface Environment.
CASI
Aerospace Medicine; Electrocardiography; Low Temperature Environments

20040200967 NASA Johnson Space Center, Houston, TX, USA
Evaluation of Neutral Body Posture on Shuttle Mission STS-57 (SPACEHAB-1)
Mount, Frances E.; Whitmore, Mihriban; Stealey, Sheryl L.; February 2003; 30 pp.; In English
Report No.(s): NASA/TM-2003-104805; S-793; No Copyright; Avail: CASI; A03, Hardcopy

Research has shown that the space environment induces physiological changes in the human body, such as fluid shifts in the upper body and chest cavity, spinal lengthening, muscular atrophy, space motion sickness, cardiopulmonary deconditioning, and bone mass loss, as well as some changes in visual perception. These require a period of adaptation and can substantially affect both crew member performance and posture. These physiological effects, when work activities are conducted, have been known to impact the body's center of gravity, reach, flexibility, and dexterity. All these aspects of posture must be considered to safely and efficiently design space systems and hardware. NASA has documented its microgravity body posture in the Man-Systems Integration Standards (MSIS); the space community uses the MSIS posture to design workstations and tools for space application. However, the microgravity body posture should be further investigated for several reasons, including small sample size in previous studies, possible imprecision, and lack of detail. JSC undertook this study to investigate human body posture exhibited under microgravity conditions. STS-57 crew members were instructed to assume a relaxed posture that was not oriented to any work area or task. Crew members were asked to don shorts and tank tops and to be blindfolded while data were recorded. Video data were acquired once during the mission from each of the six crew members. No one crew member exhibited the typical NBP called out in the MSIS; one composite posture is not adequate. A range of postures may be more constructive for design purposes. Future evaluations should define precise posture requirements for workstation, glove box, maintenance, foot-restraint, and handhold activities.
Author
Posture; Aerospace Medicine; Space Shuttle Missions; Human Factors Engineering; Physiological Effects

20040200970 NASA Johnson Space Center, Houston, TX, USA
Heat Production During Countermeasure Exercises Planned for the International Space Station
Rapley, Michael G.; Lee, Stuart M. C.; Guilliams, Mark E.; Greenisen, Michael C.; Schneider, Suzanne M.; March 2004; 120 pp.; In English
Report No.(s): NASA/TP-2004-212061; S-915; No Copyright; Avail: CASI; A06, Hardcopy

This investigation's purpose was to determine the amount of heat produced when performing aerobic and resistance exercises planned as part of the exercise countermeasures prescription for the ISS. These data will be used to determine thermal control requirements of the Node 1 and other modules where exercise hardware might reside. To determine heat production during resistive exercise, 6 subjects using the iRED performed 5 resistance exercises which form the core exercises of the current ISS resistive exercise countermeasures. Each exerciser performed a warm-up set at 50% effort, then 3 sets of increasing resistance. We measured oxygen consumption and work during each exercise. Heat loss was calculated as the difference between the gross energy expenditure (minus resting metabolism) and the work performed. To determine heat production during aerobic exercise, 14 subjects performed an interval, cycle exercise protocol and 7 subjects performed a

continuous, treadmill protocol. Each 30-min. exercise is similar to exercises planned for ISS. Oxygen consumption monitored continuously during the exercises was used to calculate the gross energy expenditure. For cycle exercise, work performed was calculated based on the ergometer's resistance setting and pedaling frequency. For treadmill, total work was estimated by assuming 25% work efficiency and subtracting the calculated heat production and resting metabolic rate from the gross energy expenditure. This heat production needs to be considered when determining the location of exercise hardware on ISS and designing environmental control systems. These values reflect only the human subject s produced heat; heat produced by the exercise hardware also will contribute to the heat load.
Author
Countermeasures; International Space Station; Physical Exercise; Temperature Effects

20040201118 B and J Enterprises, Inc., Colorado Springs, CO USA
Differential Gene Expression in Explanted Human Retinal Pigment Epithelial Cells 24-Hours Post-Exposure to 532 nm, 3.0 ns Pulsed Laser Light and 1064 nm, 170 ps Pulsed Laser Light 12-Hours Post-Exposure: Results Compendium
Obringer, John W., Author; Johnson, Martin D., Author; Jun. 2004; 33 pp.; In English
Contract(s)/Grant(s): F05611-02-P-0471; FQ8671-01-0-0507
Report No.(s): AD-A427356; USAFA-TR-2003-05; No Copyright; Avail: CASI; A03, Hardcopy

The use of laser light for military and commercial applications has sharply increased the likelihood of personnel exposure to light during operations. The increased potential for human exposure highlights the fact that there is paucity of basic science cell and molecular level concerning the effects of laser exposure of human cells. We assessed the sublethal insult to human pigment epithelial cells using a cadaver organ donor explant system for genes differentially expressed 12 and 24 hours post-exposure using gene expression microarray technology (gene chip). The two experiments presented herein are intended to the database of laser-tissue interaction at the molecular level using gene expression profiling as the assessment endpoint. This investigative approach continues to illustrate the use of human explants as an experimental model for assessing laser-induced bioeffects as the cell and molecular level. Additionally, we offer 3 conceptual cartoons outlining our vision for the future progress of laser bioeffects research, metabonomic risk assessment modeling and knowledge building from laser bioeffects data.
DTIC
Epithelium; Exposure; Gene Expression; Laser Damage; Laser Outputs; Light Beams; Pigments; Pulsed Lasers; Retina

20040201458 Army Center for Health Promotion and Preventive Medicine (Provisional), Aberdeen Proving Ground, MD USA
A Review of the Literature on Attrition from the Military Services: Risk Factors for Attrition and Strategies to Reduce Attrition
Knapik, Joseph J.; Jones, Bruce H.; Hauret, Keith; Darakjy, Salima; Piskator, Eugene; Oct. 2004; 105 pp.; In English
Report No.(s): AD-A427744; USACHPPM-12-HF-01Q9A-04; No Copyright; Avail: CASI; A06, Hardcopy

Attrition is the failure of an enlisted service member to be retained in service within the first term of enlistment. This paper emphasizes health/ fitness-related aspects of attrition but also covers demographic and psychosocial factors. Overall 3-year military attrition steadily rose from 26% in 1985 to 31% in 1995. Demographic and psychosocial risk factors for attrition include lower educational attainment, female gender, White ethnicity, lower Armed Forces Qualification Test scores, lower moral character (less conformance to laws, rules and regulations), moral waivers, pre-service job instability, and less time in the Delayed Entry Program. The age-attrition relationship appears to be bimodal with higher attrition when youngest, decreasing in 19-23 year olds, and rising again after that. Attrition for mental health reasons is associated with pre-service physical/sexual abuse, previous mental health counseling, previous treatment with medication, previous psychiatric hospitalization, low motivation, pessimism toward training, depression, lack of self-reliance, and referral to a mental health facility. Attrition is also higher among those waivered for hearing problems, skin disorders, back disorders, and prior knee injuries. Other health-related risk factors include pre-service injury, injuries during basic training, a history of prior cigarette smoking, low physical activity prior to service, greater body weight, higher body mass index and lower physical fitness. Strategies to reduce attrition include prescreening by biographical questionnaires, compensatory screening, individual behavioral health counseling, and realistic job previews. Senior leadership initiatives have a powerful effect on attrition. Attrition also appears to be reduced by increasing physical fitness prior to basic training, the Physical Training and Rehabilitation Program, and the Pre-Initial Entry Training Program (for National Guard).
DTIC
Personnel; Risk

20040201525 NASA Johnson Space Center, Houston, TX, USA

Regulatory Physiology

Lane, Helen W.; Whitson, Peggy A.; Putcha, Lakshmi; Baker, Ellen; Smith, Scott M.; Stewart, Karen; Gretebeck, Randall; Nimmagudda, R. R.; Schoeller, Dale A.; Davis-Street, Janis, et al.; Extended Duration Orbiter Medical Project; [1999], pp. 2-1 - 2-10; In English; See also 20040201524; No Copyright; Avail: CASI; A03, Hardcopy

As noted elsewhere in this report, a central goal of the Extended Duration Orbiter Medical Project (EDOMP) was to ensure that cardiovascular and muscle function were adequate to perform an emergency egress after 16 days of spaceflight. The goals of the Regulatory Physiology component of the EDOMP were to identify and subsequently ameliorate those biochemical and nutritional factors that deplete physiological reserves or increase risk for disease, and to facilitate the development of effective muscle, exercise, and cardiovascular countermeasures. The component investigations designed to meet these goals focused on biochemical and physiological aspects of nutrition and metabolism, the risk of renal (kidney) stone formation, gastrointestinal function, and sleep in space. Investigations involved both ground-based protocols to validate proposed methods and flight studies to test those methods. Two hardware tests were also completed.

Author (revised)

Cardiovascular System; Physiological Effects; Manned Space Flight; Nutrition; Metabolism; Spacecrews; Astronauts

20040201526 NASA Johnson Space Center, Houston, TX, USA

Project Summary and Conclusions

Sawin, Charles; Extended Duration Orbiter Medical Project; [1999], pp. 9-1 - 9-8; In English; See also 20040201524; No Copyright; Avail: CASI; A02, Hardcopy

A top level summary of activities conducted throughout the course of the EDOMP in response to initial concerns at the outset of the program is provided. Significant findings from the investigations are summarized, together with resulting countermeasures that were implemented and flight rules that were developed in response to these findings. Subsequent paragraphs provide more information; details will be found in the referenced sections.

Author (revised)

Space Flight; Countermeasures; Microgravity; Cardiovascular System; Physiology; Metabolism; Vestibules; Human Factors Engineering

20040201530 NASA Johnson Space Center, Houston, TX, USA

Assessment of Human Factors

Mount, Frances; Foley, Tico; Extended Duration Orbiter Medical Project; [1999], pp. 6-1 - 6-15; In English; See also 20040201524; No Copyright; Avail: CASI; A03, Hardcopy

Human Factors Engineering, often referred to as Ergonomics, is a science that applies a detailed understanding of human characteristics, capabilities, and limitations to the design, evaluation, and operation of environments, tools, and systems for work and daily living. Human Factors is the investigation, design, and evaluation of equipment, techniques, procedures, facilities, and human interfaces, and encompasses all aspects of human activity from manual labor to mental processing and leisure time enjoyments. In spaceflight applications, human factors engineering seeks to: (1) ensure that a task can be accomplished, (2) maintain productivity during spaceflight, and (3) ensure the habitability of the pressurized living areas. DSO 904 served as a vehicle for the verification and elucidation of human factors principles and tools in the microgravity environment. Over six flights, twelve topics were investigated. This study documented the strengths and limitations of human operators in a complex, multifaceted, and unique environment. By focusing on the man-machine interface in space flight activities, it was determined which designs allow astronauts to be optimally productive during valuable and costly space flights. Among the most promising areas of inquiry were procedures, tools, habitat, environmental conditions, tasking, work load, flexibility, and individual control over work.

Author

Space Flight; Man Machine Systems; Astronauts; Human Factors Engineering; Human Performance; Microgravity

20040201531 NASA Johnson Space Center, Houston, TX, USA

Hardware

Extended Duration Orbiter Medical Project; [1999], pp. 8-1 - 8-18; In English; See also 20040201524; No Copyright; Avail: CASI; A03, Hardcopy

The full complement of EDOMP investigations called for a broad spectrum of flight hardware ranging from commercial items, modified for spaceflight, to custom designed hardware made to meet the unique requirements of testing in the space

environment. In addition, baseline data collection before and after spaceflight required numerous items of ground-based hardware. Two basic categories of ground-based hardware were used in EDOMP testing before and after flight: (1) hardware used for medical baseline testing and analysis, and (2) flight-like hardware used both for astronaut training and medical testing. To ensure post-landing data collection, hardware was required at both the Kennedy Space Center (KSC) and the Dryden Flight Research Center (DFRC) landing sites. Items that were very large or sensitive to the rigors of shipping were housed permanently at the landing site test facilities. Therefore, multiple sets of hardware were required to adequately support the prime and backup landing sites plus the Johnson Space Center (JSC) laboratories. Development of flight hardware was a major element of the EDOMP. The challenges included obtaining or developing equipment that met the following criteria: (1) compact (small size and light weight), (2) battery-operated or requiring minimal spacecraft power, (3) sturdy enough to survive the rigors of spaceflight, (4) quiet enough to pass acoustics limitations, (5) shielded and filtered adequately to assure electromagnetic compatibility with spacecraft systems, (6) user-friendly in a microgravity environment, and (7) accurate and efficient operation to meet medical investigative requirements.

Author

Aerospace Medicine; Bioinstrumentation; Onboard Equipment

20040201532 NASA Johnson Space Center, Houston, TX, USA

Cardiovascular Deconditioning

Charles, John B.; Fritsch-Yelle, Janice M.; Whitson, Peggy A.; Wood, Margie L.; Brown, Troy E.; Fortner, G. William; Extended Duration Orbiter Medical Project; [1999], pp. 1-1 - 1-19; In English; See also 20040201524; No Copyright; Avail: CASI; A03, Hardcopy

Spaceflight causes adaptive changes in cardiovascular function that may deleteriously affect crew health and safety. Over the last three decades, symptoms of cardiovascular changes have ranged from postflight orthostatic tachycardia and decreased exercise capacity to serious cardiac rhythm disturbances during extravehicular activities (EVA). The most documented symptom of cardiovascular dysfunction, postflight orthostatic intolerance, has affected a significant percentage of U.S. Space Shuttle astronauts. Problems of cardiovascular dysfunction associated with spaceflight are a concern to NASA. This has been particularly true during Shuttle flights where the primary concern is the crew's physical health, including the pilot's ability to land the Orbiter, and the crew's ability to quickly egress and move to safety should a dangerous condition arise. The study of astronauts during Shuttle activities is inherently more difficult than most human research. Consequently, sample sizes have been small and results have lacked consistency. Before the Extended Duration Orbiter Medical Project (EDOMP), there was a lack of normative data on changes in cardiovascular parameters during and after spaceflight. The EDOMP for the first time allowed studies on a large enough number of subjects to overcome some of these problems. There were three primary goals of the Cardiovascular EDOMP studies. The first was to establish, through descriptive studies, a normative data base of cardiovascular changes attributable to spaceflight. The second goal was to determine mechanisms of cardiovascular changes resulting from spaceflight (particularly orthostatic hypotension and cardiac rhythm disturbances). The third was to evaluate possible countermeasures. The Cardiovascular EDOMP studies involved parallel descriptive, mechanistic, and countermeasure evaluations.

Author (revised)

Aerospace Medicine; Cardiovascular System; Manned Space Flight; Deconditioning; Spacecrews; Physiological Effects

20040201533 NASA Johnson Space Center, Houston, TX, USA

Visual-vestibular integration motion perception reporting

Harm, Deborah L.; Reschke, Millard R.; Parker, Donald E.; Extended Duration Orbiter Medical Project; [1999], pp. 5.2-1 - 5.2-12; In English; See also 20040201524

Report No.(s): DSO-604-OI-1; No Copyright; Avail: CASI; A03, Hardcopy

Self-orientation and self/surround-motion perception derive from a multimodal sensory process that integrates information from the eyes, vestibular apparatus, proprioceptive and somatosensory receptors. Results from short and long duration spaceflight investigations indicate that: (1) perceptual and sensorimotor function was disrupted during the initial exposure to microgravity and gradually improved over hours to days (individuals adapt), (2) the presence and/or absence of information from different sensory modalities differentially affected the perception of orientation, self-motion and surround-motion, (3) perceptual and sensorimotor function was initially disrupted upon return to Earth-normal gravity and gradually recovered to preflight levels (individuals readapt), and (4) the longer the exposure to microgravity, the more complete the adaptation, the more profound the postflight disturbances, and the longer the recovery period to preflight levels. While much has been learned about perceptual and sensorimotor reactions and adaptation to microgravity, there is much remaining to be learned about the mechanisms underlying the adaptive changes, and about how intersensory interactions affect

perceptual and sensorimotor function during voluntary movements. During space flight, SMS and perceptual disturbances have led to reductions in performance efficiency and sense of well-being. During entry and immediately after landing, such disturbances could have a serious impact on the ability of the commander to land the Orbiter and on the ability of all crew members to egress from the Orbiter, particularly in a non-nominal condition or following extended stays in microgravity. An understanding of spatial orientation and motion perception is essential for developing countermeasures for Space Motion Sickness (SMS) and perceptual disturbances during spaceflight and upon return to Earth. Countermeasures for optimal performance in flight and a successful return to Earth require the development of preflight and in-flight training to help astronauts acquire and maintain a dual adaptive state. Despite the considerable experience with, and use of, an extensive set of countermeasures in the Russian space program, SMS and perceptual disturbances remain an unresolved problem on long-term flights. Reliable, valid perceptual reports are required to develop and refine stimulus rearrangements presented in the PAT devices currently being developed as countermeasures for the prevention of motion sickness and perceptual disturbances during spaceflight, and to ensure a less hazardous return to Earth. Prior to STS-8, crew member descriptions of their perceptual experiences were, at best, anecdotal. Crew members were not schooled in the physiology or psychology of sensory perception, nor were they exposed to the appropriate professional vocabulary. However, beginning with the STS-8 Shuttle flight, a serious effort was initiated to teach astronauts a systematic method to classify and quantify their perceptual responses in space, during entry, and after flight. Understanding, categorizing, and characterizing perceptual responses to spaceflight has been greatly enhanced by implementation of that training system.
Author
Motion Perception; Motion Sickness; Sensory Perception; Microgravity; Astronaut Training; Gravitational Effects

20040201534 NASA Johnson Space Center, Houston, TX, USA
Visual-vestibular integration as a function of adaptation to space flight and return to Earth
Reschke, Millard R.; Bloomberg, Jacob J.; Harm, Deborah L.; Huebner, William P.; Krnavek, Jody M.; Paloski, William H.; Berthoz, Alan; Extended Duration Orbiter Medical Project; [1999], pp. 5.3-1 - 5.3-41; In English; See also 20040201524
Report No.(s): DSO-604-OI-3; No Copyright; Avail: CASI; A03, Hardcopy

Research on perception and control of self-orientation and self-motion addresses interactions between action and perception . Self-orientation and self-motion, and the perception of that orientation and motion are required for and modified by goal-directed action. Detailed Supplementary Objective (DSO) 604 Operational Investigation-3 (OI-3) was designed to investigate the integrated coordination of head and eye movements within a structured environment where perception could modify responses and where response could be compensatory for perception. A full understanding of this coordination required definition of spatial orientation models for the microgravity environment encountered during spaceflight.
Author
Motion Perception; Adaptation; Microgravity; Gravitational Effects; Return to Earth Space Flight

20040201535 NASA Johnson Space Center, Houston, TX, USA
Recovery of postural equilibrium control following space flight
Paloski, William H.; Reschke, Millard F.; Black, F. Owen; Dow, R. S.; Extended Duration Orbiter Medical Project; [1999], pp. 5.4-1 - 5.4-16; In English; See also 20040201524
Report No.(s): DSO-605; No Copyright; Avail: CASI; A03, Hardcopy

DSO 605 represents the first large study of balance control following spaceflight. Data collected during DSO 605 confirm the theory that postural ataxia following short duration spaceflight is of vestibular origin. We used the computerized dynamic posturography technique developed by Nashner et al. to study the role of the vestibular system in balance control in astronauts during quiet stance before and after spaceflight. Our results demonstrate unequivocally that balance control is disrupted in all astronauts immediately after return from space. The most severely affected returning crew members performed in the same way as vestibular deficient patients exposed to this test battery. We conclude that otolith mediated spatial reference provided by the terrestrial gravitational force vector is not used by the astronauts balance control systems immediately after spaceflight. Because the postflight ataxia appears to be mediated primarily by CNS adaptation to the altered vestibular inputs caused by loss of gravitational stimulation, we believe that intermittent periods of exposure to artificial gravity may provide an effective in-flight countermeasure. Specifically, we propose that in-flight centrifugation will allow crew members to retain their terrestrial sensory-motor adapted states while simultaneously developing microgravity adapted states. The dual-adapted astronaut should be able to make the transition from microgravity to unit gravity with minimal sensory-motor effects. We have begun a ground based program aimed at developing short arm centrifuge prescriptions designed to optimize adaptation to altered gravitational environments. Results from these experiments are expected to lead directly to in-flight evaluation of the proposed centrifuge countermeasure. Because our computerized dynamic posturography system was able to (1) quantify the

postflight postural ataxia reported by crew members and observed by flight surgeons and scientists, (2) track the recovery of normal (preflight) balance control, (3) differentiate between rookie and veteran subjects, and (4) provide normative and clinical databases for comparison, and because our study successfully characterized postflight balance control recovery in a large cross-section of Shuttle crew members, we recommend that this system and protocol be adopted as a standard dependent measure for evaluating the efficacy of countermeasures and/or evaluating the postflight effects of changing mission durations or activities.
Derived from text
Microgravity; Sensorimotor Performance; Gravitational Effects; Astronaut Performance; Adaptation; Astronauts

20040201536 NASA Johnson Space Center, Houston, TX, USA
Functional Performance Evaluation
Greenisen, Michael C.; Hayes, Judith C.; Siconolfi, Steven F.; Moore, Alan D.; Extended Duration Orbiter Medical Project; [1999], pp. 3-1 - 3-24; In English; See also 20040201524; No Copyright; Avail: CASI; A03, Hardcopy

The Extended Duration Orbiter Medical Project (EDOMP) was established to address specific issues associated with optimizing the ability of crews to complete mission tasks deemed essential to entry, landing, and egress for spaceflights lasting up to 16 days. The main objectives of this functional performance evaluation were to investigate the physiological effects of long-duration spaceflight on skeletal muscle strength and endurance, as well as aerobic capacity and orthostatic function. Long-duration exposure to a microgravity environment may produce physiological alterations that affect crew ability to complete critical tasks such as extravehicular activity (EVA), intravehicular activity (IVA), and nominal or emergency egress. Ultimately, this information will be used to develop and verify countermeasures. The answers to three specific functional performance questions were sought: (1) What are the performance decrements resulting from missions of varying durations? (2) What are the physical requirements for successful entry, landing, and emergency egress from the Shuttle? and (3) What combination of preflight fitness training and in-flight countermeasures will minimize in-flight muscle performance decrements? To answer these questions, the Exercise Countermeasures Project looked at physiological changes associated with muscle degradation as well as orthostatic intolerance. A means of ensuring motor coordination was necessary to maintain proficiency in piloting skills, EVA, and IVA tasks. In addition, it was necessary to maintain musculoskeletal strength and function to meet the rigors associated with moderate altitude bailout and with nominal or emergency egress from the landed Orbiter. Eight investigations, referred to as Detailed Supplementary Objectives (DSOs) 475, 476, 477, 606, 608, 617, 618, and 624, were conducted to study muscle degradation and the effects of exercise on exercise capacity and orthostatic function (Table 3-1). This chapter is divided into three parts. Part 1 describes specific findings from studies of muscle strength, endurance, fiber size, and volume. Part 2 describes results from studies of how in-flight exercise affects postflight exercise capacity and orthostatic function. Part 3 focuses on the development of new noninvasive methods for assessing body composition in astronauts and how those methods can be used to correlate measures of exercise performance and changes in body composition.
Author
Space Flight; Countermeasures; Astronauts; Extravehicular Activity; Intravehicular Activity; Microgravity

20040201537 NASA Johnson Space Center, Houston, TX, USA
Neuroscience Investigations: An Overview of Studies Conducted
Reschke, Millard F.; Extended Duration Orbiter Medical Project; [1999], pp. 5.1-1 - 5.1-5; In English; See also 20040201524; No Copyright; Avail: CASI; A01, Hardcopy

The neural processes that mediate human spatial orientation and adaptive changes occurring in response to the sensory rearrangement encountered during orbital flight are primarily studied through second and third order responses. In the Extended Duration Orbiter Medical Project (EDOMP) neuroscience investigations, the following were measured: (1) eye movements during acquisition of either static or moving visual targets, (2) postural and locomotor responses provoked by unexpected movement of the support surface, changes in the interaction of visual, proprioceptive, and vestibular information, changes in the major postural muscles via descending pathways, or changes in locomotor pathways, and (3) verbal reports of perceived self-orientation and self-motion which enhance and complement conclusions drawn from the analysis of oculomotor, postural, and locomotor responses. In spaceflight operations, spatial orientation can be defined as situational awareness, where crew member perception of attitude, position, or motion of the spacecraft or other objects in three-dimensional space, including orientation of one's own body, is congruent with actual physical events. Perception of spatial orientation is determined by integrating information from several sensory modalities. This involves higher levels of processing within the central nervous system that control eye movements, locomotion, and stable posture. Spaceflight operational problems occur when responses to the incorrectly perceived spatial orientation are compensatory in nature.

Neuroscience investigations were conducted in conjunction with U. S. Space Shuttle flights to evaluate possible changes in the ability of an astronaut to land the Shuttle or effectively perform an emergency post-landing egress following microgravity adaptation during space flights of variable length. While the results of various sensory motor and spatial orientation tests could have an impact on future space flights, our knowledge of sensorimotor adaptation to spaceflight is limited, and the future application of effective countermeasures depends, in large part, on the results from appropriate neuroscience investigations. Therefore, the objective of the neuroscience investigations could have a negative effect on mission success. The Neuroscience Laboratory, Johnson Space Center (JSC), implemented three integrated Detailed Supplementary Objectives (DSO) designed to investigate spatial orientation and the associated compensatory responses as a part of the EDOMP. The four primary goals were (1) to establish a normative database of vestibular and associated sensory changes in response to spaceflight, (2) to determine the underlying etiology of neurovestibular and sensory motor changes associated with exposure to microgravity and the subsequent return to Earth, (3) to provide immediate feedback to spaceflight crews regarding potential countermeasures that could improve performance and safety during and after flight, and (4) to take under consideration appropriate designs for preflight, in-flight, and postflight countermeasures that could be implemented for future flights.
Author
Visual Perception; Vestibules; Space Shuttles; Space Flight; Microgravity; Locomotion; Eye Movements; Central Nervous System; Astronauts; Adaptation; Countermeasures; Proprioception

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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

20040191683 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Designing Towards Supporting And Improving Co-Operative Organizational Work Practices
Baranauskas, M. Cecilia C.; Bonacin, Rodrigo; ICEIS 2003; [2003], pp. 128; In English; See also 20040191598; Copyright; Avail: Other Sources

Literature in CSCW and related fields has acknowledged the importance of understanding the social context in which prospective computational systems for the workplace will be embedded. The Participatory Design approaches share these concerns and address several techniques to commit the design process to considerations that take into account people's work practices and participation. Although the participatory techniques provide mechanisms to capture important concepts of the organisational context, results of these techniques are not well represented by traditional methods of system modelling. Organisational Semiotics understands the whole organisation as a semiotic system and provides methods for considering the social aspects of organisations in modelling and deriving the system. In this paper we propose an approach which combines PD techniques and OS methods to design CSCW systems. The approach is illustrated with Pokayoke: a system designed to support problem solving in the context of a lean manufacturing organisation.
Author
Manufacturing; Problem Solving; Procedures; Embedding

20040196391 Colorado School of Mines, Golden, CO, USA
Dust Mitigation of Astronaut Spacesuits
Angel, H.; Thanh, P.; Nakagawa, M.; Space Resources Roundtable VI; 2004, pp. 8; In English; See also 20040196346; Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The particles that make up moon dust and Mars soil can be hazardous to an astronaut s health if not handled properly. Exploration missions require astronauts to establish base habitat on the surface of the Moon and Mars. During these explorations, dust and soil will cling to their space suits and become imbedded in the fabric. The astronauts will track moon dust and mars soil back into their living quarters. This not only will pollute cabin air with millions of tiny air- born particles floating around, but will also be dangerous in the case that the fine particles are breathed in and become trapped in an astronaut s lungs. center and at the Colorado School of Mines are investigating ways to remove these particles from space suits. This problem is very difficult due to the nature of the Lunar regolith: They are extremely small and have jagged edges which can easily latch onto the fibers of the fabric. Important factors in determining a technique include low power and material usage do to the limited supplies in space, making the equipment durable so that it will require little work from astronauts, and the effectiveness, or amount of dust the technique can remove. that vibrate and shake the particles free. The particles will be left

on the planet s surface or collected in a vacuum to be disposed of later. The motors have an unevenly weighted shaft that, when connected to a power supply, spins unevenly and creates a motion on the fabric similar to what people use at the beach to shake sand off of a beach towel. Because the particles are so small, similar to volcanic ash, caution must be taken to make sure that this technique does not further imbed them into the fabric and make removal more difficult. Only a very precise range of frequency and amplitude of the fabric will produce a suitable vibration. Analysis was done to determine what input factors, such as power, tension in the fabric, and size of motor would produce the desired output. In order to mitigate this problem, engineers and scientists at the NASA-Glenn research The current technique under investigation uses vibrating motors imbedded in the fabric
Author
Dust; Soils; Mars Surface; Moon; Space Suits

20040200693 Porto Univ., Portugal
Accessible Computer Interaction For People With Disabilities: The Case Of Quadriplegics
Adesina-Ojo, Ayodele; Eloff, Jan; Eloff, Mariki; Kotze, Paula, et al.; ICEIS 2004: Human-Computer Interaction; [2004], pp. 181; In English; See also 20040200666; Copyright; Avail: Other Sources

Universal design is the design of products and environments so that all people can use them without adaptation or specialise design. Life must be simplified for all by making products, communications and the built environment more usable by as many people as possible at little, or no extra cost. To understand the challenges that a disabled person has to face when using the computer, we have to know what capabilities such a person has. Only then will it be possible to apply universal design to computer interfaces. The purpose of this paper is to highlight the challenges that many people face in their everyday life and determine to what extend disabled people, especially people with limited or no use of their hands and arms interact independently with computer equipment. The paper specifically look at quadriplegics, their capabilities, a survey of how they use computer equipment, as well as special devices available to assist them in this interaction.
Author
Disabilities; Human-Computer Interface; Computer Components; Computers

20040200696 Porto Univ., Portugal
Accessibility and Visually Impaired Users
Campos, Jose Creissac; Fernandes, Antonio Ramires; Pereira, Jorge; ICEIS 2004: Human-Computer Interaction; [2004], pp. 182-183; In English; See also 20040200666; Copyright; Avail: Other Sources

Internet accessibility for the visually impaired community is still an open issue. Guidelines have been issued by the W3C consortium to help web designers to improve web site accessibility. However several studies show that a significant percentage of web page creators are still ignoring the proposed guidelines. Several tools are now available, general purpose, or web specific, to help visually impaired readers. But is reading a web page enough? Regular sighted users are able to scan a web page for a particular piece of information at high speeds. Shouldn't visually impaired readers have the same chance? This paper discusses some features already implemented to improve accessibility and presents a user feedback report regarding the AudioBrowser, a talking browser. Based on the user feedback the paper also suggests some avenues for future work in order to make talking browsers and screen readers compatible.
Author
Internets; Readers; Websites; Ratios

20040200707 Porto Univ., Portugal
User Adaptation In A Pedestrian Guidance System For The Blind
Guillet, Vivien; ICEIS 2004: Human-Computer Interaction; [2004], pp. 185-186; In English; See also 20040200666; Copyright; Avail: Other Sources

Among today's emerging pedestrian guidance systems (i.e. able to automatically answer questions of the form' How should I go from localization \emph{a} to localization \emph{b} ?), some are dedicated to blind people; fewer if any focus on impaired people as well as people without any deficiency. Contrary to this, the "'ouvej' system relies on representing impairments as a part of the \emph{user's profile} in order to be adaptable to any kind of user. Furthermore, we consider that benefits of the use modeling involved in such adaptation mechanisms go beyond the only impairment category in order to respect the user's preferences in itineraries and itineraries descriptions, by modeling itinerary environment. Whereas existing adaptive system often rely on the use of explicit feedback from the user, we propose to limit adaptation-related interactions by using implicit user evaluations inferred from observations of users interactions with the system. This article focuses on

blind pedestrian users using a vocal interface. After detailing our approach, we detail our itinerary and user models; Then the implicit as well a,, explicit itinerary evaluation mechanisms are described; Next sections focus on the actual adaptation and expected benefits of inferences between different users; Our prototype is then described. We conclude by presenting our first observations, future work and evaluation.
Author
Adaptation; Blindness; Position (Location); Guidance (Motion)

20040200714 Porto Univ., Portugal
Cabal A Bliss Predictive Composition Assistant for AAC Communication Software
Gatti, Nicola; Matteucci, Matteo; ICEIS 2004: Human-Computer Interaction; [2004], pp. 172-173; In English; See also 20040200666; Copyright; Avail: Other Sources

In order to support the residual communication capabilities of verbal impaired people software applications allowing Augmentative and Alternative Communication (AAC) have been developed. AAC communication software applications provide verbal disables with an electronic table of AAC languages symbols (i.e. Bliss, PCS, PIC, etc.) in order to compose messages, exchange them via email, vocally synthetize them. A current open issue, for these softwares, regards human-computer interaction in verbal impaired people suffering motor disorders. Such persons can adopt only ad-hoc input devices, such as buttons or switches, which require an intelligent automatic scansion of the AAC symbol table. In such perspective we have developed caba[logical and]21 an innovative composition assistant exploiting an user linguistic behavior model for predictive Bliss symbols scansion, caba[logical and]21 is based on an original discrete implementation of auto-regressive hidden Markov model called DAR-HMM and on a the semantic network formalism, caba[logical and]21 is able to predict a list of symbols as the most probable ones according to both the previously selected symbol and the semantic categories associated to them. We have implemented the caba[logical and]21 as a component of Bliss2003, an AAC communication software centered on Bliss language and we have experimentally validated it with real data.
Author
Human-Computer Interface; Verbal Communication; Linguistics

20040200736 Defence Science and Technology Organisation, Fishermans Bend, Australia
A Dexterity and Tactility Evaluation of the Australian Nuclear Biological Chemical (NBC) Glove
Scanlon, S.; Roberts, W.; McCallum, R.; Robinson, D.; August 2004; 37 pp.; In English
Report No.(s): DSTO-TN-0576; DODA-AR-013-168; Copyright; Avail: Other Sources

This report details the tactility and dexterity of four different glove types, including the Australian in-service NBC butyl rubber glove and Nomex(R) flying glove for standardised (Purdue pegboard) and operational (weapon assembly/disassembly) tasks. The Nomex(R) flying glove was included for comparative purposes despite offering no NBC protection . Two commercially available chemically protective gloves (the Canadian NBC butyl rubber glove, Ansell TNT(R) nitrile glove) were also assessed. Twenty-four healthy male subjects participated in the study. Subjects completed two questionnaires, one on the priority of glove functions and the second on glove specific fit and functionality. Subjects completed either the weapon assembly/disassembly task or the Purdue pegboard task. The results from both these tasks were consistent for all gloves and in agreement with the responses recorded on the questionnaires. The Ansell TNT glove tended to provide the best dexterity scores followed by the Nomex flying, Canadian butyl and Australian butyl gloves. The Ansell TNT glove tended to be the most tactile glove followed by the Canadian Butyl, Nomex flying and Australian butyl. Subjects felt their performance in the Australian Butyl rubber glove could be enhanced through training and by adopting seamless liners similar to those used in the Canadian system. Overall subjects preferred single layered, seamless gloves that had a low impact on task-dependant dexterity and tactility. Typically subjects felt that if the Nomex flying glove offered NBC protection and had the seam removed on the index finger it would make an ideal NBC glove. The outcomes of this study provide a scientific basis from which a requirements document for a new NBC glove could be generated. It is intended that the most favourable features of a glove identified during this study will be used in future ADF NBC glove designs.
Author
Gloves; Protective Clothing; Radiation Shielding; Biological Weapons; Fabrics; Rubber

20040200955 NASA Johnson Space Center, Houston, TX, USA
Ergonomic Evaluations of Microgravity Workstations
Whitmore, Mihriban; Berman, Andrea H.; Byerly, Diane; July 1996; 59 pp.; In English
Contract(s)/Grant(s): NAS9-18800
Report No.(s): NASA-CR-1996-210378; No Copyright; Avail: CASI; A04, Hardcopy

Various gloveboxes (GBXs) have been used aboard the Shuttle and ISS. Though the overall technical specifications are similar, each GBX's crew interface is unique. JSC conducted a series of ergonomic evaluations of the various glovebox designs to identify human factors requirements for new designs to provide operator commonality across different designs. We conducted 2 0g evaluations aboard the Shuttle to evaluate the material sciences GBX and the General Purpose Workstation (GPWS), and a KC-135 evaluation to compare combinations of arm hole interfaces and foot restraints (flexible arm holes were better than rigid ports for repetitive fine manipulation tasks). Posture analysis revealed that the smallest and tallest subjects assumed similar postures at all four configurations, suggesting that problematic postures are not necessarily a function of the operator s height but a function of the task characteristics. There was concern that the subjects were using the restrictive nature of the GBX s cuffs as an upper-body restraint to achieve such high forces, which might lead to neck/shoulder discomfort. EMG data revealed more consistent muscle performance at the GBX; the variability in the EMG profiles observed at the GPWS was attributed to the subjects attempts to provide more stabilization for themselves in the loose, flexible gauntlets. Tests revealed that the GBX should be designed for a 95 percentile American male to accommodate a neutral working posture. In addition, the foot restraint with knee support appeared beneficial for GBX operations. Crew comments were to provide 2 foot restraint mechanical modes, loose and lock-down, to accommodate a wide range of tasks without egressing the restraint system. Thus far, we have developed preliminary design guidelines for GBXs and foot.
Author
Human Factors Engineering; Microgravity; Muscular Function

20040200960 Research and Technology Organization, Neuilly-sur-Seine, France
Implications of Multilingual Interoperability of Speech Technology for Military Use
Anderson, Timothy; Pigeon, Stephane; Swail, Carl; Geoffrois, Edouard; Bruckner, Christine; vanLeeuwen, David; Teixeira, Carlos; Orman, Ozgur; Collins, Paul; Grieco, John, et al.; September 2004; 40 pp.; In English
Report No.(s): RTO-TR-IST-011; AC/323(IST-011)TP/26; Copyright; Avail: CASI; C01, CD-ROM; A03, Hardcopy

Military operations are often conducted under conditions of stress induced by high workload, sleep deprivation, fear and emotion, confusion due to conflicting information, psychological tension, pain, and other typical conditions encountered in the modern battlefield context. These conditions are known to affect the physical and cognitive abilities of human speech characteristics, and this study was intended to determine the actual effects of stress on voice production quality. It is suggested that the effect of operator based stress factors on voice is likely to be detrimental to the effectiveness of communication in general, in particular to the performance of communication equipment and weapon systems equipped with vocal interfaces (e.g., advanced cockpits, command, control, and communication systems, information warfare). Progress in the field of military based speech technology, including advances in speech based system design has been restricted due to the lack of availability of databases of speech under stress. In particular, the type of stress which an operator may experience in the modern battlefield context is not easily simulated, and therefore it is difficult to systematically collect speech data for use in research and speech system training. It is foreseen that in the future it will be necessary to improve the coordination of multi-national military forces. The need therefore exists for planned simulations with military personnel using a wide range of speech technology and addressing factors such as high workload, sleep deprivation, fear and emotion, confusion, psychological tension, pain, etc.
Author
Voice Communication; Languages; Interoperability; International Cooperation; Human Factors Engineering

20040200964 Lockheed Martin Space Operations, Houston, TX, USA
Advanced Life Support Research and Technology Development Metric: Fiscal Year 2003
Hanford, A. J.; April 2004; 52 pp.; In English
Report No.(s): NASA/CR-2004-208939; S-925; No Copyright; Avail: CASI; A04, Hardcopy

This document provides the official calculation of the Advanced Life Support (ALS) Research and Technology Development Metric (the Metric) for Fiscal Year 2003. As such, the values herein are primarily based on Systems Integration, Modeling, and Analysis (SIMA) Element approved software tools or reviewed and approved reference documents. The Metric is one of several measures employed by the National Aeronautics and Space Administration (NASA) to assess the Agency s progress as mandated by the USA Congress and the Office of Management and Budget. Because any measure must have a reference point, whether explicitly defined or implied, the Metric is a comparison between a selected ALS Project life support system and an equivalently detailed life support system using technology from the Environmental Control and Life Support System (ECLSS) for the International Space Station (ISS). More specifically, the Metric is the ratio defined by the equivalent system mass (ESM) of a life support system for a specific mission using the ISS ECLSS technologies divided by the ESM for an equivalent life support system using the best ALS technologies. As defined, the Metric should increase in value as the

ALS technologies become lighter, less power intensive, and require less volume. For Fiscal Year 2003, the Advanced Life Support Research and Technology Development Metric value is 1.47 for an Orbiting Research Facility and 1.36 for an Independent Exploration Mission.
Author
Life Support Systems; Research and Development; NASA Programs; Technology Utilization; Space Missions

20040200968 NASA Johnson Space Center, Houston, TX, USA
EMU Shoulder Injury Tiger Team Report
Williams, David R.; Johnson, Brian J.; September 2003; 104 pp.; In English
Report No.(s): NASA/TM-2003-212058; S-912; Copyright; Avail: CASI; A06, Hardcopy

The number and complexity of extravehicular activities required for the completion and maintenance of the International Space Station is unprecedented. It is not surprising that training to perform these space walks presents a risk of overuse musculoskeletal injuries. The goal of this tiger team, created in December 2002, was to identify the different factors contributing to the risk of EVA training-related shoulder injury in the Neutral Buoyancy Lab at the Sonny Carter Training Facility and to make recommendations that would either significantly reduce or eliminate those risks. Since 1999, concerns have been expressed about the risk of shoulder injury associated with EVA training at the NBL, particularly in inverted body positions (McMonigal, 1999). A survey was developed and administered to 42 astronauts and astronaut candidates; the results suggest a causal relationship between EVA training at the NBL and the observed injuries. Also, during the tiger team review, it became evident that training in the extravehicular mobility unit may also result in other types of injuries, including fingernail delamination, elbow pain, knee pain, foot pain, and nerve compression leading to transient loss of sensation in certain areas of the upper or lower extremity. A multi-directorate team to detect, evaluate and respond to the medical issues associated with EVA training should be implemented immediately and given the appropriate resources and authority to reduce the risk of injury to crew during training to a level as low as reasonably achievable.
Author
Extravehicular Activity; Injuries; International Space Station; Shoulders

20040200971 NASA Johnson Space Center, Houston, TX, USA
Results of the International Space Station Interim Resistance Exercise Device Man-in-the-Loop Test
Moore, A. D., Jr.; Amonette, W. E.; Bentley, J. R.; Rapley, M. G.; Blazine, K. L.; Loehr, J. A.; Collier, K. R.; Boettcher, C. R.; Skrocki, J. S.; Hohrnann, R. J., et al.; February 2004; 32 pp.; In English
Report No.(s): NASA/TP-2004-212062; S-916; Copyright; Avail: CASI; A03, Hardcopy

The Interim Resistance Exercise Device (iRED), developed for the International Space Station (ISS), was evaluated using human subjects for a Man-In-The-Loop Test (MILT). Thirty-two human subjects exercised using the iRED in a test that was conducted over a 63-working-day period. The subjects performed the same exercises will be used on board ISS, and the iRED operating constraints that are to be used on ISS were followed. In addition, eight of the subjects were astronauts who volunteered to be in the evaluation in order to become familiar with the iRED and provide a critique of the device. The MILT was scheduled to last for 57,000 exercise repetitions on the iRED. This number of repetitions was agreed to as a number typical of that expected during a 3-person, 17-week ISS Increment. One of the canisters of the iRED failed at the 49,683-repetition mark (87.1% of targeted goal). The remaining canister was operated using the plan for operations if one canister fails during flight (contingency operations). This canister remained functional past the 57,000-repetition mark. This report details the results of the iRED MILT, and lists specific recommendations regarding both operation of the iRED and future resistance exercise device development.
Author
International Space Station; Physical Exercise; Mechanical Devices; Resistance

20040200983 NASA Johnson Space Center, Houston, TX, USA
Advanced EVA Capabilities: A Study for NASA's Revolutionary Aerospace Systems Concept Program
Hoffman, Stephen J.; April 2004; 174 pp.; In English
Report No.(s): NASA/TP-2004-212068; S-922; No Copyright; Avail: CASI; A08, Hardcopy

This report documents the results of a study carried out as part of NASA s Revolutionary Aerospace Systems Concepts Program examining the future technology needs of extravehicular activities (EVAs). The intent of this study is to produce a comprehensive report that identifies various design concepts for human-related advanced EVA systems necessary to achieve the goals of supporting future space exploration and development customers in free space and on planetary surfaces for space

missions in the post-2020 timeframe. The design concepts studied and evaluated are not limited to anthropomorphic space suits, but include a wide range of human-enhancing EVA technologies as well as consideration of coordination and integration with advanced robotics. The goal of the study effort is to establish a baseline technology 'road map' that identifies and describes an investment and technical development strategy, including recommendations that will lead to future enhanced synergistic human/robot EVA operations. The eventual use of this study effort is to focus evolving performance capabilities of various EVA system elements toward the goal of providing high performance human operational capabilities for a multitude of future space applications and destinations. The data collected for this study indicate a rich and diverse history of systems that have been developed to perform a variety of EVA tasks, indicating what is possible. However, the data gathered for this study also indicate a paucity of new concepts and technologies for advanced EVA missions - at least any that researchers are willing to discuss in this type of forum.
Author
Extravehicular Activity; NASA Programs; Aerospace Systems; Robotics

20040200994 Rice Univ., Houston, TX, USA
Learning to Control Advanced Life Support Systems
Subramanian, Devika; December 2004; 2 pp.; In English
Contract(s)/Grant(s): NAG9-1457; No Copyright; Avail: CASI; A01, Hardcopy

Advanced life support systems have many interacting processes and limited resources. Controlling and optimizing advanced life support systems presents unique challenges. In particular, advanced life support systems are nonlinear coupled dynamical systems and it is difficult for humans to take all interactions into account to design an effective control strategy. In this project. we developed several reinforcement learning controllers that actively explore the space of possible control strategies, guided by rewards from a user specified long term objective function. We evaluated these controllers using a discrete event simulation of an advanced life support system. This simulation, called BioSim, designed by Nasa scientists David Kortenkamp and Scott Bell has multiple, interacting life support modules including crew, food production, air revitalization, water recovery, solid waste incineration and power. They are implemented in a consumer/producer relationship in which certain modules produce resources that are consumed by other modules. Stores hold resources between modules. Control of this simulation is via adjusting flows of resources between modules and into/out of stores. We developed adaptive algorithms that control the flow of resources in BioSim. Our learning algorithms discovered several ingenious strategies for maximizing mission length by controlling the air and water recycling systems as well as crop planting schedules. By exploiting non-linearities in the overall system dynamics, the learned controllers easily out- performed controllers written by human experts. In sum, we accomplished three goals. We (1) developed foundations for learning models of coupled dynamical systems by active exploration of the state space, (2) developed and tested algorithms that learn to efficiently control air and water recycling processes as well as crop scheduling in Biosim, and (3) developed an understanding of the role machine learning in designing control systems for advanced life support.
Author
Life Support Systems; Machine Learning; Simulation; Control Systems Design; Dynamical Systems

20040201156 Space and Naval Warfare Systems Center, San Diego, CA USA
A Human-Computer Interface Vision for Naval Transformation
Campbell, Nancy, Author; Osga, Glenn, Author; Kellmeyer, David, Author; Lulue, Daniel, Author; Williams, Earl, Author; Jun. 2003; 20 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427415; SSC/SD-TD-3183; No Copyright; Avail: Defense Technical Information Center (DTIC)

A transformation is needed in Human-Computer Interface (HCI) to accommodate transformations in information availability, computing power, and changing warfighter roles. The HCI paradigm should be transformed from system-centric to mission- centric, and the HCI should be decoupled from individual weapon/sensor/ command and control (C2) systems to span across multiple systems to accomplish mission goals. A mission-centered design (MCD) approach can achieve the needed revolution in HCI via transformations in three areas: (1) HCI Design (how the HCI supports the warfighter); (2) HCI Design Process; and (3) HCI Software and Information Management Infrastructure. A Mission-Centered Design Consortium (MCDC) should be created to advance each of these transformations through the creation of open standards and the development/ description of best practices.
DTIC
Human-Computer Interface; Information Systems

55
EXOBIOLOGY

Includes astrobiology; planetary biology; and extraterrestrial life. For the biological effects of aerospace environments on humans see *52 Aerospace Medicine*; on animals and plants see *51 Life Sciences*. For psychological and behavioral effects of aerospace environments see *53 Behavioral Sciences*.

20040191855 Texas Univ., El Paso, TX, USA

Strategy for Analysing Potential Evolutionary Trajectories for Putative Life on Mars

Irwin, L. N.; Schultze-Makuch, D.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

By considering the course of climatological and planetary history on Earth, and the path that biological evolution is known to have taken over that course, inferences about alternative evolutionary trajectories for putative life on Mars under different possible planetary histories can be drawn.

Author

Biological Evolution; Extraterrestrial Life; Mars (Planet); Exobiology

20040191856 Arizona State Univ., Tempe, AZ, USA

Targeting Sites for Future Astrobiological Missions to Mars

Farmer, Jack; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Abstract Only; Available from CASI on CD-ROM only as part of the entire parent document

In defining a site-selection strategy to explore for a martian fossil record, a key concept is contemporaneous chemical precipitation, or mineralization. This process entombs microorganisms, stabilizes morphological information and protects biosignatures during subsequent diagenetic changes. On Earth, geological environments where microorganisms are often preserved in this way include: 1) mineralizing spring systems (subaerial, subaqueous, and shallow subsurface hydrothermal systems, and cold springs of alkaline lakes), 2) saline/alkaline environments of arid marine shorelines (sabkhas), or terminal (evaporative) lake basins, 3) duricrusts and subsoil hard-pan environments formed by the selective leaching and re-precipitation of minerals within soil profiles, and 4) periglacial environments ground ice or permafrost (frozen soils) have captured and cryopreserved microorganisms and associated organic materials. Successful implementation of a strategy for Mars exopaleontology will depend on targeting the most favorable landing sites for in situ robotic exploration and sample return. As demonstrated by the MER mission, mineralogy provides the most robust means for discovering ancient aqueous environments and comprises a fundamental step in selecting the sites that have the best chance for having capturing and preserved a record of ancient life or pre-biotic chemistry. Given the complexity of heavily cratered ancient terrains, the identification of exopaleontological targets is likely to require orbital mapping at a spatial resolution that can resolve small outcrops. The aqueous mineral deposits of most interest (silica, phosphate, clays, carbonates, evaporites, oxides and sulfides) have characteristic spectral signatures and may be identifiable from orbit using hyperspectral methods that allow the identification of discrete mineral signatures within complex mixtures. The CRISM instrument to be delivered to Mars in 2005 is likely to provide a quantum jump in our knowledge of Martian surface mineralogy, marking an important next step toward implementing focused missions for Astrobiology.

Author

Exobiology; Landing Sites; Mars (Planet); Mars Missions; Mars Surface; Site Selection; Mars Environment

20040201037 Interface Video Systems, Inc., Washington, DC, USA

Living Places in Other Solar Systems

[2004]; 2 pp.; In English; 1 hr., 50 min. playing time, in color, with sound; No Copyright; Avail: CASI; V04, Videotape-VHS

Dr. Sargent noted that evidence of other solar systems that might sustain life, particularly human life, is being sought. Protoplanetary (or debris) disks have been observed and are considered evidence that other solar systems exist or are being formed. Also observed is a wobble which is seen as evidence of circulation around a celestial body and gaps that are created by the potential planet. One indicator of life may be these rings or disks of debris around stars. Interferometers, which are telescopic devices that consist of multiple lenses, are being developed in order to better see celestial objects and what may be found around them. Other methods for improving celestial viewing capabilities are also under development. She spoke of particularly looking for wobble and gaps and debris disks where new planets are being formed in an effort to discover another planet that might sustain life as we know it. The next speaker, Dr. Chris McKay, is a planetary scientist at NASA Ames. He

talked about the possibility of life on Mars or in some other solar system. He commented on the sameness of the origin of all life, and of the origin of, and the need for, oxygen and water. He believes that water originally came to Earth from comets. At least that is a viable possible source. Water might also have come to Earth via asteroids. Dr. McKay also postulates that there can be no water on Mars because Mars has no plate tectonic system, which he believes is an essential for recycling water. . Dr. Wes Huntress, NASA s Associate Administrator for Space Science, and Dr. Barbara Stone, also from NASA Headquarters, joined Drs. Cordova, Sargent and McKay in the question and answer period following the presentations. (Mr. Goldin was excused to keep an appointment with the President.) The discussion included the following statements and questions: The more missions that there are, the more technology is developed. We need to study our solar system to have something to which we can compare other systems. Before we send people to distant places or to other planets, we need to study the psychological and biological problems that are created by going away from Earth for a long period of time. Pulsars appear to have planets rotating around them. This is of interest and should be studied further. Looking back in time, is there any thought to seeing the development of life? How long did it take for oxygen to rise on the Earth? Do debris disks around the stars provide velocity patterns? To detect life scientists are listening for radio signals, looking for oxygen or ozone, and looking for liquid water. On Earth liquid water is the defining ecological parameter for life. This means that operationally the search for life elsewhere is primarily a search for liquid water.
Derived from text
Biological Evolution; Extraterrestrial Life; Mars Surface; Radio Signals

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*.

20040191663 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Deontic Constraints: From UML Class Diagram to Relational Model
Ramos, Pedro; ICEIS 2003; [2003], pp. 96-97; In English; See also 20040191598; Copyright; Avail: Other Sources

Sometimes, because of one a typical situation, an important mandatory association between classes in a UML Class Diagram must be replaced by an optional one. That semantic and functionality impoverishment happens because the mandatory constraint must have a boolean value. In this paper we propose the introduction of a deontic constraint in the UML Class Diagram and its automatic repercussion in the correspondent Relational Model. The deontic constraint allows the formal representations of requirements that ideally should always be fulfilled, but that can be violated in atypical situations. If the violable requirement is explicitly represented it is possible to maintain both the requirement and its violation and, consequently, recur to monitoring procedures for violation warnings. We present our proposal in the general context of automatically mapping from object models into relational ones. We adopt a formal approach, based on predicate calculus, because, apart its soundness properties, it is an easy and understandable way to integrate both models and the transposition rules.
Author
Mathematical Models; Formalism

20040191666 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
A Two Tier, Goal-Driven Workflow Model for the Healthcare Domain
Browne, Eric; ICEIS 2003; [2003], pp. 113; In English; See also 20040191598; Copyright; Avail: Other Sources

Workflow models define a set of tasks to be undertaken to achieve a set of goals. Very often, the set of goals is not articulated explicitly, let alone modelled in such a way as to link the workflow schema(s) to the goal schema(s). In this paper, we introduce a two tier model, which clearly delineates the higher level goals (business model) from the lower level tasks (process model), whilst elucidating the relationships between the two tiers. We utilize a goal-ontology to represent the upper level (business model) and decompose this to an extended Petri-Net model for the lower level workflow schema. The modelling of business processes, and the management of subsequent changes, both become an integral part of the workflow itself. Healthcare is a domain where it is quite common for goals not to be realized, or not to be realized fully, and where alterations to the goals have to be undertaken on a case by case (instance-level) basis. Consequently any workflow schema will need to include tasks that both assess the degree to which a goal has been achieved, and also allow for new goals to be

established, or for the workflow to be altered. We term such workflow schemas self-managing.
Author
Mathematical Models; Commerce; Public Health; Petri Nets

20040191709 Geophysical Observatory, Helsinki, Finland
Annals of the Finnish Academy of Sciences: Mathematics, Volume 29, No. 2
Martio, Olli, Editor; Drasin, David, Editor; Gehring, Frederick, Editor; Iwaniec, Tadeusz, Editor; Jutila, Matti, Editor; Keen, Linda, Editor; Kulkarni, Ravi S., Editor; Laine, Ilpo, Editor; Lehto, Olli, Editor; Lindenstrauss, J., Editor; Mattila, Pertti, Editor, et al.; 2004; ISSN 1239-629X; 249 pp.; In English; Copyright; Avail: Other Sources

Contents include: Half-twists and equations in genus 2, Weakly compact wedge operators on Koethe echelon, Distortion of the exponent of convergence in space, Quasiconformal images of Hoelder domains, Fixed points and boundary behaviour of the Koenigs function, Correction to 'The maximal function on variable L p spaces', Arbitrary complex powers of the Dirac operator on the hyperbolic unit ball, Composition Operators between weighted spaces of holomorphic functions on Banach spaces, Integral means of analytic functions, On boundedness of maximal functions in Sobolev spaces, Lebesgue points in variable exponent spaces, Growth estimates for solutions of linear complex differential equations, Cyclic extensions of Schottky uniformizations, Mappings of finite distortion: Global homeomorphism theorem, Asymptotic growth of Cauchy transforms, Triangulations of closed sets and bases in function spaces, Quasiregular mappings of maximal local modulus of continuity, On natural invariant measures on generalised IFS iterated function systems, BMO-invariance of quasiminimizers, Analytic Cliffordian functions, Packing dimensions, transversal mappings and geodesic flows, On factorizations of entire functions of bounded type, Positive solutions of some nonlinear elliptic problems in unbounded domain, Mappings of finite distortion: Removability of Cantor sets, Myrberg's numerical uniformization of hyperelliptic curves, Singular behavior of conformal Martin kernels and nontangential limits of conformal mappings, Some counterexamples in dynamics of rational semigroups, Pathwise connectivity in uniform domains with small exceptional sets, Quotient decomposition of Q(sub #p) functions, Hamilton sequences and extremality for certain Teichmiiller mappings, David maps and Hausdortf dimension, and Pointwise multipliers from weighted Bergman spaces and Hardy spaces to weighted Bergman spaces.
CASI
Functions (Mathematics); Mathematics; Papers

20040200713 Porto Univ., Portugal
Robust Speech Recognition Based on Mapping Noisy Features to Celan Features
Rahmani, Mohsen; Akbari, Ahmad; Nasersharif, Babak; ICEIS 2004: Human-Computer Interaction; [2004], pp. 171; In English; See also 20040200666; Copyright; Avail: Other Sources

The problem of robustness in ASR systems can be considered as a mismatch between the training and testing conditions and its solution would be to find a way to reduce it. Common approaches are: Data-Driven methods and model-based methods. In this paper, we study a model of environment and obtain a relation between noisy and clean speech features based on this model. We propose two techniques for mapping noisy features to clean features in cepstrum domain. We implement the proposed and some of precedent data-driven methods to show that proposed methods are effective for robust speech recognition in noisy environments.
Author
Robustness (Mathematics); Speech Recognition; Environment Models

20040200740
Scalable High Performance Computing: Direct and Large-Eddy Turbulent Flow Simulations Using Massively Parallel Computers
Morgan, Philip E.; [2004]; 19 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): NCC3-885; No Copyright; Avail: CASI; A03, Hardcopy

This final report contains reports of research related to the tasks 'Scalable High Performance Computing: Direct and Lark-Eddy Turbulent FLow Simulations Using Massively Parallel Computers' and 'Devleop High-Performance Time-Domain Computational Electromagnetics Capability for RCS Prediction, Wave Propagation in Dispersive Media, and Dual-Use Applications. The discussion of Scalable High Performance Computing reports on three objectives: validate, access scalability, and apply two parallel flow solvers for three-dimensional Navier-Stokes flows; develop and validate a high-order parallel solver for Direct Numerical Simulations (DNS) and Large Eddy Simulation (LES) problems; and Investigate and develop a high-order Reynolds averaged Navier-Stokes turbulence model. The discussion of High-Performance Time-Domain

Computational Electromagnetics reports on five objectives: enhancement of an electromagnetics code (CHARGE) to be able to effectively model antenna problems; utilize lessons learned in high-order/spectral solution of swirling 3D jets to apply to solving electromagnetics project; transition a high-order fluids code, FDL3DI, to be able to solve Maxwell's Equations using compact-differencing; develop and demonstrate improved radiation absorbing boundary conditions for high-order CEM; and extend high-order CEM solver to address variable material properties. The report also contains a review of work done by the systems engineer.
CASI
Parallel Computers; Three Dimensional Flow; Large Eddy Simulation; Computational Electromagnetics; Parallel Processing (Computers); Simulation

20040201538 Interagency Committee on Government Information, Washington, DC, USA
Recommended Policies and Guidelines for Federal Public Websites
Jun. 2004; 58 pp.; In English
Report No.(s): PB2005-101419; No Copyright; Avail: CASI; A04, Hardcopy

The Interagency Committee on Government Information (the ICGI) was established on June 17, 2003, by the Office of Management and Budget, as required by Section 207 of the E-Government Act of 2002 (Public Law 107-347, 44 U.S.C. Chapter 36). The ICGI established several workgroups to make recommendations related to Section 207 which concern access to, dissemination of, and retention of federal information. The ICGI tasked the Web Content Management Workgroup to make recommendations on issues related to federal public websites.
NTIS
Internets; Information Dissemination; Websites

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*.

20040191625 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
New Approach to Test the SAP System Data Security
Tu, Jen-Hao; ICEIS 2003; [2003], pp. 137-138; In English; See also 20040191598; Copyright; Avail: Other Sources

The SAP system is the most widely used ERP (Enterprise Resource Planning) system in the world. There are thousands of seamlessly linked components and subsystems. Conducting security tests in a complicated ERP system is still a major challenge. Based on the study of the SAP system data security testing at the author's company, this paper will discuss issues related to legal and regulatory requirements, IT security governance and segregation of duty in order to meet these emerging security challenges. A practical SAP data security framework is proposed to link these requirements to the business units. AIS (Audit Information System) was, originally, an integrated audit tool provided by the SAP company to facilitate both the SAP system and the business audit process. The functionality of AIS will be explored to ensure the tests meet these security requirements in the SAP data security framework.
Author
Computer Information Security; Commerce; Information Systems

20040200683 Porto Univ., Portugal
Interactive 3D Product Assembler for the WWW: A Case Study of a 3D Furniture Store
Chan, Stephen; ICEIS 2004: Human-Computer Interaction; [2004], pp. 176-177; In English; See also 20040200666; Copyright; Avail: Other Sources

We describe a system that allows customers to interactively select, assemble, and modify 3D products over the WWW, enhancing the usage of 3D techniques for e-business. It provides a framework for a web-based 3D assembling system that can significantly simplify the assembling process while retaining enough flexibility to build an approximate model of real products. The assembled object is captured in a two-level architecture. Components are first connected using simplified and automatic assembling mechanism; then a bundle of connected components are grouped together by a parametric object-oriented grouping method. This grouping method parameterize the components to build a group of descriptive, featured and related object types: product, part and primitive within the assembling model. The system enhances the flexibility and

efficiency for the assembling process over the WWW. For archival and data transfer, we developed an assembly-specific data format: Assembly ML. In the prototype implementation of our interactive 3D assembler (13DA), we integrated an intelligent decision helper to assist casual customers in selecting and assembling their desired product.
Author
Object-Oriented Programming; World Wide Web; Commerce; Assembling

20040200826 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Secure Smart Card-Based Access To An E-Learning Portal
vonHelden, Josef; Bruns, Ralf; Dunkel, Juergen; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 144; In English; See also 20040200825; Copyright; Avail: Other Sources

The purpose of the project OpenLearningPlatform is the development of an integrated E-learning portal in order to support teaching and learning at universities. Compared to other E-learning systems the originality of the OpenLearningPlatform is the strong smart card-based authentication and encryption that significantly enhances its usefulness. The secure authentication of every user and the encryption of the transmitted data are the prerequisites to offer personalized and authoritative services, which could not be offered otherwise. Hence, the smart card technology provides the basis for more advanced E-learning services.
Author
Computer Information Security; Cards; Computer Programs

20040200828 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Non-Repudiation And Fairness In Electronic Data Exchange
Nenadic, Aleksandra; Zhang, Ning; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 151; In English; See also 20040200825; Copyright; Avail: Other Sources

In this paper we discuss the two security issues: non-repudiation and fairness in association with e-commerce applications. In particular, these issues are addressed in the context of electronic data exchange, which is one of the most commonly seen e-commerce applications. In detail, this paper gives a survey of the approaches to non-repudiation and fair electronic data exchange protocols. We additionally discuss the current technologies that propose solutions to these issues, and the emerging standards in the area of business data formats and protocols for the exchange of such data. Finally, we discuss the architecture layer at which to implement the protocols for non-repudiation and fair data exchange.
Author
Data Transmission; Security; Electronic Commerce; Standardization

20040200836 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
The Secure Trusted Agent Proxy Server Architecture
Giansiracusa, Michelangelo; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 144; In English; See also 20040200825; Copyright; Avail: Other Sources

Concerns of malicious host system attacks against agents have been a significant factor in the absence of investment in agent technologies for e-commerce in the greater Internet. However, in this paper, it can be seen that agent systems represent a natural evolution in distributed system paradigms. As in other distributed systems, applying traditional distributed systems security techniques and incorporating trusted third-parties can discourage bad behaviour by remote systems. The concept and properties of a trusted proxy server host as a 'middle-man' host anonomising authenticated agent entities in agent itineraries is introduced, along with its inherent benefits. It is hoped that this fresh secure agent architectural offering will inspire further new directions in tackling the very challenging malicious agent platform problem.
Author
Security; Architecture (Computers); Internets

20040200843 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Bootstrapping The Semantic Web By Developing A Multi-Agent System To Facilitate Ontology Reuse: A Research Agenda
Qasem, Abir; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 173; In English; See also 20040200825; Copyright; Avail: Other Sources

Ontologies are basic components of the Semantic Web but are difficult to build, and this acts as a bottleneck in the spread of the Semantic Web. Reuse is seen as one of the solution to this problem. This paper addresses the feasibility of a multi-agent system that will automatically identify the appropriate reusable ontologies and thereby greatly reduce the burden of its users. First, the area of automated software component reuse is reviewed and borrowed from in order to develop an appropriate framework. Next, a research agenda is proposed for developing this type of multi agent system for ontology reuse. Finally it is argued that the proposed multi-agent system will enable faster deployment of the Semantic Web by making the ontology development process efficient and developed ontologies, more robust and interoperable. This use of agents may help to bootstrap the Semantic Web itself by leveraging from the emerging Semantic Web architecture, and contributing to its growth. Author

Websites; Computer Programs

20040200847 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

An Investigation Of The Negotiation Domain For Electronic Commerce Information Systems

Zlatev, Zlatko; vanPascal, Eck; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 162; In English; See also 20040200825; Copyright; Avail: Other Sources

To fully support business cycles, information systems for electronic commerce need to be able to conduct negotiation automatically. In recent years, a number of general frameworks for automated negotiation have been proposed. Application of such frameworks in a specific negotiation situation entails selecting the proper framework and adapting it to this situation. This selection and adaptation process is driven by the specific characteristics of the situation. This paper presents a systematic investigation of there characteristics and surveys a number of frameworks for automated negotiation.

Author

Information Systems; Electronic Commerce; Surveys; Documentation

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Evaluation Of Mainframe Computer System Using Web Service Architecture

Kakazu, Yukinori; Nagao, Mitsuyoshi; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 139-140; In English; See also 20040200825; Copyright; Avail: Other Sources

In this paper, we propose a mainframe computer system using a web service architecture in order to realize a mainframe computer system that permits users to conveniently access it to perform flexible information processing. The web service is a system architecture that communicates among applications through the Internet by using the SOAP (Simple Object Access Protocol). SOAP is a simple protocol based on XML and HTTP. It has the advantages that the communication can be performed beyond the firewall provided to promote network security and that it can be used on various platforms. The web service architecture inherits these advantages of SOAP. It is likely that an effective and convenient mainframe computer system used over the Internet can be implemented by using the web service architecture. Moreover, the implementation of the proposed system can bring about new application model. Applications that users can unconsciously use the mainframe computer system and which can perform large-scale information processing can be implemented on low-performance clients, such as mobile platforms, by realizing the proposed system. In addition, the application combining the high-performance libraries on a mainframe computer system can be implemented on such a client. We report the construction of the proposed system and confirm its effectiveness through a computational experiment. The experimental result revealed that effective information processing could be performed over the Internet by using the proposed system.

Author

Evaluation; Protocol (Computers); Security; Data Processing

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Simulation Study Of TCP Performance Over Mobile IPv4 And Mobile IPv6

Hu, Jian-Kun; Phillips, Damien; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 149-150; In English; See also 20040200825; Copyright; Avail: Other Sources

Mobile IPv6 (MIPv6) is a protocol to deal with mobility for the next generation Internet (IPv6). However, the performance of MIPv6 has not yet been extensively investigated. Knowledge of how MIPv6 affects TCP performance, especially in comparison with MIPv4, can provide directions for further improvement. In this report, an intensive simulation

study of TCP performance over MIPv4 and MIPv6 has been conducted. Simulation using the famous network simulator NS-2 will be used to highlight differences when TCP is used in hybrid wireless environment, over these two Mobile IP protocols. Initial simulation has shown a solid improvement in performance for MIPv6 when IPv6 Route Optimisation features are used. During the course of simulation, a consistent event causing dropped TCP throughput was identified. Out of order arrival of packets would occur when the mobile node initiated a handover. This out of order arrival invokes TCP congestion control falsely which reduces throughput. The difference in overall throughput of MIPv4 compared to MIPv6 is roughly proportional to the difference in packet size attributed to I Pv6's increased header size. Another contribution of this work is to provide modifications and new functions such as node processing time, to the NS-2 simulator to make such investigation possible. To the best of our knowledge, no similar publication has been reported.
Author
Mobile Communication Systems; Protocol (Computers); Simulation

20040200871 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
A Time Zone Based Dynamic Cache Replacement Policy
Gopalan, Srivdya; Sripathy, Kanchan; Varadarajan, Sridhar; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 172-173; In English; See also 20040200825; Copyright; Avail: Other Sources

This paper proposes a time zone based novel cache replacement policy, LUV, intended for web traffic in the context of a hybrid cache management strategy. The LUV replacement policy is based on ranking of web objects on a set of metrics intercepted by a proxy server. Further, in order to maximize the hit rate, the cache replacement policy makes use of immediate past access patterns for individual web objects with respect to various time zones.
Author
Management Planning; Policies; Regions; Websites

20040200876 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Dynamically Reconstructive Web Server Cluster Using A Hierarchical Grouping Mechanism
Park, Myong-Soon; Lim, Sung-Il; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 148; In English; See also 20040200825; Copyright; Avail: Other Sources

The Internet is quickly growing and people who use the WWW are increasing exponentially. So, companies which offer Web Service want to service to clients during 365*24*60. Therefore they use the cluster system for the availability and the performance. The previous works have made the dispatcher do static position. So, if a node in the system is failed the total system results in crash. We need to make it do dynamic position as like SASHA (Scalable Application-Space Highly-Available) Architecture. SASHA Architecture is composed of COTS, Application-Space Software, Agent and Tokenbeat protocol for system administration. Because it composes nodes in system by a virtual ring, the system administration's overhead happened. Our paper will propose improved fault Detection and Reconfiguration performance in SASHA Architecture.
Author
Applications Programs (Computers); Fault Detection; Management; Protocol (Computers); Websites

20040200885 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Personalization Meets Mass Customization: Support For The Configuration And Design Of Individualized Products
Lacher, Martin; Leckner, Thomas; Koch, Michael; Stegmann, Rosmary; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 141-142; In English; See also 20040200825; Copyright; Avail: Other Sources

Using electronic media for customer interaction enables enterprises to better serve customers by cost-efficiently offering personalized services to all customers. In this paper we address the area of providing help for customers in selecting or designing individualized products (mass customization) by using personalization technologies. The paper provides an introduction to the application area and presents a system for supporting the customization and design of individualized products. The support solution is presented and discussed from a process (customer) point of view and from a system point of view.
Author
Websites; User Requirements

20040200899 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Agents-Middleware Approach For Context Awareness In Pervasive Computing

Djouani, Karim; Chibani, Abdelghani; Amirat, Yacine; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 164; In English; See also 20040200825; Copyright; Avail: Other Sources

With the emergence of wireless distributed systems, embedded computing is becoming more pervasive. Users in continuous transitions between handheld devices and fixed computers expect to maintain the same QoS. Thus, applications need to become increasingly autonomous by reducing interactions with users. The present paper caters with user's mobility, context-aware embedded applications, distributed systems, and in the general case accesses to remote services through embedded middleware. The context, in which exist such applications, exhibits some constraints like: low bandwidth, frequent disconnections, resources poor devices (low CPU speed, little memory, low battery power, etc). The first objective of our work is to proof that agent paradigm and technologies present a great potential to fully blossom in this new area. This allows the building of new and more effective pervasive applications. Our vision, beyond what it was given in middleware and agents for pervasive computing research, is including the context-awareness capability into the early-introduced agents-middleware approach. Thus, we have proposed an agents-middleware architecture approach, which is FIPA standard compliant. This approach is a logical suite of some transitions in research results; from embedded middleware approaches to lightweight agents' platform approaches, and arriving finally to context-aware agents-middleware approach. In this way, we present the usefulness of context notion through two derived concepts: pervasive context and user profile. Upon we have introduced tow specialized agents, within the agents-middleware, that process by inferring meta-data that describe context information extracted from sources like: sensors, user, system resources, wireless network, etc. on top of this agents-middleware we can build context-aware pervasive applications. We present also our ongoing work and the future targeted applications by our approach.

Author

Applications Programs (Computers); Information Systems; Computers

20040200902 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

User Authentication For E-Business

Coleman, James P. H.; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 159-160; In English; See also 20040200825; Copyright; Avail: Other Sources

There are many factors that need to be addressed before e-business is seen as a truly usable service to the ordinary customer. The most well known factors are: The speed of access to the Internet and service providers. The cost of access to the Internet infrastructure. The poor quality of a large number of e-business/e-commerce web sites -in particular aspects such as the interface, design ... A less well-known, but perhaps equally important factor is user authentication. User authentication is the process whereby the Service Provider (SP) is able to identify the person using the web site. This is normally done by a username/password combination. User Authentication is important for the SPs because if a product is ordered or a service is requested, then the supplier needs to be reasonably confident that the order/request is valid, and not a hoax. Unfortunately, the situation has arisen where a user who is a frequent web user may have accounts with many different SPs, e.g. Their bank, telephone company, ISP, superannuation/pension fund, insurance company, government (often with different departments within the Government) and so on. In these cases the SPs use a registration process where the user has a username and password. It is unfortunately usually the case that the username and password combinations are different between sites. This is a deterrent to the whole registration process as you have people with multiple registrations. There are many e-Gateway systems that offer a single-point-of-logon, for example the e-Government within the UK e-Government Project which aims to solve the problem at least within their infrastructure. The very large private sector has no such mechanism. This paper investigates current e-Gateway systems (including those where the primary purpose is not necessarily user authentication) and proposes a model for a more universal e-Gateway.

Author

Computer Information Security; Commerce; Internets

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Linux for Telecommunication Carrier Systems

Manabe, Yoshifumi; Kawarasaki, Yasuro; Ikebe, Takashi; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 72-74; In English; See also 20040201509; Copyright; Avail: Other Sources

This article reports the standardization of extended specifications of Linux for telecommunication carrier systems. Linux

is one of the most popular open source operating systems. With people all over the world contributing updates and bug reports leading to frequent releases of new versions, Linux is becoming an easy-to-use and multi-functional operating system. However, for Linux to be used as an operating system for telecommunication carrier systems, it must be enhanced to provide high reliability and availability.
Author
Telecommunication; Standardization; Operating Systems (Computers)

20040201514 Nippon Telegraph and Telephone Public Corp., Musashino, Japan
Electromagnetic Interference to 5.2-GHz-band Wireless LANs
Hiroshima, Yoshiharu; Akiyama, Yoshiharu; Yamane, Hiroshi; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 18-23; In English; See also 20040201509; Copyright; Avail: Other Sources

Although the electromagnetic environment and interference characteristics for 2.4-GHz-band wireless local area networks (LANs) have been studied, those for 5.2-GHz-band ones have not. This paper presents measurements for the electromagnetic environment in a city and describes the characteristics of interference from microwave medical treatment machines to 5.2-GHz-band wireless LANs, which should be taken into consideration.
Author
Electromagnetic Interference; Cities; Local Area Networks; Microwaves; Bandwidth

20040201515 Nippon Telegraph and Telephone Public Corp., Musashino, Japan
Globalization of Next-generation Core Network Control Technology
Ohba, Takumi; Takeda, Tomonori; Shimizu, Kaori; Inoue, Ichiro; Urushidani, Shigeo; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 37-41; In English; See also 20040201509; Copyright; Avail: Other Sources

This article introduces globalization trends in the architecture and protocols for controlling the next-generation core network, which will efficiently accommodate various kinds of services and rapidly growing traffic using both IP (Internet protocol) control technology and photonic technology. It also describes some activities of NTT Network Service Systems Laboratories in this area as examples: a multilayer service network architecture, L1VPN (layer-1 virtual private network), and GMPLS (generalized multi-protocol lable switching) interoperability testing.
Author
Internets; Interoperability; Network Control; Protocol (Computers)

20040201517 Nippon Telegraph and Telephone Public Corp., Musashino, Japan
High-speed Scanning System for Security Diagnosis
Tanemo, Fumiyuki; Chikira, Kazuaki; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 68-71; In English; See also 20040201509; Copyright; Avail: Other Sources

To maintain effective network security, we must correctly assess the network configurations and security vulnerabilities. Our high-speed scanning system can examine the configuration of any firewall and look for security flaws in hosts such as servers and terminals.
Author
Computer Security; High Speed; Scanners; Broadband

20040201697 Porto Univ., Portugal
Keys Graph-Based Relational To XML Translation Algorithm
Verdier, Christine; ManzideArantes, Wilmondes; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 39; In English; See also 20040201585; Copyright; Avail: Other Sources

The authors propose two algorithms for generating a DTD and an XML document respectively from the metadata and the content of a relational database without any intermediary language or user intervention. Such algorithms always generate semantically correct XML output by respecting database functional dependencies represented in a graph structure they take as input. Finally, different XML representations (or views) meeting expectations of different kind of users can be obtained from the same data according to the database entity chosen as translation pivot
Author
Algorithms; Data Bases; Relational Data Bases

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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.

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Pattern Based Analysis of EAI Languages: The Case of the Business Modeling Language

Wohed, Petia; terHofstede, Arthur; Dumas, Marlon; Perjons, Erik; ICEIS 2003; [2003], pp. 110-111; In English; See also 20040191598; Copyright; Avail: Other Sources

Enterprise Application Integration (EAI) is a challenging area that is attracting growing attention from the software industry and the research community. A landscape of languages and techniques for EAI has emerged and is continuously being enriched with new proposals from different software vendors and coalitions. However, little or no effort has been dedicated to systematically evaluate and compare these languages and techniques. The work reported in this paper is a first step in this direction. It presents an in-depth analysis of a language, namely the Business Modeling Language, specifically developed for EAI. The framework used for this analysis is based on a number of workflow and communication patterns. This framework provides a basis for evaluating the advantages and drawbacks of EAI languages with respect to recurrent problems and situations.

Author

Computer Programs; Language Programming; Data Integration; Models; Commerce

20040191608 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Towards Adaptive User Interface Generation: One Step Closer To People

Lozano, Maria; Fernandez-Caballero, Antonio; Montero, Francisco; Lopez-Jaquero, Victor; ICEIS 2003; [2003], pp. 128-129; In English; See also 20040191598; Copyright; Avail: Other Sources

User interface generation has become a Software Engineering branch of increasing interest, probably due to the great amount of money, time and effort used to develop user interfaces and the increasing level of exigency of user requirements for usability (Nielssen, 1993) and accessibility (W3C, 2002) compliance interfaces. There are different kinds of users, and that is a fact we cannot ignore. Human society is full of diversity and that must be reflected in human-computer interaction design. Thus, we need to engage users in a new kind of interaction concept where user interfaces are tailored-made, and where user interfaces are intelligent .and adaptive. A new generation of specification techniques are necessary to face these challenges successfully. Model-based design has proved to be a powerful tool to achieve these goals. A first step towards adaptive user interface generation is introduced by mean,,; of the concept of connector applied to model-based design of user interfaces.

Author

Human-Computer Interface; User Requirements; Computer Programming; Software Engineering

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Key Issues In Information Systems And Software Engineering: Views From a Joint Network Of Practitioners And Academics

Targett, D.; Ramage, M.; Liu, Ke-Cheng; Harrison, R.; Avison, D.; Bennett, K.; Bishop, R.; ICEIS 2003; [2003], pp. 93; In English; See also 20040191598; Copyright; Avail: Other Sources

SEISN (Software Engineering and Information Systems Network), a research project supported by the British research council EPSRC, aims to promote the understanding of the two research communities and practitioners. The network focuses on the exchange of ideas and enables these communities to clarify their beliefs and present experiences, findings and views. This paper summaries the work of this research network, and investigates where there is common ground between the IS and SE communities and practitioners and where differences remain. With discussions on the key issues, the paper shows the future directions of research in software engineering and information systems.

Author

Computer Systems Programs; Information Systems; Software Engineering; Computer Programming

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An Environment For Software Development Based On a Distributed Collaborative Model

deAntonio, Angelica; Villalobos, Marco; ICEIS 2003; [2003], pp. 96; In English; See also 20040191598; Copyright; Avail: Other Sources

In this paper, we present a model for collaborative software design and an environment, called Sinergia, that is being constructed based on this model. We describe the different concepts and components of the proposed model, as well as the functional features that the environment under development includes. The Sinergia tool uses a combination of technologies, such as distributed CORBA objects, Java servlets or relational databases, that make it useful in the context of a distributed multidisciplinary software development team.

Author

Software Engineering; Relational Data Bases; Computer Programming

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A High Reliability Design For NFS Server Software By Using An Extended Petri Net

Shidama, Yasunari; Wasaki, Katsumi; Yamaguchi, Shinnosuke; ICEIS 2003; [2003], pp. 112; In English; See also 20040191598; Copyright; Avail: Other Sources

In this paper, we present a model design for Network File System processes based on the Logical Coloured Petri Net(LCPN). The LCPN is an extended Petri net which solves the problem of system description in place/transition nets and coloured Petri nets proposed before. This extension of Petri nets is suitable for designing complex control systems and for discussing methods of evaluating such systems. In order to study the behavior of the server system modeled with this net, we provide simulations on a Java program. From this work, we confirmed that this extended Petri net is an effective tool for modelling the file server processes.

Author

Petri Nets; Computer Programs; Complex Systems; Reliability

20040191615 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Organizational Multi-Agent Architectures For Information Systems

Faulkner, Stephane; Do, Thanh Tung; Kolp, Manuel; ICEIS 2003; [2003], pp. 111-112; In English; See also 20040191598; Copyright; Avail: Other Sources

A Multi-Agent System (MAS) architecture is an organization of coordinated autonomous agents that interact in order to achieve particular, possibly common goals. Considering real-world organizations as an analogy, this paper proposes MAS architectural patterns for information systems which adopt concepts from organizational theories. The patterns are modeled using the i* framework which offers the notions of actor, goal and actor dependency, specified in Formal Tropos and evaluated with respect to a set of software quality attributes, such as predictability or adaptability. We conduct a comparison of organizational and conventional architectures using an e-business information system case study.

Author

Architecture (Computers); Computer Programs; Information Systems; Commerce; Autonomy

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Using Model Of Enterprise And Software For Deployment Of ERP Software

Darras, Franck; ICEIS 2003; [2003], pp. 122; In English; See also 20040191598; Copyright; Avail: Other Sources

In the deployment of ERP (Enterprise Resource Planning) software, a suitable modelling of needs will lead to a better analysis and a specification of the need for good quality. This modelling can be the key to success. The enterprise modelling develops a formal framework where each element of the enterprise is identified and seeks to include all viewpoints in the representation of the enterprise's operation. But, the the diversity of the formalisms does not facilitate their use in management of a project. The aim of this paper is to show the use of the concepts of enterprise modelling, with a formalism close to software engineering in order to ameliorate the analysis and the deployment of ERP systems.

Author

Computer Programming; Deployment; Software Engineering

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Study On Chinese Enterprise E-Readiness Index And Application

Chen, Jian; Tian, Yucun; Zhu, Yan; ICEIS 2003; [2003], pp. 124-125; In English; See also 20040191598; Copyright; Avail: Other Sources

Information Industry has become the global main industry in 21 st century, which is the mainstay of national economy and powerful drive of economy development. How to use information technology to enhance the core competition ability are the most important factor of the national and enterprise competitiveness. Since the enterprise is the foundation of the national economy, the construction of e-enterprise must be speeded up enormously for improvement of national economy informatization. Therefore, many scholars and experts are investigating this area at present. The surveys of nearly 100 Chinese typical enterprises are analyzed and several new analyzing algorithms will be concerned in this paper. Through these methods, a set of Chinese enterprise e-readiness index is put forward.

Author

Information Systems; Algorithms; Surveys

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Real-Time Database Modeling Considering Quality Of Service

Perkusich, Maria Ligia Barbosa; Perkusich, Angelo; ICEIS 2003; [2003], pp. 130; In English; See also 20040191598; Copyright; Avail: Other Sources

Recent research points the real-time database systems (RTDB) as a key functional unit that contribute to the success of emergent applications, such as electronic commerce, notice for demand, telephony systems and on line trading. These research is motivated by the fact of the dealing of these applications with great amount of data, beyond data and transactions with timing constraints, r)ue to the high service demand, much transactions may miss their deadlines. To address these problems, we present a RTDB model considering quality of service (QoS) to support guarantees the performance. A simulation study shows that our model can achieve a significant performance improvement, in terms of deadlines miss and accumulated maximum imprecision resultant of the negotiation between the logical and temporal consistency. Furthermore, we shows model analysis generated by the Design/CPN tool.

Author

Data Bases; Electronic Commerce; Consistency; Real Time Operation

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Software Prototyping Classification

Toffolon, Claudine; Dakhli, Salem; ICEIS 2003; [2003], pp. 132; In English; See also 20040191598; Copyright; Avail: Other Sources

Many academics and practitioners consider that software prototyping is a solution to many symptoms of the software crisis. As software prototyping may be costly and complex, many typologies have been proposed in the literature to help understanding this approach. The main weakness of such typologies is related to their technical orientation. In this paper, we propose an alternative classification of software prototyping which take into account all the aspects of software. Our typology is based upon two frameworks proposed by the authors in a previous work: the software dimensions theory and the software global model.

Author

Computer Programming; Prototypes; Signs and Symptoms; Classifications

20040191626 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal

Augmentation of Virtual Object to Real Environment

Kulakov, Felix; ICEIS 2003; [2003], pp. 102; In English; See also 20040191598; Copyright; Avail: Other Sources

A problem of immersion of an arbitrary computer-synthesized virtual body into a real environment at considerable distance from observer is considered. The problem under discussion refers to so-called Augmented Reality which is a rapidly developing trend within Virtual Reality. A virtual body in this case is an augmentation to the reality. The problem has 'visual'

and ‘tactile-force’ aspects. Advanced approaches to realization of these aspects of immersion are proposed.
Author
Virtual Reality; Augmentation

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Aligning an Enterprise System with Enterprise Requirements: An Iterative Process
Soffer, Pnina; ICEIS 2003; [2003], pp. 94-95; In English; See also 20040191598; Copyright; Avail: Other Sources

Aligning an off-the-shelf software package with the business processes of the enterprise implementing it is one of the main problems in the implementation of enterprise systems. The paper proposes an iterative alignment process, which takes a requirement-driven approach. It benefits from reusing business process design without being restricted by predefined solutions and criteria. The process employs an automated matching between a model of the enterprise requirements and a model of the enterprise system capabilities. It identifies possible matches between the two models and evaluates the gaps between them despite differences in their completeness and detail level. Thus it provides the enterprise with a set of feasible combinations of requirements that can be satisfied by the system as a basis for making implementation decisions. The automated matching is applied iteratively, until a satisfactory solution is found. Object Process Methodology (OPM) is applied for modeling both the system and the enterprise requirements, which are inputs for the automated matching. The alignment process has been tested in an experimental study, whose encouraging results demonstrate its ability to provide a satisfactory solution to the alignment problem.
Author
Software Engineering; Commercial Off-the-Shelf Products

20040191634 Ecole Superieure d’Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
IPM: An Incremental Process Model for Distributed Component-Based Software Development
doPrado, Antonio Francisco; deAlmeida, Eduardo Santana; dePaula, Bianchini, Calebe; ICEIS 2003; [2003], pp. 116; In English; See also 20040191598; Copyright; Avail: Other Sources

In spite of recent and constant researches in the Component-Based Development (CBD) area, there is still lack of patterns, process model and methodologies that effectively support as much the development ‘for reuse’ as ‘with reuse’. Considering the accelerated growth of the Internet over the last decade, where distribution has become an essential non-functional requirement of most applications, the problem becomes bigger. This paper proposes a novel Incremental Process Model (IPM) that integrates the concepts of Component-Based Software Engineering (CBSE), frameworks, patterns, and distribution. This process model is divided into two stages: the development ‘for reuse’, and the development ‘with reuse’. A CASE tool is the main mechanism to apply this process model, supporting inclusively, the code generation of components and applications. A distributed components environment is proposed for accomplishing the results of this process model. Through a case study it is shown how the process model works on a given problem domain.
Author
Software Engineering; Distributed Processing

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Code Generation For Distributed Systems
Gitzel, Ralf; Aleksy, Markus; ICEIS 2003; [2003], pp. 92; In English; See also 20040191598; Copyright; Avail: Other Sources

Due to the complexity of distributed code as opposed to the easy way the corresponding designs can be described graphically, interest in code generators which create applications based on abstract system descriptions, is high. An indicator for this are the many commercial products. This paper aims at exploring the theoretical foundations of code generation for distributed systems with regard to the data structures and template language syntax. Several existing approaches are analysed and a new hybrid-form data structure is proposed. The goal, that this paper aims at, is an adaptable, middleware-independent way to produce software with minimal human code.
Author
Applications Programs (Computers); Coders; Data Structures

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Analyzing Security Requirements Of Information Systems Using Tropos

Gani, Abdullah; Manson, Gordon; Giorgini, Paolo; Mouratidis, Haralambos; ICEIS 2003; [2003], pp. 103; In English; See also 20040191598; Copyright; Avail: Other Sources

Security is an important issue when developing complex information systems, however very little work has been done in integrating security concerns during the analysis of information systems. Current methodologies fail to adequately integrate security and systems engineering, basically because they lack concepts and models as well as a systematic approach towards security. We believe that security should be considered during the whole development process and it should be defined together with the requirements specification. This paper introduces extensions to the Tropos methodology to accommodate security. A description of new concepts is given along with an explanation of how these concepts are integrated to the current stages of Tropos. The above is illustrated using an agent-based health and social care information system as a case study.

Author

Complex Systems; Information Systems; Systems Engineering; Security; Warning Systems

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Customizing Web-Based Systems With Object-Oriented Views

Schett, Markus; Motschnig-Pitrik, Renate; ICEIS 2003; [2003], pp. 103-104; In English; See also 20040191598; Copyright; Avail: Other Sources

Although views have proved their place in relational data models, their role in customizing object-oriented (OO) systems has been severely underestimated. This phenomenon occurs despite the fact that views in the OO paradigm can be designed such that their functionality by far exceeds that of their relational cousins. Based on research in OO databases and on the Viewpoint Abstraction, the purpose of this paper is to integrate views into UML, to sketch the implementation of the tool RoseView, and to illustrate applications of views in web-based systems. We argue that designing system increments or adaptations as view contexts allows for full-fledged customized system versions without ever affecting the code of the original application, meaning significant savings in maintenance. Further, we introduce RoseView, a tool implemented to make views available in UML and thus to extend OO languages by an essential abstraction dimension.

Author

Websites; Object-Oriented Programming; Functional Design Specifications; Data Bases

20040191638 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

An XML Based Administration Method On Role-Based Access Control In The Enterprise Environment

Zhang, Chang N.; Zhang, Chang; ICEIS 2003; [2003], pp. 104; In English; See also 20040191598; Copyright; Avail: Other Sources

In the distributed computing environments, users would like to share resources and communicate with each other to perform their jobs more efficiently. It is important to keep resources and the information integrity from the unexpected use by unauthorized users. Therefore, there is a strong demand on the access control of distributed shared resources in the past few years. Role-Based-Access-Control (RBAC) has been introduced and has offered a powerful means of specifying access control decisions. In this paper, we propose an object-oriented RBAC model for distributed system (ORBAC), it efficiently represents the real world. Though ORBAC is a good model, administration of ORBAC including building and maintaining access control information remains a difficult problem. This paper describes practical method that can be employed in a distributed system for managing security.policies using extensible Markup Language (XML). Based on the XML ORBAC security policy, an intelligent role assignment backtracking algorithm is also presented, the computation complexity of the algorithm is O (N) where N is the number of roles in the user's authorized role set.

Author

Object-Oriented Programming; Document Markup Languages; Access Control; Security

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Deriving Use Cases From Business Processes, The Advantages Of DEMO

Shishkov, Boris; Dietz, Jan L. G.; ICEIS 2003; [2003], pp. 104-105; In English; See also 20040191598; Copyright; Avail: Other Sources

The mismatch between the business requirements and the actual functionality of the delivered software application is considered to be a crucial problem in modern software development. Solving this problem means to find out how to consistently place the software specification model on a previously developed business process model. If considering in particular the UML-based software design, we need to answer in this regard a fundamental question, namely - how to find all relevant use cases, based on sound business process modeling? Adopting the business process modeling as a basis for identification of use cases has been studied from three perspectives - it has been studied how use cases could be derived based on DEMO, Semiotic and Petri Net business process models. The goal of the current paper is, by considering the mentioned achieved results, to study and analyze the strengths of DEMO concerning the derivation of use cases. This could be helpful not only for the investigation of DEMO but also for the further activities directed towards finding out the most appropriate way(s) of identifying use cases from business processes.
Author
Software Engineering; Identifying; Commerce; Computer Programming

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OPCAT: A Bimodal Case Tool For Object-Process Based System Development
Sturm, Amon; Reinhartz-Berger, Iris; Dori, Dov; ICEIS 2003; [2003], pp. 107-108; In English; See also 20040191598; Copyright; Avail: Other Sources

CASE tools have spread at a lower pace than expected. The main reasons for this are their limited support of a particular method, high cost, lack of measurable returns, and unrealistic user expectations. Although many CASE tools implement familiar methods, their model checking and simulation capabilities are limited, if not nonexistent, and the syntax and semantics of their graphic notations may not be clear to novice users. Object-Process CASE Tool (OPCAT), which supports system development using Object-Process Methodology, meets the challenges of next generation CASE tools by providing a complete integrated software and system development environment. Based on two human cognition principles, OPCAT enables balanced modeling of the structural and behavioral aspects of systems in a single model through a bimodal visual-lingual representation. Due to this intuitive dual notation, the resulting model is comprehensible to both domain experts and system architects engaged in the development process. Due to its formality, it OPCAT also provides a solid basis for implementation generation and an advanced simulation tool, which animates system objects, processes, and states in a balanced way, enabling a complete simulation of system structure and behavior. This paper presents OPCAT and demonstrates its unique features through a small case study of a travel management information system.
Author
Software Development Tools; Systems Engineering; Software Engineering; Management Information Systems; Computer Programming

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Open Source Security Analysis: Evaluating Security Of Open Source Versus Closed Source Operating Systems
Trezentos, Paulo Rodrigues; Serrao, Carlos; Neves, Daniel; ICEIS 2003; [2003], pp. 109; In English; See also 20040191598; Copyright; Avail: Other Sources

Open source software is becoming a major trend in the software industry. Operating systems (OS), Internet servers and several other software applications are available under this licensing conditions. This article assesses the security of open source technology, namely the Linux OS. Since a growing number of critical enterprise information systems are starting to use Linux OS, this evaluation could be helpful to them. To illustrate the fact that application security depends, above all, on the security of the OS underneath, we present the case of a DRM (Digital Rights Management) solution - MOSESOpenSDRM - implemented on top of the Linux OS, in the scope of the EU MOSES IST RTD programme. Some of conclusions hereby drawn are not compatible with some Microsoft funded studies that point to the fact that open source OS's are more insecure. This main idea was firstly present by the authors in the Interactive Broadcasting Workshop - IST concertation meeting hosted by the European Commission in September 2002 (Brussels).
Author
Computer Systems Programs; Information Systems; Unix (Operating System); Security

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Analysis Of Level Of Involvement Of Six Best Practices Of RUP In OOSP

Saeed, Muhammad; Ahmed, Faheem; ICEIS 2003; [2003], pp. 98-99; In English; See also 20040191598; Copyright; Avail: Other Sources

No one in the software industry can deny the overwhelming importance of software process model to increase the quality of software product. It is a unanimous consent that better quality software can be produced through well defined and refined process model. Rational Unified Process (RUP) has emerged as a leading software process model, which has incorporated the best among the best industry practices in it. The adaptation of these best practices has almost fulfilled the requirements of an ideal software process model, which should be based upon the actual practices and theoretical concerns of software engineering in the development of software product. In this paper we analyzes RUP with some other object oriented process models like Object-Oriented Software Process (OOSP) with respect to level of incorporation of six best industrial proven practices i.e., iterative development, manage requirements, use component architecture, model visually, verify quality and control changes. The analysis will give us a true picture of involvement of six best practices in OOSP, which will ultimate enables us to perform a comparative analysis of the two-process model with respect to performance and quality.

Author

Computer Programming; Object-Oriented Programming; Software Engineering; Product Development

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Extending UML For Modeling Queries To Object-Relational Databases

Costilla, Carmen; Marcos, Esperanza; Vela, Belen; ICEIS 2003; [2003], pp. 121; In English; See also 20040191598; Copyright; Avail: Other Sources

Object-Relational Databases (ORDB) have become as a main alternative for the management of complex data and relationships. It is also very common to access to these databases through the web. Besides, new products versions integrate Object-Relational model along with XML data management. The framework of this paper is MIDAS, an Object-Relational and XML based Methodology for the design of Web Information Systems. MIDAS uses UML as modelling language for the definition of the whole system, extending and specialising it for the definition of systems based on the recommended technology. In MIDAS we have proposed an UML extension for the design of ORDB focused on the structural issues of the system. Due to the importance of queries on every information system, in this paper we extend that work for ORDB queries based on UML

Author

Data Bases; Relational Data Bases; Data Management; Information Systems

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Aspect-Oriented Software Development: An Overview

Brito, Isabel; Moreira, Ana; ICEIS 2003; [2003], pp. 136; In English; See also 20040191598; Copyright; Avail: Other Sources

Separation of concerns is a software engineering principle that claims the clearly identification of all the elements that participate in a system. There are some concerns such as security and performance that cut across many other concerns. The classical approaches do not support the modularisation and further integration of these crosscutting concerns with the functional requirements of a system producing spread and tangled representations (e.g. specifications, code) that are difficult to understand, maintain and evolve. Aspect-Oriented Programming (AOP) aims at handling these problems. Recently we have been noticing a clear interest on propagating the AOP ideas and concepts to earlier activities of the software development process. This paper gives an overview of aspect-oriented software development, giving a special emphasis to aspect-oriented requirements engineering.

Author

Software Engineering; Functional Design Specifications

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Complementary Adoption and Optimization of Enterprise Resource Planning Systems

Lee, C. Sophie; ICEIS 2003; [2003], pp. 136-137; In English; See also 20040191598; Copyright; Avail: Other Sources

Enterprise Resource Planning (ERP) systems emphasize on the integrative and platform adoption of system software, instead of piece-meal upgrades. However, technological changes can only bring limited benefit to the organization if other factors in the organization--such as strategy and organizational structure--are not changed in the coordinated or complementary directions. Failure to understand the complementarity between technology and organizational may cause low payoff of IT investment. Customer Relationship Management (CRM) software is the latest addition to the ERP family. It is rooted in relationship marketing or customer relationship management, which emphasizes the need to build a long term relationship with customers. Spending on CRM software has grown 6 times over the past years but customer satisfaction of American consumers did not grow. An examination of the literature reveals that current CRM model tends to focus more on customer 'service' instead of customer 'relationship'. This study proposes to combine the American Customer Satisfaction Index (ACSI) model and complementarity framework to provide optimal design and adoption of CRM software.
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Consumers; Software Engineering; Marketing

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Software Engineering Environment for Business Information Systems
Raabe, Alar; ICEIS 2003; [2003], pp. 102-103; In English; See also 20040191598; Copyright; Avail: Other Sources

There is a growing need to make business information systems development cycle shorter, and independent of underlying technologies. Model driven synthesis of software offers solutions to these problems. In the article we describe a set of tools and methods, applicable for synthesizing business software from technology independent models. This method and these tools are distinguished by the use of extended meta-models, which embody knowledge of problem domain and target software architecture of synthesized software system, by the use of model conversion rules described using the combined metamodel, and by the use of reference models of problem domains and sub-domains, which are combined and extended during the construction of descriptions of software system. The difference of our method from other domain specific methods is the separate step of solution domain analysis and the use of meta-model extensions. Work presented in the article has been done in the context of developing product-line architecture for insurance applications.
Author
Architecture (Computers); Software Engineering; Computer Programming; Commerce

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Defining Stability for Component Integration Assessment
Cechich, Alejandra; Piattini, Mario; ICEIS 2003; [2003], pp. 102; In English; See also 20040191598; Copyright; Avail: Other Sources

The use of commercial of-the-shelf (COTS) products as elements of larger systems is becoming increasingly commonplace. Component-Based Software Development is focused on assembling previously existing components (COTS and other non-developmental items) into larger systems, and migrating existing systems toward component approaches. Ideally, most of the application developer's time is spent integrating components. We present an approach that can be used in the process of establishing component integration's quality as an important field to resolving CBS quality problems - problems ranging from CBS quality definition, measurement, analysis, and improvement to tools, methods and processes. In this paper, we describe and illustrate the use of the first phase of our approach to determine relevant perturbations when incorporating a COTS component into given software.
Author
Computer Programming; Software Engineering; Commercial Off-the-Shelf Products

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Requirements Engineering Versus Language/Action Perspective: Different Facets and Possible Contribution
Barjis, Joseph; Galatonov, Tychon; ICEIS 2003; [2003], pp. 105; In English; See also 20040191598; Copyright; Avail: Other Sources

In today's Requirements Engineering (RE) it's often assumed that the users of the system-to-be understand well enough their business needs and the overall goals of the system, therefore the data provided by them is of utmost importance for engineering system requirements; this strategy is sometimes called the 'waiter strategy'. While it is often justified, there are

approaches that question the validity of this 'waiter strategy'. One of them is the Language/Action Perspective. The Language/Action Perspective (hereinafter LAP) is an approach to communication analysis in organisational/business systems, i.e. social systems where there exists information interchange between its components, human beings and machines (collectively called actors), with the ultimate goal of fulfilling a mission of the organisation. One of the features of LAP is that in distinction to the 'waiter strategy' approaches it assumes that it is the deeds the actors perform that are of crucial importance for understanding the nature of the processes in the system. This paper presents an overview of some results as well as a new possible approach to RE using LAP; the following methods are taken into consideration: DEMO (Dynamic Essential Modelling of Organisations) methodology, the Semiotics approach and Petri nets.
Author
Commerce; Computer Systems Design; Telecommunication

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A Three-Dimensional Requirements Elicitation And Management Decision-Making Scheme For The Development Of New Software Components
Andrecu, Andreas; Zografos, Andreas; Papadopulos, George; ICEIS 2003; [2003], pp. 101-102; In English; See also 20040191598; Copyright; Avail: Other Sources

Requirements analysis and general management issues within the development process of new software components are addressed in this paper, focusing on factors that result from requirements elicitation and significantly affect management decisions and development activities. A new methodology performing a certain form of requirements identification and collection prior to developing new software components is proposed and demonstrated, the essence of which lays on a three-entity model that describes the relationship between different types of component stakeholders: Developers, reusers and end-users. The model is supported by a set of critical factors analysed in the context of three main directions that orient the production of a new component, that is, the generality of the services offered, the management approach and the characteristics of the targeted market. The investigation of the three directions produces critical success factors that are closely connected and interdependent. Further analysis of the significance of each factor according to the priorities set by component developers can provide a detail picture of potential management implications during the development process and more importantly can support management decisions related to if and how development should proceed.
Author
Computer Programming; Computer Programs; Decision Making

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A Three Perspective Approach To Groupware Implementation Quality Management: Within An Australian University
Gittoes, Dion; ICEIS 2003; [2003], pp. 117; In English; See also 20040191598; Copyright; Avail: Other Sources

Implementing groupware into organisations to support communication and collaboration is highly problematic and often approached from a single perspective. Groupware implementation management is influenced by individual, socio-organisational and technical issues. High quality implementation management leads to system success. Quality literature is investigated to succinctly align the three perspective approach of groupware design (Palen 1999) to a three perspective approach of information systems (IS) quality (Salmela 1997). IS quality is influenced by business integration quality, IS user quality and IS work quality. A study of a groupware implementation highlights the need for a synthesis of all three perspectives to manage implementation quality and understand the adoption challenges groupware systems face. Investigating IS quality from all three perspectives leads to a holistic understanding of groupware implementation quality management. Groupware quality is investigated from the user perspective, employing ethnographic techniques in an interpretative case study of a Lotus Notes implementation, email and electronic calendar, within an Australian University.
Author
Information Systems; Management Systems; Computer Programs; Electronic Mail

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Analyzing Requirements For Content Management
Lyytikaeinen, Virpi; ICEIS 2003; [2003], pp. 121-122; In English; See also 20040191598; Copyright; Avail: Other Sources

The content to be managed in organisations is in textual or multimedia formats. Major part of the content is, however,

stored in documents. In order to find out the needs of the people and organisations producing and using the content a profound requirements analysis is needed. In the paper, a method for the requirements analysis for content management purposes is introduced. The new method combines different techniques from two existing methods, which were used in various content management development projects. The paper also describes a case study where the new method is exploited.
Author
Multimedia; Requirements

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Towards A View Based Unified Modeling Language
Kriouile, Abdelaziz; Ebersold, Sophie; Cregut, Xavier; Nassar, Mahmoud; Coulette, Bernard; ICEIS 2003; [2003], pp. 114-115; In English; See also 20040191598; Copyright; Avail: Other Sources

To model complex software systems, we propose a user-centred approach based on an extension of UML (Unified Modeling Language) called VUML. VUML provides the concept of multi-views class whose goal is to store and deliver information according to user (final or not) profile (viewpoint). A multi-views class consists of a base class (default view) and a set of views corresponding to different viewpoints on the class. Each view is defined as an extension of the default view. VUML allows the dynamic change of viewpoint and offers mechanisms to manage consistency among dependent views. In this paper, we focus on the static architecture of a VUML modelling: the multi-views class and its use in a VUML class diagram, static relations such as specialisation and dependency in VUML. We give an extract of VUML's semantics thanks to an extension of the UML metamodel. Finally, we give an overview of dynamic aspects and the principle of an implementation pattern to generate object-oriented code from a VUML model.
Author
Object-Oriented Programming; Complex Systems; Software Engineering; Semantics

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Software Development Guided By Models: The XIS UML Profile
Luz, Miguel; Silva, Alberto; ICEIS 2003; [2003], pp. 92-93; In English; See also 20040191598; Copyright; Avail: Other Sources

The UML is used to detail high level software specifications that will be interpolated for XMI and XIS (XML Information Systems) as interchange formats based on XML. UML and XML are expected to be the next generation of modeling and data interchange standards respectively. In this paper, we describe the UML Profile for IS architecture as a proposal for software development guided by UML models. The IS system is based on a multiphase generative programming approach, starting from high-level UML models till software artifacts (such as Java code and SQL scripts), passing through different representations, namely OMG's XMI, and our (IS) specific XML vocabulary. The main contribution of this paper is the overview of the IS system and the proposal and discussion of the IS UML profile.
Author
Document Markup Languages; Information Systems; Format; Computer Programs

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Interorganizational Workflow In The Medical Imaging Domain
Dustdar, Schahram; ICEIS 2003; [2003], pp. 125; In English; See also 20040191598; Copyright; Avail: Other Sources

Interorganizational Workflows are increasingly gaining relevance in enterprise information systems, particularly in developing internet-based applications. A process model has to be shared to enable work items to be managed in different workflow engines. The state-of-the-art for three interorganizational workflow models, capacity sharing, case transfer, and loosely coupled model, is discussed in this paper. Further the medical imaging domain made early progress in workflow standardization and its main concepts and software components are introduced. Key workflows and protocols of the medical imaging domain are described. Next the interorganizational workflow models are applied to the domain and advantages of certain models are pointed out. Finally the required infrastructure for a Webservice based design is discussed, conclusions for Web-service based implementations are made and further research areas are concluded.
Author
Information Systems; Imaging Techniques; Computer Programs; Medical Services

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Software Confederations And Manufacturing

Zemlicka, Michal; ICEIS 2003; [2003], pp. 127; In English; See also 20040191598; Copyright; Avail: Other Sources

Modern information systems of large companies and other human organizations (like state administration, complex health care systems) must have a specific architecture called software confederation (a peer-to-peer network of large autonomous software units behaving like permanent services). Confederation architecture is a notion and technology orthogonal to most popular object-orientation. They are used in different problem or scale domains. For the confederative systems specific experts are necessary. Such experts can be found among expert,,; having positive experience with manufacturing systems but not among the experts with strong object-orientation. Some technical problems simplifying the design of EAI are discussed and not yet solved issues are formulated.

Author

Architecture (Computers); Complex Systems; Information Systems; Software Engineering; Computer Systems Programs; Computer Programming

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Intrusion Detection Based On Data Mining

Hoang, Xuan Dau; Bertok, Peter; Hu, Jian-Ku; ICEIS 2003; [2003], pp. 118; In English; See also 20040191598; Copyright; Avail: Other Sources

Traditional computer misuse detection techniques can identify known attacks efficiently, but perform very poorly in other cases. Anomaly detection has the potential to detect unknown attacks, however, it is a very challenging task since it is aimed at the detection of unknown attacks without any priori knowledge about specific intrusions. This technology is still at its early stage. Existing research in this area focuses either on user activity (macro-level) or on program operation (micro-level) but not on both simultaneously. In this paper, an attempt to look at both concurrently is presented. Based on an intrusion detection framework (Lee, 2001), we implemented a user anomaly detection system and conducted several intrusion detection experiments by analysing macro-level and micro-level activities. User behaviour modelling is based on data mining; frequent episode algorithms are used to build the user's normal profiles. The experimental results have shown that the system can detect anomalies and changes in the user's normal working patterns effectively.

Author

Data Mining; Computer Techniques; Computer Information Security; Intrusion; Detection; Warning Systems

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Languages And Mechanisms For Software Processes And Manufacturing Enterprise Processes: Similarities And Differences

Theroude, Franck; Arbaoui, Selma; Verjus, Herve; ICEIS 2003; [2003], pp. 127-128; In English; See also 20040191598; Copyright; Avail: Other Sources

This paper tends to confront two wide and deep process fields: software process and enterprise manufacturing process (called for short, manufacturing processes). It will analyse them, present a state of the art according to a set of process requirements and conclude with a similarities and differences

Author

Languages; Manufacturing; Software Engineering

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Supporting Deliberation Process Mechanism in Software Systems Development

Ebrahim, Osman; Elgohary, Ranai; Hamad, Ahmed; ICEIS 2003; [2003], pp. 93; In English; See also 20040191598; Copyright; Avail: Other Sources

A model for providing automated support for the deliberation process inherent in the software requirements engineering is proposed. The model provides the representation and formal mechanisms that supports stakeholders in their evaluating the available alternatives to choose among them, based on specified criteria that precedes the final decision. The same mechanism is used to quantify and formalize independent judgment of each stakeholder and then combines these individual judgments

into a decision that express the group final decisions. The database capable of representing and encompassing this huge amount of the process knowledge in a way close to the conceptual data model has been designed. The model will also provide a representation mechanism for capturing and recording design rationale. This can assist in design replay or justification of decisions as well as an important history trails for management references. The developed model is applied and validated on a software requirements engineering on a case study at Air Traffic Control system (ATC).
Author
Software Engineering; Models; Computer Systems Programs; Automatic Control

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Analysis on Relation Between Service Parameters for Service Level Management and System Utilization
Komoda, Norihisa; Konno, Shoji; Akatsu, Masaharu; ICEIS 2003; [2003], pp. 93-94; In English; See also 20040191598; Copyright; Avail: Other Sources

Accompanying the rise of IT service providers such as ASP (Application Service Provider) and iDC (internet Data Center), it becomes popular to define the quality of information systems as SLA (Service Level Agreement). The true goal of SLA is to guarantee a valuable service to users. Hence, it is desirable to identify service parameters that are highly related to user satisfaction. The service parameters concerning every system should be different. We focus attention on system utilization to select the parameters. Our expectation is the following hypothesis; by investigating the characteristic on system utilization, we can statistically predict the parameters that are the most critical to the satisfaction of the system users. In this paper, we examine parameters for availability and responsiveness, which are known as two major factors in SLA. First, we provide three parameters for availability and responsiveness, respectively. Next, we prepare a questionnaire about system utilization. To analyze the relation between service parameters and system utilization, we had several experienced system engineers answer the questions for each system they had developed. Quantification theory type II is applied for the analysis and validity of our hypothesis is demonstrated. We also clarify characteristics on system that emphasizes each service parameter.
Author
Systems Engineering; Technology Utilization

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Towards An Agent Architectural Description Language For Information Systems
Kolp, Manuel; ICEIS 2003; [2003], pp. 129; In English; See also 20040191598; Copyright; Avail: Other Sources

This paper identifies the foundations for an architectural description language (ADL) to specify multi-agent system architectures for information systems. We propose a set of system architectural concepts based on the BDI agent model and existing classical ADLs. We then conceptualize SKwyRL-ADL, aimed at capturing a 'core' set of structural and behavioral concepts, including relationships that are fundamental in architecture description for BDI-MAS. We partially apply our ADL on a peer-to-peer document sharing example.
Author
Architecture (Computers); Information Systems

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A Promising Manifesto for E-Business Value Modeling Problems
Takao, Midori; Matsumoto, Masao; ICEIS 2003; [2003], pp. 132; In English; See also 20040191598; Copyright; Avail: Other Sources

Continuing to the Value Proposition Innovation method presented on occasion of the ICEIS'02 panel on 'Problems and Promises of e-business', this paper explores other crucial subject matters relevant to the theme, say, what the root problem is out from many of the difficulties encountered in recent e-business modeling projects. The series of surveys undertaken by Japan's Research Thrust IEICE Software Enterprise Modeling identify that the less matured support for such dual-discipline as e-business is the root cause that generates numerous problems. One break through for this is to provide an evaluation framework that allows you to make decision whether the underlined e-business modeling is beneficial. The framework will become a key component that is essentially needed for forming a feedback loop in 'model and go' support in e-business.
Author
Electronic Commerce; Models; Software Engineering

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IS Development with IS Components

Turki, Slim; Leonard, Michel; ICEIS 2003; [2003], pp. 133; In English; See also 20040191598; Copyright; Avail: Other Sources

In this paper, we expose our vision of the component based information systems (IS) development in a data-intensive application context. A hyperclass is a large class, formed from a subset of conceptual classes of the global schema of a database, forming a unit with a precise semantics. This concept introduces a kind of modularity in the definition and the management of a database schema and a powerful kind of independence between the methods and the schema. We present our global approach of reuse and give our definition of an IS component (ISC). For us, an ISC is an autonomous IS, respecting a set of conformity rules. It is defined through a static space, a dynamic space and an integrity rules space. We use the hyperclass concept to implement the static space. Applied to an ISC, it facilitates its handling when refined or integrated.
Author

Autonomy; Information Systems; Semantics; Computer Components

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A Methodology for the Integration of CSCW Applications

James, Anne; Gatward, Richard; Iqbal, Rahat; ICEIS 2003; [2003], pp. 134; In English; See also 20040191598; Copyright; Avail: Other Sources

Organizations rely on a wide variety of collaborative applications in order to support their every day activities and to share resources. The collaborative applications are typically designed from scratch if the existing applications do not meet organizational needs. This requires more budget and time. This paper reports on the integration of existing collaborative applications or computer supported cooperative work (CSCW) in order to support collaborative activities of organizations. This will meet their requirements at low cost. This is a part of our research towards investigating and developing an integrative framework for CSCW applications. It will be flexible enough to accommodate the various and varying needs of the organization community. We discuss different types of integration model and interoperability in CSCW and consider different models of CSCW systems. A framework for CSCW integration is presented. A methodology based on this framework is also proposed.
Author

Software Engineering; Systems Integration

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Extracting the Software Elements and Design Patterns from the Software Field

Ohki, Mikio; Kambayashi, Yasushi; ICEIS 2003; [2003], pp. 134-135; In English; See also 20040191598; Copyright; Avail: Other Sources

Deriving the class structure of object-oriented software has been studied intensively. We have proposed a methodology to divide the conceptual model used in the object-oriented analysis into basic elements, such as classes, attributes, methods, relations, and to define constraint characteristics and constructing operations on each element. In the methodology, we have applied the field theory in the quantum physics to software and proposed the software field concepts. Our thesis is that software is a kind of fields in which software elements, such as methods and attributes, interact each other to produce certain behavioral patterns. The methodology explains well the characteristics of class libraries. Once the software elements are extracted from the software field, the methodology allows constructing design patterns from the characteristics of the elements. Although we defined the extract operations to elicit the software elements, we failed to show that those operations have reasons and are correct. In order to overcome this problem, in this paper, we introduce the distribution functions to represent the software elements, and to formulate the interactions of the functions. Using the distribution functions and the interactions between them, we have succeeded to suggest how to extract the software elements from the software field, and how to derive the design patterns by using the characteristics of the extract elements. This paper first describes the basic concepts of the software field, and then introduces the distribution functions to represent the software elements. In the latter part of this paper describes that it is applicable to derive typical design patterns.
Author

Object-Oriented Programming; Patterns

20040200666 Porto Univ., Portugal

ICEIS 2004: Human-Computer Interaction

[2004]; 20 pp.; In English; 6th International Conference on Enterprise Information Systems, 14-17 Apr. 2004, Porto, Portugal; See also 20040200667 - 20040200714; Copyright; Avail: Other Sources; Abstract Only

Reports are presented from the 6th International Conference on Enterprise Information Systems, 2004. Main topic areas included: Databases and Information Systems Integration; Artificial Intelligence and Decision Support Systems; Information Systems Analysis and Specification; Software Agents and Internet Computing; and Human-Computer Interaction. This report only consists of reports from the Human-Computer Interaction topic area. Other topic areas are covered in separate reports from this conference.

CASI

Human-Computer Interface; Conferences; Software Engineering; Information Systems

20040200669 Porto Univ., Portugal

Heuristics Supporting Usable Authoring Tools

Kotze, Paula; Cloete, Elsabe; ICEIS 2004: Human-Computer Interaction; [2004], pp. 177; In English; See also 20040200666; Copyright; Avail: Other Sources

In the past few years since e-learning has gained momentum, the user profile of instructional authoring tools has also evolved It seems that commercial authoring products have not yet adapted to address all user groups, compelling lecturers who prepare e-learning materials to be impeded by their working environment, and as a result the materials do not meet the required quality. In this paper heuristics to design an authoring tool aimed at a specific user group, namely the ordinary lecturer, is described to enable subject-expert lecturers (not necessarily technically skilled) to create and reuse their own e-materials without undergoing intensive technical training. The significance of these heuristics lies in the fact that they provide method to overcome many of the complexities associated with the design of instructional authoring tools. Furthermore, tools developed according to these heuristics might enable institutions to cope with the universal design demands associated with e-learning without their e-learning programmes being delayed by the scarcity of professional instructional designers and instructional programmers

Author

Heuristic Methods; Software Development Tools; Education; Programmers

20040200671 Porto Univ., Portugal

Usability Heuristics for XML-Based Web Development

LopezBrugos, Jose A.; FernandezdeArriba, Marta; ICEIS 2004: Human-Computer Interaction; [2004], pp. 180-181; In English; See also 20040200666; Copyright; Avail: Other Sources

Heuristic evaluation is a usability engineering method for finding the usability problems in a user interface design. This paper discusses a set of rules to evaluate the level of usability of an XML-based Web site. Taking advantage that XML separates the contents of a document from its presentation, heuristics grouped by content and presentation are defined in an analogous way, allowing a suitable evaluation for that type of applications.

Author

Document Markup Languages; Heuristic Methods; Websites

20040200676 Porto Univ., Portugal

Usability Of Visual Data Mining Tools

Badjio, Edwige P. Fangseu; Poulet, Francois; ICEIS 2004: Human-Computer Interaction; [2004], pp. 187; In English; See also 20040200666; Copyright; Avail: Other Sources

Visual data mining is a field of research which needs knowledge from several domains: statistics, data analysis, machine learning, artificial intelligence, human-machine interfaces, data or information visualization. We are interested in visual data mining environment usability (man-machine interaction quality). This paper investigates how usability aspects can be incorporated in visual data mining environment so that usability can be taking into account during the design process of the tool without prototype evaluation tests which are time consuming at design stage. We have defined and we present here a sel of criteria for improving visual data mining tools usability.

Author

Data Mining; Man Machine Systems; Artificial Intelligence; Environmental Quality; Scientific Visualization

20040200677 Porto Univ., Portugal

Chat And Democracy For The Masses

Witfelt, Claus; ICEIS 2004: Human-Computer Interaction; [2004], pp. 187; In English; See also 20040200666; Copyright; Avail: Other Sources

The aim of the Danish research project 'Chat as a democratic media' was to investigate how chat can be used in democracy education in the Folkeskole (the Danish compulsory primary and lower secondary school). The results of the research project are presented and discussed.

Author

Research Projects; Education; Schools

20040200688 Porto Univ., Portugal

The Meeting of Gestalt and Cognitive Load Theories in Instructional Screen Design

Tuovinen, Juhani E.; Chang, Dempsey; ICEIS 2004: Human-Computer Interaction; [2004], pp. 177-178; In English; See also 20040200666; Copyright; Avail: Other Sources

Without doubt Gestalt Theory has formed an important basis for many aspects of educational visual screen design. Despite the familiarity many computer screen designers claim with it, Gestalt Theory is not a single small set of visual principles uniformly applied to by all designers. In fact, it appears that instructional visual design literature often deals with only a small set of Gestalt laws. Recently Gestalt literature was consulted to distill the most relevant Gestalt laws for educational visual screen design, resulting in eleven laws being identified. In this paper these laws are discussed in terms of the Cognitive Load Theory, (CLT), which has been used with considerable success to improve instructional design. The usefulness of the combined perspectives drawn from the Gestalt Theory and CLT for educational visual screen design were applied to the redesign of an instructional multimedia application, WoundCare, designed to teach nursing students wound management. The evaluation results were encouraging. Both the new design and the value of applying the eleven Gestalt laws and CLT principles to improve learning were strongly supported. However, many aspects of applying this combination of theories to educational interface design remain unclear and this forms a useful direction for future research.

Author

Education; Gestalt Theory; Computer Graphics; Human-Computer Interface

20040200689 Porto Univ., Portugal

Learning By Doing And Learning When Doing

Tschiedel, Bernd; Jantke, Klaus P.; Lange, Steffen; Grieser, Gunter; Grigoriev, Peter; Thalheim, Bernhard; ICEIS 2004: Human-Computer Interaction; [2004], pp. 178; In English; See also 20040200666; Copyright; Avail: Other Sources

In this paper, e-learning meets decision support in enterprises' business practice. This presentation is based on an on-line e-learning system named DaMiT for the domain of knowledge discovery and data mining. The DaMiT system was primarily developed for technology enhanced learning in German academia. It is now on the cusp of entering training on demand in enterprises. Stand-alone e-learning seems quite unrealistic and does not meet the needs of industries. It is very unlikely that employees fully loaded with work take a detour to study theories of whatever sort. More likely, they are willing to engage in studies whenever the need derives directly from their practical work. In those cases, they might even be willing to dive into theories. How to dovetail e-learning and enterprise business applications, such that both sides draw a proper benefit?

Author

Education; Industries; On-Line Systems

20040200691 Porto Univ., Portugal

Evaluating The Visual Manipulation With Cellular Automata-Like Algorithms

Saber, Mahmoud; Mirenkov, Nikolay; ICEIS 2004: Human-Computer Interaction; [2004], pp. 176; In English; See also 20040200666; Copyright; Avail: Other Sources

The Active Knowledge Studio group at the University of Aizu is studying, designing, and developing multimedia programming environments for various domains. One of the promising domains is the cellular automata where the global behavior of systems arises from the collective effect of many locally interacting, simple components. The cellular automata (CA) systems have a rich theoretical basis. They have also been used in a great variety of applications. A number of programming languages and environments have been developed to support the implementation of the CA models. However, these languages focus on computational and performance issues only, and do not pay enough attention to programming productivity, usability, understandability, and other aspects of software engineering. In this paper, we provide an outline of our

approach to manipulating such systems in a visual user-oriented environment. Then, we explain features of the environment, present case studies, and describe the results of evaluating our visual environment.
Author
Computer Programming; Domains; Multimedia; Programming Environments; Programming Languages; Algorithms; Automata Theory

20040200703 Porto Univ., Portugal
Modular Production Of Rich Digital Talking Books
Carrico, Luis; Guimaraes, Nuno; Serralheiro, Antonio; Trancoso, Isabel; Duarte, Carlos; ICEIS 2004: Human-Computer Interaction; [2004], pp. 183; In English; See also 20040200666; Copyright; Avail: Other Sources

This paper presents a framework for automatic production of rich Digital Talking Books (DTB). The production process converts existing audio tapes and OCR-based digitalization of text books into full-fledged, multiple synchronized, multimodal digital books. The framework deals with the content organization processes and User Interface definition. The first one identifies content units and its relations. The latter, based on abstract, yet DTB specific, pattern-based UI specifications, allow_ the definition of various forms of interaction and presentation, required by the diversity and constraints of targets users (e.g. visually impaired persons) and situations of use (e.g. learning). The framework also permits to balance the complexity and flexibility of the generated DTBS, in order to cope with the resources provided on the different execution platform.
Author
Analog to Digital Converters; Audio Tapes; Human-Computer Interface

20040200705 Porto Univ., Portugal
Collaborating To Improve ERP Usability
Topi, Heikki; Lucas, Wendy; Babaian, Tamara; ICEIS 2004: Human-Computer Interaction; [2004], pp. 187; In English; See also 20040200666; Copyright; Avail: Other Sources

Anecdotal evidence strongly suggests that enterprise resource planning (ERP) systems have unintuitive user interfaces that hinder usability, frustrate users, and ultimately interfere with their successful adoption and utilization in organizations. Despite the huge costs associated with poorly implemented systems, ERP usability has received little attention from the research community. It is our contention that existing theories on usability design and evaluation must be extended to address the unique challenges resulting from the size, complexity and integrated functionality of these industrial behemoths. This paper discusses collaboration theory as a potentially beneficial way to conceptualize the relationship between the user and the system and to provide a foundation on which interfaces can be developed that enhance user performance and satisfaction with ERP systems.
Author
Human-Computer Interface; Organizations; Costs

20040200706 Porto Univ., Portugal
Personalized Resource Discovery Searching Over Multiple Repository Types: Using User And Information Provider Profiling
Rousseau, Boris; Browne, Parisch; Malone, Paul; Foster, Paul; Mendis, Venura; ICEIS 2004: Human-Computer Interaction; [2004], pp. 185; In English; See also 20040200666; Copyright; Avail: Other Sources

The success of the Information Society, with the overabundance of online multimedia information, has become an obstacle for users to discover pertinent resources. For those users, the key is the refinement of resource discovery as the choice and complexity of available online content continues to grow. The work presented in this paper will address this issue by representing complex extensible user and information provider profiles and content metadata using XML (eXtensible Markup Language, 2000), and the provision of a middle canonical language to aid in learner-to-content matching, independent of the underlying metadata format. This approach can provide a federated search solution leading to personalise resource discovery based on user requirements and preferences, seamlessly searching over multiple repository types. The novelty of the work includes the complex extensible user profiles, information provider profiles, the canonical language and the federated search strategy. Although, the work presented is focused on E-Learning, the general ideas could be applied to any resource discovery or information retrieval system.
Author
Information Retrieval; User Requirements; Document Markup Languages; Multimedia

20040200708 Porto Univ., Portugal

Adaptive Web Search Based On Implicitly Constructed User Profile

Hatano, Kenji; Yoshikawa, Masatoshi; Uemura, Shunsuke; Sugiyama, Kazunari; ICEIS 2004: Human-Computer Interaction; [2004], pp. 186; In English; See also 20040200666; Copyright; Avail: Other Sources

It is getting more and more difficult for users to find the information they desire on the WWW (World Wide Web). Web search engines help users find useful information on the WWW. However, when the same query is submitted by different users, typical search engines return the same result irregardless of who submitted the query. Generally, each user has different information needs for his/her query. Therefore, the search result should be adapted to users with different information needs. In addition, not only personal computers but also mobile terminals such as cellular phones and PDAs are more common these days. Therefore, it is increasingly important to implement techniques which provide valuable information that satisfies each user's need for information on these devices. In this paper, we first propose several approaches to adapting search results according to each user's need for relevant information, and then verify the effectiveness of our proposed approaches. Experimental results show that more fine-grained search systems that adapt to a user's preferences can be achieved by constructing user profiles based on modified collaborative filtering.

Author

Information Retrieval; World Wide Web; Personal Computers

20040200741 NASA Ames Research Center, Moffett Field, CA, USA

On the Use of CAD-Native Predicates and Geometry in Surface Meshing

Aftosmis, M. J.; August 1999; 15 pp.; In English

Contract(s)/Grant(s): NAG3-2019; RTOP 522-31-12

Report No.(s): NASA/TM-1999-208782; NAS 1.15:1999-208782; A-99V0022; No Copyright; Avail: CASI; A03, Hardcopy

Several paradigms for accessing computer-aided design (CAD) geometry during surface meshing for computational fluid dynamics are discussed. File translation, inconsistent geometry engines, and nonnative point construction are all identified as sources of nonrobustness. The paper argues in favor of accessing CAD parts and assemblies in their native format, without translation, and for the use of CAD-native predicates and constructors in surface mesh generation. The discussion also emphasizes the importance of examining the computational requirements for exact evaluation of triangulation predicates during surface meshing.

Author

Computer Aided Design; Algorithms; Computational Fluid Dynamics; Grid Generation (Mathematics); Triangulation; Surface Geometry; Curves (Geometry)

20040200831 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

ICS, An Agent Mediated E-Commerce System: Ontologies Usage

Labidi, Sofiane; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 167; In English; See also 20040200825; Copyright; Avail: Other Sources

The Electronic Commerce has presented an exponential growth in relation to the number of users and amount of commercial transactions. Recent advances in Software Agent's technology allow agent-based electronic commerce where agents are entities acting autonomously (or semi-autonomously) on behalf of companies or people in negotiation into virtual environments. In this work, we propose the ICS (an Intelligent Commerce System) as a B2B E-Commerce system based on intelligent and mobile software agent's technology following the OMG MASIF standard. Three important features of ICS are emphasized here: the e-commerce lifecycle approach, the user modeling, and a proposed ontology for each phase of the lifecycle.

Author

Electronic Commerce; Software Engineering; Autonomy

20040200835 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

A Survey Of Knowledge Base Grid For Traditional Chinese Medicine

Xu, Jie-Feng; Wu, Zha-Chui; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 150; In English; See also 20040200825; Copyright; Avail: Other Sources

Knowledge base gird is a kind of grid, which takes many knowledge bases as its foundation and its knowledge sources.

All these knowledge sources follow a public ontology standard defined by standard organization. Knowledge base grid has its own specific domain knowledge, and so can be browsed at semantic level. It also supports correlative browse and knowledge discovery. In this paper, we introduce a generic knowledge base grid for Traditional Chinese Medicine. Its framework consists of three main parts: Virtual Open Knowledge Base, Knowledge Base Index, and Semantic Browser. We anatomize the implementation in detail. Furthermore, knowledge presentation and services of knowledge base grid are discussed.
Author
Data Mining; Knowledge Based Systems; Grid Generation (Mathematics)

20040200841 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
An Object Oriented Implementation Of Belief-Goal-Role Agents
Chainbi, Walid; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 154; In English; See also 20040200825; Copyright; Avail: Other Sources

One of the most driving forces behind multi-agent systems research and development is the Internet. Agents are populating the Internet at an increasingly rapid pace. Unfortunately, they are almost universally asocial. Accordingly, adequate agent concepts will be essential for agents in such open environment. To address this issue, we show in the first part of this paper that agents need to have communication concepts and organization concepts. We argue that instead of the usual approach of starting from a set of intentional states, the intentional structure should be deduced in terms of interaction. To this end, we come up with ontologies related 1:ocommunication and organization. The second part of this paper deals with a study which compares the agent paradigm to the object paradigm. We also show the capabilities as well as the limits of the object paradigm to deal with the agent paradigm. We illustrate our work with the well known prey/predator game.
Author
Internets; Systems Engineering; Object-Oriented Programming

20040200845 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Implementing An Internet-Based Voting: A Project Experience
Prosser, Alexander; Krimmer, Robert; Kofler, Robert; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 166; In English; See also 20040200825; Copyright; Avail: Other Sources

Worldwide research groups have developed remote electronic voting systems using several different approaches with no legal basis. In 2001 the Austrian Parliament passed a law allowing electronic votir7g with digital signatures for public elections. Besides these legal requirements, an algorithm has to solve the basic technical problem, of how to identify the user uniquely with still guaranteeing the anonymity of one's vote and further not to allow fraud by the election administration. In this paper the authors give an experience report on the implementation of the first phase of an algorithm that fulfills these requirements by strictly separating the registration from the vote submission phase.
Author
Algorithms; Internets; Remote Control; Voting

20040200848 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
A Mission-Based Multi-agent System For Internet Applications
Jayaputera, Glenn; Loke, Seng; Zaslavsky, Akady; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 146; In English; See also 20040200825; Copyright; Avail: Other Sources

Software agents have been one of the most active research areas in the last decade. As a result, new agent technologies and concepts are emerging. Mobile agent technology has been used in real life environments, such as on-line auctions, supply chain, information gatherings, etc. In most situations, mobile agents must be created and carefully crafted to work together almost from scratch. We believe that this is quite inefficient for application developers and users, and hence propose a system for generating and coordinating agents based on the notion of agent missions. The prototype system is called eHermes and its architecture and components are discussed in the paper.
Author
Applications Programs (Computers); On-Line Systems; Internets

20040200851 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Guardian Knowledge Farm Agents And Security Architectures: Web Services, XML, And Wireless Mappings

Hennessey, Britton; Hullur, Girish; McPherson, Mandy; Kelley, George; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 166-167; In English; See also 20040200825; Copyright; Avail: Other Sources

This paper merges the BDIP (beliefs, desires, intentions, and plans) rational agent model into the Jungian rational behavioral model. It also defines the key framework design dimensions and classified intelligences of knowledge farm network agents having the necessary know-how to function as trust and security guardians. The paper presents four practical example application mappings of the converged BDIP-Jungian framework into (1) seven design principles of computer systems security, (2) the web services security architecture, (3) the XML family systems security architecture, and (4) the wireless security architecture.

Author

Architecture (Computers); Design Analysis; Document Markup Languages; Computers

20040200857 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

An Internet Enabled Approach For MRO Models And Its Implementation

Kehoe, Dennis F.; Michaelides, Zenon; Pan, Peiyuan; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 156-157; In English; See also 20040200825; Copyright; Avail: Other Sources

This paper presents an Internet enabled approach for MRO applications based on the discussion on different MRO models and its implementation architectures. This approach is focused on using e-business philosophy and Internet technology to meet the requirements of MRO services. The proposed e-MRO models are framework techniques. Different system architectures for this new approach are described and available technologies for system implementation are also presented.

Author

Internets; Maintenance; Electronic Commerce

20040200859 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

GLI-BBS: A Groupware Based On Geographical Location Information For Field Workers

Sasaki, Tatsunori; Odashima, Naoki; Abe, Akihiro; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 168; In English; See also 20040200825; Copyright; Avail: Other Sources

Geographical Location Information (GLI)is information showing in which geographical position a person or an object is located. Using digital maps and digital photographs, we have developed a GLI-based Bulletin Board System (GLI-BBS), and we are promoting applications for various public works in local communities. Fieldworkers who participate in public works can use the GLI-BBS effectively to share information and to form mutual agreement. As examples of concrete GLI-BBS applications, a support system for road maintenance and management operations are taken up to examine important points in operation.

Author

Position (Location); Geographic Information Systems; Support Systems; Personnel

20040200861 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Towards a Secure Mobile Agent Based M-Commerce System

Zhang, Ning; Bamasak, Omaima; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 151; In English; See also 20040200825; Copyright; Avail: Other Sources

It is widely agreed that mobile agent technology, with its useful features, will provide the technical foundation fo_-future m-commerce applications, as it can overcome the wireless network limitations of limited bandwidth, frequent disconnections and mobile device's weaknesses. In order for mobile agents to be accepted as a primary technology for enabling m-commerce, proper security mechanisms must be developed to address the new security issues they bri,ng to the fore. The most challenging and difficult problem among them is the issue of protecting mobile agents against malicious hosts. Although, to the best of our knowledge, there is yet no general solution to this problem, mechanisms that provide effective protection against specific attacks from hostile hosts have been proposed. This paper has analysed the, security requirements for a mobile agent in the context of m-commerce, surveyed the related work in relation to the requirements specified, and suggested the development

of a framework that provides confidentiality of data carried by a mobile agent by using secret sharing scheme together with fair exchange and non-repudiation services.
Author
Security; Mobile Communication Systems; Commerce

20040200865 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Integration Of Object-Oriented Frameworks Having IDL And RPC-Based Communications
Mukherjee, Denath; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 143; In English; See also 20040200825; Copyright; Avail: Other Sources

This paper proposes a software architecture to unify disparate application frameworks that have Interface Definition Language (IDL) and RPC-based communication between client and server, thus enabling distributed computation using disparate frameworks. The architecture also demonstrates how multiple inheritance from classes belonging to disparate object-oriented frameworks is possible.
Author
Object-Oriented Programming; Architecture (Computers); Computer Programs

20040200868 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Collaborative Engineering Portal
Kumar, Krishna Kumar Ramalekshmi; Tay, Colin; Tan, Kheng Yeow; Chan, Steven; Li, Yong-Lin; Chin, Sai-Kong; Thant, Zin Myint; Chin, Sai Kong; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 150; In English; See also 20040200825; Copyright; Avail: Other Sources

The Collaborative Engineering Portal (CE-Portal) is envisioned to be a comprehensive state-of-the-art infrastructure for facilitating collaborative engineering over the Web. This system offers a Web-based collaborative use of High Performance Computing and Networking technology for product/process design that helps the enterprises to shorten design cycles. This platform allows government professionals and engineers to share information among themselves and to work together with their private counterparts as a virtual project team. The Collaborative Engineering portal is developed as a multi-tiered system implemented using VNC and other Java technologies. In conclusions, we analyze strengths, weaknesses, opportunities and threats of the approach.
Author
Computer Programs; Networks; Computation

20040200869 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
A Multi-Agent Architecture For Dynamic Collaborative Filtering
Uchyigit, Gulden; Clark, Keith; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 169; In English; See also 20040200825; Copyright; Avail: Other Sources

Collaborative Filtering systems suggest items to a user because it is highly rated by some other user with similar tastes. Although these systems are achieving great success on web based applications, the tremendous growth in the number of people using these applications require performing many recommendations per second for millions of users. Technologies are needed that can rapidly produce high quality recommendations for large community of users. In _Ihis paper we present an agent based approach to collaborative filtering where agents work on behalf of their users to form shared 'interest groups', which is a process of pre-clustering users based on their interest profiles. These groups are dynamically updated to reflect the user's evolving interests over time. We further present a multi-agent based simulation of the architecture as a means of evaluating the system.
Author
Architecture (Computers); Simulation; Computer Programs

20040200873 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
A New User-Oriented Model To Manage Multiple Digital Credentials
Oliveira, Jose; Silva, Augusto; Costa, Carlos; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 157; In English; See also 20040200825; Copyright; Avail: Other Sources

E-Commerce and Services are become a major commodity reality. Aspects like electronic identification, authentication and trust are core elements in referred web market areas. The use of electronic credentials and the adoption of a unique worldwide-accepted digital certificate stored in a smart card will provide a higher level of security while allowing total mobility with secure transactions over the web. While this adoption does not take place, the widespread use of digital credentials will inevitably lead to each service client having to be in possession of different electronic credentials needed for all the services he uses. We present a new approach that provides a user-oriented model to manage multiple electronic credential, based in utilization of only one smart card per user as a basis for secure management of web-based services, thus contributing for a more generalized use of the technology.
Author
Computer Information Security; Electronic Commerce; Cards

20040200874 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
A Design Process For Deploying B2B E-Commerce
Baghdadi, Youcef; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 153-154; In English; See also 20040200825; Copyright; Avail: Other Sources

This paper emphasizes on architecture and design process for developing applications to support B2B electronic commerce due to their growth and difference from other categories of e-commerce in many aspects, It first describes current architectures, reference models, approaches and implementing technologies: It then proposes an architecture with four abstraction levels: business process, decomposition and coordination, supporting electronic commerce services, implementing technology, and the interfaces between them. This abstraction aims to make B2B e-commerce process-driven not technology-driven. Thus making business process independent from the implementing technologies. Finally, a five-steps design process in accordance with this architecture is described.
Author
Electronic Commerce; Coordination; Deployment

20040200875 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Web Navigation Patterns
Marques, Eduardo; Garcia, Ana Cristina Bicharra; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 147-148; In English; See also 20040200825; Copyright; Avail: Other Sources

Many Internet service providers and online services require you to manually enter information, such as your user name and password, to establish a connection. With Scripting support for Dial-Up Networking, you can write a script to automate this process. A script is a text file that contains a series of commands, parameters, and expressions required by your Internet service provider or online service to establish the connection and use the service. You can use any text editor, such as Microsoft Notepad, to create a script file. Once you've created your script file, you can then assign it to a specific Dial-Up Networking connection by running the Dial-Up Scripting Tool.
Author
Communication Networks; Navigation; Computer Information Security; Internets

20040200878 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
E-Commerce Engineering: A Short Versus Long Software Process For The Development Of E-Commerce Applications
Andreou, Andreas; Mavromoustakos, Stephanos; Chrysostomou, Chrysostomos; Samaras, George; Pitsillides, Andreas; Schizas, Christos; Leonidou, Costas; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 160-161; In English; See also 20040200825; Copyright; Avail: Other Sources

The immediacy in developing e-commerce applications, the quality of the services offered by these systems and the need for continuous evolution are primary issues that must be fully analysed and understood prior and during the development process. In this context, the present work suggests a new development framework which aims at estimating the level of complexity a certain e-commerce system encompasses and driving the selection of a long or short software process in terms of time and effort. The proposed framework utilizes a special form of Business Process Re-engineering (BPR) to define and assess critical business and organizational factors within small-to-medium enterprises (SMEs) whishing to go e-commerce. This set of factors is enriched with other critical issues belonging to the quality requirements of the system and to the

application type of services it aspires to offer. The set of critical factors identified is used to estimate the average complexity level of the system using numerical values to describe the contribution of each factor to the overall complexity. The level of complexity estimated dictates the adoption of either a short or a long version of the well-known WebE process for analysing, designing and implementing the e-commerce system required by an SME.
Author
Electronic Commerce; Software Engineering; Computer Programming

20040200881 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Intelligent Software Agents In The Knowledge Economy
Raisinghani, Mahesh S.; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 174; In English; See also 20040200825; Copyright; Avail: Other Sources

Intelligent agent technology is emerging as one of the most important and rapidly advancing areas in information systems and e-business. There is a tremendous explosion in the development of agent-based applications in a variety of fields such as electronic commerce, supply chain management, resource allocation, intelligent manufacturing, industrial control, information retrieval and filtering, collaborative work, decision support, and computer games. While research on various aspects of intelligent agent technology and its application is progressing at a very fast pace, this is only the beginning. There are still a number of issues that have to be explored in terms of agent design, implementation, and deployment. For example, salient characteristics of agents in different domains, formal approaches for agent-oriented modeling, designing and implementing agent-oriented information systems, agent collaboration and coordination, and organizational impact of agent-based systems are some of the areas in need of further research. The purpose of this paper is to identify and explore the issues, opportunities, and solutions related to intelligent agent modeling, design, implementation, and deployment.
Author
Computer Programs; Commerce; Information Retrieval; Electronic Commerce

20040200882 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Learning User Profiles For Intelligent Search
Lops, Pasquale; Degemmis, Marco; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 165; In English; See also 20040200825; Copyright; Avail: Other Sources

The recent evolution of e-commerce emphasized the need for more and more receptive services to the unique and individual requests of users. Personalization has became an important strategy in Business to Consumer commerce, where a user explicitly wants the ecommerce site to consider his own information such as preferences in order to improve access to relevant products. By analyzing the information provided by a customer, his browsing and purchasing history, a personalization system could learn a customer's personal preferences and store them in a personal profile used to provide an intelligent search support. In this work, we propose a two-step profiles generation process: in the first step, the system learns coarse-grained profiles in which the preferences are the product categories the user is interested into. In the second step, the profiles are refined by a probabilistic model of each preferred product category, induced from the descriptions of the products the user likes. Experimental results demonstrate the effectiveness of the strategy proposed.
Author
Electronic Commerce; Searching; Grain Size

20040200886 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
One-To-One Personalization Of Web Applications Using a Graph Based Model
Sonneck, Georg; Mueck, Thomas; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 162; In English; See also 20040200825; Copyright; Avail: Other Sources

Due to the maturity of current web technology, a large fraction of non-technically oriented IT end users are confronted with increasingly complex web applications. Such applications should help these end users to fulfill their tasks in the most effective and efficient way. Out of this perspective there is little doubt that personalization issues play an important role in the era of web applications. Several approaches already exist to support so{-}called {\em Adaptive Hypermedia Systems}, i.e., systems which are able to adapt their output behaviour to different user categories. In this paper, we are focusing on those personalization and customization issues of web applications raised by task driven {\em user interaction} and give as example

the interaction patterns caused by different users of a financial advisor system. To achieve this goal we propose, in a first step, a graph{-}based model representing the logical structure of web applications, a fully extensible XML schema description modelling the structure of the nodes in the graph and a document type definition to store user profiles. In a second step, this basic model is augmented by process graphs corresponding to specific business tasks the web application can be used for, leading to a first form of personalization by assigning a user to a process task. We then show in a final step how matches between stored skills within the user profile and the node descriptions can lead to one{-}to{-}one personalization of the process graph.
Author
Document Markup Languages; Multimedia; Commerce

20040200887 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Collaborator: A Collaborative System For Heterogeneous Networks And Devices
Poggi, Agostino; Somacher, Matteo; Costicogiou, Socrates; Bergenti, Federico; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 162-163; In English; See also 20040200825; Copyright; Avail: Other Sources

This paper presents a software framework, called Collaborator, to provide a shared workspace supporting the activities of virtual teams. This system exploits seamless integration of standard Web technologies with agent technologies, enhancing the classic Web communication mechanisms to support synchronous sharing of applications, and its use through emerging technologies such as: third generation of mobile networks and terminals, and new generation of home appliances. The system presented in the paper is the main result of an on-going European research project Collaborator (IST-2000-30045) that aims at specifying and developing a software distributed environment to support efficient synchronous collaborative work between virtual teams, and will experiment such an environment in the construction and telecommunication working sectors.
Author
Systems Integration; Heterogeneity; Telecommunication; Computer Programs

20040200893 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Content Analysis Of Online Interrater Reliability Using The Transcript Reliability Cleaning Percentage (TRCP): A Software Engineering Case Study
Oriogun, Peter; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 142-143; In English; See also 20040200825; Copyright; Avail: Other Sources

In this paper the author presents a case study of online discourse by message unit using quantitative content analysis, with particular emphasis on the author's proposed interrater agreement percentage that will be referred to in this paper as Transcript Reliability Cleaning Percentage (TRCP). The paper will examine the ratings of participants' messages in terms of level of engagement within a negotiation forum in line with the author's Negotiated Incremental Architecture, Oriogun (2002) using the Win-Win Spiral Model, Boehm (1988). The variables that the author investigated are, participation, and interaction. The paper is divided into six sections, that will introduce the rationale for the study, a brief introduction to the Negotiated Incremental Architecture, followed by the study itself, we then define what we means by Transcripts Reliability Cleaning Percentage (TRCP) of online discourse using message unit, followed by the interpretation of individual participant's result and finally the author will conclude with, a recommendation of a follow-on paper, using our SQUAD approach to online posted messages. The SQUAD approach is a semi-structured categorisation of online messages. The paper also discusses the reasons why there has been very little research on interrater reliability with respect to content analysis of online discourse, furthermore, a comparison is made of Cohen's kappa value as reported in Rouke, Anderson, Garrison & Archer (2000) and the author's proposed Transcript Reliability Cleaning Percentage (TRCP). It is argued in this paper that the proposed Transcript Reliability Cleaning Percentage (TRCP) will better enhance interrater reliability (percentage agreement between coders) of the rating of online transcripts. The author is suggesting that it is not possible under certain circumstances to obtain 100% agreement between coders after discussion. However, the author noted that this was achieved by, Hara, Bonk & Angeli (2000).
Author
Software Engineering; Reliability; Quantitative Analysis; Computer Programming

20040200894 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
ArchCollect: A Set Of Components Towards Web Users' Interactions
Ferreira, Julio; Yano, Edgar; Sobral, Joao; Castro, Joubert; Garcia, Tiago; Pagliares, Rodrigo; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 143; In English; See also 20040200825; Copyright; Avail: Other Sources

This paper describes an example of a system that emphasizes web users' interactions, called ArchCollect. One JavaScript component and five Java components gather information coming only from the user, independing on the web application that will be monitored and on the web server used to support it. This improves the portability of this software and its capacity to deal with many web applications in a Data Center at the same time, for example. The ArchCollect relational model, which is composed by several tables, provides analyses, regarding factors such as purchases, business results, the length of time spent to serve eac,h interaction, user, process, service or product. In this software, data extraction and the data analysis are performed either by personalization mechanisms provided by internal algorithms, or by any commercial decision making tools focused on services, such as, OLAP, Data Mining and Statistics, or by both.
Author
Object-Oriented Programming; Data Mining; Decision Making; Algorithms; Computer Programs

20040200897 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
White Paper For Flow-agent Platform
Wang, Wen-Jun; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 145-146; In English; See also 20040200825; Copyright; Avail: Other Sources

Flow-Agent is the network platform to implement 'Streamline Bus' with Jini network technology. 'Streamline Bus' is trying to solve problems that prevent us to integrate different applications cross-enterprises/organizations; it realizes task-scheduling among different applications through pre-defined task data requiring/providing relations; it can provide automatically workload balance, dynamic fail over and run-time data/performance tracking. One critical issue of Flow-Agent platform is how to define the internal format for the task running/scheduling data, (1) let it provide the isolated applications the request data for running, as while (2) control the flow through the 'Streamline service'. Base on 'Streamline Bus', you can build large-scale scheduling systems, that integrates applications of different business fields. Systems based on 'Streamline Bus' are in full-distributed model, are very different from traditiona,1 'Workflow systems', which depend on centralized rule engine and has much limitations on the types of application can be integrated.
Author
Critical Flow; Scheduling; Workloads (Psychophysiology); Commerce; Applications Programs (Computers)

20040200898 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Towards the Enterprises Information Infrastructure Based on Components and Agents
Chi, Manuel; German, Ernesto; Alvarado, Matias; Sheremetov, Leonid; Contreras, Miguel; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 166; In English; See also 20040200825; Copyright; Avail: Other Sources

Information infrastructure as the mean to bring together software applications within the enterprise is the key component to enable cooperation, information and knowledge exchange in an open distributed environment. In this article, component and agent paradigms for the integration of virtual enterprises are analyzed and the advantages and drawbacks of the proposed solution are discussed. As an example of the infrastructure as an integration of the both technologies, a Component Agent Platform (CAP) that uses DCOM as a particular case of component model for its implementation is described. Finally, we discuss the interoperability issues of the proposed solution and outline the directions of the future work.
Author
Information Transfer; Software Engineering

20040200907 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Application Scenarios for Distributed Management Using SNMP Expressions
Lopes, Rui; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 171-172; In English; See also 20040200825; Copyright; Avail: Other Sources

Management distribution is an, we can say, old topic in terms of the number of proposed solutions and publications. Recently, the DISMAN workgroup suggested a set of MIB modules to address this matter in the context of SNMP. One of the DISMAN modules has the capability of using expressions to perform decentralized processing of management information - the Expression MIB. Although existing for some time now, its capabilities are not very well known. In fact, other DISMAN MIBs, such as the Schedule MIB and the Script MIB already got some attention in several papers and are target of very solid work. There are hardly any papers describing the Expression MIB and its functionality. This paper contributes to eliminate

this absence by describing our implementation effort around it as well as some real world applications for it.
Author
Information Management; Distributed Processing

20040201058 Naval Postgraduate School, Monterey, CA USA
Identifying and Analyzing Federal Government Market Opportunities for OpalSoft
MacGregor, Lee, Author; Greer, Joel, Author; Sep. 2004; 109 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427227; No Copyright; Avail: Defense Technical Information Center (DTIC)

The purpose of this MBA Project is to identify and analyze the Federal Government information technology services market to be used in OpalSoft's operational application. A general review of OpalSoft's current operations and strategy will be conducted. The core of the project will concentrate on the review and analysis of the federal government information technology services sector. This portion of the project will present regulatory mandates, data reviews and survey findings from various federal contracting organizations. These analytical insights should facilitate OpalSoft in achieving its future goals and objectives in this market. The endstate of this project is to supply OpalSoft with a greater understanding of the Federal Government market and to capitalize on opportunities that market presents.
DTIC
Identifying; Information Systems; Procurement; System Effectiveness; United States

20040201060 Naval Postgraduate School, Monterey, CA USA
Designing a Common Interchange Format for Unit Data Using the Command and Control Information Exchange Data Model (C2IEDM) and XSLT
Hodges, Glenn A., Author; Sep. 2004; 191 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427238; No Copyright; Avail: Defense Technical Information Center (DTIC)

A common problem between Military applications and operators is the consistent and meaningful exchange of data. Currently, several models and simulations exist for the purposes of training and analyzing military data. Due to the absence of an agreed-upon standard with which to represent unit data, much is lost during interchange and applications are not maximized. This thesis is a step towards a solution. Extensible Markup Language (XML) technology has been widely accepted as a standard for representing information in such a way that it is self-documenting, self-validating and platform independent. By using the Command and Control Information Exchange Data Model (C2IEDM), formerly known as Generic Hub, and XML it is possible to develop a representation of unit data that is extensible and broadly useable by tactical systems and human operators alike. This thesis approaches the problem exploring the Model Driven Architecture (MDA) and the Extensible Modeling Simulation Framework (XMSF) as possible overarching architectural concepts for a global solution. The C2IEDM is used as the core data interchange model for this research and applies XML technologies, schema and the Extensible Stylesheet Language for Transformations (XSLT) to derive a formatted data representation that is acceptable within the Flexible Asymmetric Simulation Technologies (FAST) Toolbox. The transformation example serves as template for other simulation programs to follow for interchange through the common base model. This thesis shows that by using a common data representation like C2IEDM coupled with the power of XML and XSLT, unit information can be transformed and interchanged between applications. In order to accomplish this, an extensive analysis is done on recently performed and ongoing research as well as the development of exemplars to show how the proposed process is completed.
DTIC
Architecture (Computers); Command and Control; Format

20040201062 Naval Postgraduate School, Monterey, CA USA
Code Maintenance and Design for a Visual Programming Language Graphical User Interface
Pierson, Graham C., Author; Sep. 2004; 179 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427242; No Copyright; Avail: Defense Technical Information Center (DTIC)

This work adds new functionality to an existing visual programming environment. It applies software maintenance techniques for use with the Java Language in a Microsoft Windows operating system environment. The previously undocumented application is intended to support programming with executable diagrams. This application has the potential to expand programming access to non-programmers, provide better software documentation and improve software maintainability. It is currently capable of supporting meta-programming tasks such as parsing and compiler building. The

11,184 legacy lines of code (LOC) were corrected, extended and documented to support future maintenance using an additional 957 LOC and changes to 45 LOC.
DTIC
Computer Programming; Graphical User Interface; Maintenance; Programming Languages

20040201065 Naval Postgraduate School, Monterey, CA USA
Shift and Duty Scheduling of Surgical Technicians in Naval Hospitals
Nurse, Nigel A., Author; Sep. 2004; 51 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427250; No Copyright; Avail: Defense Technical Information Center (DTIC)

Surgical technicians at Naval hospitals provide a host of services related to surgical procedures that include handing instruments to surgeons, assisting operating room nurses, prepping and cleaning operating rooms, and administrative duties. At the Naval Medical Center San Diego (NMCSD), there are 83 surgical technicians that must be scheduled for these duties. The three military and one civilian hospital interviewed for this thesis manually schedule these duties. Weaknesses of these manual schedules exposed during interviews at these hospitals include assignment inequities and the time needed to create them. This thesis reports on an optimization based and spreadsheet implemented tool developed to schedule surgical technicians for both daily and weekly duties at a Naval hospital. We demonstrate the tool for the surgical technician department at NMCSD. The schedules at NMCSD verify the utility of the developed tool and cite a drastic reduction in the time required to generate timely, equitable, and accurate schedules. The study also investigates historical operating room usage data and makes suggestions for improving scheduling practices based on these data.
DTIC
Hospitals; Scheduling; Spreadsheets

20040201070 Naval Postgraduate School, Monterey, CA USA
Prototype System for Detecting and Processing of IEEE 802.11g Signals
Kypriotis, Georgios, Author; Sep. 2004; 115 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427261; No Copyright; Avail: Defense Technical Information Center (DTIC)

On the modern battlefield, successful and fast communications is a critical issue. So the need for transmitting information in larger amounts through a military high-speed network increases. Thus the military is seeking viable and effective solutions that may fulfill these requirements in an operational environment. This thesis develops a prototype system based on appropriate low-cost software and hardware solutions. This system is able to detect, analyze and process wireless 802.11g signals. The evaluation of the newly designed system proved that it is effective up to distances of about 400 m with a low packet error rate and could be a useful tool for detecting wireless 802.11g networks. After evaluating the system, it was used for capturing wireless signals so that we would determine the effective transmission range and the data throughput of an 802.11g network. We determined that such a wireless network could be used in military operations because it offers high data rates up to 200 m, while it maintains a connection of the wireless clients for distances up to 400 m. In addition, the performance data collected can be used as guidelines for estimating the expected performance in an operational situation and can provide useful information for successful planning.
DTIC
Communication Networks; Computer Programs; Detection; Prototypes; Signal Processing; Telecommunication

20040201075 Army Research Lab., Aberdeen Proving Ground, MD USA
Parallel MuSES for Infrared Signature Modeling of U.S. Army Vehicles and Targets
Valisetty, Rama R., Author; Namburu, Raju R., Author; Petit, George, Author; Aug. 2004; 15 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427266; ARL-TR-3281; No Copyright; Avail: Defense Technical Information Center (DTIC)

The objective for this work is the parallelization of the Multiservice Electrooptical Signature (MuSES) code, a commercially available computer code for infrared signature modeling of U.S. Army vehicles and targets. During an earlier phase of development in 2002, the progress in this work included the following: (1) profiling of the code for identifying potential segments of thermal and radiation computations for parallelization, (2) selecting a normalization loop within the selective overrelaxation (SOR) iteration loop for parallelization by OpenMP, and (3) some results for the ZSU Quad 23 AA vehicle. The results indicated a scalability performance of some 55% reduction in wall clock computation time on eight processors. Since then, the following parallelization enhancements have been added to the code: (1) partial direct solution computation loop within the SOR iteration loop, (2) tri-diagonal solution computation loop within the SOR iteration loop, (3)

accelerated solution computation loop within the SOR iteration loop, and (4) routine ComputeRadNodeAveValues. The effectiveness of the enhanced code was evaluated on the previously mentioned ZSU tank, a Prius car, and the M2 Bradley Fighting Vehicle. As a result of the enhancements, the maximum performance improvement of the code increased to an average 72% reduction in the wall clock time on 16 processors for computing radiance in the IR range (3-4 micrometers, 8-12 micrometers). (3 tables, 5 figures)
DTIC
Combat; Computer Programming; Computerized Simulation; Infrared Radiation; Infrared Signatures; Parallel Processing (Computers); Signatures; Software Engineering; Targets

20040201076 Naval Postgraduate School, Monterey, CA USA
Utilization of Web Services to Improve Communication of Operational Information
Lowery, David, Author; Sep. 2004; 133 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427270; No Copyright; Avail: Defense Technical Information Center (DTIC)

Currently under development, the Global Information Grid (GIG) Enterprise Services (ES) is a suite of capabilities intended to provide improved user access to mission-critical data via Web-based and network technologies. Some of the problems of implementing such capabilities include non-uniform data formats, incompatible run-time environments and nonstandard proprietary applications, all of which block operational interoperability. Web services are specifically designed to address the interoperability challenges of a service-oriented architecture (SOA) such as the GIG. SOAs are networked infrastructures that are designed to facilitate the interoperability of collections of services without requiring service context awareness. Standards-based Web services provide the necessary flexibility and extensibility to ensure information flow is platform, run-time and software independent. The proof of concept (POC) software example developed for this research demonstrates the flexibility and extensibility of standards-based, operating-system-independent Web services. The result is an experimental endeavor to provide a mock operation command center information portal, which provides a notional summary personnel status report to the commander in real-time from a Web service that was originally generated by a stand-alone client/server system. The POC is developed with great attention to open-source technologies and open-standards compliance. The key technologies involved are Extensible Markup Language (XML), the Java programming language, PHP: Hypertext Preprocessor (PHP) scripting language and Simple Object Access Protocol (SOAP). This work demonstrates the benefits of leveraging Web services to unlock legacy specialized applications to enhance the Warfighter's battlespace awareness by improving information flow via a Web based information portal.
DTIC
Command and Control; Communication Networks; Computer Programming; Interprocessor Communication; Java (Programming Language); Programming Languages; User Requirements

20040201081 Naval Postgraduate School, Monterey, CA USA
Information Security and Wireless: Alternate Approaches for Controlling Access to Critical Information
Nandram, Winsome, Author; Sep. 2004; 91 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427280; No Copyright; Avail: Defense Technical Information Center (DTIC)

The advent of Wireless Local Area Networking (WLAN) has seen a widespread adoption of its technology and functionality in many different areas. Many studies show more and more organizations are extending their networks to incorporate wireless devices and their applications. Permitting wireless devices to access private networks however, further complicates the tasks of protecting the network and its resources from unauthorized access. Now that they have become a significant element in today's networks, selecting and deploying adequate security measures have become the focus of many research efforts. Typically, network managers implement countermeasures to augment security. The goal of this thesis is to research approaches that compliment existing security measures with fine grain access control measures. The Extensible Markup Language (XML) is adopted to accommodate such granular access control as it provides the mechanisms for scaling security down to the document content level.
DTIC
Military Technology; Security; Wireless Communication

20040201099 Naval Postgraduate School, Monterey, CA USA
A Real-Time Rope Model Suitable for Game Engine Usage
Garrido, Randy A., Author; Sep. 2004; 75 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427331; No Copyright; Avail: Defense Technical Information Center (DTIC)

This thesis attempts to lay a foundation for producing a real-time rope model suitable for game engine usage. The model presented here is only one of the many possible approaches in modeling a rope. The basic premise used was derived from Erkin Tunca's source code. The concept is then attempted on the Open Dynamics Engine (ODE) built by Russell Smith. This work shows promise but much still needs to be done. This thesis only scratches the surface on the subject. In addition, ODE is primarily designed for (articulated) rigid bodies. Therefore, the next step is to create a deformable body (the rope) in ODE.
DTIC
Computerized Simulation; Game Theory; Real Time Operation

20040201148 Pattern Analysis and Recognition Corp., Rome, NY USA
Extended Exploitation Toolkit for Video (EXTV)
Krol, John, Author; Manthey, Dan, Author; Sep. 2004; 52 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-02-C-0108; Proj-3480
Report No.(s): AD-A427402; AFRL-IF-RS-TR-2004-252; No Copyright; Avail: Defense Technical Information Center (DTIC)

A software toolkit for video data exploitation was developed under this project. This Extended exploitation Toolkit for Video (EXTV) provides the capability to display and manipulate DoD standard motion imagery (video) along with its metadata. It allows for the creation of NITF standard image products to include a video mosaic or captured frame. A unique video annotation capability was developed and demonstrated under this project. It allows for the creation of a non-destructive annotation layer which can be played over the video. An annotation standard was drafted and presented to the National Geospatial-Intelligence Agency's (NGA) Motion Imagery Standard Board (MISB). Upon further implementation and testing it is expected that this standard will be formally submitted to the MISB for recommendation as a DoD standard. These capabilities were realized through incorporation of EXTV into the Geo*View product. Geo*View is an AFRL and PAR Government Systems Corporation developed imagery viewer and metadata editor, which is JITO certified for NITF.
DTIC
Exploitation; Kits

20040201162 University of Southern California, Marina del Rey, CA USA
Semantic Interoperability Measure: Template-Based Assurance of Semantic Interoperability in Software Composition (TBASSCO)
Yao, Ke-Thia, Author; Neches, Robert, Author; Ko, In-Young, Author; MacGregor, Robert, Author; Sep. 2004; 20 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-00-2-0610; DARPA ORDER-K513; Proj-DASA
Report No.(s): AD-A427423; AFRL-IF-RS-TR-2004-263; No Copyright; Avail: Defense Technical Information Center (DTIC)

SIM-TBASSCO (semantic Interoperability Measures: Template-Based Assurance of Semantic Interoperability in Software Composition) addresses a longstanding software engineering goal of assembling software from components. Conventional approaches support composition up to a point, but cannot handle qualitative considerations in composition, such as implementation effort, performance, resource requirements, or reliability. SIM-TBASSCO helps software developers engage in guided, efficient searches and evaluations of the set of alternative system implementation that can be built with the components available to them. It will let developers evaluate components' functional and data equivalence compatibility and find pertinent data conversion mappings. During runtime SIM-TBASSCO helps system administrators monitor and gauge the health of system and enables them to perform dynamic reconfigurations to overcome bottlenecks/faults while preserving design time constraints.
DTIC
Computer Programming; Interoperability; Software Engineering; Templates

20040201163 Cycorp, Inc., Austin, TX USA
Disparate Ontology Understanding, Brokering, Linking, and Elaboration (DOUBLE)
Reed, Stephen, Author; Sep. 2004; 27 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-02-C-0021; Proj-DAML
Report No.(s): AD-A427424; AFRL-IF-RS-TR-2004-255; No Copyright; Avail: Defense Technical Information Center (DTIC)

The primary work under the 'Disparate Ontology Understanding, Brokering, Linking, and Elaboration (DOUBLE)' effort

is OpenCyc, the publication of an open-content version of Cycorp's upper ontology together with a freely distributable knowledge base store and deductive inference engine. OpenCyc is one of the largest and most comprehensive reference ontology for the Semantic Web. The other part of the effort consisted of developing an automatic web page annotator, that takes unstructured web page text as input; and outputs OWL statements corresponding to relationships between entities parsed from the text. This tool is intended to facilitate OWL adoption by automating the initial stages of the process and flattening the otherwise steep learning curve.
DTIC
Semantics

20040201201 University of Southern California, Marina del Rey, CA USA
Rapidly Building High-Performance Information Agents
Knoblock, Craig A., Author; Jul. 2004; 17 pp.; In English
Contract(s)/Grant(s): F49620-01-1-0053
Report No.(s): AD-A427498; AFRL-SR-AR-TR-04-0537; No Copyright; Avail: CASI; A03, Hardcopy

This research project addressed the problem of rapidly constructing high-performance information agents. In this work we made three significant advances. First, we developed a technique called Co-testing to address the problem of generating high accuracy wrappers to extract data from online sources. Second, we developed a method called speculation execution for improving the performance of streaming data flow execution systems used in information agents. Third, we developed a wizard-based approach to interactively and rapidly constructing information agents.
DTIC
Information Retrieval; Internets; On-Line Systems

20040201215 Army Engineer Research and Development Center, Vicksburg, MS USA
Development of the TI-01 Application Benchmark
Alter, Robert W., Author; Duffy, Daniel Q., Author; Fahey, Mark R., Author; Fahey, Rebecca A., Author; Hensley, Jeffrey L., Author; Aug. 2004; 99 pp.; In English
Contract(s)/Grant(s): DAHC94-96-C-0002
Report No.(s): AD-A427526; ERDC/ITL-TR-04-4; No Copyright; Avail: CASI; A05, Hardcopy

This report documents the design, construction and validation of the Technology Insertion 2001 (TI-01) application benchmark test package for the Department of Defense (DoD) High Performance Computing Modernization Program Office (HPCMPO). This test suite contained 12 application programs chosen to be representative of the DoD's HPC workload. The report justifies this claim of representativeness. On a given HPC system, each application program was typically tested using at least two sets of input data, and each program/input data test case was always tested at multiple numbers of processors. These tests were done in dedicated mode with no other applications on the system, so as to obtain a presumably 'best possible' performance. This collection of tests was repeated on five different HPC systems: a Cray T3E, an IHM POWEP2-based SP, and IBM POWER3-based SP, an SGI Origin 2000, and an SGI Origin 3800. Additionally, two throughput tests constructed to represent HPCMPO workloads were conducted. Again, the methodology used to obtain representativeness is described.
DTIC
Computer Programs

20040201217 Army Engineer Research and Development Center, Vicksburg, MS USA
Three-Dimensional Eutrophication Model of the Lower St. John River, Florida
Tillman, Dottie H., Author; Cerco, Carl F., Author; Noel, Mark R., Author; Martin, James L., Author; Hamrick, John, Author; Aug. 2004; 310 pp.; In English
Contract(s)/Grant(s): CRDA-02-EL-03
Report No.(s): AD-A427528; ERDC/EL-TR-04-13; No Copyright; Avail: CASI; A14, Hardcopy

The CE-QUAL-ICM three-dimensional eutrophication model was applied to the lower, estuarine, portion of the St. Johns River, Florida. Transport processes were obtained from the Environmental Fluid Dynamics Code. Model application period was December 1996 through November 1998. The model activated 28 state variables in the water column including physical variables, three algal groups, multiple forms of carbon, nitrogen, phosphorus and silica, and dissolved oxygen. Several features were added to the model for this application. These included representation of the internal algal phosphorus pool, distinction of labile and refractory dissolved organic matter, and representation of nitrogen fixation. The water column was coupled to a predictive sediment diagenesis model that computed sediment-water fluxes of dissolved oxygen, chemical oxygen demand,

ammonium, nitrate, phosphate, and silica, based on computed inputs of particulate organic matter. Model results were compared to an extensive suite of observations in the water column and benthic sediments.
DTIC
Eutrophication; Ocean Bottom; Rivers; Three Dimensional Models

20040201221 Naval Postgraduate School, Monterey, CA USA
Synthetic Vision: Visual Perception for Computer Generated Forces Using the Programmable Graphics Pipeline
Pursel, Eugene R., Author; Sep. 2004; 115 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427534; No Copyright; Avail: Defense Technical Information Center (DTIC)

In visual simulations, the human must make most of her decisions based on the visual cues rendered to her display. On the other hand, synthetic forces have the luxury of basing their decisions on the data contained in the simulation's model. Line of sight calculations are often examples of the synthetic player's excess of information. Current methodologies for determining a synthetic player's line of sight to a target are generally variations of a ray-casting technique. Hiding from a synthetic player in plain sight by using shadow, camouflage, or by simply remaining motionless is not possible. Synthetic vision is an alternative to ray-casting. We perform multiple renders from each synthetic player's point of view and temporarily maintain those images in graphics memory. We then execute vertex and fragment shader programs to make comparisons of the stored images. All the renders and calculations are performed on the Graphics Processing Unit (GPU) and the result is returned to the synthetic player in the form of an annotated list of visible targets. Performing these target visibility calculations on the GPU gives the synthetic player a more robust spectrum of visual inputs with which to make decisions, enabling more realistic behaviors.
DTIC
Artificial Intelligence; Detection; Enhanced Vision; Graphical User Interface; Pipelines; Ray Tracing; Target Acquisition; Virtual Reality; Visual Perception

20040201222 Naval Postgraduate School, Monterey, CA USA
Tactical Web Services: Using XML and Java Web Services to Conduct Real-Time Net-Centric Sonar Visualization
Rosetti, Scott, Author; Sep. 2004; 249 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427536; No Copyright; Avail: Defense Technical Information Center (DTIC)

With the unveiling of ForceNet, the Navy's architectural framework for how naval warfare is to be conducted in the information age, much of the technological focus has been placed on Web technology. One of the most promising technologies is Web services. Web services provide for a standard way to move and share data more reliably, securely, and quickly. The capabilities imbedded in Extensible Markup Language (XML) and Simple Object Access Protocol (SOAP) can merge previously disparate systems into one integrated environment. Already proven successful in the administrative realm, widearea networks such as the Secure Internet Protocol Network (SIPRNET) have become secure and reliable enough to pass data between systems and units to support tactical operations. The Modeling, Virtual Environments and Simulation (MOVES) Institute at the Naval Postgraduate School is currently working to extend these precepts into the modeling and simulation world under the Extensible Modeling and Simulation Framework (XMSF) project. By leveraging existing Web service technology, warfighters at the tip of the spear can have access to previously unrealized amounts of tactically-relevant data, analysis, and planning tools. The goal of this thesis is to apply the XMSF and Extensible 3D (X3D) graphics to the field of sonar visualization. Undersea warfare is a complex operation that requires a continuous and detailed analysis of the acoustic environment. Tactical sensor employment without a firm understanding of the complete undersea picture can lead to fatal consequences. By taking advantage of Web services and XMSF technology, warfighters will need only access to the network to be able to pull real-time environmental analysis data from large databases, remotely run sonar prediction models on supercomputers, and view detailed three-dimensional (3D) virtual worlds that visualize the undersea picture.
DTIC
Computerized Simulation; Document Markup Languages; Real Time Operation; Sonar; Warfare; Wide Area Networks

20040201223 Naval Postgraduate School, Monterey, CA USA
Implementing METOC Transformation: Applying Autonomous Agents
Vorrath, J., Author; Sep. 2004; 65 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427540; No Copyright; Avail: Defense Technical Information Center (DTIC)

To achieve integration of the Naval Meteorology and Oceanography (METOC) community into the developing FORCEnet environment, transformational innovations must be researched and implemented. Agent based software is an

example of technology that can be employed in this way by changing the method by which METOC data is distributed to end-users. This thesis documents the creation and implementation of a software agent that uses Internet connections to retrieve numerical model data, loads this output into array data containers, and then makes it available to the end-user in a machine-readable forecast object format. The impact of the importation of this forecast object into warfare commander command-and-control software is then assessed using the commercially available SEAWAY logistics tool. This assessment highlights the importance of defining the METOC functional requirements for the emerging FORCEnet environment, so that proper interfaces to exchange data freely, and visually depict it, are incorporated during next generation software development. Using these types of agents to automate the generation and delivery of weather parameters could also allow the importation of data into previously insular software, provide reach-back support to the warfighter, and be a means of reducing manpower and budgetary requirements during this time of fiscal constraint.
DTIC
Autonomy; Distributed Processing; Meteorological Parameters

20040201280 Black Rock Dynamics, Cornwell, NY USA
Upgrading the ATB Model Code from FORTRAN 77 to FORTRAN 90
Gardner, Thomas R., Author; Jul. 2004; 123 pp.; In English
Contract(s)/Grant(s): F33657-97-D-6004; Proj-7184
Report No.(s): AD-A427739; AFRL-HE-WP-TR-2004-0113; No Copyright; Avail: CASI; A06, Hardcopy

The Articulated Total Body (ATB) Model and its predecessors have been in use for over twenty-five years to study the effects of various force environments on the response of a multi-body subject. The ATB model has been used by both government and industry to study the effects of automobile crashes, aircraft ejections, and other accident scenarios. The applications of the ATB model have varied since its inception, and it is now commonly used for accident reconstruction, ergonomic simulations and a myriad of other situations where human body motion is modeled. The ATB Model was originally written in the FORTRAN IV (FORTRAN 66) programming language, but with time the code has gradually been modified to become essentially Fortran 77 compliant code. This modernization of the code has helped to reduce some of the clever coding logic originally employed to circumvent some of the hardware constraints of the earlier computers, such as purposely allowing arrays to overflow in adjacent memory locations to conserve memory space. With the increased use of the ATB model, it would be beneficial to have the program coded in a more modem modular format that is readily amenable to future enhancements. Such a modular version of the code would also easily interface with other programs, such FEM and aerodynamic codes, other dynamics codes, feedback control packages, graphics packages, and numerous other related codes. In addition, such a modular code would lend itself to faster debugging and reduce the potential for undetected errors. The Fortran 90 programming language was chosen as the upgrade path for the ATB Model code for a number of reasons. Since Fortran 90 is a superset of Fortran 77, any standard Fortran 77 code should run without modification.
DTIC
Fortran; Simulation

20040201286 Alabama Univ., Huntsville, AL USA
BST Graphics Platform
Dow, Stephen J., Author; Jul. 2004; 11 pp.; In English
Report No.(s): AD-A427758; 5-22005; No Copyright; Avail: CASI; A03, Hardcopy

The SED Basic Skills Trainers (BST), which display targets moving over a background terrain scene, use a layer of graphics software we call the graphics platform to deal with the low-level construction of each video frame. The graphics platform used in the trainers fielded to date was mostly developed in the late 1990s and has limited ability to handle dynamic effects such as atmospheric obscurants and cannot perform continuous zoom. To overcome these limitations the graphics platform has been considerably restructured.
DTIC
Architecture (Computers); Computer Graphics

20040201512 Nippon Telegraph and Telephone Public Corp., Atsugi, Japan
Representation of Reflection and Transparency by a Photorealistic 3D Capture System
Matsuoka, Hiroto; Takeuchi, Tatsuto; Harada, Ikuo; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 48-53; In English; See also 20040201509; Copyright; Avail: Other Sources

We have developed a fast fully automated system that can generate photorealistic three-dimensional computer graphics

data from a real object. A major factor in this success came from the findings of our psychophysical experiments, which revealed that human observers do not have an accurate idea of what should actually be reflected from the surface of an object. Utilizing this characteristic of human vision, we developed a rendering algorithm called Alpha Blending with Blurred Background for representing the reflection and transparency of real objects with less computational power. Since this rendering algorithm does not require object-shape data, the cost of object modeling is lower. The system can be applied to many areas, ranging from the rendering of virtual shopping malls for e-commerce to the creation of digital museums, and has many other potential uses.
Author
Computer Graphics; Algorithms; Three Dimensional Models; Human-Computer Interface; Virtual Reality

20040201585 Porto Univ., Portugal
ICEIS 2004: Databases and Information Systems Integration
[2004]; 46 pp.; In English; 6th International Conference on Enterprise Information Systems, 14-17 Apr. 2004, Porto, Portugal; See also 20040201586 - 20040201704; Copyright; Avail: Other Sources

Main topic areas include: (1) Databases and Information Systems Integration; (2) Artificial Intelligence and Decision Support Systems; (3) Information Systems Analysis and Specification; (4) Software Agents and Internet Computing; and (5) Human-Computer Interaction
Author
Data Bases; Systems Integration; Systems Analysis; Artificial Intelligence; Information Systems

20040201594 Porto Univ., Portugal
Transaction Concepts For Supporting Changes In Data Warehouses
Krolikowski, Zbyszko; Wrembel, Robert; Bebel, Bartosz; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 33; In English; See also 20040201585; Copyright; Avail: Other Sources

A data warehouse (DW) provides an information, from external data sources, for analytical processing, decision making, and data mining tools. External data sources are autonomous, i.e. they change over time, independently of a DW. Therefore, the structure and content of a DW has to be periodically synchronized with its external data sources. This synchronization concerns DW data as well as schema. Concurrent work of synchronizing processes and user queries may result in various anomalies. In order to tackle this problem we propose to apply a multiversion data warehouse and an advanced transaction mechanism to a DW synchronization.
Author
Data Mining; Data Processing; Information Systems; Autonomy

20040201595 Porto Univ., Portugal
OntoEditor: A Web Tool For Manipulating Ontologies Stored In Database Servers
deSouzaBaptista, Claudio; Vasconcelos, Karine Freitas; Schiel, Ulrich; Arruda, Ladjane; RodriguesdaSilva, Elvis; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 36-37; In English; See also 20040201585; Copyright; Avail: Other Sources

The Web is moving to a new generation in which machine-understandable processing is mandatory. In order to achieve this goal it is essential to define ontologies which enable the modeling of application domains and can be shared and understood by different applications in different platforms. These ontologies are complex and so it is necessary to provide software tools which aims to facilitate ontology manipulation. In this paper, we describe a new tool for ontology manipulation known as OntoEditor. OntoEditor is a Web tool, which has a graphical interface for representing an ontology graph. Moreover, OntoEditor uses a database management system for ontology persistecy and query manipulation. The ontologies are represented internally as RDF and RDF Schema.
Author
Data Base Management Systems; Data Bases; Domains; Software Development Tools

20040201596 Porto Univ., Portugal
Durative Events In Active Databases
Augusto, Juan Carlos; Gomez, Rodolfo; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 39; In English; See also 20040201585; Copyright; Avail: Other Sources

Active databases are DBMS which are able to detect certain events in the environment and trigger actions in consequence.

Event detection has been subject of much research, and a number of different event specification languages is extant. However, this is far from being a trivial or accomplished task. Most of these languages handle just instantaneous events, but it has been noticed that a number of situations arise where it would be interesting or even necessary to handle durative events. We elaborate on a given specification language which combines instantaneous and durative events, revealing some issues which must be taken into account when the semantics of event composition is defined.
Author
Data Bases; Actuators; Semantics

20040201599 Porto Univ., Portugal
InfoFlex: Flexible And Distributed Content Management. Using Web Services And Semantic Web To Manage Content
Perez, Antonio Hernandez; Flores, Tomas Nogales; Mateos, David Rodriguez; Fernandez, Luis Sanchez; Fisteus, Jesus Arias; Garcia, Norberto Fernandez; Lugo, Jesus Villamor; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 43; In English; See also 20040201585; Copyright; Avail: Other Sources

The development of information and communication technologies and the expansion of the Internet means that nowadays there are huge amounts of information available via these emergent media. The need to manage such information, which was in the past stored on paper media, has become apparent in different fields. A number of content management systems have appeared which aim to achieve this task. Most of these systems are oriented towards Web publishing on a central site, and they do not support collaboration among several, distributed sources of managed content. In this paper we present a proposal for an architecture for the efficient and flexible management of distributed systems.
Author
Internets; Management Systems; Distributed Processing

20040201601 Porto Univ., Portugal
Real-Time Databases For Sensor Networks
Perkusich, Maria Ligia Barbosa; Neto, Pedro Fernandes Ribeiro; Perkusich, Angelo; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 37; In English; See also 20040201585; Copyright; Avail: Other Sources

In the last years, the demand of embedded systems has been increased. Also, due to the increasing competition among different kind of companies, such as cellular phone, automobiles and industrial automation, the requirements for such system,, are getting more complex. However, the data storage and processing techniques, for these environments, are insufficient for the new requirements. In this paper, we develop a model for the integration of real-time database technology with an embedded sensor network systems, to tackle such deficiencies.
Author
Real Time Operation; Data Bases; Data Storage

20040201602 Porto Univ., Portugal
Referencial Integrity Model For XmL Data Integrated From Heterogeneous Databases Systems
Ferrandin, Mauri; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 37; In English; See also 20040201585; Copyright; Avail: Other Sources

This article presents a proposal for maintenance of the referential integrity in data integrated from relational heterogeneous databases stored in XML materialized views. The core idea is the creation of a rules repository that will have to be observed t(if carrying through any operation of update in the mediating layer of a system for integration of heterogeneous relational sources of data to guarantee that the, updates carried through in the data stored in this layer can be propagated to the relational databases that are part of the system integrated without causing problem of referential integrity in the same ones. This proposal has as main objective to specify a mechanism capable to guarantee that the data after exported from the relational heterogeneous databases in a mediating layer, continue respecting the same integrity which these were submitted in the origin databases.
Author
Maintenance; Document Markup Languages; Data Systems; Systems Integration

20040201604 Porto Univ., Portugal
Supporting Knowledge Reuse During The Software Maintenance Process Through Agents
Piattini, Mario; Vizcaino, Aurora; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 3; In English; See also 20040201585; Copyright; Avail: Other Sources

Knowledge management has become an important topic as organisations wish to take advantage of the information that they produce and that can be brought to bear on important decisions. This work describes a system to manage and reuse the information (and knowledge) generated during the software maintenance process, which consumes a large part of the software lifecycle costs. The architecture of the system is formed of a set of agent communities. Each community manages different types of knowledge. The communities' agents have the goal of encouraging the reuse of good solutions and taking advantage of information obtained from previous experience. In consequence, the software maintenance is made easier and there are less costs and effort. To achieve this goal, agents use several reasoning techniques such as case based reasoning or decision tree based algorithms which allow them to generate new knowledge from the information that they manage.
Author
Software Development Tools; Maintenance; Decision Theory; Information Management

20040201607 Porto Univ., Portugal
Towards Design Rationales Of Software Confederations
Zernlicka, Michal; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 34; In English; See also 20040201585; Copyright; Avail: Other Sources

The paper discuss reasons why service-oriented architecture is a new software paradigm and the consequences of this fact for the design of enterprise information systems. It is shown that such systems called confederations need not (should not) use web services in the sense of W3C which are more or less a necessity in e-commerce. As business processes supported by enterprise systems must be supervised by businessmen, the same must hold for communication inside confederations. It implies that the interfaces of the services must be user-oriented (user-frendly). It has positive consequences for the software engineering properties of the confederation. Confederations should sometimes include parts based on a difficult implementation philosophy (e.g. data orientation). Pros and cons of it are discussed. Open issues of service orientation are presented.
Author
Computer Programming; Electronic Commerce; Information Systems

20040201608 Porto Univ., Portugal
Version Management For Data Warehouse Evolution
Schlottgen, Alexandre; Edelweiss, Nina; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 34-35; In English; See also 20040201585; Copyright; Avail: Other Sources

Various multidimensional data models were proposed in the last years for Data Warehouse (DW) modeling. However, there is a considerable shortage of models that deal with DW schema evolutions. In order to understand the DW life cycle and guarantee the correct and consistent maintenance of the populated data, it is necessary to control the modifications made at multidimensional schemata. This article studies the DW schema modification operations, presenting an extension to ME/R (Multidimensional Entity Relationship Model) to support the multiple versions management of DW schemata.
Author
Data Bases; Management Information Systems

20040201609 Porto Univ., Portugal
A Responsibility-Driven Architecture For Mobile Enterprise Applications
Mahmoud, Qusay; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 35; In English; See also 20040201585; Copyright; Avail: Other Sources

This paper deals with wireless applications that get downloaded, over the air, on handheld wireless devices and get executed there. Once running, they may need to interact with applications residing on remote wired servers. The motivation for this work is provided in part by the characteristics of the wireless computing environment. There are several implications of these characteristics that require a software architecture that reduces the load on the wireless link and supports disconnected operations. We present a responsibility-driven architecture that enables mobile thin-clients to interact with enterprise servers. We extend this architecture with mobile agent to reduce the load on the wireless link and support disconnected operations. This architecture is capable of supporting multiple devices with or without a client browser.
Author
Architecture (Computers); Wireless Communication

20040201610 Porto Univ., Portugal

Proposal For Automating The Generation Process Of Questionnaires To Measure The Satisfaction Level Of Software Users

Lund, Maria Ines; Zapata, Sergio; Paparo, Mauro; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 36; In English; See also 20040201585; Copyright; Avail: Other Sources

The most recent concepts on softwap'e quality take into account the factors of product quality, process quality and the satisfaction level of users. Therefore when putting forth a plan for improving a software product, special attention should be paid as to incorporate the level of users' satisfaction into the development premises. On this latter respect, well-designed surveys have proven to be a valuable tool to obtain and measure satisfaction variables. The survey-based strategies, however, present a drawback on the fact that the tasks involved in questionnaire generation are difficult to automate, which renders the entire approach almost impracticable. This work presents a proposal for automating the various stages defined in questionnaire generation, with the aim at making the measurement method be both applicable and more practical.

Author

Computer Programs; Surveys

20040201617 Porto Univ., Portugal

Knowledge Transfer to and Among End-Users in Pre-Packaged Enterprise Application Software Implementation: An Exploratory Study of the Roles of Communities of Practice

Tanamal, Jimmy; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 23; In English; See also 20040201585; Copyright; Avail: Other Sources

This paper is concerned with the roles of Communities of Practice (CoPs) in knowledge transfer during the implementation of a particular IT artefact, i.e. the Pre-packaged Enterprise Application Software (PEAS) or also known as Enterprise Resource Planning (ERP) software. Using an in-depth longitudinal case-study across different stages of a Financial PEAS implementation in a large Australian university, we assess the effectiveness and applicability of the practices of CoPs for transferring the PEAS knowledge to and among end-users. The key finding of this paper is that CoPs can be utilized to enhance knowledge transfer for a better PEAS implementation result. Our findings also indicate that CoPs can be assigned to steward this dynamic PEAS knowledge in its most updated version among the very people who are its owners.

Author

Applications Programs (Computers); Procedures; Security; Knowledge

20040201619 Porto Univ., Portugal

Efficient Querying Of Transformed XML Documents

Birkenheuer, Georg; Boettcher, Stefan; Groppe, Sven; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 28; In English; See also 20040201585; Copyright; Avail: Other Sources

An application using XML for data representation requires the transformation of XML data if the application accesses XML data of other applications, or of a global database using another XML format. The common approach transforms entire XML documents from one format into another e.g. by using an XSLT stylesheet. The application can then work locally on a copy of the original document transformed in the application-specific format. Different from the common approach, we use an XSLT stylesheet in order to transform a given XPath query such that we retrieve and transform only that part of the XML document which is sufficient to answer the given query. Among other things, our approach avoids problems of replication, saves processing time and in distributed scenarios, transportation costs. Experimental results of a prototype prove that our approach is scalable and efficient.

Author

Transformations (Mathematics); Data Bases; Document Markup Languages

20040201623 Porto Univ., Portugal

The Concept and Implementation of the Market Place e-utilities.com

Dimassi, Jamil; Souveyet, Carine; Rolland, Colette; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 13; In English; See also 20040201585; Copyright; Avail: Other Sources

In order to remain competitive in a deregulated environment, a group of European Utilities developed a prototype of a single Marketplace called e-utilities.com whose mandate is a clear customer centric orientation in the European environment

for a successful mid-term multi-utility business via the Web. This paper highlights the concept of e-utilities.com and its implementation in a Web portal.
Author
Commerce; Utilities; Europe

20040201627 Porto Univ., Portugal
Rapid XML Database Application Development
Norvag, Kjetil; Schmidt, Albrecht; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 18; In English; See also 20040201585; Copyright; Avail: Other Sources

This paper proposes a rapid prototyping framework for XML database application development. By splitting up the development process into several refinement steps while keeping the application programming interface stable, the framework aims at rapid implementation of a prototype with a well-defined interface and a subsequent implementation of more advanced concepts like business rules in several steps. The refinement process takes the form of incrementally adding domain-specific information to the application. This is achieved by transgressing from general-purpose XML tools that do not support the definition and enforcement of constraints to frameworks that support domain-specific models and constraints such as E/R modeling. We have employed this method in the development of an example application, and we give performance numbers that illustrate the incremental improvements of each step.
Author
Data Bases; Rapid Prototyping; Software Engineering; Document Markup Languages

20040201628 Porto Univ., Portugal
Software Product Line Analysis of Enterprise Information System
Capretz, Luiz Fernando; Ahmed, Faheem; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 10; In English; See also 20040201585; Copyright; Avail: Other Sources

Now a days geographical and physical constraint that allowed only for fixed and static placements of resources has vanished completely within an enterprise utilizing the concept of information technology to integrate their business needs. The object oriented programming approach has paved a way to reusability of components thus reducing cost and development efforts up to certain extend. Software product line has further strengthened the concept of reusability, and component-based architecture. In this paper we have analyzed the concept of Software Product Line Analysis for an Enterprise Information System which will help to construct a Software Product Line within the organization to produce high quality software product in order to fulfill the information technology requirements of the organization.
Author
Software Engineering; Information Systems

20040201646 Porto Univ., Portugal
WISH Query Composer
Butler, Gregory; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 26-27; In English; See also 20040201585; Copyright; Avail: Other Sources

The WISH (With Intuitive Search Help) Query Composer is a software tool for composing form-based queries and their associated reports for relational databases. It incorporates the SQL and XML industry standards to generate user-friendly customizable queries and reports. It uses the very simple but flexible XML semantics to represent database schemas, SQL queries and result datasets, regardless of in which relational database management system (RDBMS) the data is stored. The tool is developed in the Eclipse development environment using the Java programming language with Swing components, and connects to the database through Java Database Connectivity (JDBC). The Java Architecture for XML Binding (JAXB) is used to automate the mapping between XML documents and Java objects.
Author
Software Development Tools; Information Retrieval; Relational Data Bases

20040201652 Porto Univ., Portugal
Deploying a Supply Chain Portal To Transform Military Operations
Sullivan, Robert; Boyson, Sandor; Stevens, Robert; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 44; In English; See also 20040201585; Copyright; Avail: Other Sources

This short paper addresses the challenges and anticipated benefits of building and deploying a comprehensive end to end

supply chain technology infrastructure for the U.S. Army, layering a portal, middleware, collaborative planning and forecasting applications and integrated ERP software in a rapid deployment process. As noted by Boyson and Corsi a supply chain portal can 'harness diverse real time data sources to: -provide a unified format and middleware platform for legacy, enterprise and internet data -personalize views based on user requirements and access classifications -distribute field-based data gathered from scanners, PDA devices and other information appliances to multiple users in real time over the portal Thus, the portal provides a unifying structure allowing a single shared database to coordinate all the transactions within the organization as well as the transactions between the organization and its trading partners in real time'
Author
Applications Programs (Computers); Real Time Operation; Data Bases; Classifications; User Requirements

20040201655 Porto Univ., Portugal
A Framework For On-Demand Integration Of Enterprise Data Sources
Niemi, Tapio; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 42; In English; See also 20040201585; Copyright; Avail: Other Sources

Deploying a data warehouse system in a company is usually an expensive and risky investment. Constructing a data warehouse is a large project that can take very long time. However, a company cannot know in advance exactly what benefits a data warehouse will offer, nor is it easy to predict kind of functionality it should be able to support to be usable in an event where company's processes or structures are changed. Due to these reasons, in many cases data warehousing projects hav_ either been abandoned or been shown to be at least partial failures. We propose a new method by providing a platform to implement business intelligence systems on. The basic idea is to construct the analysis database (i.e. an OLAP cube) on demand and only include the data th;at is needed for the analysis at hand from the operational databases. In this way the data is always up-to-date, suitable for the current analysis, and some of the biggest risks associated with data warehouse systems can be avoided. The computational costs related to the cube construction are likely to remain at acceptable level, since only the relevant part of the data for the current analysis is needed from operational databases. Moreover, business intelligence systems, like OLAP, are traditionally limited to the data stored in the data warehouse of the company. In many cases this is not enough since the phenomenon under analysis can be dependent on something outside the scope of the company. For example, the oil price or the weather can have a remarkable effect on business. If a decision support system can not have access to this kind of external data, the analysis cannot find the right explanation for the problem. The proposed method enables the user performing the analysis to include external data to the OLAP cube. We outline the use of Grid technologies - research field closely related to Internet computing - in the implementation to offer a cost-effective way to harness enough computing power used on parallel processing and sufficient security infrastructure (GSI). Another aspect of the Grid is that due to its potential to offer large amounts of storage capacity in a way that optimally leverages the advances in price/capacity ratio of new storage devices, it is possible to retrieve also archived transactional data in transparent manner. To deal with heterogenous data sources the XML language with XSL transformations is applied.
Author
Data Bases; Data Systems; Parallel Processing (Computers); Programming Languages; Document Markup Languages; Decision Support Systems

20040201656 Porto Univ., Portugal
A Method Based On Chaotic And Fractal Control For Software Quality: An Experience
Zhang, Kai; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 30-31; In English; See also 20040201585; Copyright; Avail: Other Sources

Despite the fact that great efforts have been made, there still have been major software problems unsolved, such as overtime and low quality. The chaotic and fractal have become a focal research field recent years, but there are only two papers to study the software quality by chaos tool. The purpose of this paper is to explore an approach how to early control software quality by the chaotic and fractal tools. After the analysis for the growing process of the software defects, the authors believe that the software defect growth has chaotic fractal characteristic, and design a method based on the chaotic and fractal control for process management of software quality. Two experiments have testified to the control efficiency.
Author
Chaos; Fractals; Computer Systems Programs

20040201657 Porto Univ., Portugal
DM-XIDS: An Application-Layer Router Of Incoming XML Streams
Gui, Hao; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 19; In English; See also 20040201585; Copyright; Avail: Other Sources

With the explosion of the information on the Internet and the widely use of the XML as a data exchange media, more and more information application can communicate with each other and deliver data of large volume in a continuous streaming. This trend has led to the emergence of novel concepts in data acquisition, integration, exchange, management and access. In this paper, we propose middleware architecture on XML streams information dissemination and design a prototype DM-XIDS as an applicable extension to our traditional database management system (named DM). Friendly graphical user interface is developed to efficiently generate and manage the diverse information subscriptions, which are described as queries in XPath. Effective algorithm is adopted to filter and match the ad hoc segment in the whole document. Automata-based query filtering mechanism will successfully implement the selection of data according to the queries in regular path expression that may include both nested path declaration and value predicate. Dedicated architecture is designed to accomplish our goals to dynamically direct the incoming XML data-stream from a static collection of information into a specific physically or logically distributed database environment. As a middleware of our database system, DM-XlDS presents a novel concept of an application-layer information router with additional administrative functions, which builds bridges between the XML stream source and the underlying data storage conforming to the pre-customized strategy.
Author
Applications Programs (Computers); Data Base Management Systems; Document Markup Languages; Information Management; Information Dissemination

20040201660 Porto Univ., Portugal
An Approach For Schema Evolution In ODMG Databases
Negrete, Cecilia Delgado; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 20; In English; See also 20040201585; Copyright; Avail: Other Sources

Schema evolution is the process of applying changes to a schema in a consistent way and propagating these changes to the instances while the database is in operation. However, when a database is shared by many users, updates to the database schema are always difficult. To overcome this problem, in this paper we propose a version mechanism for schema evolution in ODMG databases that preserves old schemas for continued support of existing programs running on the shared database when schema changes are produced. Our approach uses external schema definition techniques and is based on the fact that if a schema change is requested on an external schema, rather than modifying the schema, a new schema, which reflects the semantics of the schema change, is defined.
CASI
Data Bases; Semantics; Data Base Management Systems

20040201663 Porto Univ., Portugal
Enhancing the Success Ratio of Distributed Real-Time Nested Transactions
Abdouli, Majed; Sadeg, Bruno; Amanton, Laurent; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 17; In English; See also 20040201585; Copyright; Avail: Other Sources

The traditional transaction models are not suited to real-time database systems RTDBSs. Indeed, many current applications managed by these systems necessitate a kind of transactions where some of the ACID properties must be ignored or adapted. In this paper, we propose a real-time concurrency control protocol and an adaptation of the Two-Phase Commit Protocol based on the nested transaction model where a nested transaction is viewed as a collection of both essential and non-essential subtransactions: the essential subtransaction has a firm2 deadline, and the non-essential one has a soft3 deadline. We show through simulation results, how our protocol, based on this assumption, allows better concurrency between transactions and between subtransactions of the same transaction, enhancing then the success ration4 and the RTDBS performances, i.e.,more transaction may meet their deadline.
Author
Protocol (Computers); Data Bases; Real Time Operation

20040201666 Porto Univ., Portugal
RJDBC: A Simple Database Replication Engine
Peidro, Javier Esparza; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 33-34; In English; See also 20040201585; Copyright; Avail: Other Sources

Providing fault tolerant services is a key question among many services manufacturers. Thus, enterprises usually acquire complex and expensive replication engines. This paper offers an interesting choice to organizations which can not afford such costs. RJDBC stands for a simple, easy to install middleware, placed between the application and the database management

system, intercepting all database operations and forwarding them among all the replicas of the system. However, from the point of view of the application, the database management system is accessed directly, so that RJDBC is able to supply replication capabilities in a transparent way. Such solution provides acceptable results in clustered configurations. This paper describes the architecture of the solution and some significant results.
Author
Applications Programs (Computers); Data Base Management Systems; Interception; Data Bases; Fault Tolerance

20040201669 Porto Univ., Portugal
An Alternative Approach For Building Web-Applications
Rostanin, Oleg; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 33; In English; See also 20040201585; Copyright; Avail: Other Sources

Nowadays in J2EE-world there is a lot of blueprints, articles and books that propose some recommendations, recipes and patterns for producing web-applications in right way. There are also ready decisions like Jakarta Struts that can be taken as a base of a new project development. While developing the DaMiT e-learning system we tried to collect, analyse and implement many of the architectural features being proposed as well as to invent some new mechanisms such as supporting multiple kinds of client software or introducing XML-based interfaces between application tiers.
Author
Document Markup Languages; Blueprints; Architecture (Computers)

20040201670 Porto Univ., Portugal
Memory Management For Large Scale Data Stream Recorders
Zimmermann, Roger; Fu, Kun; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 38; In English; See also 20040201585; Copyright; Avail: Other Sources

Presently, digital continuous media (CM) are well established as an integral part of many applications. In recent years, a considerable amount of research has,focused on the efficient retrieval of such media. Scant attention has been paid to server: that can record such streams in real time. However, more and more devices produce direct digital output streams. Hence, the need arises to capture and store these streams with an efficient data stream recorder that can handle both recording and playback of many streams simultaneously and provide a central repository for all data. In this report we investigate memory management in the context of large scale data stream recorders. We are especially interested in finding the minimal buffer space needed that still provides adequate resources with varying workloads. We show that computing the minimal memory is an NP-complete problem and will require further research to find efficient heuristics.
Author
Data Flow Analysis; Real Time Operation; Memory (Computers); Heuristic Methods

20040201671 Porto Univ., Portugal
Converting Legacy Relational Database Into XML Database Through Reverse Engineering
Lo, Anthony; Alhaji, Reda; Barker, Ken; Wang, Chun-Yan; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 38; In English; See also 20040201585; Copyright; Avail: Other Sources

XML (eXtensible Markup Language) has emerged and is being gradually accepted as the standard for data interchange over the Internet. Since most data is currently stored in relational database systems, the problem of converting relational data into XML assumes special significance. Many researchers have already done some accomplishments in this direction. They mainly focus on finding XML schema (e.g., DTD, XML-Schema, and RELAX) that best describes a given relational database with a corresponding well-defined database catalog that contains all information about tables, keys and constraints. However, not all existing databases can provide the required catalog information. Therefore, these applications do not work well for legacy relational database systems that were developed following the logical relational database design methodology, without being based on any commercial DBMS, and hence do-not provide well-defined metadata files describing the database structure and constraints. In this paper, we address this issue by first applying the reverse engineering approach to extract the ER (Extended Entity Relationship) model from a legacy relational database, then convert the ER to XML Schema. The proposed approach is capable of reflecting the relational schema flexibility into XML schema by considering the mapping of binary and nary relationships. We have implemented a first prototype and the initial experimental results are very encouraging demonstrating the applicability and effectiveness of the proposed approach.
Author
Document Markup Languages; Extraction; Metadata

20040201672 Porto Univ., Portugal

Model Based Middleware Integration

Seyler, Frederick; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 37; In English; See also 20040201585; Copyright; Avail: Other Sources

In this paper, we describe a process and a meta model that we are defining for the reuse of legacy based systems. This aims at filing the gap between design level bridges and the implementation of interoperability. Our proposal is a component based integration process, a metamodel based on well known component research results and a reuse architecture allowing an operational integration of legacy applications. The metamodel, called Ugatze is composed by a set of UML packages covering multiple Viewpoints of the reuse activity. Ugatze is the Basque name for the Bearded Vulture, it reuses bones of death animal.. to eat, and its re-integration in Basque Country seems to be difficult, but it is a challenge.

Author

Applications Programs (Computers); Interoperability

20040201673 Porto Univ., Portugal

Retro-Dynamics And E-Business Model Application For Distributed Data Mining Using Mobile Agents

Medhat, Mohamed; Ariwa, Ezendu; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 3; In English; See also 20040201585; Copyright; Avail: Other Sources

Distributed data mining (DDM) is the semi-automatic pattern extraction of distributed data sources. The next generation of the data mining studies will be distributed data mining for many reasons. First of all, most of the current used data mining techniques require all data to be resident in memory, i.e., the mining process must be done at the data source site. This is not feasible for the exponential growth of the data stored in organization(s) databases. Another important reason is that data is inherently distributed for fault tolerance purposes. DDM requires two main decisions about the DDM implementations: A distributed computation paradigm (message passing, RPC, mobile agents), and the used integration techniques (Knowledge probing, CDM) in order to aggregate and integrate the results of the various distributed data miners. Recently, the new distributed computation paradigm, which has been evolved as mobile agent is widely used. Mobile agent is a thread of control that can trigger the transfer of arbitrary code to a remote computer. Mobile agents paradigm has several advantages: Conserving bandwidth and reducing latencies. Also, complex, efficient and robust behaviours can be realized with surprisingly little code. Mobile agents can be used to support weak clients, allow robust remote interaction, and provide scalability. In this paper, we propose a new model that can benefit from the mobile agent paradigm to build an efficient DDM model. Since the size of the data to be migrated in the DDM process is huge, our model will overcome the communication bottleneck by using mobile agents paradigm. Our model divides the DDM process into several stages that can be done in parallel on different dat_ sources: Preparation stage, data mining stage and knowledge integration stage. We also include a special section on how current e-business models can use our model to reinforce the decision support in the organization. A cost analysis in terms of time consumed by each minor process (communication or processing) is given to illustrate the overheads of this model and the other models.

Author

Data Mining; Data Transmission; Computation; Applications Programs (Computers)

20040201674 Porto Univ., Portugal

Important Factors In ERP Systems Implementations

Soja, Piotr; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 4; In English; See also 20040201585; Copyright; Avail: Other Sources

In the article the problem of success factors in ERP systems implementations has been discussed. The review of the literature concerning success factors has been discussed and the collection of potential ERP implementation success factors was identified. Next, the result of research has been presented, where respondents have been asked about their opinion about the importance of subsequent factors for the implementation success. There were two groups of respondents: the first consisted of people from Polish enterprises implementing ERP systems and the second comprised experts working in ERP systems suppliers. On the basis of the research, the most important and necessary factors in the respondents' opinions have been identified, as well as the least important ones.

Author

Data Bases; Information Resources Management

20040201683 Porto Univ., Portugal

Assessing Effort Prediction Models For Corrective Software Maintenance: An Empirical Study

Pompella, Eugenio; DeLucia, Andrea; Stefanucci, Silvio; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 2; In English; See also 20040201585; Copyright; Avail: Other Sources

We present an assessment of an empirical study aiming at building effort estimation models for corrective maintenance projects. We show results from the application of the prediction models to a new corrective maintenance project within the same enterprise and the same type of software systems used in a previous study. The data available for the new project are finer grained according to the indications devised in the first study. This allowed to improve the confidence in our previous empirical analysis by confirming most of the hypotheses made and to provide other useful indications to better understand the maintenance process of the company in a quantitative way.

Author

Mathematical Models; Prediction Analysis Techniques; Software Engineering

20040201685 Porto Univ., Portugal

Conceptual Model For Software Fault Localization

Tubaishat, Abdallah; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 2; In English; See also 20040201585; Copyright; Avail: Other Sources

Existing cognitive science and psychology studies suggest that a bi-level approach to fault localization is needed with both shallow and deep reasoning. This approach form the underpinnings for developing our Conceptual Model for Software Fault Localization (CMSFL) to aid programmers with the problem of software fault localization. Our CMSFL proposes that, during the fault localization process programmers build two mental models: an actual code model (the buggy code), and an expectation model (the correct code). A multi dimensional approach is suggested with both shallow and deep reasoning phases to enhance the probability of localizing many types of faults.

Author

Computer Programs; Probability Theory; Cognition

20040201686 Porto Univ., Portugal

A Middleware For The Management Of Large Utilities Plants

Rossettini, Andrea; Cavalieri, Salvatore; Floridia, Carmelo; DUrso, Fabrizio; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 7; In English; See also 20040201585; Copyright; Avail: Other Sources

The paper presents the main features of the European project Mobicossum IST 1999-57455, still running. The project is a CRAFT one approved inside the Fifth Framework Programme. It aims to define a middleware offering services for the management of large plants, in the field of gas and water distribution and waste water treatment systems. In the paper, the main features of the project will be explained, focusing on the description of the implementation of the core of the middleware, called Generalised Interface.

Author

Applications Programs (Computers); Utilities

20040201687 Porto Univ., Portugal

Acquiring And Integrating External Data Into Data Warehouses

Strand, Mattias; Wangler, Benkt; Lauren, Carl-Fredrik; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 7-8; In English; See also 20040201585; Copyright; Avail: Other Sources

Data warehouses (DWs) has become one of the major IT-investments during the last decades and in order to fully exploit the potential of data warehouses, more and more organizations are acquiring and integrating external data into their star-schemas. However, the literature covering external data acquisition and integration is limited. Therefore, in this paper the results of an interview study conducted among banking organizations are presented. The study aimed at identifying different approaches for acquiring and integrating external data into DWs. The results show that there are many different approaches for the acquisition and integration, depending on the purpose and structure of the data being acquired. In addition, the most common external data acquisition and integration process is presented and discussed.

Author

Data Acquisition; Data Bases; Applications Programs (Computers)

20040201689 Porto Univ., Portugal

Solving Interoperability Problems On a Federation Of Software Process Systems

Mostefai, Mohamed-Amine; Ahmed-Nacer, Mohamed; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 34; In English; See also 20040201585; Copyright; Avail: Other Sources

Software process components that share information and that cooperate for common tasks lead to multiple problems of interoperability for software process support environments based on a federation of heterogeneous and autonomous components. Some based-interoperability approaches have been proposed, especially at the conceptual level. However, mon problems remain to be solved to enable the heterogeneous process components interoperability at execution level. This paper presents a process-based approach (architecture) for the federation of software process systems. Based on this federation architecture, we focus on its implementation problems for the process execution interoperability. We show how we solve these problems and we discuss their implementation through the main development platforms of distributed applications.

Author

Computer Programs; Computer Systems Programs; Interoperability

20040201696 Porto Univ., Portugal

A Method For XML Document Schema Evolution

Al-Jadir, Lina; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 36; In English; See also 20040201585; Copyright; Avail: Other Sources

XML has become an emerging standard for data representation and data exchange on the Web. Although XML data is self-describing, most application domain.,; tend to use document schemas. Over a period of time, these schemas need to be modified to reflect a change in the real-world, a change in the user's requirements, mistakes or missing information in the initial design. Most of the current XML management systems do not support schema changes. In this paper, we propose a method to manage XML document schema evolution. We consider XML documents associated with DTDs. Our method consists in three steps. First, the DTD and XML documents are stored as a database schema and a database instance respectively. Second, DTD changes are applied as schema changes on the database. Third, the updated DTD and XML documents are retrieved from the database. Our method supports a complete set of DTD changes. The semantics of each DTD change is defined by preconditions and post-actions, such that the new DTD is valid, existing XML documents conform to the new DTD, and data is not lost if possible. We implemented our method in an object-oriented database system.

Author

Data Bases; Object-Oriented Programming; Management Systems

20040201698 Porto Univ., Portugal

Emulative Software Engineering: An Experiment And Experience

Xiong, Qian-Xing; Zhang, Zhang-Kai; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 39; In English; See also 20040201585; Copyright; Avail: Other Sources

Concurrent Engineering is a good method, but the method overstress the communication and cooperation of various departments in an enterprise so that it does not meet the requirement of fast tempo and direct confrontation of modern work. This paper proposes a so-called Emulative Software Engineering and reposes its hope in the method to solve the difficult problems of software quality and schedule control. The authors did a development experiment based on a teaching activity, which three groups joined. The experimental result and data show that the method is feasible or workable. It is reasonably believed that the method has the great and practical value for software development in spite of the fact that it originates from new idea and software development of teaching activity. In addition, the results of the experiment indicate that Emulative Software Engineering has the weakness in information exchange, which needs to be rectified with the support from the strong points, close exchange, of both Concurrent Engineering and knowledge management.

Author

Computer Programming; Concurrent Engineering; Quality Control

20040201699 Porto Univ., Portugal

Health Care Process Based On The ABC Model Through a Meta-Structured Information System

Verdier, Christine; Cluze, Gerard; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 24; In English; See also 20040201585; Copyright; Avail: Other Sources

We propose in this article to define a system which generates a generic care process based on the ABC method. For this purpose, we adapt dynamically the medical information system with UML packages in order to generate some semantic and

syntactic links between the different packages that represent the 'business objects' of a hospital. These packages contain all the information related to a specific problem for all the patients. So we are able to extract the particular data concerning a criteria (diagnosis, IP number, etc.) and a patient end, in that manner, to re-build the care process. The ABC method gives the skeleton of the care process and allows the definition of costs on a particular care process (e.g. the care process of the patient 'John' concerning the disease 'kidney failure' in the hospital H).
Author
Health; Information Systems; Musculoskeletal System; Computer Programs

20040201703 Porto Univ., Portugal
Integration, Flexibility and Transversality: Essential Characteristics of ERP Systems
Raymond, Louis; Uwizeyemungu, Sylvestre; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 25; In English; See also 20040201585; Copyright; Avail: Other Sources

The interest of firms in ERP systems has been echoed in both the scientific and professional literature. It is worth noting however that while this literature has become increasingly abundant, there does not yet exist an operational definition of the ERP concept that is, if not unanimously, at least widely accepted. This constitutes a handicap for both the research and practice communities. The present study outlines what could be considered as an ERP by first determining the essentially required characteristics of such a system: integration, flexibility and transversality. Indicators are then provided in order to operationalise these three characteristics. The study concludes by proposing a research framework on the impact of an ERP's key characteristics upon the performance of the system in a given organisational setting.
Author
Management; Research; Software Engineering

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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.

20040191600 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
On the Systemic Enterprise Architecture Methodology (SEAM)
Wegmann, Alain; ICEIS 2003; [2003], pp. 100; In English; See also 20040191598; Copyright; Avail: Other Sources

For companies to be more competitive, they need to align their business and IT resources. Enterprise Architecture is the discipline whose purpose is to align more effectively the strategies of enterprises together with their processes and their resources (business and IT). Enterprise architecture is complex because it involves different types of practitioners with different goals and practices during the lifecycle of the required changes. Enterprise Architecture can be seen as an art and is largely based on experience. But Enterprise Architecture does not have strong theoretical foundations. As a consequence, it is difficult to teach, difficult to apply, and does not have true computer-supported tool. This lack of tool is unfortunate as such tools would make the discipline much more practical. This paper presents how system sciences, by defining the concept of the systemic paradigm, can provide these theoretical foundations. It then gives a concrete example of the application of these foundations by presenting the SEAM paradigm. With the systemic paradigm, the enterprise architects can improve their understanding of the existing methodologies, and thus find explanations for the practical problems they encounter. With the SEAM paradigm, architects can use a methodology that alleviates most of these practical problems and can be supported by a tool.
Author
Methodology; Information Systems; Commerce; Architecture (Computers)

20040191601 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Relationship Support In Object Models
Dahchour, Mohamed; Pirotte, Alain; ICEIS 2003; [2003], pp. 107; In English; See also 20040191598; Copyright; Avail: Other Sources

Relationships play a central role in information modeling. However, most object models (programming languages and database systems)do not provide a construct to deal with them as autonomous units. They merely treat them as pointer-valued

attributes and therefore confine them to a second-class status. The paper defines the generic semantics of relationships, addresses a set of requirements to be satisfied to properly manage all kinds of relationships, surveys existing techniques for representing relationships in object models, and compares them to each others according to whether they satisfy the relationship requirements.
Author
Programming Languages; Data Bases; Support Systems

20040191602 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Trusted Authentication Between User And Machine
Kong, Eun-Bae; Doo, Soyoung; Kim, Jong-Nyeo; ICEIS 2003; [2003], pp. 110; In English; See also 20040191598; Copyright; Avail: Other Sources

Authentication is an important issue in computer system connected to internet. This paper describes a method of providing a trusted path between a user and a system using an access control processing technique. The method of providing a trusted path between a user and a system includes the step of determining whether access to resources of the system will be permitted or refused on the basis of access control rules and stored attributes set by a security administrator in the secure database. Thereafter, the user is notified of permission for or refusal of the access in accordance with the result of the determination
Author
Access Control; Internets; Computer Information Security

20040191605 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
A Context-Aware User-Adaptive Supporting System For Goal-Oriented Requirements Elicitation Process
Li, Chao; Liu, Han; Wang, Jiz-He; Wang, Qing; Li, Ming-Shu; ICEIS 2003; [2003], pp. 122; In English; See also 20040191598; Copyright; Avail: Other Sources

Goal-oriented requirements elicitation is recognized as an important elicitation method from both research and industry. While in a complex multi-user environment, many problems rise up in performing goal-oriented requirements elicitation because of ignorance of user participation support. We present a supporting system here to assist users in taking part in goal-oriented requirements elicitation process. The system, with its serious consideration of user factor, is believed to offer better participation experiences for users in GRE process.
Author
Industries; Research and Development; Support Systems; User Requirements

20040191606 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Functional Size Measurement of Layered Conceptual Models
Poels, Geert; ICEIS 2003; [2003], pp. 125; In English; See also 20040191598; Copyright; Avail: Other Sources

This paper builds on previous work showing a way to map the concepts used in object-oriented business domain modelling onto (a subset of) the concepts used by the COSMIC Full Function Points (COSMIC-FFP) functional size measurement method for modelling and sizing a software system from the point of view of its functional user requirements. In this paper we present a refined set of measurement rules resulting from a careful revision of our previous proposal, based on 'field trials', feedback from function points experts and the forthcoming transition from COSMIC-FFP version 2.1 to the ISO/IEC standard version 2.2. The main contribution of the paper is, however, an extended set of rules to be used when applying COSMIC-FFP to multi-layer conceptual models, including at least an enterprise layer and, on top of this, an information system services layer. We also outline the approach that will be used to further verify and validate the proposed measurement rules and to evaluate their efficiency and effectiveness.
Author
Commerce; Functional Design Specifications; Information Systems; Models

20040191619 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Implementing a Generic Component-Based Framework For Tele-control Applications
Chimaris, Avraam; Papadopoulos, George; ICEIS 2003; [2003], pp. 127; In English; See also 20040191598; Copyright; Avail: Other Sources

In this paper, we design and implement a generic framework of components that can be used for the realization of Tele-Control applications. This category of applications focuses particularly on the issues of managing distributed units on remote end-systems. Such applications contain remote and administrative units that are connected and exchange data and control messages. In the analysis of our framework, we used UML for the specifications, analysis and presentation of system operations. The distributed units of our framework are using XML messages and TCP channels for exchanging data and control messages. We implement a communication 'protocol' that contains the basic messages that can be used in Tele-Control Systems. Finally we are presenting two different applications, which are implemented by reusing the generic components of our framework.
Author
Document Markup Languages; Messages; Remote Control

20040191620 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
E-Commerce Authentication: An Effective Countermeasures Design Model
Sawma, Victor; ICEIS 2003; [2003], pp. 129; In English; See also 20040191598; Copyright; Avail: Other Sources

Existing authentication models for e-commerce systems take into account satisfying legitimate user requirements described in security standards. Yet, the process of introducing countermeasures to block malicious user requirements is ad hoc and relies completely on the security designer expertise. This leads to expensive implementation life cycles if defects related to the design model were discovered during the system-testing phase. In this paper, we describe an authentication countermeasures design model for ecommerce systems. This model includes effective countermeasures against all known malicious user requirements and attacks. The described model is preventive in nature and can be used with other authentication models or can be implemented as a stand-alone module for e-commerce, systems.
Author
Electronic Commerce; Computer Information Security; User Requirements; Countermeasures

20040191622 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Distributed Software Development: Toward an Understanding of the Relationship Between Project Team, Users and Customers
Evaristo, Roberto; Audy, Jorge; Prikladnicki, Rafael; ICEIS 2003; [2003], pp. 130-131; In English; See also 20040191598; Copyright; Avail: Other Sources

The objective of this paper is to propose a typology for distributed software development comprising the relation between the three main stakeholders: project team (developers, analysts, managers, testers, system administrator, graphic artist, etc.), customers and users. With this objective, we propose a set of criteria to define geographically distributed environments. As a result, a model to define the distribution level for an organization in a DSD (Distributed Software Development) environment is presented. Such model is applied in two case studies and its results are discussed. These cases studies involve two companies with headquarters in the USA (U.S.) and a development unit in Brazil. Data from two exploratory case studies are presented to support the proposed model. Advantages of this representation as well as some aspects of the increasing distribution of software development particularly in a few Brazilian organizations are discussed.
Author
Computer Programming; Software Engineering

20040191627 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Prescribed Impacts and Impacts Stipulated for ICS
Govaere, Virginie; ICEIS 2003; [2003], pp. 105-106; In English; See also 20040191598; Copyright; Avail: Other Sources

The aim of this work is to present the consequences of introducing communication and information systems (ICS) into a company for the users or the organizations users. Consequently, this introduction want to inform and to warn the designer of new technologies of the impacts of their achievements. With the ICS, the exchange of information in a relationship is never neutral, its ability to circulate is never natural, and the fact of being able to exchange it, whatever the means and media used or these quality, has no predictive value concerning the real exchanges. Thus, an analysis of the applications in technical terms (performances and functionalities available) is insufficient. Indeed, the taking into account of the context in the broad sense

is essential to determine their real performance. This structuring aims at bring out a difference between the performance offered by the designers of ICS and that observed in real situation.
Author
Information Systems; Systems Engineering; Telecommunication

20040191630 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Two Approaches in System Modeling and Their Illustrations with MDA and RM-ODP
Wegmann, Alain; Naumenko, Andrey; ICEIS 2003; [2003], pp. 113; In English; See also 20040191598; Copyright; Avail: Other Sources

We explain two approaches to the design of system modeling frameworks and perform their comparative analysis. The analysis familiarizes the reader with strengths and weaknesses of the approaches, and thus helps to grasp the preferences for their practical applications. The first of the approaches is illustrated with the example of Model Driven Architecture (MDA), and the second - with the example of Reference Model of Open Distributed Processing (RM-ODP).
Author
Distributed Processing; Systems Engineering; Models; Architecture (Computers)

20040191632 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Distributed Workflow Management in Open Grid Services Architecture
Yu, Zhen; Wu, Zhaohui; ICEIS 2003; [2003], pp. 123-124; In English; See also 20040191598; Copyright; Avail: Other Sources

Vast resources in a grid can be managed flexibly and effectively by workflow management systems. Here a structure of the workflow management system in Open Grid Services Architecture is proposed. In the structure, main components of conventional workflow management systems are made into some high-level Grid Services and distributed in the grid. Then those services compose a distributed workflow management system, which can make full use of the workflow resources and ensure the process executed efficiently and reliably in the grid The interfaces required by those workflow services and some implementation details of the system are discussed too.
Author
Architecture (Computers); Distributed Processing; Grid Computing (Computer Networks)

20040191641 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Design And Realization Of Power Plant Supervisory Information System (SIS) Based On INFI 90
Zhang, Guo-Zhong; Ye, Zhen; ICEIS 2003; [2003], pp. 95; In English; See also 20040191598; Copyright; Avail: Other Sources

To improve the management level of power plants and to adapt to the requirements of market-oriented reform for electric enterprises, a method of design and realization of a Supervisory Information System (SIS) based on INFI 90 DCS for manufacturing management in power plant is put forward in this paper. By adding a CIU to the INFI net, the real-time data of manufacture process is retrieved to the historical data platform through interface PCs, fibers and switches. The whole system used OpsCon as interface driver, iHistorian as the historical data platform, iFIX as the configuration software, and infoAgent as a tool for assistant decision-making such as on-line historical data analysis, equipment status monitoring and malfunction diagnosis, equipment reliability and life management etc. Practice shows that the SIS makes full use of resources of DCS and MIS, forms a synthetic automation system integrated by DCS, SIS, and MIS, and realizes an automatic control covering the whole process of electric production.
Author
Information Systems; On-Line Systems; Real Time Operation; Manufacturing; Automatic Control

20040191646 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Beyond End Users Computing
Heng, Michael; ICEIS 2003; [2003], pp. 97-98; In English; See also 20040191598; Copyright; Avail: Other Sources

Three central problems in the development, introduction, maintenance, operation and upgrading of computer-based

information systems are (1) users and IS designers fail to understand each other well, (2) it takes too long to introduce IS into organizations, and (3) maintenance requires dedication associated with a sense of ownership, and upgrading requires continuous attention and in-depth knowledge of the business and potentials of IT. These three problems are often tackled separately. It is argued that based on the recent advances in IS development tools, environment and method as well as increased IT literacy, a new way of handling all these problems in an integrated way is possible in certain type of organizational setting. The key idea is to form a team from the users' group in a big organization who are computer enthusiasts to function as the core of a continuing team to take over the responsibilities of developing, introducing, maintaining, and upgrading the IS. The approach is essentially a synthesis of the structured way of building systems and the end user computing. Some problems related to this approach would also be surveyed.The approach is also very much in the spirit of the idea of growing systems in emergent organizations as propounded by Treux, Baskerville and Klein (1999) in their CACM paper.
Author
Information Systems; Organizations; Computer Techniques; Commerce

20040191648 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
System Modeling Across Organizational And Technical Boundaries
Gustiene, Prima; Gustas, Remigijus; ICEIS 2003; [2003], pp. 121; In English; See also 20040191598; Copyright; Avail: Other Sources

Enterprise Engineering proved to be useful when a generally accepted intentional description of information system is not available. A blueprint of enterprise infrastructure provides a basis for system analysis of the organizational and technical processes. It is sometimes referred as enterprise architecture. The major effort of this paper is the demonstration of how to bridge a gap among various levels (syntactic, semantic and pragmatic) of enterprise engineering. Most information system engineering methodologies are heavily centred on system development issues at the implementation level. Thus, such methodologies are restrictive in a way that a supporting technical system specification can not be motivated or justified in the context of organizational process models. Enterprise models provide a basis for gradual understanding of why and how various technical system components come about. Some undesirable qualities of enterprise engineering are sketched in this paper.
Author
Systems Analysis; Information Systems; Systems Engineering

20040191659 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
An Innovative Approach to Wireless Applications Development: An Exploration of Practice
Olla, Phillip; ICEIS 2003; [2003], pp. 106; In English; See also 20040191598; Copyright; Avail: Other Sources

Due to the developing of enabling technologies such as mobile data networks and various types of affordable mobile devices, mobile computing has become widely accepted and applied for both consumer and business initiatives, it is fuelling the new trend of information systems development. There is evidence that the profile of systems development on innovative projects is very different from that faced in the past when the systems development methodologies were first promoted. Therefore there is the need to move from the past which has documented problems 'Software crisis' to the future, by deriving new methodological approaches more appropriate to the needs of the current development environment. This paper used Action Research to study an organisation called the Mobile Application Development and Integration Centre, which created an innovative approach to develop and deploy wireless applications produced by independent third parties.
Author
Systems Engineering; Wireless Communication; Communication Networks

20040191660 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Rapid Development of Process Modeling Tools
Risi, Michele; deLucia, Andrea; Costagliola, Gennarco; Tortora, Genoveffa; Francese, Rita; ICEIS 2003; [2003], pp. 108; In English; See also 20040191598; Copyright; Avail: Other Sources

We present an approach for the rapid development and evolution of visual environments for modelling distributed software engineering processes. The definition of the process modeling language takes into account the requirements of the customer that directly participates in the development process. The development process is supported by the VLDesk, an integrated set of grammar-based tools for the definition and automatic generation of visual environments. The produced visual

environment enables an organization to quickly design distributed process models and generate the corresponding XML code that specifies the activities with its elements, including actors and artifacts produced and the transitions expressed in the form of event-condition-action rules. In this way the designed process model can be easily instantiated for a specific project and enacted by any workflow engine supporting a programmable event-condition-action paradigm.
Author
Computer Programming; Document Markup Languages; Software Engineering

20040191661 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
A Synthesis of Business Role Models
Wegmann, Alain; Balabko, Pavel; ICEIS 2003; [2003], pp. 119-120; In English; See also 20040191598; Copyright; Avail: Other Sources

Modern Information and Communication Technology open a door for innovations that can improve the functioning of companies. Many innovations can come from the analysis of business processes. Today modeling is widely used for the analysis of business processes. In these work we propose a process modeling technique based on role modeling. To specify a process where one business object may play several roles, a synthesis operation (the composition of two base roles in a third role) has to be specified. All role-based techniques have difficulties specifying role synthesis: synthesis is never specified without the description of actual messages passing between business roles. Such implementation details complicate the understanding of the model and semantics of synthesis become implicit. To specify a business process of a complex system at a higher level of abstraction requires the proper understanding of relationships between roles, when they are put together in one common context. In this paper we define the concept of 'synthesis constraints' that shows relations between roles. Using 'synthesis constraints' allows a business modeler to make explicit his decisions about how the synthesis is done in an abstract and implementation independent way. This approach can be used for building a BPR case tool that enables the discovery of new business processes by means of different disassembling and assembling of roles.
Author
Information Systems; Commerce; Complex Systems; Models

20040191662 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
A Framework for Business Simulator: A First Experience
Champagnat, Ronan; ICEIS 2003; [2003], pp. 110; In English; See also 20040191598; Copyright; Avail: Other Sources

This paper deals with a multi-agent based modeling of a company in order to perform a simulation. The specificities of the simulation purpose is that it concerns the economical aspects, but also the production process. This implies that the model of the company must represent the production processes. This paper focuses on the modeling of a company and the analysis of the model. In order to automatically derive a simulation model from a modeling of the company an UML meta-model has been achieved and is presented. Then a validation of the components of the simulator is presented. It allows to perform a validation of the nominal comportment of agents. This paper is structured as follows: first, starting from a description of the company a multi-agent model is derived; then a meta-model for plant modeling is presented; and a validation of the simulator is detailed; finally the requirements and objectives for a business simulator is discussed.
Author
Commerce; Simulators; Models; Automatic Control

20040191664 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Structural Conflict Avoidance in Collaborative Ontology Engineering
Hellman, Ziv; ICEIS 2003; [2003], pp. 97; In English; See also 20040191598; Copyright; Avail: Other Sources

Given the increasing importance of ontologies in enterprise settings, mechanisms enabling users working simultaneously to edit and engineer ontologies in a collaborative environment are required. The challenges in preventing structural conflicts from arising from simultaneous user editing of ontologies are not trivial, given the high level of dependencies between concepts in ontologies. In this paper we identify and classify these dependencies. Sophisticated ontology locking mechanisms based on a graph depiction of the dependencies that are sufficient for preventing structural conflicts arising in collaborative

settings are proposed. Applications of this research to the Semantic Web are also considered.
Author
Systems Engineering; Computer Systems Programs

20040191665 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Refactoring Use Case Models: A Case Study
Butler, Gregory; ICEIS 2003; [2003], pp. 99; In English; See also 20040191598; Copyright; Avail: Other Sources

Refactoring is a behavior-preserving program transformation. Our research shows that refactoring as a concept can be broadened to apply to use case models to improve their understandability, changeability, reusability and traceability. In this paper we describe a metamodel for use case modeling in detail. Based on this metamodel we define and categorize a list of use case refactorings. Then we present a case study to illustrate the practical use of these refactorings. Several examples are described to show different views on refactoring use case models.
Author
Models; Metadata; Computer Systems Programs; Transformations

20040191671 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Computing Message Dependencies In System Designs And Programs
Maciaszek, Leszek; Liong, Bruc Lee; ICEIS 2003; [2003], pp. 117-118; In English; See also 20040191598; Copyright; Avail: Other Sources

This paper explains the metrics for the computation of class dependencies and introduces new metrics for the computation of message dependencies in system designs and programs. The metrics are used in the design-coding cycle of software production. They define the quality of an architectural solution. The system architecture assumed in this paper is an extension of the MVC (Model-View-Controller) framework nicknamed BCEMD (Boundary-ControI-Entity-Mediator-DBInterface). The paper demonstrates how the BCEMD framework minimizes object dependencies in synchronous message passing. We compute message dependencies from a parsed bytecode. The metrics are then reflected in UML models representing the system design. The paper starts by briefly explaining the BCEMD architecture and its advantages. We summarize our earlier paper to show how the BCEMD approach minimizes the cumulative class dependency. We then introduce the new metrics resulting in a cumulative message dependency for the system. The metrics measure the complexity of program's run-time behavior. Each metric is defined, given an algorithm for its computation, and it is then exemplified. We demonstrate how the new metrics reinforce our claim that the BCEMD architecture delivers understandable, maintainable and scalable software solutions.
Author
Systems Engineering; Computer Systems Programs; Message Processing; Architecture (Computers)

20040191673 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
An Approach To DFD Modeling
Damij, Katja; ICEIS 2003; [2003], pp. 114; In English; See also 20040191598; Copyright; Avail: Other Sources

The objective of this work is to introduce an approach to developing Data Flow Diagrams. The approach discussed enables the analyst to create a DFD in an easy manner based on identifying the system's activities. The approach has three steps. The first step develops the activity table. The second step transforms the activity table into an elementary-level DFD. The third step deals with creating DFDs at work and business process levels. The approach discussed represents a well-defined algorithm, which leads the analyst through a few prescribed and very simple steps to achieve the goal of DFD development. This approach is independent of the systems analyst and his/her experience.
Author
Flow Charts; Data Flow Analysis; Transformations (Mathematics); Algorithms

20040191675 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
A Distributed Workflow System On OGSA: Workflow Grid Services
Wei, Kai; Wu, Zhao-Hui; ICEIS 2003; [2003], pp. 113-114; In English; See also 20040191598; Copyright; Avail: Other Sources

The Open Grid Services Architecture (OGSA) tries to address the challenges of integrating services across distributed, heterogeneous, dynamic 'virtual organization' formed from the disparate resources within a single enterprise and/or from external resource sharing and service provider relationships. In this paper, we attempt to bring forwards a new model of workflow system with the Grid Services, which have more valuable characteristics than the Web Services. During discussing the model, we present some new concepts in distributed workflow systems, all of which are dealing with Grid services within the OGSA framework.
Author
Architecture (Computers); Computational Grids; Heterogeneity; Distributed Processing

20040191679 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Scoring WWW Page's With Social Credibility In a Hyperlink Environment
Kiyomitsu, Hidenari; Morisita, Junya; Kinugawa, Tatsuya; Hirabayashi, Masami; Ohtsuki, Kazuhiro; Kitamura, Shinzo; ICEIS 2003; [2003], pp. 126; In English; See also 20040191598; Copyright; Avail: Other Sources

In this paper, we propose an approach in web page scoring. We introduce the evaluation based on the credibility of the page creators. We assume all Web pages are latently evaluated on this criterion. We call this evaluation as an evaluation by Social Credibility (SC). We propose a dynamical scoring approach utilizing this evaluation of SC and analysis of link structure by defining degree of recommendation to each link. We show the convergence of the calc.ulation based on our approach under certain conditions. We also show the diversity of this evaluation utilizing SC that is given externally by regarding the evaluation of SC and the propagation of scores are independent. We experiment this approach and discuss about the results.
Author
Information Retrieval; World Wide Web; Data Links; Scoring

20040191680 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
An Authentication Scheme Using a Secret Sharing Technique
Al-Ibrahim, Mohamed; ICEIS 2003; [2003], pp. 118; In English; See also 20040191598; Copyright; Avail: Other Sources

We introduce an authentication scheme based on Shamir threshold secret sharing technique. The scheme, in general, is used for authenticating peer-to-peer communication. In particular, it is used for authenticating a host to join a multicast group.
Author
Computer Information Security; Operating Systems (Computers); Information Systems

20040191684 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
User Interface Complexity Assessment In Large-Scale Safety-Critical Environments
Coskun, Erman; Grabowski, Martha; ICEIS 2003; [2003], pp. 129-130; In English; See also 20040191598; Copyright; Avail: Other Sources

In order to design an understandable and usable interface, the human-computer interaction, computer-supported cooperative work, psychology, cognitive sciences, and human factors disciplines have developed methodologies and determined critical elements for successful user interfaces. The importance of the user interface increases particularly in safety-critical or mission-critical systems where the user has time limitations within which to make correct decisions. User interfaces for these type of systems should be well-designed, easy to understand and use. Otherwise mishaps or accidents may occur and consequences of accidents may include loss of human life, large financial losses, and environmental damage. All this suggests that examining the complexity of user interface in safety-critical large-scale systems is important. In this study, we study user interface complexity in safety-critical environments and report the results of a study conducted with an Embedded Intelligent Real-Time System and its operators.
Author
Human-Computer Interface; Human Factors Engineering; Real Time Operation; Cognition

20040191685 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Reusing a Time Ontology
Pinto, H. Sofia; Peralta, Duarte Nuno; Mamede, Nuno; ICEIS 2003; [2003], pp. 133; In English; See also 20040191598; Copyright; Avail: Other Sources

Ontologies are becoming crucial in several disparate areas, such as the Semantic Web or Knowledge Management. Ontology building is still more of an art than an engineering task. None of the available methodologies to build ontologies from scratch has been widely accepted. One cost effective way of building ontologies is by means of reuse. In this article we describe the development of an ontology of Time by means of reuse, following an evolving prototyping life cycle. This process involved several complex subprocesses: knowledge acquisition and requirement specification using Natural Language techniques, reverse engineering, knowledge representation translation, technical evaluation. As far as we know, this is the first time that all these processes have been combined together. We describe the techniques and best practices that were successfully used.
Author
Natural Language (Computers); Prototypes; Reverse Engineering

20040191688 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
A Peer-to-Peer Knowledge-Sharing Approach for a Networked Research Community
Tian, Yang; ICEIS 2003; [2003], pp. 122-123; In English; See also 20040191598; Copyright; Avail: Other Sources

Over the past few years, the interests in the potential of peer-to-peer computing and the use of different approaches to knowledge sharing, involving the development of networked communities has grown rapidly. This paper investigates the potential that a peer-to-peer community may have for effective and efficient knowledge sharing. It starts with an introduction to networked communities and the supporting knowledge sharing activities. A comparison between the centralized and the decentralized approaches in supporting networked communities is made. A case study using a networked Journal Club is discussed in detail, including the design and implementation of the supporting peer-to-peer prototype using JXTA as the developing platform. The paper concludes with a discussion of the peer-to-peer architecture as the direction of future knowledge sharing systems.
Author
Computer Networks; Knowledge Representation; Architecture (Computers); Research and Development

20040191689 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Modelling and Generating Business-to-Business Applications Using an Architecture Description Language - Based Approach
Alloui, Ilham; ICEIS 2003; [2003], pp. 124; In English; See also 20040191598; Copyright; Avail: Other Sources

The emergence of Internet and the World Wide Web in accordance with new technological advances led the organizations to seize the opportunities offered by electronic business. In particular, the opportunity to co-operate within the context of electronic (virtual or networked) enterprises / communities / alliances, based on open networks and current information and communication technologies. Among the various kinds of electronic alliances we target are inter-organizational ones that aim at co-operating to achieve clients' orders while preserving the autonomy of involved organisations and enabling concurrency of their activities, flexibility of their negotiations and dynamic evolution of their environment. Members of such alliances may either have similar competencies or complementary ones. In this context, the paper presents a software architecture-based approach to model and generate business-to-business (B2B) applications that support decentralized and dynamic electronic alliances. The approach is founded on modelling alliance's life-cycle using an Architecture Description Language (ADL) called Zeta and generating an executable code from the description into a target implementation environment called Process/Web. The benefits of such approach are manifold: (i) using an ADL provides high-level abstractions hiding implementation details, (ii) having a language means that several life-cycle models can be defined and modified according to change requirements, (iii) generating executable code from abstract models can be done in several target implementation languages. The work presented is being developed and validated within the framework of the X French regional project.
Author
Commerce; Models; Architecture (Computers); Hardware Description Languages

20040191698 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Systems Development Method Rationale: A Conceptual Framework for Analysis
Agerfalk, Par; Wistrand, Kai; ICEIS 2003; [2003], pp. 133-134; In English; See also 20040191598; Copyright; Avail: Other Sources

The rationale of their creators inherently influences information systems development methods. Rationale, which is always based on the creator's values and assumptions about the problem domain, motivates, implicit or explicit, the different modelling activities and primitives prescribed by a method. The method, and hence its inherited rationale, directs method users' attention toward certain kinds of phenomena and away from others. Today we see a trend towards standardizing systems development in terms of standard modelling languages and standard development processes. When using an existing (standard) method, developers are forced to rely on the rationale of that particular method. Sometimes, however, there are reasons to enhance the standard method to reflect aspects of the world held as important by the method users - but not emphasized by the method creator. Hence, there is a need to integrate the rationale of the method users with that of the existing method. In this paper, we investigate what method rationale is and how it can be modelled and analysed. The paper employs a method engineering approach in that it proposes method support for analysing, describing and integrating method rationale - an emerging essential task for method engineers in a world of standardization.
Author
Information Systems; Systems Engineering; Methodology; Data Processing

20040196371 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Autonomous In-Situ Resources Prospector
Dissly, R. W.; Buehler, M. G.; Schaap, M. G.; Nicks, D.; Taylor, G. J.; Castano, R.; Suarez, D.; Space Resources Roundtable VI; 2004, pp. 17; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

This presentation will describe the concept of an autonomous, intelligent, rover-based rapid surveying system to identify and map several key lunar resources to optimize their ISRU (In Situ Resource Utilization) extraction potential. Prior to an extraction phase for any target resource, ground-based surveys are needed to provide confirmation of remote observation, to quantify and map their 3-D distribution, and to locate optimal extraction sites (e.g. ore bodies) with precision to maximize their economic benefit. The system will search for and quantify optimal minerals for oxygen production feedstock, water ice, and high glass-content regolith that can be used for building materials. These are targeted because of their utility and because they are, or are likely to be, variable in quantity over spatial scales accessible to a rover (i.e., few km). Oxygen has benefits for life support systems and as an oxidizer for propellants. Water is a key resource for sustainable exploration, with utility for life support, propellants, and other industrial processes. High glass-content regolith has utility as a feedstock for building materials as it readily sinters upon heating into a cohesive matrix more readily than other regolith materials or crystalline basalts. Lunar glasses are also a potential feedstock for oxygen production, as many are rich in iron and titanium oxides that are optimal for oxygen extraction. To accomplish this task, a system of sensors and decision-making algorithms for an autonomous prospecting rover is described. One set of sensors will be located in the wheel tread of the robotic search vehicle providing contact sensor data on regolith composition. Another set of instruments will be housed on the platform of the rover, including VIS-NIR imagers and spectrometers, both for far-field context and near-field characterization of the regolith in the immediate vicinity of the rover. Also included in the sensor suite are a neutron spectrometer, ground-penetrating radar, and an instrumented cone penetrometer for subsurface assessment. Output from these sensors will be evaluated autonomously in real-time by decision-making software to evaluate if any of the targeted resources has been detected, and if so, to quantify their abundance. Algorithms for optimizing the mapping strategy based on target resource abundance and distribution are also included in the autonomous software. This approach emphasizes on-the-fly survey measurements to enable efficient and rapid prospecting of large areas, which will improve the economics of ISRU system approaches. The mature technology will enable autonomous rovers to create in-situ resource maps of lunar or other planetary surfaces, which will facilitate human and robotic exploration.
Author
Algorithms; Computer Systems Programs; Autonomy; In Situ Resource Utilization; Lunar Resources; Oxygen Production

20040200667 Porto Univ., Portugal
DICHOCOA Communicator: Subsystem for Bio-Medical Home System
Volner, Rudolf; Pousek, Lubomir; ICEIS 2004: Human-Computer Interaction; [2004], pp. 188; In English; See also 20040200666; Copyright; Avail: Other Sources

This paper explains the concept, main functions, services and other aspects of the DICHOCOA Communicator, which is a new communication system based on text communication and making the user aware of the existence and activities of others connected to the network. The article describes information network and CATV applications, backbone network structure.
Author
Telecommunication; Systems Engineering; Biomedical Data; Communication Networks

20040200668 Porto Univ., Portugal

Using Visuals To Convey Information

Gouveia, Luis Borges; ICEIS 2004: Human-Computer Interaction; [2004], pp. 185; In English; See also 20040200666; Copyright; Avail: Other Sources

This paper argues that the use of visuals can help conveying information, and that can be an advantage to the use of visualisation and information visualisation to support information management. It present the concepts of visualisation and information visualisation and provides a broad view of available systems.

Author

Information Management; Visual Stimuli; Computer Systems Programs

20040200670 Porto Univ., Portugal

A Methodoogy for Interface Design for Older Adults

Zajicek, Mary; ICEIS 2004: Human-Computer Interaction; [2004], pp. 175; In English; See also 20040200666; Copyright; Avail: Other Sources

This paper puts forward a new design method based upon Alexandrian patterns for interface design for particular user groups The author has created a set of interface design patterns for speech systems for older adults with the aim of supporting the dynamic diversity in this group. The patterns themselves reflect a significant body of research work with this user group uncovering important information about how they interact with speech systems. The design knowledge embedded in these patterns is therefore closely linked to knowledge about the user and enables interface designers to clarify which users are excluded from their software.

Author

Adults; Methodology; Human-Computer Interface

20040200672 Porto Univ., Portugal

Emotion Synthesis Virtual Environments

Kollias, Stefanos; Raouzaiou, Amaryllis; Karpouzis, Kostas; ICEIS 2004: Human-Computer Interaction; [2004], pp. 182; In English; See also 20040200666; Copyright; Avail: Other Sources

Man-Machine Interaction (MMI) systems that utilize multimodal information about users' current emotional state are presently at the forefront of interest of the computer vision and artificial intelligence communities. Interfaces with human faces expressing emotions may help users feel at home when interacting with a computer because they are accepted as the most expressive means for communicating and recognizing emotions. Thus, emotion synthesis can enhance the atmosphere of a virtual environment and communicate messages far more vividly than any textual or speech information. In this paper, we present an abstract means of description of facial expressions, by utilizing concepts included in the MPEG?4 standard to synthesize expressions using a reduced representation, suitable for networked and lightweight applications.

Author

Man Machine Systems; Emotional Factors; Virtual Properties; Computer Vision; Artificial Intelligence

20040200673 Porto Univ., Portugal

Real World Sensorization and Virtualization for Observing Human Activities

Hori, Toshio; Nishida, Yoshifumi; Kitamura, Koji; Kanade, Takeo; Mizoguchi, Hiroshi; ICEIS 2004: Human-Computer Interaction; [2004], pp. 178; In English; See also 20040200666; Copyright; Avail: Other Sources

This paper describes a method for robustly detecting and efficiently recognizing daily human behavior in real world. The proposed method is performed with the following steps: 1) real world sensorization for robustly observing his or her behavior using ultrasonic 3D tags, which is a kind of an ultrasonic location system, 2) real world virtualization for creating a virtual environment through modeling 3D shape of real objects by a stereovision system, and 3) virtual sensorization of the virtualizeq objects for quickly registering human behavior handling objects in real world and efficiently recognizing target human behavio0 As for real world sensorization, this paper describes algorithms for robustly estimating 3D positions of objects that a human handles. This paper also describes a method for real world virtualization and virtual sensorization using the ultrasonic 3D tag system and a stereo vision system.

Author

Human Behavior; Virtual Reality; Detection; Algorithms

20040200674 Porto Univ., Portugal

Towards a Model For Personalized Communication Services Based On User Perception

Ribeiro, Claudia; Cunha, Paulo; Rosa, Nelson; ICEIS 2004: Human-Computer Interaction; [2004], pp. 184; In English; See also 20040200666; Copyright; Avail: Other Sources

The emerging of the new generation applications like videoconference and the increasing in the demand of QoS services has enforced the need of new service models. As in the most new applications the user can perceive the level of quality a service is provided, data communication services are currently evolving towards more personalized ones. A direct con-sequence of this trend is the necessity of explicit treatment of the user perception. Challenges in this evolution include the better understanding of 'how' users perceive QoS and 'how' the perception is actually realised by underlying QoS mechanisms. This paper addresses these questions by presenting a formal architecture, namely ESCHER that implements a conceptual user perception model for QoS services.

Author

Data Transmission; Telecommunication; Video Communication

20040200679 Porto Univ., Portugal

Managing Emotions in Smart User Models for Recommender Systems

Lopez, Beatriz; LluisdelaRosa, Josep; Gonzalez, Gustavo; ICEIS 2004: Human-Computer Interaction; [2004], pp. 175; In English; See also 20040200666; Copyright; Avail: Other Sources

Our research focuses on the development of methodologies that take into account the human factor in user models. There is an obvious link between personality traits and user preferences - both being indications of default tendencies in behavior, that can be automated by systems that recommend items to a user. In this work, we define an emotional component for Smart User Models and provide a methodology to build and manage it. The methodology contemplates the acquisition of the emotional component, the use of emotions in a recommendation process and the updating of the Smart User Model according to the recommendation feedback. The methodology is illustrated with cases study.

Author

Emotions; Models; Methodology; Human Factors Engineering

20040200681 Porto Univ., Portugal

An Investigation Into The Requirements For An E-Learning System

Sofer, Yaen Yaacov; McIntosh, Steve B.; ICEIS 2004: Human-Computer Interaction; [2004], pp. 172; In English; See also 20040200666; Copyright; Avail: Other Sources

The learning environment where students of the same age group learn together instructed by a teacher, was developed over the years and is known today as the traditional classroom. This traditional classroom may be changed by using the latest Web-based technology to replace and/or support the learning process. These new learning environments are accessible using the Internet as the main communication medium and by other remote means such as CD-ROM, and video. Many aspects of the current use of these new technologies reflect an approach to teaching and learning reminiscent of the 'programmed learning' training material of the 1970s. This paper uses Soft Systems Methodology (SSM) and to construct a Consensus Primary Task Model (CPTM) to analyse the requirements for a distance or e-learning system. In conducting the analysis, we investigate the alternative methods proposed for the construction of a CPTM.

Author

Education; Requirements; World Wide Web; Systems Engineering

20040200682 Porto Univ., Portugal

Defects, Usefulness and Usability of Ethics Theories in IS Ethics Education

Vartiainen, Tero; Siponen, Mikko T.; ICEIS 2004: Human-Computer Interaction; [2004], pp. 175; In English; See also 20040200666; Copyright; Avail: Other Sources

Computer ethics is recognized as an essential component of information systems curricula. However, little is known about hey students perceive the usefulness and usability of ethics theories in solving computer-related moral conflicts, and what kinds ot mistakes they make in solving moral problems by applying those theories. To fill this gap, an interpretive qualitative and quantitative study (n=20) was conducted to determine the defects, perceived usefulness and usability of alternative ethics theories (utilitarianism, Kantian ethics, virtue ethics, prima facie principles, Rawls' veil of ignorance) in computer ethics

teaching. The results shed a new light on the use of these theories in this field of education, and also suggest new directions for it.
Author
Information Systems; Defects; Ethics

20040200684 Porto Univ., Portugal
An AHP Based Decision Model to Evaluate Various E-Learning Packages
Ray, Subhajyoti; ICEIS 2004: Human-Computer Interaction; [2004], pp. 174; In English; See also 20040200666; Copyright; Avail: Other Sources

e-Learning is being increasingly accepted as standard for corporate learning and acquiring of new skills and competencies and provides a flexible and cost effective solutions to organization's training needs. With a plethora of e-learning providers an(solutions available in the market, there is a new kind of problem faced by organizations and that is of selecting the right e-learning suite. This paper addresses the issue of selection of e-learning solution that best meets the criteria relevant to the training needs of the organization. The problem of selecting the most suitable e-learning solution has been formulated as a multi criteria decision problem to be solved by the Analytic Hierarchy Process (AHP). The hierarchical structure of the problem allows the decision maker to compare various e-learning solutions using content, navigation and evaluation features of e-learning solutions. A numerical example is also provided to illustrate the technique proposed here.
Author
Decision Making; Hierarchies; Education

20040200685 Porto Univ., Portugal
Managerial Openness And The Adoption Of Distributed Group Support Systems: The Case Of Web-wide Participation
Rohrbaugh, John; ICEIS 2004: Human-Computer Interaction; [2004], pp. 173; In English; See also 20040200666; Copyright; Avail: Other Sources

The full involvement of designated participants in meeting process is a well-recognized standard of group effectiveness, yet most face-to-face meetings are undertaken without the presence of every group member. The problem of total participation in asynchronous meetings convened with distributed group support systems has been noted frequently but investigated rarely. This paper describes a portion of a large field study using the distributed group support system WebWide Participation in which explanations for meeting involvement (and non-involvement) were explored. In particular, three WebWide meetings with varying levels of participation were selected, and surveys were sent to all designated participants. The hypothesis was that non-participants have less openness (i.e., one of the key personality dimensions in Big Five personality theory--the characteristic of being intellectually curious and receptive to new experiences) than active participants who willingly joined in the meeting process. Using two indices of managerial openness, a discriminant analysis was undertaken that correctly distinguished over three-quarters of the participants and non-participants in the targeted WebWide meetings. The importance of this finding for advancing the adoption of other new group support technologies is discussed.
Author
Support Systems; Discriminant Analysis (Statistics); Synchronism

20040200692 Porto Univ., Portugal
Unobtrusive Acquisition of User Information for E-Commerce Applications
Zaslavsky, Arkady; Alahakoon, Oshadi; Loke, Seng; ICEIS 2004: Human-Computer Interaction; [2004], pp. 181; In English; See also 20040200666; Copyright; Avail: Other Sources

E-commerce has become a common activity among many people. Although widely used, the interfaces which users communicate with e-commerce systems are still at an early stage of development in terms of intelligence and user-friendliness. Unobtrusiveness is recognized as one of the most important desired attributes of an intelligent and friendly interface. In this paper we describe our work on an information architecture to minimize obtrusiveness. A layered information architecture supported by a structured user profile model is described in the paper. As example scenario is presented to clarify the new architecture and the development of a cost model for measuring the level of obtrusiveness is discussed.
Author
Electronic Commerce; Cost Analysis; Mathematical Models

20040200694 Porto Univ., Portugal
A Flexible Interface Architecture for Digital Talking Books
Simoes, Hugo; Carrico, Luis; Duarte, Carlos; ICEIS 2004: Human-Computer Interaction; [2004], pp. 181-182; In English; See also 20040200666; Copyright; Avail: Other Sources

Talking books, besides helping the blind and print-disabled communities to have easier access to books, also allow reading in situations when the vision becomes temporarily unavailable, for instance, while driving. In this paper, we present a user interface model-based architecture for digital talking books. The books allow for multimodal interaction in an effort to broaden the usage scope, considering the execution platform, user and environment characteristics. The enrichment of the books with different multimedia units is also envisioned. The impact usability tests had in the development of the book's interaction and presentation aspects is also reported.
Author
Architecture (Computers); Interfaces; Multimedia; Reading

20040200695 Porto Univ., Portugal
Robust Spoken Document Retrieval Based on Multilingual Subphonetic Segment Recognition
Tanaka, Kazuyo; Itoh, Yoshiaki; Lee, Shi-wook; ICEIS 2004: Human-Computer Interaction; [2004], pp. 182; In English; See also 20040200666; Copyright; Avail: Other Sources

This paper describes the development and application of a subphonetic segment recognition system for spoken document retrieval. Following from the development of an open-vocabulary spoken document retrieval system, where the retrieval process is accomplished in the symbolic domain by measuring the distance between the parts of subphonetic segment results from pattern recognition in the acoustic domain, the system proposed here performs matching based on subphonetic segment as more basic unit than the semantic unit. As such, the system is not constrained by vocabulary or grammar, and can be readily extended to multilingual tasks. This paper presents the proposed spoken document retrieval system including the proposed subphonetic segment recognition scheme, and evaluates the performance and feasibility of the system through experimental application to multilingual retrieval tasks.
Author
Information Retrieval; Pattern Recognition; Applications Programs (Computers)

20040200697 Porto Univ., Portugal
Online Learning for Future Information Technology Professionals
Billings, Deidre; ICEIS 2004: Human-Computer Interaction; [2004], pp. 170-171; In English; See also 20040200666; Copyright; Avail: Other Sources

This paper discusses the development and implementation of a new Professional Skills for IT Practitioners course in the Bachelor of Computing Systems degree programme at UNITEC, Auckland, New Zealand. IT software skills learning from a previous Packages course was successfully integrated with that for business communication and other essential professional skills to form a more relevant and meaningful course. In developing the course prescription and researching and evaluating possible resources the main criteria were to ensure compatibility with an online delivery component as well as maintaining strong links between communication skills and the real information technology world at all stages of the course. A constructivist focus on collaborative learning and deep personal introspection into the learning process was built into the course framework from the outset. The collaborative learning element was utilised extensively by way of group work in the practical sessions and assignments and in online discussion board dialogue. The personal introspection aspect was the main feature of the weekly online log reflective reporting for the third assignment. The mode of delivery included an online component and resources and a holistic assessment methodology following a constructivist, student-centred paradigm where students were encouraged to be active learners, engaging in optimum peer dialogue, collaboration and reflective practice. In particular, it was considered vital to develop a framework within which the students could construct knowledge and understanding and the lecturer's role would be that of facilitator rather than knowledge-bearer.
Author
Information Systems; Commerce; Computers; Students

20040200698 Porto Univ., Portugal
User Interface Design for Voice Control Systems
Tschirk, Wolfgang; ICEIS 2004: Human-Computer Interaction; [2004], pp. 171; In English; See also 20040200666; Copyright; Avail: Other Sources

A voice control system converts spoken commands into control actions, a process which is always imperfect due to errors of the speech recognizer. Most speech recognition research is focused on decreasing the recognizers' error rates; comparitatively little effort was spent to make user interfaces more robust towards such errors, in other words, to find strategies that optimize the overall system, given a fixed speech recognizer performance. In order to design and evaluate such strategies

prior to their implementation and test, three components are required: 1) an appropriate set of performance figures of the speech recognizer, 2) suitable performance criteria for the user interface, and 3) a mathematical framework for estimating the interface performance from that of the speech recognizer. In this paper, we will identify four basic interface designs and propose a generic mathematical approach for predicting their respective performance.
Author
Speech Recognition; Voice Control; Predictions; Errors; Interfaces

20040200699 Porto Univ., Portugal
A Continuous Line Process Based MRF Modelization
Achour, Karim; Mahiddine, Lyes; ICEIS 2004: Human-Computer Interaction; [2004], pp. 174-175; In English; See also 20040200666; Copyright; Avail: Other Sources

In this paper, we present a method allowing to reconstruct contours. This study is tied to the dual problem of image on Enterprise Information Systems, CFP available Page 175 of 188 segmentation and contours extraction. Indeed, the need to obtain closed areas in an image is due to the fact that it facilitates the high level processes in computer vision like pattern recognition and human-computer Interaction. To this end, our main concern is to obtain a contours-reconstructed image by the use of a Markov Random Field model coupled with a line process model. The optimization is done by the Mean Field Annealing algorithm.
Author
Algorithms; Information Systems; Optimization; Models; Markov Processes

20040200700 Porto Univ., Portugal
Supporting Course Sequencing in a Digital Library: Usage of Dynamic Metadata for Learning Objects
Salcedo, Raul Morales; Yoneo, Yano; Ogata, Hiroaki; ICEIS 2004: Human-Computer Interaction; [2004], pp. 178-179; In English; See also 20040200666; Copyright; Avail: Other Sources

The production of interactive multimedia content is in most cases an expensive task in terms of time and cost. Hence, optimizing production by exploiting the reusability of interactive multimedia elements is mandatory. Reusability can be triggered by a combination of reusable multimedia components and the appropriate use of metadata to control the components as well as their combination. In the same way, digital libraries comprise vast digital repositories, a wide range of services, and user's environments and interfaces, all intended to support learning and collaborative research activities. In this article, we discuss the reusability and adaptability aspects of interactive multimedia content in a digital library's learning environment. We extend a component-based architecture to build interactive multimedia visualization within digital library's learning environment with the use of metadata for reusability and customizability.
Author
Metadata; Multimedia; Digital Techniques; Integrated Library Systems

20040200702 Porto Univ., Portugal
Content Enrichment Through Dynamic Annotation
Weir, George; Lepouras, George; Vassilakis, Costas; ICEIS 2004: Human-Computer Interaction; [2004], pp. 183; In English; See also 20040200666; Copyright; Avail: Other Sources

This paper describes a technique for interceding between users and the information that they browse. This facility, a form of dynamic annotation, affords a means of editing Web page content 'on-the-fly' between the source Web server and the requesting client. This yields a generic way of modifying the content displayed to local users by addition, removal or reorganising any information sourced from the World-Wide Web. We have been exploring the scope for this device and believe that it affords many worthwhile applications. Here, we describe two varieties of use. The first variety focuses on support for individual users in two contexts (second-language support and second language learning). The second variety of use focuses on support for groups of users. These differing applications have the common goal of content enrichment of the materials placed before the user. Dynamic annotation provides a potent and flexible means to this end.
Author
Support Systems; Enrichment; Editing; World Wide Web

20040200704 Porto Univ., Portugal
Accessing Hypermedia Systems Effectiveness In Learning Contexts
Silva, Alexander; Santana, Silvina; Pinto, Joaquim; ICEIS 2004: Human-Computer Interaction; [2004], pp. 183-184; In English; See also 20040200666; Copyright; Avail: Other Sources

Hypermedia systems are increasingly being used in teaching/learning environments. Biomec is a hypermedia system that has got, as it main goal, the interrelation of concepts coming from Sports and Basic Mechanics, just as it is intended in an area of knowledge denominated Physics of Sports. Biomechanics' teachers complain that students, in general, enter the course with scanty knowledge of Physics. They seem to ignore the utility of studying Physics and consider it a hard task, in spite of the obvious necessity they have of understanding Physics' concepts. The final objective of Biomec is to increase the efficiency and effectiveness of the learning processes in this area of study. Biomec uses several resources, as diagrams, graphs, animations and videos, in an attempt to complement and supplement the traditional sequential approaches. The system development has been grounded in learning theories, with contents being organized according to the theory of Ausubel (1968 and the theory of cognitive flexibility (Spiro et al., 1992). The approach follows connectionism, which understand the human memory as a semantic network and believe that learning elapses from the increasing number of connections among the concepts. A hypermedia system like Biomec can be understood as an approach to the semantic network, in which the knots acts as concepts and the links as interrelations. Apparently, a hypermedia system like Biomec is suitable to the teaching/learning of Physical Education. However, only an astringent evaluation, with its target public, can assert what are its real benefits. This work describes the preliminary evaluation of Biomec and presents a methodology for the evaluation and improvement of this kind of systems. The prototype evaluation was done studding its impact on the process of teaching/learning of students attending the discipline Biomechanics, at a Faculty of Physical Education and Sports and appraising their attitudes towards the Physics before and after its interaction with the system. Besides, the system was analysed by a group of teachers of the discipline, by means of a questionnaire. The methodology uses concept maps and techniques of multivariate data analysis.
Author
Multimedia; Multivariate Statistical Analysis; Education; Biodynamics; Systems Engineering

20040200709 Porto Univ., Portugal
A Multimedia Workflow-Based Collaborative Engineering Environment
Gattass, Marcello; Valle, Carla; Santos, Ismael; Raposo, Alberto; ICEIS 2004: Human-Computer Interaction; [2004], pp. 187-188; In English; See also 20040200666; Copyright; Avail: Other Sources

In this paper we discuss the scenario of Petroleum Engineering projects of PETROBRAS, a large Brazilian governmental oil & gas company. Based on this scenario, we propose a set of requirements and system architecture to guide the construction of a Collaborative Engineering Environment (CEE) for assisting the control and execution of large and complex industrial project. in oil industry, specifically tailored for Petroleum Engineering. The environment is composed by the integration of three different technologies of distributed group work: Workflow Management System, Multimedia Collaboration System and a Collaborative Virtual Environment.
Author
Multimedia; Systems Engineering; Management Systems

20040200710 Porto Univ., Portugal
Modelling Dialogues with Emotional Interactive Agents
Martinovska, Cveta; Bozinovski, Stevo; ICEIS 2004: Human-Computer Interaction; [2004], pp. 180; In English; See also 20040200666; Copyright; Avail: Other Sources

The paper describes a possible approach to the design of emotionally intelligent interactive agents capable of conveying emotional, verbal and non-verbal signals. User's affective profile is built according to the standard test in psychiatry and clinical psychology Emotions Profile Index. We introduce a fuzzy framework to model the emotional state and personality traits. Knowing that the user is extrovert or agreeable helps the agent to formulate appropriate responses and to infer the intent behind user's act. Dialog automata are used to conceptualise the conversation between the user and the animated agent.
Author
Verbal Communication; Human-Computer Interface; Models; Emotions

20040200711 Porto Univ., Portugal
Basic Strategies To Enhance Tele-operation Platforms Through The Internet
Cerrada, Carlos; Gomez, Ruben; Escribano, Juan; ICEIS 2004: Human-Computer Interaction; [2004], pp. 179-180; In English; See also 20040200666; Copyright; Avail: Other Sources

This paper shows in a schematic way the basic objectives to enhance teleoperation platforms, that have been achieved in the PhD Thesis .... These objectives are the result of acquired experience working with the teleoperation platform developed

by our research group in teleoperation. The objectives carried out have been formulated after analyzing the performance of the initial platform and detecting some restrictions in several key parts of its design. Specifically, three basic improvement areas have been take into account. The enhance objectives have been focused in aspects such as the operating system, the human-machine interface and finally, in aspects regarding to the communication between the master and the slave. In this paper the main detected problems are introduced as well as the chosen solutions in each case. Experimental results regarding to the last enhancement objective are finally shown.
Author
Internets; Teleoperators; Information Systems

20040200712 Porto Univ., Portugal
Predicting the User Acceptance of Personalized Information Systems: Case Medical Portal
Pahnila, Seppo; ICEIS 2004: Human-Computer Interaction; [2004], pp. 180; In English; See also 20040200666; Copyright; Avail: Other Sources

This paper describes ongoing research, which focuses on the effect of attitudes and intentions in the use of personalized Web Information Systems (WIS). By applying the widely used Technology Acceptance Model (TAM), the theory of planned behavior, innovation diffusion theory and self-efficacy theory, we take an extended view of the factors explaining the individual acceptance and usage of newly emerging personalized Web Information Systems. Many features of personalized WIS differ from the 'traditional' information systems, and we believe that this research will shed new light on the research into the acceptance of personalized WIS.
Author
Information Systems; World Wide Web; Human-Computer Interface; Medical Science

20040200825 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
ICEIS 2003: Software Agents and Internet Computing
[2003]; 38 pp.; In English; 5th International Conference on Enterprise Information Systems, 23-26 Apr. 2003, Angers, France; See also 20040200826 - 20040200908; Copyright; Avail: Other Sources

Reports are presented from the 5th International Conference on Enterprise Information Systems on the topic area of Software Agents and Internet Computing. Report areas include e-commerce, communications, knowledge construction, scripting and dial-up networking, electronic data exchange, wireless communications, web client-server applications, XML topics, internet voting,and e-commerce mobile agents.
Derived from text
Electronic Commerce; Internets; Computer Programs

20040200830 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Agent-Based Generic Services And Their Application For The Mobile Workforce
Bouzid, Maram; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 158; In English; See also 20040200825; Copyright; Avail: Other Sources

In this paper we propose an architecture of agent-based services for easy development of multi-agent applications. It is based on the notion of service components, which can be installed ('plugged') into a communicative agent, and which can be composed in order to offer more sophisticated services. This architecture was validated through the design and development of a set of generic services for mobile workforce support, within the European project LEAP. These generic services were also built to develop two multi-agent applications that assist the mobile workers of British Telecommunications and the German Automobile Club ADAC. Both have been tested in real world conditions in UK and Germany.
Author
Architecture (Computers); Telecommunication; Automobiles

20040200833 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
AgentAPI: An API For The Development Of Managed Agents
Lopes, Rui; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 172; In English; See also 20040200825; Copyright; Avail: Other Sources

Managed agents, namely SNMP agents, costs too much to develop, test and maintain. Although assuming simplicity since its origins, the SNMP model has several intrinsic aspects that make the development of management applications a complex task. However, there are tools available which intend to simplify this process by generating automatic code based on the management information definition. Unfortunately, these tools are usually complicated to use and require a strong background of programming experience and network management knowledge. This paper describes an API for managed agent development which also provides multiprotocol capabilities. Without changing the code, the resulting agent can be managed by SNMP, web browsers, wap browsers, CORBA or any other access method either simultaneously or individually.
Author
Management Information Systems; Architecture (Computers)

20040200834 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Automatic E-Commerce Using a Mobile Agents Model
Raimondi, Francesco Maria; Pennacchio, Salvatore; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 172; In English; See also 20040200825; Copyright; Avail: Other Sources

Electronic commerce business to business using mobile agents is one of the most important future promises and also one good result of global mobility code. As we will show, classic commerce model and electronic commerce model both introduce advantages and disadvantages. Electronic commerce through mobile agents has an objective that is to eliminate defects and to arrange advantages of previous models.
Author
Electronic Commerce; Mobility; Models

20040200839 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
VoiceXML Applied To a Wireless Communication System
Wang, Frank; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 153; In English; See also 20040200825; Copyright; Avail: Other Sources

The project aims to develop a wireless online communication system (Wireless Messenger) to aid communication for small-medium enterprises. By expressing automated voice services using VoiceXML, a visual Web site is created in addition to the physical WML Web site. This wireless system links an out-of-office mobile phone and an in-house server. The functions of this system include posting and notifying of messages internally, posting and notifying of notices, setting and notifying of events, calendar reference modules and administrative controls.
Author
Wireless Communication; On-Line Systems; Websites

20040200844 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Agent Communication Channels: Transport Mechanisms
Mahmoud, Qusay; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 165-166; In English; See also 20040200825; Copyright; Avail: Other Sources

Most of the work that has been done on agent communication has concentrated on ontologies - Agent Communication Languages (ACLs) that are used to describe objects that the agents manipulate. Little attention, if any, has been given to agent communication channels - the transport layer through which data is sent between agents. Here we describe the different communication transport techniques that can be used to send data between agents, and then we will compare and contrast the different transport mechanisms. This is important as the way agents communicate can have a significant effect on the performanq.e of agent-based systems.
Author
Channels (Data Transmission); Natural Language (Computers)

20040200849 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Potential Advantages Of Semantic Web For Internet Commerce
Zhao, Yu-Xiao; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 152; In English; See also 20040200825; Copyright; Avail: Other Sources

Past decade saw much hype in the area of information technology. The emerging of semantic Web makes us ask if it is another hype. This paper focuses on its potential application in Internet commerce and intends to answer the question to some degree. The contributions are: first, we find and examine twelve potential advantages of applying semantic Web for Internet commerce; second, we conduct a case study of e-procurement in order to show its adw_ntages for each process of e-procurement; lastly, we identify critical research issues that may transfer the potential advantages into tangible benefits.
Author
Websites; Internets; Commerce

20040200850 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Scalable And Flexible Electronic Identification
Shaw, David; Maj, S.; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 145; In English; See also 20040200825; Copyright; Avail: Other Sources

Verification of network service requests may be based on widely available identification and authentication services. Complexity or multiple access requirements may require access control artefacts such as hardware based signature generators. Characteristics of artefact generated signatures include security and repeatability. Electronic signatures used in remote transactions need to be graded, flexible and scalable to permit appropriate user selection. Further, inherent error detection may reduce inadvertent errors and misconduct and aid arbitration.
Author
Electronics; Computer Networks

20040200855 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Engineering Multiagent Systems Based On Interaction Protocols: A Compositional Petri Net Approach
Ling, Sea; Loke, Seng Wai; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 156; In English; See also 20040200825; Copyright; Avail: Other Sources

Multiagent systems are useful in distributed systems where autonomous and flexible behaviour with decentralized control is advantageous or necessary. To facilitate agent interactions in multiagent systems, a set of interaction protocols for agents has been proposed by the Foundation of Intelligent Physical Agents (FIPA). These protocols are specified diagramatically in an extension of UML called AUML (Agent UML) for agent communication. In this paper, we informally present a means to translate these protocols to equivalent Petri net specifications. Our Petri nets are compositional, and we contend that compositionality is useful since multiagent systems and their interactions are inherently modular, and so that mission-critical parts of a system can be analysed separately.
Author
Petri Nets; Protocol (Computers)

20040200858 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Implementation Of Mobile Information Device Profile On Virtual Lab
Nambi, Aravind Kumar Alagia; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 167-168; In English; See also 20040200825; Copyright; Avail: Other Sources

The rate at which information is produced in today's world is mind-boggling. The information is changing by every minute and today's corporate mantra is not 'knowledge is power' but 'Timely knowledge is pcwer'. Millions of Dollars are won or lost due to information or lack of it. Business executives and corporate managers push their technology managers to provide information at the right time in the right form. They want information on the go and want to be connected all the time to the Internet or their corporate network. The rapid advancement of Technology in the field of miniaturization and that of communications has introduced a lot of roaming devices for people to connect through to the network like laptop, PDA, mobile phones and many embedded devices. Programming for these devices were cumbersome and limited since each device supported their own standard I/O ports, screen resolution and had specific configurations. The introduction of Java 2 Micro Edition (J2ME) has solved this problem to some extent. J2ME is divided into configuration and profiles, which provide specific information to a group of related devices. Mobile phones can be programmed using J2ME. If the mobility offered by the cellular phones combined with Electrical Engineering many new uses can be found out for existing electrical machines.

It will also enable remote monitoring of electrical machines and the various parameters involved in Electrical Engineering. Author
Mobile Communication Systems; Information Adaptive System

20040200860 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Securing Internet Servers From SYN Flooding
Mahmood, Riaz; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 168-169; In English; See also 20040200825; Copyright; Avail: Other Sources

Denial-of-Service (DOS) attacks utilize the vulnerabilities present in current Internet protocols and target end server machines with flood of bogus requests - thus blocking the services to the legitimate users. In this paper a counter denial-of-service method called Dynamic Ingress Filtering Algorithm (DIFA) is introduced. This algorithm aims to remove the network peripheries inability to counter spoof-based denial-of-service attacks originating from valid network prefi:\hes. Dynamic Ingress Filtering mechanism by virtue of its design, gives protection against both types of spoof-based attacks, generating from valid network prefixes and invalid network prefixes. This is because of the reason that incoming traffic IP addresses change rate is compared with predefined threshold time limit. If the addresses are changing rapidly from a particular source - the packets arriving from that host are not forwarded. Advantages of DIFA include design simplicity, scalability and reasonable implementation costs.
Author
Internets; Security; Algorithms; Targets

20040200862 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
A Semantic Framework For Distributed Applications
Zhang, Liang-Jie; Tsai, Wei-Tek; Li, Bing; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 138-139; In English; See also 20040200825; Copyright; Avail: Other Sources

The .XIN technology is a novel approach to build and integrate existing distributed applications. The essence of a .XIN is business logic descriptions. Based on the concept of .XIN, developers' effort is minimized because their developing work is concentrated on mapping business logic to .XINs. The adaptor layer is an interpreter that translates .XINs into implementations of particular distributed domains. This layer hides details of implementation techniques of distributed applications. Moreover, applications built with .XIN can share their services over Internet via RXC (Remote .XIN Call) and a remote .XIN-based Service can be blended into a local .XIN-based application via RXI (Remote .XIN Interchange). Finally, an object interface can be mapped to a .XIN interface. With the support of this mapping, both non-.XIN applications and .XIN applications have the same interface, .XIN interface. So it is possible for them to share their respective services over the Internet. This is also a new approach to integrate heterogeneous applications. The technology of .XIN is a semantic framework for distributed applications.
Author
Commerce; Distributed Processing

20040200863 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Open Trading: The Search For The Information Economy's Holy Grail
Scriven, Graham; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 139; In English; See also 20040200825; Copyright; Avail: Other Sources

This paper examines the concept of Open Trading, establishing its crucial importance in achieving comprehensive benefits for all trading partners as a result of the move towards the Information Economy. The rationale for interoperability is also examined and placed in perspective. The paper considers how Open Trading can be achieved and suggests ten principles as a practical guide for both vendors and business organisations.
Author
Commerce; Interoperability; Economics

20040200866 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Operation-Support System For Large-Scale System Using Information Technology

Koide, Seiji; Mizoguchi, Riichiro; Gofuku, Akio; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 149; In English; See also 20040200825; Copyright; Avail: Other Sources

We are developing an operation support system for large-scale system such as rocket launch using Information Technology. In the project, we build a multi-media database that organizes diverse information and data produced in designing, testing, and practical launching, develop case-based and model-based trouble shooting algorithms and systems that automatically detect anomaly and diagnose the causes rapidly, and provide a fast networking environment that allows us to work with experts in distance. The distributed collaborative environment in which all of human operators and software agents can work collaboratively is been developing by means of the Web servicing technology such as UDDI, WSDL, and SOAP, and the Semantic Web technology such as RDF, RDFS, OWL, and Topic Maps. This project was prepared with the contract under the Japanese IT program of the Ministry of Education, Culture, Sports, and Technology.

Author

Data Bases; Information Systems; Support Systems; Multimedia

20040200870 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Web Services Security Model Based On Trust

Vasiu, Luminita; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 169; In English; See also 20040200825; Copyright; Avail: Other Sources

The concept of Web services is the latest in the evolution of ever more modular and distributed computing. Web services represent a fairly simple extension to existing component models, such as Microsoft's Component Object Model (COM) or Sun's Enterprise Java Bean (EJB) specification .It is obvious that Web services have what it takes to change something important in the distributed programming field. But, until they do it developers will have some difficulties in figuring out how to solve and eliminate problems that appear when trying to build heterogeneous applications.In an open environment security is always an issue. In order to overcome this problem the main challenge is to understand and asses the risk involved in securing a Web-based service. How do you guarantee the security of a bank transaction service? There are efforts being made to develop security mechanisms for Web services. Standards like SAML, XKMS, SOAP security will probably be used in the future to guarantee protection for both the consumers and the services. In this paper we analyse some security issues faced by Web services and present a security model based on trust which supports more specific models such as identity-based-security, access control lists.

Author

Services; Security; Identities; Protection

20040200872 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

FIDES - A Financial Decision Aid That Can Be Trusted

Vranes, Sanja; Sucurovic, Snezana; Tomasevic, Violeta; Stanojevic, Mladen; Simeunovic, Vladimir; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 158; In English; See also 20040200825; Copyright; Avail: Other Sources

FIDES is aimed at valuating investment projects in accordance with the well-known UNIDO standard and making recommendations on a preferable investment, based on multicriteria analysis of available investment options. FIDES should provide a framework for analyzing key financial indicators, using the discounted cash-flow technique, and also allows for non-monetary factors to enter the multicriteria assessment process, whilst retaining an explicit and relatively objective and consistent set of evaluation conventions and clear decision criteria. Moreover, since virtually every investment and financing decision, involving allocation of resources under uncertain conditions, is associated with considerable risk, FIDES should integrate the risk management module. The basic principle governing risk management is intuitive and well articulated, taking into account investor's subjective appetite for and aversion to risk, and the decision sensitivity to the uncertainty and/or imprecision of input data. Thus, with FIDES, financial analysts and decision-makers will be provided with effective modeling tools in the absence of complete or precise information and the significant presence of human involvement. The decision aid will be implemented using multiple programming paradigms (Internet programming, production rules, fuzzy programming, multicriteria analysis, etc.), using a three-tier architecture as a backbone. Being Web based, the application is especially convenient for large, geographically dispersed corporations.

Author

Decision Support Systems; Internets; Websites

20040200877 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Architecture Of Automatic Recommendation System In E-Commerce

Khosla, Rajiv; Li, Qui-Bang; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 161; In English; See also 20040200825; Copyright; Avail: Other Sources

Automatic recommendation system will become an indispensable tool for customers to shop online. This paper proposes an architecture of automatic recommendation system in e-commerce. The response time of the system, which is the bottleneck of the system, is overcome by high performance computing. The architecture has already applied to an online banking system. Author

Architecture (Computers); Electronic Commerce; On-Line Systems

20040200879 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Electronic Job Marketplaces: A Newly Established Manifestation Of E-Business

Dafoulas, Georgios; Turega, Mike; Nikolaou, Athanasios; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 161; In English; See also 20040200825; Copyright; Avail: Other Sources

Finding suitable candidates for critical job posts is currently an issue of concern for most organizations. Consideration of cultural fit, experience, ability to adapt to the company's marketplace and ability to grow with the organization all weigh heavily on the minds of most human resource professionals. Since the mid-90s a significant number of recruiting firms started exploiting the Internet mainly because of its global nature that provides access to an unlimited pool of skills. Optimistic estimations examine the Internet as a medium for conducting the recruitment and selection process in an online environment. This paper suggests developing an integrated Electronic Job Marketplace offering a new service in the Internet Job Market: Online Interviewing for screening candidate employees. In order to meet hiring objectives and control the increasing cost of recruiting, organisations could implement an online recruiting and selection process. The critical requirements of the new model are: eliminating paperwork, improving time-to-hire, reducing turnover, creating a resume and position-centric environment as well as using the Internet as a recruitment and selection tool.
Author

Commerce; Websites; Internets

20040200880 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

A Dynamic And Scalable Agent-Based Approach For Knowledge Discovery: Web Site Exploration

Lopez, Aurelio Lopez; Torreblanca, Alberto Mendez; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 173-174; In English; See also 20040200825; Copyright; Avail: Other Sources

The World Wide Web has become an open world of information with a continuous growth.This dynamic nature is causing several difficulties for discovering potentially useful Knowledge from the web. The techniques of web mining and software agents can be combined for resolving the problem. In this paper, we propose a dynamic and scalable agent-based approach for knowledge discovery from specific web sites, where the information is constantly added or eliminated, or its structure is permanently modified.We also report preliminary results of the approach for the exploration of web sites.
Author

Websites; Exploration; World Wide Web

20040200883 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Combining Web Based Document Management and Event-Based Systems: MUDS and MOOS Together with DMS Form a Cooperative Open Source Knowledge Space

Hampel, Thorsten; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 140-141; In English; See also 20040200825; Copyright; Avail: Other Sources

The WWW has developed as the de facto standard for computer based learning. However, as a server-centered approach it confines readers and learners to passive non-sequential reading. Authoring and web-publishing systems aim at supporting the authors, design process. Consequently, learners' activities are confined to selecting and reading (downloading documents) with almost no possibilities to structure and arrange their learning spaces nor do that in a cooperative manner. This paper presents a learner-centered - completely web-based - approach through virtual knowledge rooms. Our technical framework

allows us to study different technical configurations within the traditional university setting. Considering the systems design the concept of virtual knowledge rooms is to combine event-based technology of virtual worlds with the classical document management functions in a client-server framework. Knowledge rooms and learning materials such as documents or multimedia elements are represented as a fully object oriented model of objects, attributes and access rights. We do not focus on interactive systems managing individual access rights to knowledge bases, but rather on cooperative management and structuring of distributed knowledge bases.
Author
World Wide Web; Systems Engineering; Multimedia

20040200884 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Users-Tailored E-Business Through a Three-Layer Personalization Model Based On Agents
Ruiz, Irene Luque; Gomez-Nieto, Miguel Angel; Garcia, Gonzalo Cerruela; Espinosa, Enrique Lopez; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 141; In English; See also 20040200825; Copyright; Avail: Other Sources

The explosion of Internet together with the advantages that offers nowadays the electronic commerce, are provoking an important growth of the Web sites devoted to the development of this activity; what gives rise to each time be greater the quantity of information that arrives to the users upon the products or services that offer said sites. The users before so much information, which in some cases will interest it and in other not, finish for not processing it. This situation has provoked that the researchers try to seek solutions, among the ones that emphasizes the use of Artificial Intelligence for solve this problem. With this idea appears the personalization of Web sites, which has as objective to provide to the user the information that he needs. In this paper a personalization model in various levels is proposed, which applied to the Business Virtual Centre portal (BVC) will try to personalize services, information, as well as, the activities that will be able to carry out each user in it. Personalization model is based on: stereotypes existing in the system, information introduced by the user and the knowledge extracted from the information generated by the user during its stay in the BVC.
Author
Electronic Commerce; Internets; Artificial Intelligence; Websites

20040200889 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
SoMeONe: A Cooperative System For Personalized Information Exchange
Agosto, Layda; Vignollet, Laurence; Bellec, Pascal; Plu, Michel; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 151-152; In English; See also 20040200825; Copyright; Avail: Other Sources

This paper presents a user-centric, social-media service: SoMeONe. It's goal is to build an information exchange network using Web informational networks. It should allow the construction of personal knowledge bases whose quality is improved by collaboration. It tries to increase the user's commitment by helping him to establish and to maintain interesting interactions with enriching people. Although many users are individualist, the rules we define for this media should encourage a cooperative behaviour. The functionalities it offers are between a bookmark management system and mailing lists. With SoMeONe users exchange information with semantic addressing: they only need to annotate information for being diffused to appropriate users. Each user interacts only through a manually controlled contact network composed of known and trusted users. However, to keep his contact network open, SoMeOne helps each user to send information to new appropriate users. In return, the user expects these users to send him new information as well. In companies, where the Intranet is composed of huge amounts of heterogeneous and diverse information, such collective behaviour should increase the personal efficiency of each collaborator. Thus, SoMeONe provides some solutions to some knowledge management problems particularly for companies aware of the value of their social capital.
Author
Knowledge Based Systems; Knowledge Bases (Artificial Intelligence); Internets

20040200891 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
The Resource Framework For Mobile Applications: Enabling Collaboration Between Mobile Users
Roth, Joerg; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 138; In English; See also 20040200825; Copyright; Avail: Other Sources

Mobile devices are getting more and more interesting for several kinds of field workers such as sales representatives or

maintenance engineers. When in the field, mobile users often want to collaborate with other mobile users or with stationary colleagues at home. Most established collaboration concepts are designed for stationary scenarios and often do not sufficiently support mobility. Mobile users are only weakly connected to the communication infrastructure by wireless networks. Small mobile devices like PDAs often do not have sufficient computational power to handle effortful tasks to coordinate and synchronize users. They have for example very limited user interface capabilities and reduced storage capacity. In addition, mobile devices are subject to other usage paradigms like stationary computers and often turned on and off during a session. In this paper, we introduce a framework for mobile collaborative applications based on so-called resources. The resource framework leads to a straightforward functional decomposition of the overall application. Our platform Pocket DreamTeam provides a runtime infrastructure for application based on resources. We demonstrate the resource concept with the help of two applications build to top of the Pocket DreamTeam platform.
Author
Communication Networks; Computers; Wireless Communication; Mobility

20040200895 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Towards Web Site User's Profile: Log File Analysis
deCarvalho, Carlos Alberto; Pierozzi, Ivo, Jr.; Gomes, Eliane Goncalves; deCleofasFaggionAlencar, Maria; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 144-145; In English; See also 20040200825; Copyright; Avail: Other Sources

The Internet is a remote, innovative, extremely dynamic and widely accessible communication medium. As in all other human communication formats, we observe the development and adoption of its own language, inherent to its multimedia aspects. The Embrapa Satellite Monitoring is using the Internet as a dissemination medium of its research results and interaction with clients, partners and web site users for more than one decade. In order to evaluate the web site usage and performance of the e-communication system the Webalizer software has been used to track and to calculate statistics based on web server log file analysis. The objective of the study is to analyze the data and evaluate the indicators related to requests origin (search string, country, time), actions performed by users (entry pages, agents) and system performance (error messages). It will help to remodel the web site design to improve the interaction dynamics and also develop a customized log file analyser. This tool would retrieve coherent and real information.
Author
Multimedia; Websites; Human-Computer Interface

20040200905 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Towards Agent Based Business Information Systems and Process Management
Sievering, Johann; Morin, Jean-Henry; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 170; In English; See also 20040200825; Copyright; Avail: Other Sources

Todays Business Information Systems and Business Intelligence applications have become key instruments of corporate management. They have evolved over time to a mature discipline within IT departments. However, they appear to be slow at integrating emerging technologies offering major improvements to trading partners in the global networked ecosystem. The Internet is slowly evolving towards Peer-to-Peer architectures and grid computing, Agent-Oriented Programming, Digital Rights and Policy Management, trusted computing, ontologies and semantics. These evolutions are setting the ground and requirements for the future of corporate IT. This paper reports on current investigations and developments on this issue making the case for the integration of emerging technologies in Business Information Systems. In particular, mobile agents and peer-to-peer computing offer major advantages in terms of technical architectures as well as a programming paradigm shift. We are currently working on a framework addressing these issues towards Active Business Objects.
Author
Information Systems; Internets; Industrial Management

20040200906 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Membership Portal and Service Provisioning System for an Infrastructure of Hubs: Managed e-Hub
Zhang, Liang-Jie; Chang, Henry; Tian, Zhong; Yang, Shun Xiang; Zuo, Ying Nan; Xu, Jing Min; Chao, Tian; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 171; In English; See also 20040200825; Copyright; Avail: Other Sources

The goal of Managed e-Hub research prototype is to build a common infrastructure of hubs so that businesses can develop B2B exchanges meeting their business needs based on it. In this paper, an open and extensible framework for Managed e-Hub is presented and the hub fundamental services are discussed in detail as well. The service provisioning system of Managed e-Hub not only provides a way of integrating other services into the hub by means of service on-boarding and subscription, but also provisions these services with their required provisioning information.
Author
Architecture (Computers); Computer Networks

20040200908 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
WIDAM: Web Interaction Display and Monitoring
Gamboa, Hugo; Ferreira, Vasco; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 155; In English; See also 20040200825; Copyright; Avail: Other Sources

In this paper we describe the design and implementation of a system called Web Interaction Display and Monitoring (WIDAM). We have developed a web based client-server application that offers several services: (i) Real time monitoring of the user interaction to be used in synchronous playback (Synchronous Monitoring Service); (ii) Real time observation by other users (Synchronous Playback Service); (iii) Storage of the user interaction information in the server database (Recording Service); (iv) Retrieval and playback of a stored monitored interaction (Asynchronous Playback Service). WIDAM allows the usage of an interaction monitoring system directly over a web page, without the need of any installation, using low bandwidth comparatively to image based remote display systems. We discuss several applications of the presented system like intelligent tutoring systems, usability analysis, system performance monitoring, synchronous or asynchronous e-learning tools.
Author
Websites; Human-Computer Interface; Applications Programs (Computers); Client Server Systems; Interactive Control

20040201073 Naval Postgraduate School, Monterey, CA USA
A CyberCIEGE Scenario Illustrating Secrecy Issues in an Internal Corporate Network Connected to the Internet
Lamorie, Justin D., Author; Sep. 2004; 106 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427264; No Copyright; Avail: Defense Technical Information Center (DTIC)

The CyberCIEGE project seeks to create an alternative to traditional Information Assurance (IA) training and education approaches by developing an interactive, entertaining commercial-grade PC-based computer game that teaches IA concepts while simultaneously entertaining the player. The game provides a robust, flexible and extensible gaming environment where each game instance is based on a fully customizable scenario. These customized scenarios produce game simulations that are tailored to meet a player's specific IA training needs, thus providing personalized, focused IA training at a minimum cost in both dollars and time. Additionally, the interactive game simulations, provided by the CyberCIEGE game, create an entertaining and realistic training environment for the player. Finally, the ability to load the game onto, and execute it from a PC allows IA training to be conducted practically anywhere, i.e. at home, or while traveling. To demonstrate this capability, this thesis developed a customized scenario designed to educate players in secrecy issues concerning the connection of an internal corporate network with the Internet. Additionally, this thesis produced Scenario Definition Files (SDFs) designed to test the game engine to determine if it would produce results that met the SDF developer 's expectations and that the simulated game environment was realistic.
DTIC
Computerized Simulation; Data Processing; Education; Game Theory; Games; Internets; Organizations; Simulation

20040201084 Naval Postgraduate School, Monterey, CA USA
Performance Analysis of Wireless LAN Signals Transmitted Over a Ricean Fading Channel in a Pulsed Noise Interference Environment
Spyrou, Evangelos, Author; Sep. 2004; 91 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427289; No Copyright; Avail: Defense Technical Information Center (DTIC)

This thesis examines the performance of the waveforms specified by the IEEE 802.11a wireless local area network standard when the signal is transmitted over a Ricean fading channel with AWGN and pulsed noise interference. The pulsed interference is assumed to have constant average power and is either fading or nonfading. The probability of bit error is conditional on the received signal to noise power ratio, which is modeled as a random variable. The probability density function of this random variable is obtained either analytically or numerically for each modulation type, and the probability

of bit error is evaluated as the expected value of the conditional probability. In one case, use is made of a new technique for the numerical inverse of the Laplace transform in order to evaluate numerically the signal to noise ratio probability density function. Due to the complexity of the analysis when both the signal and the interference are subject to Ricean fading, the analysis was simplified by assuming Ricean signal fading with Rayleigh interference fading and vice versa. The results of the analysis show that performance is affected by the degree of signal fading and also depends on the pulsed interference duty cycle. The signal to interference power ratio affects the way performance depends on these two factors.
DTIC
Channel Noise; Fading; Local Area Networks; Rayleigh Waves; Reliability Analysis; Signal to Noise Ratios

20040201089 Naval Postgraduate School, Monterey, CA USA
A Formal Analysis of the MLS LAN: TCB-to-TCBE, Session Status, and TCBE-to-Session Server Protocols
Craven, Daniel S., Author; Sep. 2004; 155 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427307; No Copyright; Avail: Defense Technical Information Center (DTIC)

This thesis presents a formal analysis process and the results of applying that process to the MLS LAN: TCB-to-TCBE, Session Status, and TCBE-to-Session Server Protocols. The formal analysis process consists of several distinct stages: the creation of a detailed informal protocol description, analyzing that description to reveal assumptions and areas of interest not directly addressed in the protocol description, the transformation of that description and the related assumptions into a formal Strand Space representation, analyzing that representation to reveal assumptions and areas of interest, and concluding with an application of John Millen's automated Constraint Checker analysis tool to the Strand Space representations under an extremely limited set of conditions to prove certain protocol secrecy properties.
DTIC
Local Area Networks; Microwave Landing Systems; Protocol (Computers); Strands; Systems Analysis

20040201092 Naval Postgraduate School, Monterey, CA USA
CyberCIEGE Scenario Illustrating Integrity Risks to a Military-Like Facility
Fielk, Klaus W., Author; Sep. 2004; 126 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427312; No Copyright; Avail: Defense Technical Information Center (DTIC)

As the number of computer users continues to grow, attacks on assets stored on computer devices have increased. Despite an increase in computer security awareness, many users and policy makers still do not implement security principles in their daily lives. Ineffective education and the lack of personal experience and tacit understanding might be a main cause. The CyberCIEGE game can be used to convey requisite facts and to generate tacit understanding of general computer security concepts to a broad audience. This thesis asked if a Scenario Definition File (SDF) for the CyberCIEGE game could be developed to educate and train players in Information Assurance on matters related to information integrity in a networking environment. The primary educational concern is the protection of stored data. Another goal was to test whether the game engine properly simulates real world behavior. The research concluded that it is possible to create SDFs for the CyberCIEGE game engine to teach specifically about integrity issues. Three specific SDFs were developed for teaching purposes. Several SDFs were developed to demonstrate the game engine's ability to simulate real world behavior for specific, isolated educational goals. These tests led to recommendations to improve the game engine.
DTIC
Computer Information Security; Computer Networks; Education; Risk; Security

20040201224 Naval Postgraduate School, Monterey, CA USA
An Architectural Framework for Describing Supervisory Control and Data Acquisition (SCADA) Systems
Ward, Michael P., Author; Sep. 2004; 122 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427541; No Copyright; Avail: Defense Technical Information Center (DTIC)

Two recent trends have raised concerns about the security and stability of Supervisory Control and Data Acquisition (SCADA) systems. The first is a move to define standard interfaces and communications protocols in support of cross-vendor compatibility and modularity. The second is a move to connect nodes in a SCADA system to open networks such as the Internet. Recent failures of critical infrastructure SCADA systems highlight these concerns. To ensure continued operations in times of crisis, SCADA systems, particularly those operating in our critical infrastructure, must be secured. Developing an abstract generic framework for defining and understanding SCADA systems is a necessary first step. A framework can provide the tools to understand the system's functions and capabilities, and how components in the system relate and interface with each other. This thesis examines and describes SCADA systems, their components, and commonly used communications

protocols. It presents a matrix approach to describing and defining the features, functions and capabilities of a SCADA system. Two small SCADA systems, using industry standard components and simulating real world applications, were designed and constructed for this thesis to provide context for applying the matrix approach.
DTIC
Data Acquisition; Protocol (Computers); Security

20040201489 Loyola Coll., Baltimore, MD, USA
Design of Complex Technical Equipment by Darwinian Evolution
Kohne, Glenn S.; Karasz, William J.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 661-667; In English; See also 20040201469; No Copyright; Avail: CASI; A02, Hardcopy

Design of equipment to perform certain functions and to meet given performance criteria is a fundamental activity for engineers. In the traditional approach to design, we select specific components and interconnect them in specific ways that we believe will achieve some desired performance. We use various analysis techniques to evaluate the ability of our design to meet performance requirements. Using the results of analysis, we enter an iterative process of modifying and reevaluating the design. The success of this technique depends strongly on our individual experiences and imaginations. Alternately, we could simply select a random number of component parts with randomly chosen performance characteristics. We could connect these components together quite randomly. When this device is tested against the required performance criteria, it would most likely fail miserably. However, if we create 10,000 such devices and test them all, some of them would meet the required performance criteria better than the others. We could use the best performing 10% of these devices as parents of the next generation. For each of the surviving 10%, generate 1,000 new circuits with randomly chosen additions, deletions, and component value changes. Evaluation of this second generation will likely produce some devices that perform better than any in the first generation. This experiment aims to demonstrate that after 100 s or 1,000 s of generations, the best devices will meet any realistic set of performance requirements. No experience or imagination is necessary. One of the investigators (GSK) became interested in strict-rule random systems in the early 1960 s. The idea came from original research by an English biologist named Donald Michie in 1960. He described an experiment that involved a group of matchboxes displaying various tic-tac-toe board possibilities containing colored beads indicating the next move that could learn to play tic-tac-toe. The specific details as to how this would work is not important. What is important is that the experiment provided for a random selection of the next move, and then either rewarded or penalized each given matchbox in a game based on the outcome of the game. This is the fundamental theory underlying the idea of Darwinian natural selection. After playing a large number of games, and adjusting the colored beads within each matchbox according to the rules, the 'machine' learned how to play a game of tic-tac-toe that would either win or end in a tie. This experiment demonstrated the fact that one could build a system that, with experience, could 'learn' how to solve any given problem.
Author
Analog Circuits; Evolution; Design Analysis; Human-Computer Interface

20040201518 NTT Data Intellilink Corp., Japan
Connecting Seed Technology with User Needs through Open Source Systems
Miyake, Kou; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 6-11; In English; See also 20040201509; Copyright; Avail: Other Sources

NTT DATA INTELLILINK, a fully owned subsidiary of NTT DATA, uncovers and incubates next-generation seed technology in the rapidly evolving world of systems integration (SI). Today, in an era of one million subscribers to NTT's B-FLET'S broadband connection service, the forecast for network computing is unprecedented expansion in the years to come. Against this background, we talked to Kou Miyake, President and Chief Executive Officer of NTT DATA INTELLILINK, about the technologies that are now attracting attention in SI and the strategies being used to apply them.
Author
Broadband; Forecasting; Systems Integration; User Requirements; Systems Engineering

20040201519 Nippon Telegraph and Telephone Public Corp., Musashino, Japan
Multilayer Coordination Technologies for Next-generation Core Networking
Miyamura, Takashi; Hayashi, Rie; Misawa, Akira; Urushidani, Shigeo; NTT Technical Review, Volume 2, No. 11; November 2004, pp. 42-47; In English; See also 20040201509; Copyright; Avail: Other Sources

In this article, we introduce multilayer coordination technologies, which provide various advantages such as improved

efficiency of network operation, fast and stable failure recovery, and efficient use of network resources. The rapidly increasing bandwidth requirements of IP traffic mean that networks based on optical technologies in conjunction with IP routing technologies will provide the backbone of the next-generation Internet. One of the major issues is how to construct an optical-technology-based backbone network that provides economical transport of large-scale IP-based packet traffic while achieving high reliability and multi-QoS (quality of service) support. These objectives can be achieved using multilayer coordination technologies.
Author
Communication Networks; Internets; Broadband; Optical Communication

20040201597 Porto Univ., Portugal
Measuring The Impact Of Enterprise Systems On Business Objectives
Owhoso, Vincent; Chand, Donald; Hunton, James; Vasudevan, Sri; Hachey, George; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 42-43; In English; See also 20040201585; Copyright; Avail: Other Sources

This is a research-in-progress report on our research project aimed at understanding how to assess the success of ERP systems. Based on an in-depth study of a successful ERP implementation in a multinational manufacturing and service organizations, we have identified sample performance indicators in all four dimensions of Balanced Scorecard. Our study shows that instead of building an ERp scorecard, it is more fruitful to study the impacts of the ERP systems on business goals and strategies.
Author
Commerce; Manufacturing; Organizations

20040201600 Porto Univ., Portugal
ARCO: Moving Digital Library Storage To Grid Computing
Trezentos, Paulo; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 40-41; In English; See also 20040201585; Copyright; Avail: Other Sources

Storage has been extensively studied during the past few decades\cite{Fost97,Trez01}. However, the emerging trends on distributed computing bring new solutions for existent problems. Grid computing proposes a distributed approach for data storing. In this paper, we introduce a Grid-based system (ARCO) developed for multimedia storage of large amounts of data The system is being developed for Biblioteca Nacional, the National Library of Portugal. Using Grid informational system and resources management, we propose a transparent system where TeraBytes of data are stored in a beowulf cluster built of commodity components with backup solution and error recover mechanisms.
Author
Data Systems; Data Storage; Grid Computing (Computer Networks); Resources Management

20040201603 Porto Univ., Portugal
Identifying Clones In Dynamic Web Sites Using Similarity Thresholds
Scanniello, Giuseppe; DeLucia, Andrea; Tortora, Geny; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 4; In English; See also 20040201585; Copyright; Avail: Other Sources

We propose an approach to automatically detect duplicated pages in dynamic Web sites. Our approach analyzes both the page structure, implemented by specific sequences of HTML tags, and the displayed content. In addition, for each pair of dynamic pages we also consider the similarity degree of their scripting source code. The similarity degree of two pages is computed using different similarity metrics for the different parts of a web page based on the Levenshtein string edit distance. We have implemented a prototype to automate the clone detection process on web applications developed using JSP technology and used it to validate our approach in a case study.
Author
Document Markup Languages; Websites; Analogies

20040201605 Porto Univ., Portugal
A Reconfiguration Algorithm For Distributed Computer Networks
Glezer, Chanan; Zviran, Moshe; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 1; In English; See also 20040201585; Copyright; Avail: Other Sources

This article presents an algorithmic reconfiguration model, combining mechanisms of load balancing and fault tolerance in order to increase utilization of computer resources in a distributed multi-server, multi-tasking environment. The model has

been empirically tested in a network of computers controlling telecommunication hubs and is compared to previous efforts to address this challenge.
Author
Algorithms; Computer Networks

20040201606 Porto Univ., Portugal
BVA+: A Bit Vectors Algorithm For Accelerating Queries In Multilevel Secure Databases
Haraty, Ramzi; Zeitunlian, Arda; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 1; In English; See also 20040201585; Copyright; Avail: Other Sources

Much research has been done in the area of multilevel database systems, especially in the security area and accelerating queries. In this paper, we present BVA+, which is based on bit vectors to accelerate queries in multilevel secure database systems. As its predecessor (BVA), the BVA+ algorithm follows the classic Sea View Model, but it recovers query output from single-level relations in a faster and more space-efficient manner than the previous works performed on this subject, in addition, the BVA+ algorithm does not produce spurious or extra tuples, which have always been a major problem in the area of multilevel secure database systems.
Author
Data Bases; Algorithms

20040201632 Porto Univ., Portugal
An Exchange Service for Financial Markets
Rabhi, Fethi; Dabous, Feras; Yu, Hai-Rong; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 27; In English; See also 20040201585; Copyright; Avail: Other Sources

The critical business requirements and compelling nature of the competitive landscape are pushing Information Technology systems away from the traditional centrally controlled corporate-wide architectures towards dynamic, loosely coupled, self-defining and service-based solutions Web services are regarded as a key technology for addressing the need for connecting extended applications and providing standards and flexibility for enterprise legacy systems integration. This paper reports our experiences when integrating a financial market trading system. This integration process starts from analyzing the trading system's architecture, then identifying system functionality and finally realizing the design and implementation of a Web service. Performance and security and the trade-offs involved are the major focus points throughout this process. Comprehensive benchmarking is conducted with and without Web service and security considerations.
Author
Systems Integration; Electronic Commerce

20040201633 Porto Univ., Portugal
Study of Different Approaches to the Integration of Spatial XML Web Resources
Corcoles, Jose; Gonzalez, Pascual; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 16; In English; See also 20040201585; Copyright; Avail: Other Sources

The research community has begun to investigate foundations for the next stage of the Web, called Semantic Web. Current efforts include the Extensible Markup Language XML, the Resource description Framework, Topic Maps and the DARPA Agent Markup Language DAML+OIL. A rich domain that requires special attention is the Geospatial Semantic Web. However, in order to approach the Geospatial Semantic Web, it is necessary to solve the problem of developing an integration system for querying spatial resources stored in different sources. In this paper, we study two different approaches to integrating spatial and non-spatial information represented in the Geographical Markup Language (GML). The approaches studied follow LAV (Local as View) integration. With this study we obtain the best approach to developing a real system for querying GML resources stored in different sources.
Author
World Wide Web; Internet Resources; Document Markup Languages

20040201640 Porto Univ., Portugal
Web-Based Training System for Forest Fire Office Staff
Garbajosa, Juan; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 40; In English; See also 20040201585; Copyright; Avail: Other Sources

The objective of this paper is to present an approach for a web-based training system for Forest fire offices. The

development of a modelling and simulation technology for systems with a network-like architecture is a growing day by day. Forest fire offices represents an appropriate application to do this development. The approach described is based on an XML languages family defined in a research project and applied to a number of systems that have been modelled and simulated. This paper introduces two different points of views: the first the system architecture; the second the XML-based language and its use for simulation.
Author
Internet Resources; Training Simulators; Fire Fighting

20040201647 Porto Univ., Portugal
Dynamic Change of Server Assignments in Distributed Workflow Management Systems
Reichert, Manfred; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 27; In English; See also 20040201585; Copyright; Avail: Other Sources

Process-oriented application systems can only be realized - with reasonable effort and at acceptable costs - by the use of a workflow management system (WfMS). Central WfMS, with a single server controlling all workflow (WF) instances, however, may become overloaded very soon. In the WF literature, therefore, many approaches suggest using a multi-server WfMS with distributed WF control. In such a distributed WfMS, the concrete WF server for the control of a particular WF activity is usually defined by an associated server assignment. Following such an approach, problems may occur if components (WF servers, subnets, or gateways) become overloaded or break down. As we know from other fields of computer science, a favorable approach to handle such cases may be to dynamically change hardware assignment. This corresponds to the dynamic change of server assignments in WfMS. For the first time, this paper analyzes to what extent this approach is reasonable in such situations.
Author
Distributed Processing; Management Systems

20040201649 Porto Univ., Portugal
Transformation-Oriented Middleware For Legacy System Integration
Frei, Urs; Menkhaus, Guido; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 21; In English; See also 20040201585; Copyright; Avail: Other Sources

Most established companies have ac.quired legacy systems through mergers and acquisitions. The systems were developed independently of each other and very often they do not align with the evolving IT infrastructure. Still, they drive day-to-day business processes. Replacing the legacy application with new solutions might not be feasible, practical or cost a considerable amount of time. However, immediate integration might be a requirement for a strategic project, such as supply chain management or e-business. This article presents a transformation system for legacy system integration that allows flexible and effective transformation of data between heterogeneous systems. Sequences of transformations are described using a grammar based approach.
Author
Systems Integration; Applications Programs (Computers); Data Systems; Sequencing

20040201650 Porto Univ., Portugal
Correlating Events For Monitoring Business Processes
Schiefer, Josef; McGregor, Carolyn; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 20-21; In English; See also 20040201585; Copyright; Avail: Other Sources

With the increasing demand for real-time information on critical performance indicators of business processes, the capturing, transformation and correlation of real-world events with minimal latency are a prerequisite for improving the speed and effectiveness of an organization's business operations. Events often include key business information about their relationship to other events that can be utilized to collect relevant event data for the calculation of business performance indicators. In this paper we introduce an approach for correlating events of business processes that uses correlation sessions to represent correlation knowledge. Correlation sessions facilitate the processing of data across multiple events and thereby enable a calculating of business metrics in near real-time. The benefit over existing approaches is that it is tailored to instrument business processes and business applications that may operate in a heterogeneous software environment. We propose a Java-based, container-managed environment which provides a distributed, scalable, near-real time processing of events and which includes a correlation service that effectively manages correlation sessions. We also show a complete

example that illustrates how correlation sessions can be utilized for computing the cycle time of business processes.
Author
Real Time Operation; Commerce; Java (Programming Language); Correlation

20040201651 Porto Univ., Portugal
Schema Evolution For Stars And Snowflakes
Kaas, Christian; Pedersen, Torben Bach; Rasmussen, Bjorn; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 21; In English; See also 20040201585; Copyright; Avail: Other Sources

The most common implementation platform for multidimensional data warehouses is RDBMSs storing data in relational star and snowflake schemas. DW schemas evolve over time, which may invalidate existing analysis queries used for reporting purposes. However, the evolution properties of star and snowflake schemas have not previously been investigated systematically. This paper systematically investigates the evolution properties of star and snowflake schemas. Eight evolution operations are considered, covering insertion and deletion of dimensions, levels, dimension attributes, and measure attributes For each operation, the formal semantics of the changes for star and snowflake schemas are given, and instance adaption and impact on existing queries are described. Finally, we compare the evolution properties of star and snowflake schemas, concluding that the star schema is considerably more robust towards schema changes than the snowflake schema.
Author
Data Storage; Deletion; Semantics

20040201654 Porto Univ., Portugal
Understanding The ERP Post-Implementation Discourse
Carton, Fergal; Adam, Frederic; Sammon, David; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 41-42; In English; See also 20040201585; Copyright; Avail: Other Sources

This paper presents the first stage of a larger research project focusing on understanding the emergence of ERP I1.ERP is now being seen for what it really is: 'a means to an end', in that, its primary benefit is in the integrated infrastructure that it introduces and its ability to support future IS investments. The paper focuses on the changes that have been observed in the services offered by vendors and consultants in the now renamed ERP II market. Now terms like 'ERP' and 'e-business' are fol the most part avoided by vendors and consultants as they are perceived to be out-of-date. For example, SAP once promoted that fact that they were '29 years in the business of e-business' with 'the best-run e-businesses run SAP', but now their message promotes, '30 years in the business of helping businesses grow' with 'the best-run businesses run SAP'. In this paper, issues of concern with the realities of ERP post-implementation are presented through examining: benefits realisation; informational requirements; and generic to specific solutions. While we would argue that it is difficult to understand the rationale for the introduction of these 'newer' ERP extensions, we must acknowledge that a market has been created and that once again the 'new-look' ERP vendors are the dominant ERP II players. This leads us to question whether there is anything new in ERP II.
Author
Commerce; Messages

20040201658 Porto Univ., Portugal
Data Extraction And Transformation With Flat File For Business Integration
Ye, Sheng; Sun, Wei; Tian, Zhong; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 41; In English; See also 20040201585; Copyright; Avail: Other Sources

Documents and their exchange play important roles in business operations and transactions. With the development of e-business, the capability of exchanging data in different formats is necessary for integrating heterogeneous enterprise applications. Though XML is becoming the standard communication protocol over the Internet, most enterprise applications today can only process a specific format text data, mostly in a flat file. These diverse data formats will continue to exist until the enterprises' applications are upgraded to a version supporting XML. So the transformation between XML and flat file is widely demanded in business integration solutions. This paper introduces a round trip transformation technology between flat file and XML, Flat File Adapter. This technology employs a systematic and patent pending data extraction and formatting method to support the processing of complex format flat file. By using Flat File Adapter, developer can design the data transformation rules shortly, and these rules will be captured in a template that make it is easy to update for later requirements' changes. In this paper, we introduce the system architecture, detailed components, and particular data extraction and

transformation method. Finally, a sample application in B2B e-procurement solution is also described.
Author
Electronic Commerce; Architecture (Computers); Document Markup Languages; Extraction

20040201659 Porto Univ., Portugal
Improving Query Performance On OLAP-Data Using Enhanced Multidimensional Indices
Feng, Yao-Kai; Ryu, Hiroshi; Makinouchi, Akifumi; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 31; In English; See also 20040201585; Copyright; Avail: Other Sources

Multidimensional indices are efficient to improve the query performance on OLAP data. As one multidimensional index structure, R*-tree is popular and successful, which is a member of the famous R*-tree family. We enhance the R*-tree to improve the performance of range queries on OLAP data. First, the following observations are presented. (1) The clustering pattern of the tuples (of the OLAP data) among the R*-tree leaf nodes is a decisive factor on range search performance and it is controllable. (2) There often exist many slender nodes when the R*-tree is used to index business data, which causes some problems both with the R*-tree construction and with queries. And then, we propose an approach to control the clustering pattern of tuples and propose an approach to solve the problems of slender nodes, where slender nodes refer to those having a very narrow side (even the side length is zero) in some dimension. Our proposals are examined by experiments using synthetic data and TPC-H benchmark data.
Author
Approach Control; Commerce; Construction; Query Languages

20040201661 Porto Univ., Portugal
Managing Web-Based Information
Vernazza, Tullio; Succi, Giancario; Sillitti, Alberto; Scotto, Marco; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 31; In English; See also 20040201585; Copyright; Avail: Other Sources

The heterogeneity and the lack of structure of World Wide Web make automated discovery, organization, and management of Web-based information a non-trivial task. Traditional search and indexing tools provide some comfort to users, but they generally provide neither structured information nor categorize, filter, or interpret documents in an automated way. In recent years, these factors have prompted the need for developing data mining techniques applied to the web, giving rise to the term 'Web Mining'. This paper introduces the problem of web data extraction and gives a brief analysis of the various techniques to address it. Then, News Miner, a tool for Web Content Mining applied to the news retrieval is presented.
Author
Information Management; Automatic Control; Data Mining; Heterogeneity; Management Information Systems; Management Systems

20040201688 Porto Univ., Portugal
Connectivity Of ERP System
Esichaikul, Vatcharaporn; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 2; In English; See also 20040201585; Copyright; Avail: Other Sources

The study is an attempt to propose the criteria for determining the appropriate connectivity of ERP systems. The result of this study provides a framework assisting ERP adopters in selecting integration approach which are appropriate to their needs. A survey was conducted to obtain information from ERP users to learn about their opinions on factors and criteria affecting connectivity of ERP systems. Findings from the study revealed that data oriented approach and application integration oriented approach are the most preferred integration methodologies. Opinions on criteria for evaluating ERP connectivity are nature of business process of organization, availability of technologies and service supports, nature of information system of organization, system flexibility, degree of integration, transaction volume, implementation cost, ease of maintenance, implementation time, security, and budget. Finally, the study proposes a framework to determine appropriate connectivity of ERP systems.
Author
Systems Integration; Security; Information Systems

20040201694 Porto Univ., Portugal
A Conceptual Framework For Forecasting ERP Implementation Success: A First Step Towards The Creation Of An Implementation Support Tool
Carlsson, Fredrik; Nilsson, Andreas; Magnusson, Johan; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 8; In English; See also 20040201585; Copyright; Avail: Other Sources

The continuing soar in popularity when it comes to standardized information systems sold en masse under the labelling of Enterprise Resource Planning (ERP) Systems is somewhat kept under control by the ever flowing stream of reports from the industry of implementations gone bad. According to some researchers it is possible to assume that as many as 90% of all initiated ERP implementation projects can be regarded as failures as a result of changes in scope, prolongation of the project time or simply budget overruns. With the implementation of an ERP system being a very costly and risky endeavour, organizations considering 'getting on the bandwagon' stand much to gain from pre-emptively forecasting the probability of success for an ERP implementation in their enterprise. Given this, the purpose of this paper is to investigate a possible conceptual framework for forecasting ERP implementation success and discuss the role of such a framework in a software based tool. This was achieved through an initial in-depth literary review aimed at finding factors affecting the outcome of the ERP implementation projects. These results were then communicated to an industrial support group comprised of possible ERP implementation stakeholders. After lengthy discussions concerning the usability, validity and reliability of the proposed list of factors, a conceptual framework was agreed upon for forecasting ERP implementation success The framework was then tested against a number of possible stakeholders outside the industrial support group. As the results show we have been able to create a conceptual framework for forecasting ERP implementation success that is currently in the second wave of testing. The usability, validity and reliability of the framework is discussed and elaborated upon, and this paper concludes that the perceived usability and hence also value of the conceptual framework is substantial, whereas the validity and reliability remain to be tested.
Author
Software Development Tools; Forecasting; Cost Analysis; Probability Theory; Information Systems

20040201695 Porto Univ., Portugal
Design And Representation Of The Time Dimension In Enterprise Data Warehouses: A Business Related Practical Approach
Hezzah, Ahmed; Tjoa, A. Min; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 35; In English; See also 20040201585; Copyright; Avail: Other Sources

A data warehouse provides a consisl:ent view of business data over time. In order to do that data is represented in logical dimensions, with time being one of the most important dimensions. Representing time, however, is not always straightforward due to the complex nature of time issues and the strong dependence of the time dimension on the type of business. This paper addresses the specific issues encountered during the design of the time dimension for multidimensional data warehouses. It introduces design and modeling techniques for representing time in the data warehouse by the use of one or multiple time dimensions or database timestamps. It also discusses generic problems linked to the design and implementation of the time dimension which have to be considered for (global) business processes, such as representing holidays and fiscal periods, increasing the granularity of business facts, considering the observation of daylight saving time and handling different time zones. These problems seem to have wide application, and yet, more in-depth investigations need to be conducted in this field for real-world time-based analysis in enterprise-wide data warehouses.
Author
Real Time Operation; Design Analysis; Data Bases

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*.

20040196380 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Robotic Subsurface Analyzer and Sample Handler for Resource Reconnaissance and Preliminary Site Assessment for ISRU Activities at the Lunar Cold Traps
Gorevan, S. P.; Wilson, J.; Bartlett, P.; Powderly, J.; Lawrence, D.; Elphic, R.; Mungas, G.; McCullough, E.; Stoker, C.; Cannon, H., et al.; Space Resources Roundtable VI; 2004, pp. 21; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Since the 1960s, claims have been made that water ice deposits should exist in permanently shadowed craters near both lunar poles. Recent interpretations of data from the Lunar Prospector-Neutron Spectrometer (LP- NS) confirm that significant concentrations of hydrogen exist, probably in the form of water ice, in the permanently shadowed polar cold traps. Yet, due to the large spatial resolution (45-60 Ian) of the LP-NS measurements relative to these shadowed craters (approx.5-25 km),

these data offer little certainty regarding the precise location, form or distribution of these deposits. Even less is known about how such deposits of water ice might effect lunar regolith physical properties relevant to mining, excavation, water extraction and construction. These uncertainties will need to be addressed in order to validate fundamental lunar In Situ Resource Utilization (ISRU) precepts by 2011. Given the importance of the in situ utilization of water and other resources to the future of space exploration a need arises for the advanced deployment of a robotic and reconfigurable system for physical properties and resource reconnaissance. Based on a collection of high-TRL. designs, the Subsurface Analyzer and Sample Handler (SASH) addresses these needs, particularly determining the location and form of water ice and the physical properties of regolith. SASH would be capable of: (1) subsurface access via drilling, on the order of 3-10 meters into both competent targets (ice, rock) and regolith, (2) down-hole analysis through drill string embedded instrumentation and sensors (Neutron Spectrometer and Microscopic Imager), enabling water ice identification and physical properties measurements; (3) core and unconsolidated sample acquisition from rock and regolith; (4) sample handling and processing, with minimized contamination, sample containerization and delivery to a modular instrument payload. This system would be designed with three mission enabling goals, including: (1) a self-contained, low power, low mass, 'black box'' configuration for operations from a lander, various classes of rovers or a surface-based platform with human assistance or robotic anchoring mechanisms; (2) reconfigurable and scalable sample handling for delivery to various types of instrumentation, depending on mission requirements; and (3) the use of advanced automation control and diagnostic techniques that will afford local human deployed, remote teleoperation and fully autonomous intelligent operations. Though a great deal of technology has been advanced toward these objectives, the SASH system faces significant design challenges, including the low gravity environment, various levels of autonomy in operations, radiation exposure, dust contamination, and temperature extremes and deltas. Significant input from the scientific and engineering communities, as well as a significant environmental testing program, will be required to guide the design process.

Author

Automatic Control; Control Systems Design; In Situ Resource Utilization; Autonomy; Lunar Prospector; Space Exploration; Reconnaissance; Cold Traps

20040200701 Porto Univ., Portugal

Automatic Navigation among Mobile DTV Services

Peng, Cheng-Yuan; ICEIS 2004: Human-Computer Interaction; [2004], pp. 179; In English; See also 20040200666; Copyright; Avail: Other Sources

Limited input buttons on a mobile device restrict people to access digital broadcast services. In this paper, we present a reinforcement learning approach to automatic navigating among services in mobile digital television systems. Our approach uses standard Q-learning algorithm as a theory basis to predict next remote control button for the user by learning usage patterns from interaction experiences. We do the experiment using the modified algorithm in our system. The experimental results demonstrate that the performance is good and the method is feasible and appropriate in practice.

Author

Digital Television; Human Behavior; Machine Learning; Predictions

20040200856 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Enhancing News Reading Experience Through Personalization Of News Content And Services Using Intelligent Agents

Balavijendran, Logandran; Cheong, Soon Nyean; Mustapha, Azhar Kassim; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 156; In English; See also 20040200825; Copyright; Avail: Other Sources

One of the most common things we use the Internet for is to read the news. But there is so much news catering for so many people, that it often gets confusing and difficult to read what you want to read about. This system uses an Intelligent Agent to guess what the user is interested in and personalizes the news content. This is done by observing the user and determining short-term and long-term interests. To further enrich the experience, it provides features that allows the user to track specific news events and receive instant alerts; summarize news so you can take a quick look before committing yourself; find background information to learn about the news; search and filter results according to the user profile and also provides a smart download tool that makes viewing heavy multimedia content practical without needing large bandwidth (by exploiting the irregular nature of internet traffic and use). This agent is designed to work of the News on Demand Kiosk Network and designed primarily in J2EE.

Author

Internets; News; Artificial Intelligence

20040200961 Interface Video Systems, Inc., Washington, DC, USA

To Boldly Go: Machine Consciousness and the Exploration of Space

[2004]; 1 pp.; In English; 2 hrs., 1 min., playing time, in color, with sound; No Copyright; Avail: CASI; V04, Videotape-VHS

Dr. France Cordova, NASA's Chief Scientist, chaired this meeting, another part of the NASA Administrator's Seminar Series. She introduced Administrator Daniel S. Goldin, who welcomed the attendees, and noted that the two speakers have a running feud regarding the possibility of creating robots that can 'think'. Dr. Cordova then introduced the first speaker, Dr. Roger Penrose of the Mathematical Institute at Oxford in the U.K. His primary interests are in mathematics, physics, information systems technology, and artificial intelligence. He thinks that robots cannot be made to 'think' and that consciousness is not computable. Dr. Hans Moravec, who spoke next, has opinions and activities that are related to, but substantially different from those of Dr. Penrose. Dr. Moravec believes that he can build a robot that can act based on the deductions that it will make. To mimic human thinking capabilities, he figures that a robot ultimately will need to be able to handle ten trillion computations per second. He predicts that his goal of building a 'thinking' robot will be met in the 2030-2040 time period. He pointed out that he already has built a car that successfully drove itself from Washington, DC to San Diego, CA. He commented that a human being, was ready to take over driving the car, if necessary, but there was no need. The robots envisioned by Dr. Moravec would not only be able to 'think', but also would have human-like emotions, and ultimately would be able to reproduce. The discussion that followed raised questions about the morality of sending human-like robots into outer space. Also a concern was expressed that human-like robots might perceive humans as a threat and become dangerous to people.

Author

Artificial Intelligence; Consciousness; Robots; Cognitive Psychology

20040201432 Norfolk State Univ., VA, USA

Robotic Control

Jones, Veronica; Boone, Jessie; Farrow, Yedidah; Smith, Chris; Williams, Michael; Basappa, Prathap; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 443-452; In English; See also 20040201420; No Copyright; Avail: CASI; A02, Hardcopy

In this project, we have integrated the Vision System (camera) controlled by Labview (LV), along with the Rhino Robot controlled by RoboTalk (RT), in order to control the movement of the conveyor belt to simulate a Computer Integrated Manufacturing environment. RT is a programming language, used here to control the motors of the Rhino Robot, as well as the conveyor belt. LV is a graphical software system for developing software for scientific and engineering applications. The software applications are developed using LV, RT, and the IMAQ Browser 6.0. The IMAQ vision builder is a tool for prototyping and testing image processing applications. The objective of this project is to show how to interface various software applications, to scan, determine, and discharge an object from a conveyor belt. We have demonstrated how Labview can be used to detect the presence of the object and determine if an object is acceptable, which will move the object along the conveyor belt into a waiting bucket. Alternatively, if the object is found defective the computer will send an output signal to the Mark III Controller and the robotic arm will remove the object from the conveyor belt. In this context, we are using RT, LV, and the IMAQ Browser 6.0 to integrate certain operations.

Author

Computer Programming; Robotics; Robot Arms; Computer Programs

20040201643 Porto Univ., Portugal

An Automation System Based on LabVIEW to Control The Test of Mechanical Flow Meters

Mejia, Victor; Martinez, Javier; Silva, Victor; Alvarez, Ricardo; Cortez, Petronilo; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 12; In English; See also 20040201585; Copyright; Avail: Other Sources

A mechanical flow meter is a device used mainly to measure and calculates velocity of water flow on rivers and open channels. These devices, as the time of use pass trough, suffer mechanical imperfections, that's why it is important to calibrate them twice a year, depending of its time of use. At the Mexican Institute of Water Technology (IMTA in Spanish) was designed and developed a circular water tank for propose of test of these meters. The present paper shows the automation systems designed to control the tests to calibrate these mechanical meters. The system is based on LabVIEW. LabVIEW is a general purpose programming tool with extensive libraries for data acquisition instrument control, data analysis, and data presentation. With this tool and a special hardware interface, it was possible to automate the process to test these meters. The system is called SCM (System of characterization of mechanical meters). SCM control the test of two mechanical meters

simultaneously, and has some user's control features that permit the Operator a easy to use human machine interface.
Author
Automatic Control; Calibrating; Data Acquisition; Computer Programs

64
NUMERICAL ANALYSIS

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

20040191644 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Using LOTOS In Workflow Specification
Longheu, Alessandro; ICEIS 2003; [2003], pp. 98; In English; See also 20040191598; Copyright; Avail: Other Sources

Complexity of business processes is getting higher and higher, due to the rapid evolution of market and technologies, and to the reduced time-to-market for new products. Moreover, it is also essential to check workflow (WF) correctness, as well as to guarantee specific business rules. This can be achieved using specific tools within workflow management systems (WFMS), but a formal approach (mathematical-based) is a more effective methodology to guarantee workflow requirements. Formal description techniques (FDT) based on process algebra allow both to formally describe WF at any level of abstraction, and to formally verify properties as correctness and business rules. In this paper, we apply FDT in production workflows specification using the LOTOS language. In particular, we first show how most recurrent WF patterns can be described in LOTOS, then showing an application example of how WFs can be defined based on LOTOS patterns, allowing a more effective verification of correctness/business rules.
Author
Algebra; Commerce; Management Systems

20040201098 Space and Naval Warfare Systems Center, San Diego, CA USA
GeoPlot Declutter Interface Usability Evaluation
Feher, Bela, Author; Jul. 2004; 44 pp.; In English
Report No.(s): AD-A427323; SSC/SD-TR-1917; No Copyright; Avail: CASI; A03, Hardcopy

This study evaluates the usability of an advanced human-system interface that uses an automated algorithm to reduce user workload by automatically decluttering low-threat tracks. The usability evaluation was conducted in association with an experiment conducted for two purposes: (1) to compare two decluttered interfaces with a standard, non-decluttered interface for performing an air defense task, and (2) to compare medium and high threshold cutoffs on the declutter algorithm.
DTIC
Algorithms; Human-Computer Interface

20040201108 MPI Software Technology, Inc., Birmingham, AL USA
A Multi-Time Scale Morphable Software Milieu for Polymorphous Computing Architectures (PCA) - Composable, Scalable Systems
Skjellum, Anthony, Author; Yuan, Hong, Author; Dandass, Yoginder S., Author; Oct. 2004; 31 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-01-C-0079; DARPA ORDER-L168; Proj-L168
Report No.(s): AD-A427345; AFRL-IF-RS-TR-2004-267; No Copyright; Avail: Defense Technical Information Center (DTIC)

Polymorphous Computing Architectures (PCA) rapidly 'morph' (reorganize) software and hardware configurations in order to achieve high performance on computation styles ranging from specialized streaming to general threaded applications; the former is most like a pipeline processor, while the latter is most like a collection of common desktop processors. This project explored a multi-time scale morphable software environment (denoted milieu') whose purpose was to suggest ways to build applications from components of varying scales; these components were to include small and large amounts of code, different algorithms, and different parallelism. The purpose of PCA is to reduce the cost, size, power, and other 'footprint' aspects of computing that can be most efficiently done with radically different kinds of computing elements; pre-PCA systems connect disparate parts with low utilization outcomes. This project sought to create a model-based software framework for reactive monitoring, optimization, modeling, resource negotiation and allocation, regeneration, and verification. Model-based software uses principles like 'legos' or 'tinker toys' to model interactions and roles, and allow a framework in which software

is created. This project report addresses the research objectives and key accomplishments, while introducing the technical concepts and approaches developed in this project for the PCA software development. Future work is also recommended in this report.
DTIC
Algorithms; Parallel Processing (Computers); Polymorphism

20040201185 Illinois Univ., Urbana, IL USA
Trajectories for Locomotion Systems: A Geometric and Computational Approach via Series Expansions
Bullo, Francesco, Author; Oct. 2004; 11 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAD19-01-1-0716
Report No.(s): AD-A427472; ARO-41631.4-CL; No Copyright; Avail: Defense Technical Information Center (DTIC)

The objective of this research has been the design and validation of innovative methods for motion planning of highly mobile all-terrain vehicles and motion coordination for multi-vehicle networks. The initial focus of this research was on algorithms for (single) vehicle trajectory generation. We have studies fast local trajectory optimization algorithms for vehicles with limited control authority. The main research focus has been on a novel class of asynchronous distributed coordination algorithms for multi-vehicle networks. We have developed coverage and coordination algorithms for communication-constrained vehicle models. The algorithms are spatially distributed in the sense that only spatially localized information is required for their implementation. We believe this is a fundamental improvement over the current state-of-the-art in motion coordination. Finally, we have developed an outdoor experimental platform, called the Multi-Rover Network Laboratory,' consisting of eight model rovers equipped with embedded computers, wifeless interfaces, and sensors.
DTIC
Algorithms; Locomotion; Trajectories

20040201196 Oregon Univ., Eugene, OR USA
Improving Coalition Performance by Exploiting Phase Transition Behavior
Etherington, David W., Author; Parkes, Andrew J., Author; Sep. 2004; 30 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-00-2-0534; Proj-ANTS
Report No.(s): AD-A427490; AFRL-IF-RS-TR-004-261; No Copyright; Avail: Defense Technical Information Center (DTIC)

This document describes research into the effects of phase transitions and related phenomena on the design and operation of autonomous negotiating teams (ANTs). Results are reported in three areas: computational thresholds, solution clusters, and pseudo-Boolean solvers. First, the existence of computational thresholds below the usual computational hardness phase transition is shown, and the implications of these thresholds for 'anytime', 'good enough soon enough' behavior are discussed. Second, the effects of solution-clustering behavior on problem decomposition and negotiation strategy are explored, and it is shown that focusing negotiations on clusters both increases the chance of success and reduces the number of rounds of negotiation required. Finally, the application of pseudo-Boolean representations and solvers to ANTS problems is discussed, including the impacts of various heuristic choices and learning strategies that were necessary to provide practical leverage on the ANTs program's demonstration problems.
DTIC
Phase Transformations

20040201210 Army Engineer Research and Development Center, Vicksburg, MS USA
A Numerical Method for Computing Barge Impact Forces Based on Ultimate Strength of the Lashings Between Barges
Arroyo, Jose R., Author; Ebeling, Robert M., Author; Aug. 2004; 220 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427517; ERDC/ITL-TR-04-2; No Copyright; Avail: CASI; A10, Hardcopy

In 1993 Headquarters, U.S. Army Corps of Engineers, issued the first formal Corps-wide analysis procedure providing guidance for analyzing the effects of barge impact loading on navigation structures. According to the ETL 1110-2-338 engineering procedure, the magnitude of the impact forces generated by a particular collision event is dependent on the mass including hydrodynamic added mass of the barge train, the approach velocity, the approach angle, the barge train moment of inertia, damage sustained by tie barge structure, and friction between the barge and the wall. Two significant concerns have been raised since the release of the ETL 1110-2-338 procedure: 1) A key aspect of the ETL 1110-2-338 engineering formulation is computation of collision energy dissipated in nonrecoverable, plastic hull deformation of (i.e., damage to) the corner of the barge where impact with the wall occurs. However, the majority of the impacts made by barge trains transiting Corps locks do not result in damage to the barge structure nor damage to the walls. 2) In addition, several engineers who have

used the ETL 1110-2-338 engineering procedure have questioned the accuracy of the computed results. In 2003, the U.S. Army Engineer Research and Development Center issued the report ERDC/ITL-TR-03-3, 'Analysis of Impact Loads from Full-Scale, Low-Velocity, Controlled Barge Impact Experiments, December 1998,' by Arroyo, Ebeling, and Barker. This report addresses the interpretation of 8 of the 44 December 1998 full-scale, low-velocity, controlled-impact, barge train impact experiments conducted at the decommissioned Gallipolis Lock at Robert C. Byrd Lock and Dam, Gallipolis Ferry, WV.
DTIC
Boats; Impact Loads; Impact Strength; Numerical Analysis

20040201219 Army Cold Regions Research and Engineering Lab., Hanover, NH USA
Blast-Sound-Absorbing Surfaces. A Joint Project of the ERDC and the Netherlands Ministry of Defense
Attenborough, Keith, Author; Cummings, Alan, Author; Dutta, Piyush, Author; Schomer, Paul, Author; Salomons, Erik, Author; Sep. 2004; 114 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427530; ERDE/CREL-TR-04-17; No Copyright; Avail: Defense Technical Information Center (DTIC)

This research investigated methods of absorbing blast sound, including the development of analytical theories, numerical simulations, laboratory experiments, and a field trial. Prior to this research, no theory existed for the design of sound-absorbing surfaces at low frequencies in a highly non-linear shock environment. The work includes developments of (1) a theory for the non-linear response of rigid-porous materials to high amplitude sound, allowing for a linear variation of flow resistivity with flow velocity (Forchheimer's non-linearity); (2) a time-domain non-linear theory that assumes low frequencies, semi-infinite media, and weak shocks and gives explicit results for incident triangular shock waveforms; (3) an alternative time-domain formulation that enables predictions for a finite layer but requires numerical integration; and (4) a further non-linear theory that predicts the response of multiple rigid-porous layers to continuous high-intensity sound. Numerical work has been carried out to predict the surface impedance of a porous and elastic layer subject to continuous high-intensity sound and including Forchheimer s non-linearity. Measurements have been made on the propagation constant, characteristic impedance, and reflection coefficients for finite-amplitude, low-frequency continuous sound waves incident on porous concrete, porous aluminum, sand, gravel stones, perforated panels, and open-cell polymer foams. In addition, shock tube systems based on membrane rupture have been used to look at the acoustic shock response of materials. Finally, the far-field propagation is modeled using parabolic equation method. A full-scale field test using high explosives was conducted at Ft. Drum, NY. The primary purpose was to test predictions of the blast reflection from and attenuation into a porous medium, and a secondary objective was to test the effect of plowing the ground surface over a larger area.
DTIC
Netherlands; Nonlinear Systems; Numerical Analysis

20040201232 Villanova Univ., PA USA
Space-Time Array Processing for Radar and Communications
Buckley, Kevin, Author; Perry, Richard, Author; Teti, Joseph, Author; Jan. 1998; 12 pp.; In English
Contract(s)/Grant(s): N00014-98-1-0892
Report No.(s): AD-A427560; 5-27626; No Copyright; Avail: CASI; A03, Hardcopy

We developed a new approach using EM derived algorithms for MLSE over channels having unknown FIR impulse coefficients with known statistics. The ML formulation for optima sequence estimation over random channels is generally intractable to solve directly. However, the EM algorithm is a technique which can effectively be used to solve such intractable ML problems. Specifically, by using EM to marginalize over the channel coefficient distribution, optimal estimates of the transmitted sequence are derived which can achieve lower bit-error-rates than methods which jointly estimate both the transmitted sequence and the channel coefficients, and methods based on first optimally estimating the channel coefficients.
DTIC
Algorithms; Search Radar; Signal Processing

20040201249 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany
Adaptive Kopplung des Netzfreien SPH-Verfahrens mit Finiten Elementen zur Berechnung von Impaktvorgaengen- (Adaptive Coupling of the Mesh-Free SPH-Method with Finite Elements for the Calculation of Impact Events)
Sauer, Martin, Author; Jan. 2000; 223 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427616; No Copyright; Avail: CASI; A10, Hardcopy

Impact and penetration problems are of particular importance in many fields of engineering science, including wave propagation. Traditionally, mesh-based methods like the Finite Element Method have been used for their numerical analyses.

Recently, mesh-free methods have attracted interest. The mesh-free 'Smooth Particle Hydrodynamics' (SPH) method used in this work offers advantages in modelling both large deformations and behavior of failed material, because there are not fixed topological bonds between numerical sampling points. However, applicability of SPH-method was restricted due to its high computational expenses. The 'Hybrid Approximation' presented in this report, a method for coupling the SPH-method with Finite Elements, allows for selective use of SPH in the discretization of a structure: SPH is used locally if large deformations occur, while otherwise Finite Elements are used.
DTIC
Finite Element Method; Wave Propagation

20040201294 Washington Univ., Seattle, WA USA
Stochastic Models and Statistical Analysis for Clock Noise
Percival, Donald B., Author; Sep. 2004; 4 pp.; In English
Contract(s)/Grant(s): N00014-03-1-0614; Proj-312900
Report No.(s): AD-A427776; No Copyright; Avail: CASI; A01, Hardcopy

This report describes work on stochastic models that form the basis for the statistical analysis of clock noise. A popular simple model for clock noise is a pure power law (PPL) process. A method for efficiently computing the autocovariance sequence (ACVS) for discrete parameter stationary PPL processes is developed. The method is extended to handle the ACYS for the stationary process obtained when a nonstationary PPL process is differenced to achieve stationarity.
DTIC
Clocks; Statistical Analysis; Stochastic Processes

20040201665 Porto Univ., Portugal
Advantages Of UML For Multidimensional Modeling
Lujan-Mora, Sergio; Trujillo, Juan; Vassiliadis, Panos; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 31-32; In English; See also 20040201585; Copyright; Avail: Other Sources

In the last few years, various approaches for the multidimensional (MD) modeling have been presented. However, none of them has been widely accepted as a standard. In this paper, we summarize the advantages of using object orientation for MD modeling. Furthermore, we use the UML, a standard visual modeling language, for modeling every aspect of MD systems. W_ show how our approach resolves elegantly some important problems of the MD modeling, such as multistar models, shared hierarchy levels, and heterogeneous dimensions. We believe that our approach, based on the popular UML, can be successfully used for MD modeling and can represent most of frequent MD modeling problems at the conceptual level.
Author
Models; Dimensional Analysis

65
STATISTICS AND PROBABILITY

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

20040191616 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
The Relevance Of a Global Accounting Model In Multi-Site ERP Implementations
Bokovec, Ksenca; Damij, Talib; ICEIS 2003; [2003], pp. 100; In English; See also 20040191598; Copyright; Avail: Other Sources

ERP systems and their processes are cross-functional. They transform companies' practice from traditional functional and local oriented environments to global operations, where they integrate functions, processes and locations. They can support company-specific processes in the framework of globally defined organisational structures and procedures if properly implemented. This paper seeks to contribute to the area of multi-site ERP implementations. A case study from several companies in a large retail corporation is presented, focusing on the global accounting model from the perspective of an ERP implementation project. This case study analyses the most important elements of a globally designed financial and management accounting model and their 'translation' to the structures and processes of the ERP system. Moreover, It

demonstrates the importance of the application methodology in early project phases. Central standardisation and maintenance issues of the global accounting model are also outlined.
Author
Accounting; Financial Management; Standardization

20040201082 Naval Postgraduate School, Monterey, CA USA
Improving Branch-and-Price Algorithms and Applying Them to Stochastic Programs
Silva, Eduardo F., Author; Sep. 2004; 99 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427284; No Copyright; Avail: Defense Technical Information Center (DTIC)

The first phase of this research demonstrates improvements in the performance of branch-and-price algorithms (B&P) for solving integer programs by (i) stabilizing dual variables during column generation, (ii) performing strong branching, (iii) inserting multiple near-optimal columns from each subproblem, (iv) heuristically improving feasible integer solutions, and by applying several other techniques. Computational testing on generalized-assignment problems shows that solution times decrease over na ve B&P by as much as 96%; and, some problems that could not be solved by standard branch and bound on the standard model formulation have become easy. In the second phase, this research shows how to solve a class of difficult, stochastic mixed-integer programs using B&P. A new, column-oriented formulation of a stochastic facility-location problem (SFLP), using a scenario representation of uncertainty, provides a vehicle for demonstrating this method s viability. Computational results show that B&P can be orders of magnitude faster than solving the original problem by branch and bound, and this can be true even for single-scenario problems; i.e., for deterministic problems. B&P also solves SFLP exactly when random parameters are modeled through certain continuous probability distributions. In practice, these problems solve more quickly than comparable scenario-based problems.
DTIC
Algorithms; Integers; Stochastic Processes

20040201087 Naval Postgraduate School, Monterey, CA USA
Using Hughes' Salvo Model to Examine Ship Characteristics in Surface Warfare
Haug, Kevin G., Author; Sep. 2004; 82 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427300; No Copyright; Avail: Defense Technical Information Center (DTIC)

As resources constrain investment decisions, what combination of parameters most effectively causes one force to defeat another? Using Hughes' Salvo equations, the author conducted combat simulations to investigate the singular and pairwise effects of providing one force an advantage in its offensive power, defensive power, staying power, force size, and information. The purpose of this thesis is to identify specific combinations that present potential priorities in ship design and force planning. Cases are examined in terms of fraction of forces killed and surviving, and consolidated in a comparison of fractional exchange ratios between the forces. Over the range of parameters explored, when forces are closely matched, a defensive advantage allows a force to outlast another, execute damage, and limit damage incurred to its own force. The Polya distribution of shots shows that the bonus gained by attaining perfect information is a significant edge, and the hazard of failing to deny the enemy the same. (3 tables, 30 figures, 5 refs.)
DTIC
Allocations; Combat; Navy; Ships; Simulation; War Games; Warfare

20040201129 Illinois Univ., Chicago, IL USA
Two-Dimensional World Decomposition Based Parametric Methods for Space-Time Adaptive Processing of Radar Signals
Nehorai, Arye, Author; Sep. 2004; 11 pp.; In English
Contract(s)/Grant(s): F49620-02-1-0339
Report No.(s): AD-A427376; AFRL-SR-AR-TR-04-0529; No Copyright; Avail: CASI; A03, Hardcopy

Generalized multivariate analysis of variance and related reduced-rank regression are general statistical models that comprise versions of regression, canonical correlation, and analyses, as well as analysis of variance (ANOVA) and covariance in univariate and multivariate settings. It is a powerful and yet not very well known tool. In 1 we develop a unified framework for explaining, analyzing, and extending signal processing methods based on GMANOVA. We show the applicability of this framework to a number of detection and estimation problems in signal processing and communications, and provide new and simple ways to derive numerous existing algorithms for: 1) radar target estimation and detection; 2) source location using parametric signal models; 3) synchronization and space-time channel and noise estimation; 4) space-time symbol detection in

5) blind channel equalization, estimation, and signal separation; 6) spectral analysis nuclear magnetic resonance (NMR) spectroscopy. Many of the above methods were originally derived 'from scratch,' without knowledge of their close relationship with the GMANOVA model. We explicitly show this relationship and present new insights and guidelines for generalizing these methods. We also acknowledge the pioneering works of Brillinger (on frequency-wave number analysis, and Kelly and Forsythe (on radar detection, who first applied GMANOVA to signal processing problems. Our results could inspire applications of the general framework of GMANOVA to new problems in signal processing. We present such an application to flaw detection in nondestructive evaluation (NDE) of materials. A promising area for future growth is image processing.
DTIC
Algorithms; Analysis of Variance; Decomposition; Multivariate Statistical Analysis; Signal Processing; Space-Time Adaptive Processing

20040201146 Massachusetts Inst. of Tech., Lexington, MA USA
Power-Law Scattering Models and Nonlinear Parametric Estimation for Super-Resolution Radar
Hatch, N., Author; Holl, D., Jr., Author; Cyganski, D., Author; Apr. 2002; 78 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F19628-00-C-0002
Report No.(s): AD-A427396; TR-2004-075; No Copyright; Avail: CASI; A05, Hardcopy

This paper introduces a direct solution of the frequency-dependent, GTD-based, scatterer model parameters leading towards a new modem spectral estimation technique to be used for enhanced superresolution RADAR analysis. The overcomplete nature of the full GTD scatterer model basis (positive and negative half-integer power laws) is recognized and overcome by introducing the vector channel method, well known from communication theory. This physically motivated discrete-model based analysis eliminates the need for computationally intensive and potentially non-convergent local optimization procedures. Each scatterer is assigned a half-integer power law that identifies its cross section frequency dependence and hence restricts the possible underlying physical feature geometries. This analysis opens the possibility for vector-attribute based feature processing for target recognition that offers the potential for significant improvement in target identification performance.
DTIC
Nonlinearity; Scattering; Target Recognition

20040201186 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Phase-Type Approximations for Wear Processes in A Semi-Markov Environment
Solo, Christopher J., Author; Mar. 2004; 138 pp.; In English
Report No.(s): AD-A427473; AFIT/GOR/ENS/04-11; No Copyright; Avail: Defense Technical Information Center (DTIC)

The reliability of a single-unit system experiencing degradation (wear) due to the influence of a general, observable environment process is considered. In particular, the failure time distribution is evaluated using only observations of the unit's current operating environment which is characterized as a finite semi-Markov process (SMP). In order to impose the Markov property, generally distributed environment state sojourn times are approximated as phase-type (pH) random variables using observations of state holding times and transition rates. The use of PH distributions facilitates the use of existing analytical results for reliability evaluation of units subject to an environment process that evolves as a continuous-time Markov chain. The procedure is illustrated through three numerical examples, and results are compared with those obtained via Monte Carlo simulation. The maximum absolute deviation in probability for failure time distributions was on the order of 0.004. The results of this thesis provide a novel approach to the reliability analysis of units operating in randomly evolving environments for which degradation or failure time observations are difficult or impossible to obtain.
DTIC
Degradation; Markov Processes; Wear

20040201267 Naval Postgraduate School, Monterey, CA USA
Statistical Monitoring of Suicides in the U.S. Armed Forces
Martin, Matthew K., Author; Sep. 2004; 93 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427661; No Copyright; Avail: Defense Technical Information Center (DTIC)

This study develops a methodology that assists military commanders and health professionals in making decisions on when and where to apply intervention techniques based on shifts in suicide rates. The software package that incorporates the

methodology for statistical process control provides rapid detection of an out-of-control suicide rate situation. Furthermore, it minimizes the potential for unwarranted reaction to usual variation. The study models DoD suicides as a Poisson process to detect departures from usual variation using a self-starting control chart scheme. Methods are implemented in a Microsoft Excel spreadsheet with Visual Basic macros for ease of use. For the USA Army, persistent shifts in the process mean are detected in August 1985 (increase), September 1987 (decrease), April 1991 (increase), November 1997 (decrease), and September 2001 (decrease). The increase in April 1991 follows the commencement of Iraqi combat operations under Operation Desert Storm in January 1991. With regard to Operation Iraqi Freedom, which began in March 2003, this study does not reveal a change in the Army's suicide rate commensurate with more soldiers being deployed to an environment of combat stress. For the Navy, persistent shifts in the process mean are detected in December 1990 (decrease), January 1993 (increase), May 1994 (decrease), July 1995 (increase), and March 1996 (decrease). Apparently, no relationships to wartime environments or high operational tempos are evident in these shifts. For the Marine Corps, persistent shifts in the process mean are detected in January 1993 (increase) and March 1998 (decrease). For the Air Force, persistent shifts in the process mean are detected in January 1988 (increase), April 1990 (decrease), November 1994 (increase), November 1998 (decrease), and April 1999 (decrease). Once again, no relationships to wartime environments or high operational tempos are evident for these two service components. (25 figures, 13 ref7

DTIC

Armed Forces; Armed Forces (United States); Mental Health; Military Personnel; Personnel; Statistical Analysis

66
SYSTEMS ANALYSIS AND OPERATIONS RESEARCH

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

20040191655 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal

Information System Failure: analysis and Commentary

Wise, John; Nahouraii, Ata; Debons, Anthony; ICEIS 2003; [2003], pp. 137; In English; See also 20040191598; Copyright; Avail: Other Sources

Contemporary events of considerable significance to national and public welfare suggest that information was a significant force on the character and outcome of each event such as the Chechen rebels held more than 700 hostages in the Dubrovku, Kremlin theater on October 23, 2002, the terrorist attack of 9/11, the Challenger shuttle accident, the explosion at Bhopal. The need to identify the success and failures of information systems in these events is deemed to be relevant to national and private interests. In 1986, an aggregation of distinguished scholars met in Bad Windsheim, Federal Republic of Germany to serve as lecturers in an Advanced Study Institute sponsored by the NATO's Science division. A number of issues were addressed which included the prevailing methods used in the assessment of information system failure, the organizational factors pertaining thereof, the role of human cognitive variables, the capacity of the system to induce or resist failure and many other socio-economic-political variables that were considered pertinent to an understanding of information system failure. The paper summarizes these dimensions of information system failure as presented at the institute and in addition, comments on the importance on such systems based on contemporary socio-political circumstances.

Author

System Failures; Systems Analysis; Information Systems

20040191686 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal

Building Conceptual Schemas by Refining General Ontologies: A Case Study

dePalol, Xavier; Conesa, Jordi; Olive, Antoni; ICEIS 2003; [2003], pp. 108-109; In English; See also 20040191598; Copyright; Avail: Other Sources

The approach of deriving conceptual schemas from general ontologies has not been analyzed in detail in the field of information systems engineering. We believe that the potential benefits of that approach makes its analysis worthwhile. This paper aims at contributing to this analysis by means of a case study. The scope of the case study is rather limited, but even so we believe that some general valid conclusions can be drawn. The main result has been that deriving conceptual schemas by refining a general ontology may require less effort than building them from scratch, and may produce better schemas. On the other hand, an organization may achieve a high level of integration and reuse, at the conceptual level, if that organization builds all its conceptual schemas as a refinement of a general ontology. Our conclusions are similar to those originated in the

development of object-oriented designs and applications using frameworks.
Author
Information Systems; Object-Oriented Programming; Systems Engineering

20040201204 State Univ. of New York, Stony Brook, NY USA
Multiscale Modeling of Complex Physics: Fluids Solids and Optics
Glimm, James, Author; Jan. 2004; 18 pp.; In English
Contract(s)/Grant(s): DAAD19-01-1-0642
Report No.(s): AD-A427504; ARO-42254.36-MA; No Copyright; Avail: CASI; A03, Hardcopy

Algorithms, simulations and modeling for fluid mixing and complex flow were developed. Our front tracking algorithm was improved for its accuracy and conservation properties. Local mesh refinement was added. Simulations in agreement with experiment were obtained. New models of the fluid mixing process were derived, which were also compared to experimental data.
DTIC
Algorithms; Computational Fluid Dynamics; Mathematical Models; Molecular Biology; Photonics; Solids

67
THEORETICAL MATHEMATICS

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

20040201195 North Carolina State Univ., Raleigh, NC USA
Experimental Study of Nonlinear in Hypersonic Laminar Boundary Layer
Chokani, Ndaona, Author; Jan. 2001; 126 pp.; In English
Contract(s)/Grant(s): F49620-01-1-0105
Report No.(s): AD-A427489; AFRL-SR-AR-TR-04-0536; No Copyright; Avail: CASI; A07, Hardcopy

Three high order spectral analysis techniques - the short-time Fourier transform (STFT), the Fourier bispectrum, and the STFT bispectrum - are developed and used to characterize the nonlinear dynamics of a transitioning hypersonic boundary layer flow. The hot-wire measurements in a transitioning boundary layer in the NASA Langley Mach 6 quiet tunnel are analyzed, and the effects of wall cooling and adverse pressure gradient on the nonlinear dynamics are examined. The STFT identifies the modulation of the dominant second mode and its harmonic in the nonlinear region of the transition process. Phase modulation is observed to be the primary energy transfer mechanism, but in the latter nonlinear stages the role of amplitude modulation is increasingly important. The Fourier bispectrum quantifies the modulation as a low frequency phase coupled quadratic interaction. In addition, the Fourier bispectrum quantifies the dominant role of the second mode through its forcing of harmonic quadratic interactions. The STFT bispectrum identifies the transient stages of nonlinear interactions that are observed to be important in the nonlinear stages of transition. These nonharmonic, broadband interactions may offer new approaches for control of hypersonic transition.
DTIC
Boundary Layer Flow; Fourier Transformation; Hypersonic Boundary Layer; Hypersonics; Laminar Boundary Layer; Nonlinear Systems; Nonlinearity

20040201408 Department of the Navy, Washington, DC USA
Method and System for Determining a Bounding Region
Perruzzi, Joseph J., Inventor; Oct. 2004; 31 pp.; In English
Report No.(s): AD-D020151; No Copyright; Avail: CASI; A03, Hardcopy

A method for determining a bounding region for a launched weapon. The method processes the course and speed of ocean currents, and the bearing and range to an aim point to determine the resultant speed of the launched weapon. The method then processes the resultant speed to determine a course for the weapon. The method also processes the ownship position at launch, the desired aim point and the resultant speed to determine weapon run time. The method provides a mathematical distribution of the uncertainty in the speed and course of the ocean current and then processes it to generate a scatter region of possible weapon positions. The method then processes the distribution function of the mathematical distribution and the desired aim

point to determine a plurality of positions that define a bounding region. Finally, the method quantifies possible positions of the scatter region that are within the bounding region.
DTIC
Boundaries; Ocean Currents

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*.

20040201012 Embry-Riddle Aeronautical Univ., Daytona Beach, FL, USA, NASA Glenn Research Center, Cleveland, OH, USA
CAA for Jet Noise Physics: Issues and Recent Progress
Mankbadi, Reda; Proceedings of the Jet Noise Workshop; November 2001, pp. 891-939; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Dr. Mankbadi summarized recent CAA results. Examples of the effect of various boundary condition schemes on the computed acoustic field, for a point source in a uniform flow, were shown. Solutions showing the impact of inflow excitations on the result were also shown. Results from a large eddy simulation, using a fourth-order MacCormack scheme with a Smagorinsky sub-grid turbulence model, were shown for a Mach 2.1 unheated jet. The results showed that the results were free from spurious modes. Results were shown for a Mach 1.4 jet using LES in the near field and the Kirchhoff method for the far field. Predicted flow field characteristics were shown to be in good agreement with data and predicted far field directivities were shown to be in qualitative agree with experimental measurements.
Derived from text
Boundary Conditions; Sound Fields; Acoustics; Computation; Turbulence Models

20040201103 SRI International Corp., Menlo Park, CA USA
Microstructural Failure Physics for Structural Failure Prognosis and Diagnosis
Shockey, Donald A., Author; Simons, Jeffrey W., Author; Kobayashi, Takao, Author; Grishin, Dennis, Author; Dec. 2003; 47 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F33615-01-C-5227; Proj-L514
Report No.(s): AD-A427340; SRI-PROJECT-P11345; AFRL-ML-WP-TR-2004-4232; No Copyright; Avail: Defense Technical Information Center (DTIC)

The physics of microstructural deformation and failure in IN100 was investigated to improve existing tools for predicting and analyzing turbine disc failure. A finite element failure model of damage evolution under cyclic loads was developed and applied to simulate fatigue cracking in a compact tension specimen. A procedure was developed for determining from a fracture surface whether a failed component had experienced overloads and for estimating the overload magnitude and crack delay. A method for extracting and categorizing fracture surface features was developed to assist microstructure-based prognosis models and enable a data base approach for failure analysis.
DTIC
Crack Propagation; Diagnosis; Failure; Gas Turbines; Microstructure; Prognosis; Rotors; Structural Failure

20040201155 State Univ. of New York, Stony Brook, NY USA
Quantum Computing With Quasiparticles of the Fractional Quantum Hall Effect
Averin, Dmitri, Author; May 2001; 4 pp.; In English
Contract(s)/Grant(s): DAAD19-01-1-0511
Report No.(s): AD-A427413; ARO-42385.2-PH-QC; No Copyright; Avail: Defense Technical Information Center (DTIC)

The focus of this project was the theoretical study of quantum computation based on controlled transfer of individual quasiparticles in systems of quantum antidots in the regime of the Fractional Quantum Hall Effect (FQHE). The work addressed the basic issues of operation of such FQHE qubits as well as related questions of physics of FQHE transport and topological quantum computation. The main parts of our effort were the studies of mechanisms of decoherence, design of single- and two-qubit operations for FQHE qubits, quantitative description of quasiparticle tunnelling between the edges of FQHE liquids, and decoherence properties of some of the generic models of topological quantum computation. The basic

conclusion of this project is that the FQHE qubits provide a realistic way of implementation of semiconductor solid-state quantum logic devices competitive with other types of semiconductor qubits. Non-trivial exchange statistics of FQHE quasiparticles should enable convenient realization of the two-qubit operations that does not require the control of the two-particle interaction. For quasiparticles with the non-abelian statistics, the topological nature of this statistics can provide additional stability against decoherence.
DTIC
Elementary Excitations; Hall Effect; Quantum Computation; Quantum Electronics; Quantum Hall Effect

20040201188 Technische Hogeschool, Delft, Netherlands
Tools for Persistent-Current Qubits
Mooij, J. E., Author; Harmans, C., Author; Oct. 2004; 6 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): DAAD19-01-1-0548
Report No.(s): AD-A427479; ARO-42376.1-PH-QC; No Copyright; Avail: Defense Technical Information Center (DTIC)

The project concentrates on the design, fabrication, implementation and operation of solids state quantum logical elements and circuits for the realization of quantum computers. It utilizes qubits based on circulating persistent currents in superconducting loops containing (three) Josephson junctions. This Final Report presents the major achievements obtained during the project, highlighting the progress from the initial spectroscopy and first Rabi results on a single qubit to the most recent finding of controlled quantum dynamics of multi- element circuits, controlled-invasiveness state detection, coupled 2-qubit systems, and large increase of coherence by proper circuit layout and parameter control. It briefly puts these into perspective with respect to the contribution of Persistent Current Qubits to the development of quantum information processing based on solid state devices.
DTIC
Quantum Theory; Superconductors (Materials)

20040201209 Pennsylvania State Univ., University Park, PA USA
Geometrically Frustrated Magnets as Model Systems
Schiffer, Peter, Author; Jan. 2004; 3 pp.; In English
Contract(s)/Grant(s): DAAD19-01-1-0021
Report No.(s): AD-A427515; ARO-41677.4-MS; No Copyright; Avail: Defense Technical Information Center (DTIC)

The specific aim of this research program is to understand the cooperative magnetic properties of geometrically frustrated magnets which are model systems for the general phenomena of frustration. In the past year, we have continued studies of the dynamic properties of a new type of frustrated magnetic system, the 'spin ice' compound Dy2Ti2O7. The spin ice materials are a class of frustrated magnetism in which ferromagnetic interactions can be frustrated. The geometry of the lattice and the nature of the local spins in these materials demonstrate that spin ice systems represent a new modality of spin freezing in a glassy system. We have found a variety of novel behavior in these materials, in particular a crossover from thermal to quantum spin relaxation which is reverses as spin-spin correlations develop, and a reentrant behavior of the spin freezing with dilution of the magnetic sublattice. We have also initiated studies of other frustrated magnetic materials as well as frustrated arrays of ferromagnetic nanostructures.
DTIC
Frustration; Magnetic Materials; Magnetic Properties; Magnets; Particle Spin; Quantum Numbers

20040201475 Purdue Univ., West Lafayette, IN, USA
The Phree-Phall Phormula of Physics: Velocity Is the Square Root of 2gh
Widener, Edward L.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 887-891; In English; See also 20040201469; No Copyright; Avail: CASI; A01, Hardcopy

To explore the applications and implications of free-fall physics, in teaching materials science. We also calibrate flowmeters: orifice, nozzle, venturi, pitot-tube. Laboratory experiments with basic equipment are described.
Derived from text
Velocity; Free Fall; Kinetic Energy

20040201563 Lawrence Livermore National Lab., Livermore, CA

Fast Running Test Bed Model to Evaluate Atmospheric Plume Source Properties, 2, Source Location Inversion Sensitivity Tests

Grossman, A. S.; Molenkamp, C. F.; Grant, K. E.; Jun. 01, 2001; 36 pp.; In English

Report No.(s): DE2004-15007619; UCRL-ID-144571-PT2; No Copyright; Avail: Department of Energy Information Bridge

A technique has been developed to obtain selected source parameters for a release of toxic material into the atmosphere by inversion of a set of sensor observations. The technique utilizes the Marquardt inversion method coupled to a Gaussian puff atmospheric dispersion model. The major objective of this report is to perform a set of sensitivity calculations to explore the robustness of the source location inversion procedure to variations in source location relative to sensor location, spacing of sensors, sensor integration period, and sensor observation times. The results of the tests for variation of source location show that the inversion accuracy is sensitive to source placement relative to a rectangular sensor array with most accurate inversions occurring when the source is aligned with a downwind row of sensors and least accurate when the source is placed between downwind sensor rows. When the density of the sensor array was increased by a factor of 4, i.e. spacing cut in half, the case with the poorest source location inversion accuracy in the first test significantly improved. The results of tests for variation of sensor integration time show that the most accurate source location inversion occurs for the smallest integration time and the least accurate for the largest integration time. The results of tests for variation of the number of observations show that the most accurate source location inversion occurs for the case with the most observation times and the accuracy degrades as the number of observation times decreases. As a general rule throughout all of the sensitivity tests performed here, the most accurate source inversions occur when the number of data points (in both time and space) is maximized.

NTIS

Atmospheric Chemistry; Atmospheric Models; Meteorological Parameters

20040201565 Lawrence Livermore National Lab., Livermore, CA

Characterization of Low Temperature Ferrite/Austenite Transformations in the Heat Afected Zone of 2205 Duplex Stainless Steel Arc Welds

Palmer, T. A.; Elmer, J. W.; Babu, S. S.; Vitek, J. M.; Aug. 20, 2003; In English

Report No.(s): DE2004-15007726; UCRL-JC-151465; No Copyright; Avail: National Technical Information Service (NTIS)

Spatially Resolved X-Ray Diffraction (SRXRD) has been used to identify a previously unobserved low temperature ferrite/austenite phase transformation in the heat affected zone (HAZ) of 2205 Duplex Stainless Steel (DSS) welds. In this 'ferrite dip' transformation, the ferrite transforms to austenite during heating to peak temperatures on the order of 750oC, and re-transforms to ferrite during cooling, resulting in a ferrite volume fraction equivalent to that in the base metal. Time Resolved X-Ray Diffraction (TRXRD) and laser dilatometry measurements during Gleeble thermal simulations are performed in order to verify the existence of this low temperature phase transformation. Thermodynamic and kinetic models for phase trans-formations, including both local-equilibrium and para-equilibrium diffusion controlled growth, show that diffusion of substitutional alloying elements does not provide a reasonable explanation for the experimental observations. On the other hand, the diffusion of interstitial alloying elements may be rapid enough to explain this behavior. Based on both the experimental and modeling results, two mechanisms for the 'ferrite dip' transformation, including the formation and decomposition of secondary austenite and an athermal martensitic-type transformation of ferrite to austenite, are considered.

NTIS

Ferrites; Austenite; Martensitic Transformation; Low Temperature

20040201567 Brookhaven National Lab., Upton, NY, USA

Riken-Todai Mini-Workshop on Topics in Hadron Physics at Rhic

2004; 298 pp.; In English

Report No.(s): DE2004-15007783; BNL-72336-2004; No Copyright; Avail: Department of Energy Information Bridge

The RIKEN-TODAI Mini-Workshop on ''Topics in Hadron Physics at RHIC'' was held on March 23rd and 24th, 2064 at the Nishina Memorial Hall of RIKEN, Wako, Saitama, Japan, sponsored by RIKEN (Institute of Physical and Chemical Research) and TODAI (University of Tokyo). The workshop was planned when we learned that two distinguished theorists in hadron physics, Professors L. McLerran and S.H. Lee, would be visiting TODAI and/or RIKEN during the week of March 22-26. We asked them to give key talks at the beginning of the workshop and attend the sessions consisting of talks by young theorists in RIKEN, TODAI and other institutes in Japan and they kindly agreed on both. Considering the JPS meeting scheduled from March 27 through 30, we decided to have a.one-and-half-a-day workshop on March 23 and 24. The purpose

of the workshop was to offer young researchers an opportunity to learn the forefront of hadron physics as well as to discuss their own works with the distinguished theorists.
NTIS
Hadrons; Physics

20040201571 Department of Energy, Washington, DC
Advanced Catalytic Hydrogenation Retrofit Reactor
Machado, R. M.; Aug. 15, 2002; 60 pp.; In English
Report No.(s): DE2004-822407; No Copyright; Avail: Department of Energy Information Bridge
Industrial hydrogenation is often performed by using slurry catalyst reaction systems in large stirred-tank reactors. These systems are inherently problematic in a number of areas, including industrial hygiene, safety, environmental, waste production, operability and productivity. The key objective of this program was to develop and demonstrate a practical MLR pilot system using realistic reaction chemistry and to confirm that high reaction rates, long catalyst life and high selectivity can be achieved with a suitable monolith catalyst. The pilot plant design is flexible enough to allow testing of a variety of specialty hydrogenation chemistries and at the same time is highly instrumented to allow commercial scaleup design information to be obtained from customer trials.
NTIS
Hydrogenation; Plant Design; Productivity

20040201575 Stanford Linear Accelerator Center, Stanford, CA, USA
Tests of Low Scale Quantum Gravity in (e(sup -))e(sup-) and (gamma)(gamma) Collisions
Rizzo, T. G.; Jul. 1999; In English
Report No.(s): DE2004-10120; SLAC-PUB-8204; No Copyright; Avail: National Technical Information Service (NTIS)
Arkani-Hamed, Dimopoulos and Dvali have recently proposed that gravity may become strong at energies near 1 TeV due to the existence of large extra dimensions thus 'removing' the hierarchy problem. In this talk we examine the exchange of towers of Kaluza-Klein gravitons and their influence on Moller scattering as well as the production of pairs of massive gauge bosons in(gamma)(gamma)collisions. These tower exchanges lead to a set of new dimension-8 operators that can significantly alter the Standard Model expectations for these processes. In the case of(gamma)(gamma)collisions, the role of polarization for both the initial state photons and the final state gauge bosons in improving sensitivity to graviton exchange is emphasized.
NTIS
Microgravity; Bosons; Gravitation

20040201583 Royal Inst. of Tech., Stockholm, Sweden
Hierarchy of the Euclidean Non-Linear Schroedinger Equation is a Harmonic Oscillator Containing KdV
Kolsrud, T.; May 2004; 18 pp.; In English
Report No.(s): PB2005-101372; No Copyright; Avail: CASI; A03, Hardcopy
No abstract available
Schroedinger Equation; Euclidean Geometry

71
ACOUSTICS

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

20040200978 NASA Langley Research Center, Hampton, VA, USA, Lockheed Martin Engineering and Sciences Co., Hampton, VA, USA
High Speed Research Noise Prediction Code (HSRNOISE) User's and Theoretical Manual
Golub, Robert, Technical Monitor; Rawls, John W., Jr.; Yeager, Jessie C.; November 2004; 206 pp.; In English
Contract(s)/Grant(s): NAS1-00135; WU 23-781-20-12
Report No.(s): NASA/CR-2004-213014; Rept-02-DF28-01; No Copyright; Avail: CASI; A10, Hardcopy
This report describes a computer program, HSRNOISE, that predicts noise levels for a supersonic aircraft powered by mixed flow turbofan engines with rectangular mixer-ejector nozzles. It fully documents the noise prediction algorithms, provides instructions for executing the HSRNOISE code, and provides predicted noise levels for the High Speed Research

(HSR) program Technology Concept (TC) aircraft. The component source noise prediction algorithms were developed jointly by Boeing, General Electric Aircraft Engines (GEAE), NASA and Pratt & Whitney during the course of the NASA HSR program. Modern Technologies Corporation developed an alternative mixer ejector jet noise prediction method under contract to GEAE that has also been incorporated into the HSRNOISE prediction code. Algorithms for determining propagation effects and calculating noise metrics were taken from the NASA Aircraft Noise Prediction Program.
Author
Noise Prediction; Supersonic Aircraft; High Speed; Prediction Analysis Techniques; Computer Programs; Jet Aircraft Noise

20040200997 NASA Glenn Research Center, Cleveland, OH, USA
Proceedings of the Jet Noise Workshop
Huff, Dennis, Compiler; November 2001; 1070 pp.; In English; Proceedings of the Jet Noise Workshop, 7-9 Nov. 2000, Cleveland, OH, USA; See also 20040200998 - 20040201033; Original contains color illustrations
Contract(s)/Grant(s): WU-910-30-11-00
Report No.(s): NASA/CP-2001-211152; E-13008; No Copyright; Avail: CASI; A99, Hardcopy

Jet noise has been a major problem for aircraft for nearly 50 years. There has been considerable research performed around the world aimed at identifying ways to reduce jet noise. This work was first intended for turbojet aircraft and later extended to low bypass ratio turbofans. Many of the people who performed this pioneering research have retired or are no longer active in aeroacoustics. After so many years of work in jet noise, it is a challenge to piece together the history of its development through existing publications due to the large volume of documents. It is possible to forget important developments from the past as new researchers tackle similar problems. Therefore, a jet noise workshop was organized by the AeroAcoustics Research Consortium (AARC) with the intent of reviewing research that has been done by experts throughout the world. The forum provided a unique opportunity for current researchers to hear the diverse views from world experts on issues related to jet noise modeling and interpretation of experimental data.
Author
Aeroacoustics; Conferences; Jet Aircraft Noise; Noise Prediction (Aircraft)

20040200998 NASA Glenn Research Center, Cleveland, OH, USA
Acoustic Analogy
Goldstein, Marvin; Proceedings of the Jet Noise Workshop; November 2001, pp. 277-292; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

The paper discusses the following: One-third octave jet noise spectra for a convergent nozzle at subsonic and supersonic velocities. Angle from downstream jet axis, 80 deg. Based data from Olsen. Narrow band jet noise spectra at 90 deg. and small angles to jet axis from Tam, Golobiowski and Seiner. V-large eddy simulation. Equation for small scale (unresolved) components. Formal solution for pressure.
CASI
Analogies; Jet Aircraft Noise; Noise Spectra

20040200999 National Center for Physical Acoustics, University, MS, USA
Jet Noise Source Mechanisms: A Need for a Physics Based Modeling Procedure
Seiner, John M.; Proceedings of the Jet Noise Workshop; November 2001, pp. 293-311; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Optimization of Noise Reduction Concepts are: Development of Suitable Physics Based Algorithm Relating Noise Reduction to Turbulence Dynamics. Measure and Prediction of Two-Point Turbulence Statistics. Application of Data Compression Scheme: POD. Construction of Dynamics Systems Model For Operation With Non-Linear Closed Loop Controller. Development of Robust Actuators and Sensors.
Derived from text
Noise Reduction; Algorithms; Turbulence; Jet Aircraft Noise

20040201000 Office National d'Etudes et de Recherches Aerospatiales, Chatillon, France
Modal Decomposition of Fluctuations in a Parallel Sheared Flow Based on the Displacement
Elias, Georges; Proceedings of the Jet Noise Workshop; November 2001, pp. 427-435; In English; See also 20040200997; No Copyright; Avail: CASI; A02, Hardcopy

The slides present Galbrun's equation, the Lagrangian of the Galbrun's equation, energy and intensity derived from the Lagrangian, and modal decomposition for a stratified flow
CASI
Decomposition; Lagrangian Function; Shear Flow

20040201003 Boeing Co., Seattle, WA, USA
Assessment of Jet Noise Theory/Prediction Methods
Viswanathan, Krishnamurthy; Proceedings of the Jet Noise Workshop; November 2001, pp. 979-1010; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Only two sets of results are presented since Morris was unable to complete the predictions before the workshop. Furthermore, Morris carried out a detailed evaluation of the jet noise theories and identified some fundamental issues that set the different approaches apart (see below). Comparisons of predictions and data are shown in the accompanying charts. The results of the MGBK predictions are shown first - these may be identified by the use of the band number for the x-axis. Note that Tam s results have the Strouhal number on the x-axis. The results indicate that, 1. The MGBK methodology fails to predict the measured spectral shape. The levels are also significantly off. 2. Tam s approach provides very good predictions of amplitudes and spectra for the various cases considered, except for the extremely heated jet case. For aircraft applications and for the development of noise suppression devices, spectral shapes are important. There is a clear need for the development of models that would address this vital issue.
Author
Jet Aircraft Noise; Noise Prediction; Prediction Analysis Techniques; Noise Reduction

20040201005 Purdue Univ., West Lafayette, IN, USA
Integral Methods for Jet Aeroacoustics
Lyrintzis, Anastasios S.; Proceedings of the Jet Noise Workshop; November 2001, pp. 967-977; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Viewgraphs on Integral Methods for Jet Aeroacoustics are presented. The topics include: 1) Methods of Acoustic Analysis; 2) Kirchhoff's Method; 3) Porous FW-H equation; 4) Jet Noise Predictions; 5) Refraction Corrections; and 6) Suggestions for Future Work
CASI
Aeroacoustics; Jet Aircraft Noise; Methodology; Integral Equations

20040201008 Rolls-Royce Ltd., Derby, UK
Physics of Jet Noise Suppression
Kempton, Andrew; Proceedings of the Jet Noise Workshop; November 2001, pp. 685-697; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Dr. Kempton reviewed that successful suppression devices for high-bypass-ratio engines rely on reducing the peak jet velocity while avoiding additional high frequency penalties. Methods of reducing peak jet velocity include increased fan diameter, internal mixing (lobed mixers), and external mixing (nozzle serrations, chevrons). Kempton s presentation concentrated on forced mixers to realize the potential jet noise benefit due to internal mixing. Although the enhanced mixing reduces low frequency noise, it could increase the high frequency noise (and the benefit is lost). Kempton indicated that, by careful design practice, Rolls-Royce is able eliminate any high frequency noise penalty.
Author
Noise Reduction; Jet Aircraft Noise; High Frequencies

20040201009 Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Berlin, Germany
Is Acoustic Analogy Really Valid? Are Large Turbulent Structures Important?
Michel, Ulf; Proceedings of the Jet Noise Workshop; November 2001, pp. 353-380; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Evidence will be given in this presentation that 1) The acoustic analogy is really valid; 2) Large coherent structures in the jet turbulence are important for jet noise emission. This will be demonstrated by comparing experimental data with scaling

laws based on the acoustic analogy. This will be demonstrated by comparing experimental data with scaling laws based on the acoustic analogy.
Author
Aeroacoustics; Jet Aircraft Noise; Turbulent Flow; Turbulence Models

20040201010 Institute of Sound and Vibration Research, Southampton, UK
Fundamental Problems in Aeroacoustics
Morfey, Christopher L.; Proceedings of the Jet Noise Workshop; November 2001, pp. 381-398; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

The viewgraph presentation presents equations for the following problems in aeroacoustics: Dissipation noise from unbounded flows; Euler equations for inviscid flow: Source term in the Lilley-Goldstein analogy; Application of the Lilley-Goldstein analogy to sound radiation from a turbulent jet; Flow factor trends in a hot jet.
CASI
Aeroacoustics; Mathematical Models; Equations

20040201011 Centre National de la Recherche Scientifique, Ecully, France
Jet Noise Computation: Direct and Hybrid Approaches
Bailly, Christophe; Bogey, Christophe; Juve, Daniel; Proceedings of the Jet Noise Workshop; November 2001, pp. 833-890; In English; See also 20040200997; No Copyright; Avail: CASI; A04, Hardcopy

Dr. Bailly presented an overview of experimental observations of jet noise and direct and hybrid approaches to jet noise prediction. LES combined with CAA numerical methods is able to simulate turbulent flows. Results showed good agreement between calculations and measured jet characteristics. The following difficulties in making direct calculations were given: Direct acoustic calculation is restricted to geometric basic flows. Use of compressible flow field requires efficient boundary conditions. Acoustic far field can be obtained via a Kirchhoff surface or by solving a wave equation or linearized Euler s equation. It seems difficult to apply a direct approach for low Mach number flows.
Derived from text
Jet Aircraft Noise; Numerical Analysis; Experimentation; Turbulent Flow; Boundary Conditions

20040201013 Embry-Riddle Aeronautical Univ., Daytona Beach, FL, USA
CAA for Jet Noise Physics
Mankbadi, Reda; Proceedings of the Jet Noise Workshop; November 2001, pp. 891-939; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Dr. Mankbadi summarized recent CAA results. Examples of the effect of various boundary condition schemes on the computed acoustic field, for a point source in a uniform flow, were shown. Solutions showing the impact of inflow excitations on the result were also shown. Results from a large eddy simulation, using a fourth-order MacCormack scheme with a Smagorinsky sub-grid turbulence model, were shown for a Mach 2.1 unheated jet. The results showed that the results were free from spurious modes. Results were shown for a Mach 1.4 jet using LES in the near field and the Kirchhoff method for the far field. Predicted flow field characteristics were shown to be in good agreement with data and predicted far field directivities were shown to be in qualitative agree with experimental measurements.
Derived from text
Boundary Conditions; Acoustics; Uniform Flow; Turbulence Models; Jet Aircraft Noise

20040201014 Florida State Univ., Tallahassee, FL, USA
Review of Noise Data and Recent Advances in Jet Noise Theory
Tam, Christopher; Proceedings of the Jet Noise Workshop; November 2001, pp. 121-276; In English; See also 20040200997; No Copyright; Avail: CASI; A08, Hardcopy

In Part 1 of this presentation Professor Tam presented a number of examples from a wide range of experiments which suggest that turbulent shear flows, including jets, can be described in terms of a large-scale, coherent-like structure, and a smallscale motion, which he proposed should be labeled fine-scale . He also showed Schlieren photographs where the sound radiation in the near field appeared to be generated by both sets of turbulent scales in motion along a jet. Tam also showed from the far-field radiated noise experimental databank of Seiner et al (1985), that the sound of greatest intensity for a Mach 2 jet at 500K was in the downstream arc between the jet boundary and 50 degrees to the jet axis. He then drew the conclusion that this radiation was the result of Mach wave radiation generated by the large-scale structures moving supersonically with

respect to the medium at rest outside the jet, while the fine-scale motion was responsible for the dominant radiation in the sideline and upstream directions. Tam also presented data to support the view that, for the relatively high Reynolds number of the fully developed turbulent jet experiments.
Derived from text
Jet Aircraft Noise; Jet Boundaries; Shear Flow; Sound Intensity; Sound Waves

20040201015 Pennsylvania State Univ., University Park, PA, USA
Comparison of Lilley's Equation/Acoustic Analogy and Tam and Auriault's Model
Morris, Philip; Proceedings of the Jet Noise Workshop; November 2001, pp. 1011-1016; In English; See also 20040200997; No Copyright; Avail: CASI; A02, Hardcopy

Some points considered in in the Tam and Auriault model are linearized Euler equations, two-point cross correlation in a fixed reference frame, and adjoint solution for mean flow/acoustic interaction effects. Some points considered in Lilley's equation/acoustic analogy are convected wave equation, two-point cross correlation in a moving reference frame, and high and low frequency solutions of Lilley's equation for mean flow/acoustic interaction effects.
CASI
Acoustics; Analogies; Cross Correlation

20040201020 Florida Atlantic Univ., Boca Raton, FL, USA
Jet Noise Source Location: A Review
Glegg, Stewart A. L.; Proceedings of the Jet Noise Workshop; November 2001, pp. 439-478; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

A review of jet noise source location is presented. The topics include: 1) Jet Noise Source Location prior to 1985; 2) Recent measurements; 3) Modern array processing methods; and 4) Recommendations for the future.
CASI
Jet Aircraft Noise; Aeroacoustics

20040201023 NASA Glenn Research Center, Cleveland, OH, USA
Sound Source Identification Through Flow Density Measurement and Correlation With Far Field Noise
Panda, J.; Seasholtz, R. G.; Proceedings of the Jet Noise Workshop; November 2001, pp. 561-570; In English; See also 20040200997; No Copyright; Avail: CASI; A02, Hardcopy

Sound sources in the plumes of unheated round jets, in the Mach number range 0.6 to 1.8, were investigated experimentally using 'casuality' approach, where air density fluctuations in the plumes were correlated with the far field noise. The air density was measured using a newly developed Molecular Rayleigh scattering based technique, which did not require any seeding. The reference at the end provides a detailed description of the measurement technique.
Author
Noise (Sound); Flow Measurement; Density Measurement; Rayleigh Scattering

20040201027 California Univ., Irvine, CA, USA
Mach Wave Suppression
Papamoschou, Dimitri; Proceedings of the Jet Noise Workshop; November 2001, pp. 741-760; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Directional elimination of Mach waves was demonstrated with an eccentric coflow. Perceived noise in the aft quadrant was reduced by 15 dBA. As a result, the directivity of perceived noise changed from the aft quadrant to the lateral direction. The eccentric coflow suppressed crackle, an annoying component of noise not captured by spectral methods. The suppression of crackle is consistent with elimination of Mach waves. The eccentric arrangement was superior to coaxial arrangements and to the fully-mixed equivalent jet. The effectiveness of the eccentric arrangement is attributed to the reduced length of the potential core.
Author
Mach Number; Spectral Methods; Directivity; Quadrants

20040201028 Rolls-Royce Allison, Indianapolis, IN, USA

Anomalous Effect of Nozzle Length Reduction on Jet Noise of Forced Mixers

Mengle, Vinod G.; Proceedings of the Jet Noise Workshop; November 2001, pp. 761-781; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Dr. Lele presented an overview of issues and recent progress in CAA for jet noise. He summarized the issues in jet noise physics, including issues on which there is general agreement and those where there are diverse opinions. Also summarized were the variety of physical aspects of jet noise and the variety of possible jet noise mechanisms. The major computational issues in the use of CAA to compute the noise from jets are the disparity in length scales and amplitudes, the need for accurate treatment of unsteady shocks, and the critical need for 'quiet' boundaries (i.e. boundary conditions that are both non-reflecting and that are not sources of noise as disturbances pass through them). Examples of recent progress in jet noise prediction, based on model problems were presented. Results from analyses using DNS, linearized Euler, and LES were also presented. Good agreement with data was achieved. Other computational issue addressed were those in regard to grid requirements, inflow forcing functions, flow and sound statistics, boundary conditions, high resolution schemes for complex domains, interaction of shocks with other disturbances, high-resolutions methods for LES, hybrid methods for prediction of radiated noise.
Author

Boundary Conditions; Jet Aircraft Noise; Noise Prediction; Mathematical Models; Direct Numerical Simulation

20040201029 DYNACS Engineering Co., Inc., Cleveland, OH, USA

Small-Scale Turbulence Noise

Khavaran, Abbas; Proceedings of the Jet Noise Workshop; November 2001, pp. 721-740; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

Topics of the slide presentation include computational based methodology; turbulence mixing noise; Lilley's equation, far-field acoustics; self noise; shear noise; source modeling; noise predictions with a Splitter nozzle; separate flow nozzles; MGBK prediction versus data for base, chevron, and tab nozzles; and predicted noise for 3 separate flow nozzle configurations
CASI

Acoustics; Noise Prediction

20040201030 Georgia Inst. of Tech., Atlanta, GA, USA

Show Evidence if the Acoustic Analogy-Based Theory is Correct/Incorrect

Ahuja, Krish; Proceedings of the Jet Noise Workshop; November 2001, pp. 313-351; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

This viewgraph presentation presents information on the application of Lighthill's theory to jet noise, including scaling, noise spectra, high aspect ratio nozzles (HARN), large scale turbulence structures, excited jets, broadband amplification, and coherence.
CASI

Aeroacoustics; Jet Aircraft Noise

20040201031 Southampton Univ., UK

Acoustic Analogy: A Review

Lilley, Geoffrey M.; Proceedings of the Jet Noise Workshop; November 2001, pp. 15-64; In English; See also 20040200997; No Copyright; Avail: CASI; A03, Hardcopy

The term fine-scale in the recent excellent work of Chris Tam is I believe a poor descriptor and one which will mislead many in the aeroacoustics world. To many 'fine' appears as very thin, or threadlike and may be confused with eddies in the Kolmogorov range. We need a simple descriptor, such as 'energy containing eddies'. In particular we are dealing with eddies of macroscopic scales not microscopic scales. There are many length scales of energy containing eddies in a turbulent jet associated with the growth of the mixing region from the from the nozzle exit, where the energy containing eddies are very small to far downstream where they are very large. It is now clear I made a very great error when I followed Lighthill in labelling the main sources of jet noise as associated with the mean-shear turbulent interaction, or the amplifying effect of mean shear, and the turbulent-turbulent interaction.
Author (revised)

Aeroacoustics; Mathematical Models; Lighthill Method; Jet Aircraft Noise

20040201032 Pennsylvania State Univ., University Park, PA, USA
Noise from Large-Scale Turbulent Structures/Instability Waves
Morris, Philip J.; Proceedings of the Jet Noise Workshop; November 2001, pp. 65-120; In English; See also 20040200997; No Copyright; Avail: CASI; A04, Hardcopy

Large Scale Structures/Instability Wave Models provide a direct link between the unsteady turbulent flow and the radiated noise. It provides information and time and length scales of turbulent flow. It does not predict amplitude (only relative levels). The analytic complexity for non-circular jets is increased. Replacement by direct Calculation has already been achieved. Author

Aeroacoustics; Turbulence Models; Aerodynamic Noise

20040201071 Naval Postgraduate School, Monterey, CA USA
Autonomous Optimal Rendezvous of Underwater Vehicles
Nicholson, John W., Author; Sep. 2004; 146 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427262; No Copyright; Avail: Defense Technical Information Center (DTIC)

The capability of an autonomous underwater vehicle (AUV) to rendezvous with other AUVs was implemented and demonstrated in the Naval Postgraduate School ARIES AUV; providing a method of overcoming the severe range limitations of high-bandwidth underwater data transfer methods in order to enable accelerated access to data collected by a network of data-gathering survey AUVs. Rendezvous was implemented by autonomous reconfiguration of ARIES' operations, using a mission planning module to combine acoustically-transmitted rendezvous requests from survey AUVs with pre-stored survey AUV mission data to generate rendezvous missions based either on time-optimal or energy-optimal trajectories. The planning module efficiently generates rendezvous trajectories based on solutions derived using optimal control theory. A new third layer of control, based on a finite state machine, was added above ARIES' autopilot and mission execution functions in order to initiate mission planning and replanning, activate missions, sequence vehicle operations through seven defined states, control acoustic communications, and handle perturbations and missed rendezvous.
DTIC

Acoustics; Autonomy; Communication; Rendezvous Trajectories; Sound Transmission; Underwater Vehicles

20040201091 Naval Postgraduate School, Monterey, CA USA
Analysis of the Influence of Turbulence and Environmental Variability on Broadband Acoustic Coherence
Eroglu, Ozer, Author; Sep. 2004; 95 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427310; No Copyright; Avail: Defense Technical Information Center (DTIC)

Acoustic propagation in the littoral regions of the world, even over short ranges, can be complex at high frequencies (\g5 kHz), and applications such as underwater detection and communications suffer as a result. To this end, the Asian Seas International Acoustics Experiment (ASIAEX) was conducted with funding from the Office of Naval Research. One phase of this experiment took place from 29 May to 9 June 2001 and focused on short-range, shallow water acoustic propagation in the East China Sea. This thesis will be based on some of the measurements taken during the East China Sea experiment by a team from the Applied Physics Laboratory of the University of Washington. The environmental parameters and array geometry used in this and previous modeling work are as close as possible to the experiment. The objective of this thesis is to better understand the nature of turbulent perturbations and how they affect short-range acoustic propagation in a shallow water environment. This will include variations in total energy of the turbulence, variations in associated length scales, and variations in depth. In addition, the influence of other variable factors on signal coherence will also be examined. Most notably, variations in background sound-speed structure and source depth variability will be included.
DTIC

Broadband; Shallow Water; Sound Waves; Turbulence; Turbulence Effects; Variability; Wave Propagation

20040201144 Polytechnic Univ., Brooklyn, NY USA
A Laser Vorticity Probe for the Characterization and Control of Turbulent Boundary Layers
Otugen, M. V., Author; Oct. 2003; 61 pp.; In English
Contract(s)/Grant(s): F49620-01-1-0009
Report No.(s): AD-A427394; AFRL-SR-AR-TR-04-0538; No Copyright; Avail: CASI; A04, Hardcopy

A laser-based probe for the direct, non-intrusive measurement of temporally- and spatially-resolved velocity gradient and vorticity is developed and demonstrated. The optical probes developed were used in turbulent two-stream mixing layers as well as laminar and turbulent boundary layers for the measurement of several velocity gradients and spanwise vorticity. The

measurement technique is based on the collection and direct heterodyning of coherent light scattered from particles in two adjacent locations allowing the determination of a velocity gradient. The beat frequency of the heterodyned light gives the difference in the Doppler shift and is proportional to the velocity difference of two points. This frequency is analyzed using a conventional laser Doppler velocimetry (LDV) signal processor (in the present, a burst spectrum analyzer). The angle between the laser beam and the direction of the scattered light determines the measured component of velocity. Therefore, a component of the vorticity vector is measured by using two sets of transmitting and collecting optics, focused at a single location, along with two LDV processors. The technique is non-intrusive, straightforward and relatively inexpensive since it uses standard, off-the-shelf optical and electronic components. It also allows the development of a compact probe with integrated instrumentation. In the present research, the time-frozen measurements of the partial derivative of u with respect to y, the partial derivative of v with respect to x, the partial derivative of v with respect to y in the boundary and mixing layers were carried out using the laser velocity gradient (LVG) probe. Time-frozen measurements of the spanwise component of vorticity were also carried out using the laser vorticity probe (LVP) which is composed ol, essentially, two sets of LVP probes.
DTIC

Laser Doppler Velocimeters; Lasers; Turbulent Boundary Layer; Vorticity

20040201241 Army Cold Regions Research and Engineering Lab., Hanover, NH USA

Past Research on Sound Propagation through Forests

Albert, Donald G., Author; Oct. 2004; 23 pp.; In English

Report No.(s): AD-A427598; ERDC/CRREL-TR-04-18; No Copyright; Avail: CASI; A03, Hardcopy

This report reviews past scientific research to determine whether forests have any noise reduction effects for blast noise from artillery training or explosions. Unfortunately, there has been very little relevant work that would contribute to answering this question. For military noise sources, the main frequencies of interest are below 100 Hz. Most of the past investigations have been done at high frequencies using low-amplitude continuous wave noise sources rather than high-amplitude impulsive sources. For these reasons, additional measurements will be needed to determine the effect of forests on artillery and blast noise.
DTIC

Forests; Noise Reduction; Sound Propagation; Sound Transmission

20040201246 Army Engineer Research and Development Center, Vicksburg, MS USA

Migratory Waterfowl Habitat Selection in Relation to Aquatic Vegetation

Dick, Gary O., Author; Smith, JoEtta K., Author; Smart, R. M., Author; Sep. 2004; 13 pp.; In English

Report No.(s): AD-A427608; ERDC/TN-APCRP-EA-09; No Copyright; Avail: CASI; A03, Hardcopy

This technical note describes studies of environmental conditions and habitat quality of replicated pond ecosystems dominated by populations of exotic plants or mixed communities of native aquatic plants. Study ponds were similar in depth, size, and shape, as well as in (initial) water and sediment composition. One component of these studies included evaluation of migratory waterfowl utilization of pond habitats based upon vegetation community composition. Aquatic vegetation is a critical food source for many migratory waterfowl, and numerous studies have shown that water bodies with abundant aquatic plants receive the greatest use (White and Malaher 1964, Hobaugh and Teer 1981, Johnson and Montalbano 1989). In cases where aquatic vegetation is restricted or absent, waterfowl use is generally low (Heitmeyer and Vohs 1984). Additionally, declines in migratory waterfowl have been correlated with loss of submersed aquatic vegetation in numerous water bodies (Jorde et al. 1995, Orth and Moore 1981, Haramis 1991). The benefits of aquatic vegetation for waterfowl may be dependent upon the species of vegetation present, with studies showing that migratory waterfowl appear to prefer native aquatic plants as opposed to exotic species (Smith 2001, Benedict and Hepp 1996). Although reasons for this preference are not clear, native plants are held to be more nutritious than exotic species and are therefore%more valuable to waterfowl (Paulus 1982, Sudgen 1973). Native aquatic plants may also provide better habitat for invertebrate recruitment, an important supplemental food source for many waterfowl species (Keast 1984). Conversely, invasion and establishment of less beneficial exotic aquatic plants such as hydrilla (Hydrilla verticillata) and Eurasian watermilfoil (Myrlophyllum spicatum) may limit waterfowl utilization of water resources.
DTIC

Aquatic Plants; Ecosystems; Habitats; Vegetation; Water Resources; Waterfowl

20040201274 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany

Zur Akustik des Javanischen Gong Ageng unter Beruecksicktigung Verwandter Goinstrumente (Acoustics of the Javanese Gong Ageng with Consideration of Related Gong Instruments)

Varsanyi, Andras, Author; Jan. 2000; 89 pp.; In German

Report No.(s): AD-A427681; No Copyright; Avail: CASI; A05, Hardcopy

Although several works are present on the javanese gong ageng, nevertheless again and again content wise the material connection, production, sound and music are missing. This available work represents a chapter of the thesis at the music-scientific institute of the Eberhard Karl University in Tuebing and is a general introduction and overview of the conditions of the research. This work represents a skilled work from the oscillation technology field, with some fundamental functions and observations that are treated in more detail than usual in such a work. Nevertheless, one tries to support from the side relative to vibration some historical aspects regarding the development javanischen gong ageng which in detail are stated in Varsanyi 2001-I.

DTIC

Acoustics; Signal Transmission; Solar Oscillations; Sound Waves

20040201423 Purdue Univ. Calumet, Hammond, IN, USA

Acoustical Measurements of Damage Accumulation in Brick Pavers

Kin, Yulian; Sutin, Alexander; Parsons, Bernard; Roades, Eric; Dalton, Karen; Zhou, Chenn; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 317-323; In English; See also 20040201420; No Copyright; Avail: CASI; A02, Hardcopy

Purdue University Calumet is conducting funded research on the application of an advanced computational fluid dynamics (CFD) model to evaluate erosion patterns in the brick lining of a blast furnace in the steel industry. The purpose of this evaluation is to maximize the campaign life of the furnace. To develop the CFD modeling, it is necessary to determine different parametric effects of performance of the furnace, including actual erosion of the brick wall. Therefore, as a first step, Purdue University Calumet conducted preliminary laboratory experiments on brick pavers using acoustical methods which are described in this paper. The laboratory investigations were conducted with the active participation of Purdue students and we intend to incorporate some experiments into the laboratory session of the regular courses.

Author

Acoustic Measurement; Damage; Bricks; Computational Fluid Dynamics; Erosion

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*.

20040201203 Arizona Univ., Tucson, AZ USA

Nonclassical Matter Wave Sources

Meystre, Pierre, Author; Jessen, Poul, Author; Oct. 2004; 15 pp.; In English

Contract(s)/Grant(s): DAAD19-00-1-0375

Report No.(s): AD-A427503; ARO-41067.1-PH; No Copyright; Avail: Defense Technical Information Center (DTIC)

The general goal of our research is the generation, manipulation, and characterization of coherent and nonclassical matter-wave sources. The research has both a theoretical and an experimental component. Theoretical achievements include the use of nonlinear atom optical techniques to generate beams of entangled atoms and squeezed atomic beams from Bose-Einstein condensates, as well as the generation of entangled atom-photon pairs, the extension of the ideas bosonic atom optics to the nonlinear atom optics to fermionic atoms and to boson-fermion mixtures. We have also started to analyze how the combination of these developments can be applied to the realization and manipulation of molecular fields of tailored quantum statistics. On the experimental side we have worked with Cs atoms in optical lattices to implement qubits, quantum gates and circuits. We have demonstrated trapping in deep 3D lattices initialization by sideband cooling and single-qubit control. In a second project we have used optical probes to implement continuous weak measurements of collective observables in an atomic ensemble. We have developed a detailed understanding of Faraday measurements of atomic spins, and a novel scheme to probe the pseudospin associated with the atomic clock transition.

DTIC

Atomic Beams; Nonlinear Optics

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*.

20040201425 Thomas Jefferson National Accelerator Facility, Newport News, VA, USA
Pentaquarks: Discovering New Particles
Smith, Elton; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 407-422; In English; See also 20040201420; No Copyright; Avail: CASI; A03, Hardcopy

Contents include the following: Siblings of the proton. Families of atoms. Properties of quarks. Families of protons and neutrons. Interactions understood in terms of quarks. Electromagnetics and color forces. Particles are color neutral. CEBAF Large Acceptance Spectrometer.
CASI
Neutrons; Protons; Quarks; Linear Accelerators

20040201573 California Univ., Berkeley, CA, USA, Lawrence Livermore National Lab., Livermore, CA, Los Alamos National Lab., NM
First Year Report: Nuclear Reaction Measurements with Radioactive Beams and Targets
2004; 10 pp.; In English
Report No.(s): DE2004-823823; No Copyright; Avail: Department of Energy Information Bridge

OAK-B135 During the underground nuclear tests in Nevada, some of the most important information was obtained by radiochemical analysis of post-test excavations. By adding small samples of refractory and rare earth elements not commonly present in the surrounding soil to the device, a detailed look could be had of the actual event. In order to properly analyze these data, several hundred cross sections are needed at a neutron energy of 14 MeV (a d-t-burn product). Although it has always been assumed that these calculations are correct, insufficient experimental data exist to corroborate this assumption. The purpose of this experiment is to measure two reaction cross sections, namely the Zr(89) (n, 2n) Zr(88) and Zr(89) (n, np) Y(88) reactions. Although the former reaction has been measured in an unpublished report (A. A. Delucchi and W. Goishi, LANL Report LA-7841-C (1977) pp. 33-36), we intend to reduce the experimental error in this cross section. The latter cross section has not been measured. This case is much simplified because these reaction products have half-lives(approx)100 days compared with(approx)3 days for the target nuclide. Therefore the assay can be accomplished long after the target nuclei have decayed away.
NTIS
Nuclear Reactions; Rare Earth Elements

74
OPTICS

Includes light phenomena and the theory of optical devices; for specific optical devices see also *35 Instrumentation and Photography*. For lasers see *36 Lasers and Masers*.

20040200720 National Inst. of Information and Communications Technology, Japan
Optical Thin Film Technology Used in the Terahertz Frequency
Hosako, Iwao; Review of the National Institute of Information and Communications Technology, Volume 50, Nos. 1/2; March/June 2004, pp. 81-86; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

No English abstract available.
CASI
Frequencies; Optical Materials; Thin Films

20040200722 National Inst. of Information and Communications Technology, Japan
Nano-Gate Transistor: World's Fastest InP-HEMT
Shinohara, Keisuke; Matsui, Toshiaki; Review of the National Institute of Information and Communications Technology, Volume 50, Nos. 1/2; March/June 2004, pp. 87-94; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

InP-based InGaAs/InAlAs high electron mobility transistors (HEMTs) which can operate in the sub-millimeter-wave frequency range (300 GHz - 3 THz) are key devices for future 100 - 160 Gbps ultrahigh-speed optical communications because of their high-frequency, low- noise performance. We succeeded in fabricating the world's shortest 25-nm-gate InP-HEMTs which exhibited a record current gain cutoff frequency (f(sub T)) of 562 GHz. Moreover, we investigated the effect of device structures on their high frequency performance, and it was greatly improved by optimizing these structural parameters.
Author
High Electron Mobility Transistors; Optical Communication; Microwave Frequencies; Submillimeter Waves; Millimeter Waves

20040200724 National Inst. of Information and Communications Technology, Japan
Nondiffracting Light Beams for Long Ranges
Aruga, Tadashi; Kunimori, Hiroo; Review of the National Institute of Information and Communications Technology, Volume 50, Nos. 1/2; March/June 2004, pp. 105-110; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

A method of generating an unusual light beam, long range nondiffracting beam (LRNB) has been studied. The LRNB propagates over a long range keeping its narrow beam width as if it does not diffract, while general light beams spread by the diffraction effect. The new beam can be generated by a technique of wave front control, e.g., by a distorted concave spherical wave front that can be formed by a Galilean transmitting telescope with an eyepiece that has a spherical aberration. We will introduce some results of experiments and theoretical analyses of the LRNB generation using an unique optical system with a telescope and a laser.
Author
Light Beams; Wave Front Deformation; Diffraction; Optical Correction Procedure

20040200727 National Inst. of Information and Communications Technology, Japan
Generation and Application of Quantum-Correlated Twin Beams
Kasai, Katsuyuki; Zhang, Yun; Sasaki, Masahide; Review of the National Institute of Information and Communications Technology, Volume 50, Nos. 1/2; March/June 2004, pp. 65-73; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

The signal and idler beams from a non-degenerate, above threshold, optical parametric oscillator have a strong quantum correlation, which are called twin beams. This correlation arises from the simultaneous generation of the signal and idler photons in the form of twin pairs of photons through the parametric down conversion, and the generated twin beams have exactly the same photon statistics. As a result, the fluctuations on the difference between the intensities of the twin beams are reduced with respect to the shot noise limit, that is, intensity-difference squeezing. We have observed squeezing of 8 dB (84%) on the intensity difference between the twin beams generated by a semi-monolithic optical parametric oscillator. In this paper, a comprehensive overview of the generation of twin beams using the optical parametric oscillator and the applications exploiting the quantum correlation of twin beams are presented.
Author
Parametric Amplifiers; Shot Noise; Beams (Radiation); Quantum Optics

20040200728 National Inst. of Information and Communications Technology, Japan
Fourier Synthesis of Optical Pulses
Hyodo, Masaharu; Abedin, Kazi Sarwar; Onodera, Noriaki; Watanabe, Masayoshi; Review of the National Institute of Information and Communications Technology, Volume 50, Nos. 1/2; March/June 2004, pp. 3-15; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

With the rapid progress made recently in the field of optical communication technology, much attention is being focused on the techniques for generating ultrafast optical pulses with an ultra-high repetition frequency. Fourier synthesis is one of the most promising techniques for doing this, because, unlike in conventional techniques such as mode-locking, there is no limitation on having an arbitrarily high repetition frequency. Fourier synthesis is also used to synthesize arbitrary waveforms based on the inverse process of Fourier-series expansion. We have demonstrated the generation of ultrafast optical pulses with repetition frequencies from 9.6 GHz to as high as 1.8 THz by synthesizing the outputs from three independently oscillating semiconductor lasers. We have also demonstrated that the Fourier- synthesized pulses could be synchronized to an external

optical clock. This paper describes the outlines of the above experiments as well as a technique for successive generation of arbitrary bit streams.
Author
Fourier Transformation; Optical Communication; Electromagnetic Pulses; Fourier Series

20040200729 National Inst. of Information and Communications Technology, Japan
Atom Optics and Atom Lithography
Ohmukai, Ryuzo; Watanabe, Masayoshi; Review of the National Institute of Information and Communications Technology, Volume 50, Nos. 1/2; March/June 2004, pp. 17-24; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

High-resolution atomic channeling using velocity-selected atoms may be able to over-come precision limitations of the conventional atom lithography. We have experimentally clarified the dependence of line width and contrast of atomic patterns in the channeling region on the velocity spread of the atomic source for the first time. Thermal or velocity-selected atomic beams prepared with a one-dimensional magneto-optical trap were employed as the atomic sources. We can show that narrower line width and higher contrast atomic patterns are obtained as the velocity spread becomes narrower. We also successfully produced periodic ytterbium (Yb) narrow lines on a substrate using a near-resonant laser light and the direct-write atom lithography technique. We clearly observed a grating pattern of Yb atoms fabricated on a substrate with a line separation of approximately 200 nm after examining the surface of the substrate with an atomic force microscopy. This is the first demonstration of nanofabrication using the atom-optical approach with Yb atoms.
Author
Atom Optics; Lithography; Nanofabrication; Ytterbium

20040200733 National Inst. of Information and Communications Technology, Japan
Image Storage Techniques using Photorefractive Effect
Takayama, Yoshihisa; Zhang, Jiasen; Okazaki, Yumi; Kodate, Kashiko; Tadashi, Aruga; Review of the National Institute of Information and Communications Technology, Volume 50, Nos. 1/2; March/June 2004, pp. 111-116; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

Optical image storage techniques using the photorefractive effect are presented, where the random reference multiplexing scheme is introduced to the holographic recording process in order to increase the storage capacity. The common feature of our techniques is the use of a bundle of multimode fibers placed in the optical path of reference wave. This approach can automatically impose quasi-random patterns on the wavefront when the reference wave penetrates the fiber bundle. As a proof-of-principle, experiments of recording holograms are performed with a LiNbO3 crystal. The results show that the use of fiber bundle enables us to build a simple and compact optical setup with keeping the capacity of hologram multiplexing.
Author
Images; Photorefractivity; Multiplexing; Optical Memory (Data Storage)

20040201093 Naval Postgraduate School, Monterey, CA USA
Imaging Transport: Optical Measurements of Diffusion and Drift in Semiconductor Materials and Devices
Freeman, Will, Author; Sep. 2004; 61 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427315; No Copyright; Avail: Defense Technical Information Center (DTIC)

Knowledge of transport parameters is important to the development of new optoelectronic materials and devices, such as ultraviolet (UV) semiconductor lasers and advanced solar cells. A series of experiments was performed to measure fundamental transport parameters in luminescent semiconductor materials. Using a technique that couples a scanning electron microscope (SEM) in spot mode with a charge coupled display (CCD) camera, it is possible to image the recombination of charge created at a point. The goal is to extract fundamental transport parameters, such as minority carrier diffusion length (Ldiffusion)) and drift length (Ldrift), with high spatial resolution. Direct transport imaging was used to study diffusion without bias and drift under a range of applied electric fields. The recombination distribution as a function of applied bias was imaged. For the unbiased measurements, the results showed that for bulk n-type GaAs the spotwidth was independent of probe current indicating the luminescence distribution is primarily a function of generation volume and not diffusion length. For thin layer samples that could be approximated as two dimensional (2D), it was found that the spotwidth changed as a function of probe current indicating the potential to extract diffusion length data. Results are compared to numerical modeling of charge transport and the feasibility and limitations of this method for contact-free measurements of lifetime (tau) and mobility (mu) are assessed.
DTIC
Diffusion; Imaging Techniques; Luminescence; Optical Measurement; Semiconductors (Materials)

20040201245 Science Applications International Corp., Champaign, IL USA
High Order Electromagnetic Modeling for High Frequency
Moore, John T., Author; Oct. 2004; 59 pp.; In English
Contract(s)/Grant(s): F49620-02-C-0038
Report No.(s): AD-A427607; AFRL-SR-AR-TR-04-0557; No Copyright; Avail: CASI; A04, Hardcopy

The goals of this project were to insert mature physical theory of diffraction (PTD) based phenomenology models into the Xpatch computational electromagnetics (CEM) prediction codes and analysis tools. Several incremental length diffraction coefficient derivations were identified as candidates for inclusion. The shadow boundary incremental length diffraction coefficient (ILDC) capability was integrated based on the significant correction it applies to the physical optics current discontinuity in the neighborhood of the shadow region of smooth scatterers. The truncated wedge incremental length diffraction coefficient was implemented because it provides fully polarimetric responses for a large range of edge discontinuities and surface areas, and it avoids discontinuities and singularities associated with earlier wedge ILDC derivations. A detailed study of creeping waves was performed to supplement the shadow boundary ILDC development. All functionality developed under this project underwent comprehensive unit, integration, and regression level testing prior to delivery.
DTIC
High Frequencies

20040201424 Old Dominion Univ., Norfolk, VA, USA
Measurements Using the Lightest Tough: Light
Dharamsi, Amin; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 385-406; In English; See also 20040201420; No Copyright; Avail: CASI; A03, Hardcopy

Quantitative measurements in science and technology should be 1) Precise and sensitive; 2) Non-intrusive; 3) Fast, 'real time'. Optical measurements are suitable for measuring the characteristics on an object with minimal disturbance. This viewgraph presentation discusses the interaction of light with matter and the sensitivity and precision of optical measurement.
Author (revised)
Optical Measurement; Nonintrusive Measurement; Light (Visible Radiation)

20040201488 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA, USA
Crystals and X-Rays: An Optical Analog
Julian, Maureen M.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 655-659; In English; See also 20040201469; No Copyright; Avail: CASI; A01, Hardcopy

Because of the subtleties of X-ray photographs, experimental X-ray diffraction is a difficult topic to introduce in an undergraduate curriculum. I have developed a dramatic lecture hall demonstration on crystals and X-rays using a mirror ball typically found in roller skating rinks. In a darkened lecture hall, a single spotlight is focused on the stationary mirror ball and the walls of the hall are immediately covered with a display of light spots. In 1912 Max Laue theorized that the wavelength s of X-rays might be just about the same as the distances between atoms in crystals. If this were the case, then X-rays would be diffracted or bent by crystals. The first x-ray diffraction pattern was recorded from a beautiful blue crystal of copper sulfate pentahydrate. Scientists strove to interpret the relationship between the pattern of spots, which appeared on the film, and the atoms, which make up the crystal. William H. Bragg, at the University of Leeds in England, visualized corpuscular X-ray tunneling down the many open avenues in the crystal. On July 21, 1912, Bragg wrote to the mathematical physicist Sir Arthur Schuster: 'I wonder whether the rays producing the side [diffracted] spots are really 'rays' proceeding in straight line from some point in the crystal (say where the X-ray impinges or emerges), or are they sections of some loci by the photographic plate. It all seems most mysterious!'. During that summer at Leeds, Bragg had many discussions about the puzzles of X-ray diffraction with his son, William Lawrence Bragg, who was home on vacation from Cambridge University. When young Bragg returned to his studies he set a crystal of mica in the path of the X-ray beam. First, he noticed that the shape of the spot became flattened as the angle of the crystal about its axis increased. This increase contradicted the corpuscular theory and made him suspect that the crystal was behaving in a way analogous to the optical reflection of rays.
Author
X Rays; Bragg Angle; Crystals; Optical Reflection; X Ray Diffraction; Diffraction Patterns

20040201547 Lawrence Livermore National Lab., Livermore, CA
Brief History of Laser AGEX
Perry, T. S.; Jan. 26, 2001; 20 pp.; In English
Report No.(s): DE2004-15007467; No Copyright; Avail: Department of Energy Information Bridge

A great deal of physics understanding is required for the design and construction of thermonuclear weapons. Since the days of the Manhattan Project, physicists have relied on a combination of theory and experiment for the successful creation of nuclear weapons. One of the great experimental difficulties faced by the designers of nuclear weapons is that nuclear weapons operate in a high energy density regime not found on the earth except during a nuclear weapon detonation. Replicating these conditions is difficult unless a nuclear weapon is actually detonated. One of the reasons for the large number of expensive tests at the Nevada Test Site was that there was no other way to obtain the required data.
NTIS
Lasers; Detonation; Nuclear Weapons

75
PLASMA PHYSICS

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

20040201577 Georgia Inst. of Tech., Atlanta, GA, USA
Fusion Research Center, Georgia Institute of Technology Atlanta, GA.
Stacey, W. M.; Mandrekas, J.; Oct. 2004; 56 pp.; In English
Report No.(s): PB2005-100307; GTFR-171; No Copyright; Avail: CASI; A04, Hardcopy

The collaboration of the Georgia Tech Fusion Research Center in the analysis and interpretation of DIII-D experiments as part of the national DIII-D Team began in 1998 under support from General Atomics and has continued since 1999 under support of DoE OFES (Grant DE-FG02-ER54538). This analysis and interpretation of DIII-D experiments has been closely integrated with the ongoing, internally supported code and theory development in the Georgia Tech Fusion Research Center, and results of both efforts are discussed in this section without distinction. The principal areas of experimental analysis and interpretation have been: (1) the physics of the edge pedestal; (2) density limits caused by thermal instabilities in the plasma edge; (3) plasma rotation; (4) neutral atom fueling and recycling in the plasma edge; and (5) impurity transport in general and the radiating mantle in particular.
NTIS
Neutral Atoms; Plasmas (Physics)

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*.

20040200723 National Inst. of Information and Communications Technology, Japan
Mobile Whole-head SQUID System of SNS Junctiom in a Superconducting Magnetic Shield
Ohta, Hiroshi; Matsui, Toshiaki; Review of the National Institute of Information and Communications Technology, Volume 50, Nos. 1/2; March/June 2004, pp. 95-103; In Japanese; See also 20040200717; Copyright; Avail: Other Sources

Mobile, SQUID, Mesoscopic josephson junction, Superconducting magnetic shield, Tonic and burst mode, Thalamo-cortical network
Author
Mobile Communication Systems; Josephson Junctions; SQUID (Detectors)

20040201457 Oklahoma Univ. Health Sciences Center, Norman, OK USA
A Study of Bose-Einstein Condensates Using Perturbation Theory
Watson, Deborah K.; Nov. 2004; 7 pp.; In English
Contract(s)/Grant(s): N00014-00-1-0576
Report No.(s): AD-A427774; 125-4008; No Copyright; Avail: CASI; A02, Hardcopy

We have developed and applied a perturbation approach to study Bose-Einstein condensates using a full many-body Hamiltonian. Our approach offers distinct advantages for describing a large system of N interacting identical particles. In particular, our approach has the potential to yield insight into the dynamics of motion of the condensate by defining collective coordinates at first order. Our initial many-body results for a Bose-Einstein condensate indicate that very accurate many-body results are possible using powerful group theoretic techniques with a quite modest amount of computation. This method can be applied to strongly-interacting condensates which bridge the gap between dilute condensates which can be described by mean field treatments and the regime of superfluidity/superconductivity where strong interactions make first principles treatments difficult. Characterizing condensates in the strongly interacting regime where correlation effects are important is the goal of this research.
DTIC
Bose-Einstein Condensates; Perturbation Theory

20040201553 Massachusetts Inst. of Tech., Lexington, MA, USA
Progress and Continuing Challenges in GaSb-based III-V Alloys and Heterostructures Grown by Organometallic Vapor Phase Epitaxy
Wang, C. A.; May 06, 2004; In English
Report No.(s): DE2004-824870; No Copyright; Avail: National Technical Information Service (NTIS)
This paper discusses progress in the preparation of mid-IR GaSb-based III-V materials grown by organometallic vapor phase epitaxy (OMVPE). The growth of these materials is complex, and fundamental and practical issues associated with their growth are outlined. Approaches that have been explored to further improve the properties and performance are briefly reviewed. Recent materials and device results on GaInAsSb bulk layers and GaInAsSb/AlGaAsSb heterostructures, grown lattice matched to GaSb, are presented. State-of-the-art GaInAsSb materials and thermophotovoltaic devices have been achieved. This progress establishes the high potential of OMVPE for mid-IR GaSb-based devices.
NTIS
Organometallic Compounds; Vapor Phases; Vapor Phase Epitaxy

20040201570 Milan Univ., Italy, Montpellier Univ., France, Mainz Univ., Germany, Imperial Coll. of Science, Technology and Medicine, London, UK
HIGSS Working Group: Summary Report
Cavlli, D.; Djouadi, A.; Mar. 15, 2002; In English
Report No.(s): DE2004-822137; No Copyright; Avail: National Technical Information Service (NTIS)
In this working group we have investigated the prospects for Higgs boson searches at the Tevatron and LHC and, in particular, the potential of these colliders to determine the Higgs properties once these particles have been found. The analyses were done in the framework of the Standard Model (SM) and its supersymmetric extensions as the minimal (MSSM) and next-to-minimal (NMSSM) supersymmetric extensions. The work for the discovery potential of the LHC mainly concentrated on the difficult regions of previous analyses as those which are plagued by invisible Higgs decays and Higgs decays into supersymmetric particles. Moreover, the additional signatures provided by the weak vector-boson fusion process (WBF) have been addressed and found to confirm the results of previous analyses. A major experimental effort has been put onto charged Higgs boson analyses. The final outcome was a significant improvement of the discovery potential at the Tevatron and LHC than previous analyses suggested. For an accurate determination of Higgs boson couplings, the theoretical predictions for the signal and background processes have to be improved.
NTIS
Higgs Bosons; Particle Accelerators

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*.

20040201079 Naval Postgraduate School, Monterey, CA USA
High Latitude Coupled Sea-Ice-Air Thermodynamics
Swick, William A., Author; Sep. 2004; 91 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427275; No Copyright; Avail: Defense Technical Information Center (DTIC)

Presently ice extent forecast models such as the U.S. Navy Polar Ice Prediction System (PIPS) neglect or treat small-scale thermodynamic processes and entrainment unrealistically. Incorporating better algorithms that include more complete physics of the mixed layer dynamics will allow for improved prediction of ice thickness and distribution, open water distribution, polynyas, and deep-water formation in the polar seas. A one-dimensional mixed layer turbulent kinetic energy (TKE) budget model based on Garwood's NPS mixed layer model for deep convection (Garwood, 1991) was written in MATLAB(trade name). The model consisted of a system of ten equations derived by vertically integrating the budgets for heat, momentum, salinity, and turbulent kinetic energy between the sea-ice-air interface and the base of the turbulent mixed layer. The NPS mixed layer model was tested using atmospheric forcing and ocean profiles collected at the Surface Heat Budget of the Arctic Ocean Experiment (SHEBA) site, where wind stress and forced convection predominates. Sensitivity studies using ocean profiles of the Greenland Sea were also conducted to address thermodynamics and ocean profiles, where surface cooling and free convection predominates. Specific findings and results include: the role of unsteadiness, the responses of feedback processes depending on the mixed layer structure, and the importance of the temporal resolution of the model forcing on both skill and sensitivity of the output. The role of unsteadiness such as heat storage within the mixed layer has a large impact on ice melting or formation. Feedback between the atmosphere and ice is responsive and depends not only on atmospheric forcing but the underlying ocean structure.
DTIC
Polar Regions; Sea Ice; Thermodynamics

20040201153 California Univ., Riverside, CA USA
State Purification and Decoherence Suppression by Continuous Measurement of a Qubit
Korotkov, Alexander, Author; Oct. 2004; 8 pp.; In English
Contract(s)/Grant(s): DAAD18-01-1-0491
Report No.(s): AD-A427409; ARO-42383.18-PH-QC; No Copyright; Avail: Defense Technical Information Center (DTIC)
The main goal of the project was to study theoretically the process of continuous measurement and feedback control of solid-state qubits, and to analyze possible use of quantum feedback for decoherence suppression. This initial goal has been somewhat extended in the course of the project and also included theoretical analysis of the RF-SET operation and close collaboration with experimental group at JPL on superconducting qubits. The obtained results have been published in 9 journal papers (2 more submitted) and 7 conference proceedings and book chapters. 1) We have developed the theory of continuous measurement of solid-state qubits and applied it to various setups, including entangled qubits, nanomechanical resonators, realistic nonideal detectors, and quadratic detectors. We have studied one-qubit quantum feedback and calculated the degree of decoherence suppression and state purification provided by the feedback. We have shown that the qubits can be made almost 100% entangled by continuous measurement, in spite of external decoherence. Several experiments have been proposed. 2) We have developed the theory of the response and sensitivity of the normal-metal RF-SET with realistically large Q-factor, and also proposed a new operation mode of the RF-SET. 3) We have been involved in collaboration with experimental group of Dr. Echternach (JPL) on observation of Rabi oscillations in the single-Cooper-pair-box qubit. Our contribution included development of the computer code for fining experimental results, geometrical modeling of the sample design using FASTCAP, and theoretical support in a course of experiment.
DTIC
Purification; Quantum Theory; Solid State

80
SOCIAL AND INFORMATION SCIENCES (GENERAL)

Includes general research topics related to sociology; educational programs and curricula. For specific topics in these areas see *categories 81 through 85*.

20040191604 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Portuguese Local E_Government
Dias, Silvia; Arnaral, Luis; Santos, Leonel; ICEIS 2003; [2003], pp. 119; In English; See also 20040191598; Copyright; Avail: Other Sources
The Internet, the World Wide Web and electronic commerce are transforming the way of doing business. These changes are impacting every industry in our country, including local government. The Internet offers a wide variety of opportunities to improve services to citizens and to divulge information about the communities. In Portugal, the adherence to the Internet

by local government is increasing visibly, but much more has to be done. In 1999 a first study was done in order to evaluate the situation of e-government in our country, and two years passed a new study was undertaken, this time in order to evaluate the evolution registered in this area. In this paper we describe some conclusions achieved in these studies comparing their evolution in these two years.
Author
Portugal; Politics; Internets

20040191667 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Implementing User Centered Partnership Design: Change In Attitude Made A Difference
Maj, Paul; Kohli, Gurpreet; Sutharshan, Anuradha; ICEIS 2003; [2003], pp. 101; In English; See also 20040191598; Copyright; Avail: Other Sources

IT project success depends upon a number of factors. There are many in the information systems discipline who believe that user participation is necessary for successful development. This paper is primarily concerned with end users and implements a method of incorporating end user participation in all the phases of an IT project. The proposed qualitative, case-based approach aims to achieve high level of usability of the delivered system and to make sure that skills and knowledge of the team are better used. This approach enables users to better understand and accept the new systems as well as ensuring that the final deliverable is really what the users required. Significantly this new method required a change in attitude and perception of not only the end users but also the IT development staff. This process involves studying the user tasks better, make users define what they want, make regular and early prototypes of the user interface, and user involvement from start until the end of the project. The aim of this paper was to identify the user centred factors involved in different stages of the project and to understand how the steps involved could make a positive difference to an organisation. This approach was implemented and evaluated in a local government agency in Western Australia. The results were impressive. The suggested User oriented approach was then implemented in 3 other projects in the same organisation and the approach had made a positive difference.
Author
Information Systems; Prototypes

20040200690 Porto Univ., Portugal
Assessment of E-Learning Satisfaction from Critical Incidents Perspective
Chen, Nian-Shing; Lin, Kan-Min; ICEIS 2004: Human-Computer Interaction; [2004], pp. 172; In English; See also 20040200666; Copyright; Avail: Other Sources

Learner satisfaction is one of the key issues for evaluating the success of e-learning. To understand learner satisfaction and its affecting factors is very important for the quality development of e-learning. In this study, we proposed an e-learning satisfaction assessment model from critical incidents perspective and find out what critical incidents do really affect e-learning satisfaction. The model is called SAFE, abbreviated from Satisfaction Assessment from Frequency of negative critical incidents perspective for E-Learning. The theoretical model is tested by an empirical study of 230 learners on NSYSU Cyber-University. The result shows SAFE model can provide 71% explanatory power of overall cumulative satisfaction for e-learning and the learners of NSYSU Cyber-University are satisfied with the e-learning courses they enrolled. The critical incidents which affecting e-learning satisfaction can be classified into four categories; administration, functionality, instruction and interaction, among them the interaction and functionality are the most important factors than the others.
Author
Education; Evaluation; On-Line Systems

20040200840 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
A New Solution For Implementation Of a Collaborative Business Process Model
Kamogawa, Takaaki; Matsumoto, Masao; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 153; In English; See also 20040200825; Copyright; Avail: Other Sources

This paper presents a Collaborative Business Process Model based on a Synchronized Theory. The Cisco case of co-working with suppliers is viewed in terms of business-process collaboration to identify issues concerning collaboration with suppliers. The authors also discuss past and present concepts of collaboration, and propose that it is necessary to combine a synchronized theory with a collaborative business process model. We propose a new solution for implementation of the

Collaborative Business Process Model from the viewpoint of open infrastructure.
Author
Commerce; Theories; Processes; Models

20040200846 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
What Is The Value Of Emotion In Communication? Implications For User Centered Design
Cox, Robert; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 140; In English; See also 20040200825; Copyright; Avail: Other Sources

This research presents an investigation into the question - what is the value of emotion in communication. To gain a greater appreciation of this title, it is this paper's intention to deconstruct the sentence into its component parts - namely its nouns; Value, Emotions and Communications, and to study them in isolation to each other and as a total construct. Further, the everyday use of communications technology (i.e. e-mail, chat lines, mobile and fixed line telephones) has changed human communication norms. To identify the significance of this change, an investigation into the question of whether emotions continue to play an important role. in effective human-to-human communications is most likely warranted.
Author
Emotions; Electronic Mail; Sentences

20040200888 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Knowledge Construction In E-Learning: Designing An E-Learning Environment
Sun, Lily; Liu, Ke-Cheng; Williams, Shirley; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 146-147; In English; See also 20040200825; Copyright; Avail: Other Sources

In the traditional classroom, students tend to dePend on tutors for their motivation, direction, goal setting, progress monitoring, self-assessment, and achievement. A fundamental limitation is that students have little opportunity to conduct and manage their learning activities which are important for knowledge construction. E-Learning approaches and applications which are supported by pervasive technologies, have brought in great benefits to the whole society, meanwhile it also has raised many challenging questions. One of the issues of which researchers and educators are fully aware is that technologies cannot drive a courseware design for e-Learning. An effective and quality learning requires an employment of appropriate learning theory and paradigms, organisation of contents, as well as methods and techniques of delivery. This paper will introduce our research work in design an e-Learning environment with emphases on instructional design of courseware for e-learning.
Author
Learning Theory; Motivation; Students

20040200904 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
On Estimating the Amount of Learning Materials: A Case Study
Jaervenmpaeae, Matti; Tyrvaeinen, Pasi; Sievaenen, Ari; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 160; In English; See also 20040200825; Copyright; Avail: Other Sources

E-learning has been studied as the means to apply digital computers to educational purposes. Although the benefits of information and communication technology are obvious in several cases, there still exists a lack of convincing measures for the value of using computers in education. This reflects the general difficulty in evaluating investments on information systems, known as the 'IT investment paradox' that has not been solved so far. In this paper we approach the problem by estimating the amount of teaching and learning material in a target organisation, a university faculty. As expected, the volume of learning material dominates the communication of the faculty forming about 95% of all communication volume and 78% to 82% of communication when measured with other metrics. Also the use of alternative communication forms used in the target organisation was analysed quantitatively. The study also indicates, that communication forms dominating the volume of communication are likely to be highly organisation-specific.
Author
Digital Computers; Education; Information Systems

20040201427 Air Force Research Lab., Wright-Patterson AFB, OH, USA

SMEDS: Scanning Electron Microscope EDucatorS

Thorp, Katie; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 471-504; In English; See also 20040201420; No Copyright; Avail: CASI; A03, Hardcopy

SEMEDS Goals are: Demonstrate that science is fun. Show that scientists and engineers are real people. Identify career opportunities in science and engineering. Provide teachers with resources in electron microscopy. Demonstrate how science is used in a working environment. Establish a connection between the classroom and the real world.

Derived from text

Scanning Electron Microscopy; Education; Instructors

20040201436 Maryland Univ., College Park, MD, USA

The Junior Laboratory: A Place to Introduce Basics as well as New Findings

Martinez-Miranda, Luz J.; Wilson, O. C., Jr.; Salamanca-Riba, L. G.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 191-206; In English; See also 20040201420

Contract(s)/Grant(s): DE-AC04-94AL-85000; NSF DMR-00-80008; No Copyright; Avail: CASI; A03, Hardcopy

he goals are: 1. To familiarize students with the basic techniques of materials science while giving them a taste of what we do in the research of materials. 2. To teach students how to communicate their results in writing, and orally. 3. To teach students how to design an experiment. 4. How to be able to change samples, add techniques, without burdening the students. 5. How to do the above and still teach them what they need to learn. 6. How to keep this as an undergraduate course and not a graduate research course.

Derived from text

Education; Research

20040201437 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA, USA

MATLAB Exercise: The Periodic Table

Julian, Maureen M.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 233-243; In English; See also 20040201420; No Copyright; Avail: CASI; A03, Hardcopy

Every week my thermodynamics students receive a MATLAB problem as part of their homework assignment. Last year the most popular problem was the creation of a three-dimensional periodic table with the molar entropies, designed to explore the third law of thermodynamics. This exercise fits into a broader scheme of acquiring a working knowledge of an advanced interactive mathematical language and is part of a series of MATLAB exercises created for use in courses in thermodynamics and X-ray crystallography, and for a one-year introductory course in the Department of Materials Science and Engineering. MATLAB and other languages, for example, Mathematica, have facilities that are useful and easy to use such as the three-dimensional bar graphs presented here. Although MATLAB is required for most of our students, these exercises have no MATLAB prerequisites. The emphasis is on the scientific content, not on previous MATLAB expertise. The success of this advanced software made practical a significant increase in the material taught during the semester. This increase was facilitated by an increase in the amount and depth of the analytical work done by the students. This paper describes the use of the computer software and presents an unexpectedly interesting example. Each week new MATLAB techniques are added, so that the sophistication of the students programming progresses along with their understanding of the course material. Good programming documentation is paramount. At the end of the course, each student collects the exercises in a loose-leaf book that becomes a personal reference. The students tell me that they are using the exercise books to aid in assignments for other courses.

Derived from text

Computer Programs; Crystallography; Thermodynamics

20040201440 College of Western New England, Springfield, MA, USA

'The Classroom is our Lattice': A Series of 'Quick' Visualization Exercises for the Introductory Materials Science Course

Vollaro, Mary B.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 277-283; In English; See also 20040201420; No Copyright; Avail: CASI; A02, Hardcopy

This series of exercises has been developed to address the needs of students taking an introductory materials science course presented in a traditional lecture format. Students are taught visualization skills early in their engineering education but it is often not obvious to them how these skills can be applied to materials science, particularly in regard to crystallography and other phenomenon associated with atomic arrangements. Using this theme and our classroom environment, the new concepts can be presented throughout the semester that expand on activities done with the lattice and basic atomic arrangements in materials. Within each class, the learning styles of the students are diverse (often the majority are kinetic or hands-on learners) and the exercises presented actively involve students in creating the physical model. For the students, this quick activity complements both the schematics in the text and computer animations presented in the course.
Derived from text
Education; Atoms; Amorphous Materials; Crystal Lattices; Solid Solutions; Visual Control

20040201443 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA, USA
The Materials Science and Engineering (MSE) Communications Program at Virginia Tech
Kampe, Steve L.; Pappas, E. C.; Hendricks, R. W.; Kander, R.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 291-308; In English; See also 20040201420; No Copyright; Avail: CASI; A03, Hardcopy

MSE at Virginia Tech has developed a comprehensive communications program that runs concurrently with the traditional, technical curriculum. Students are taught / practice all conceivable workplace communication skills. Students are provided the opportunity to consider and discuss a wide variety of workplace and societal issues. A long-running assessment program indicates extremely high regard for the communications program by former students 2nd generation of program administration has begun.
Derived from text
Students; Communication; Educational Resources

81
ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

20040191599 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Tracking Business Rule Evolution To Support Is Maintenance
Bajec, Marko; ICEIS 2003; [2003], pp. 95; In English; See also 20040191598; Copyright; Avail: Other Sources

Business rules describe how organisations are doing business. Their value has also been recognised within the information system (IS) domain, mostly because of their ability to make applications flexible and amenable to change. In this paper we argue that business rules can be used as a link between organisations and their ISs. We show that business rules originate in organisations and that many business rules are explicitly or implicitly captured in enterprise models. We advocate, based on research work, that if business rules are managed in an appropriate manner they can help keeping IS aligned and consistent with the business environment. In the paper we propose a business rule management scenario for managing business rules from an organisational perspective. The scenario recognises business rule management as an interface between enterprise modelling and IS development and maintenance.
Author
Commerce; Information Systems; Management Methods

20040191623 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
The Impact of Information and Communication Technologies in Small and Medium Enterprises
Santana, Silvina; ICEIS 2003; [2003], pp. 131-132; In English; See also 20040191598; Copyright; Avail: Other Sources

This work shows part of the results of an empirical investigation carried out in small and medium enterprises of the Portuguese industry. One of it's goals was to determine the impact that the use of Information and Communication Technologies (ICT) may have in the way the companies deal with the external environment and in organizational factors like culture, strategy, management and leadership, structure, people, processes, routines and procedures and financial resources. The investigation followed a model for the study of organizational learning, previously developed and involved 458 companies of the District of Aveiro, the ones that had responded and affirmed to hold and use ICT in a preliminary auscultation

to all the companies of the industry of this district (3057). Collected data was submitted to procedures of multivariate data analysis, namely, Principal Components Analysis and Cluster Analyses.
Author
Communication; Information Theory; Technologies; Commerce

20040191629 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
FODERAL: Management of Engineering Data Using a Semistructured Data Model
Mangold, Christoph; Rantzau, Ralf; Mitschang, Bernhard; ICEIS 2003; [2003], pp. 126; In English; See also 20040191598; Copyright; Avail: Other Sources

The Foderal system is a flexible repository for the management, integration and modeling of product data. Current systems in this domain employ object-oriented data models. Whereas this is adequate for the management of product data, it proves insufficient for integration and modeling. Present semistructured data models, however, are suited ideally for integration, but data management and also modeling is a problem. In this paper we describe our approach to narrow down the gap between structured and semistructured data models. We present the Foderal information system which employs a new semistructured data model and show how this model can be employed in the context of management, integration, and modeling of engineering data.
Author
Data Management; Models; Systems Engineering; Information Systems

20040191631 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Telework: Employment Opportunities for a Disabled Citizen
Rocha, Nelson; Santana, Silvina; ICEIS 2003; [2003], pp. 123; In English; See also 20040191598; Copyright; Avail: Other Sources

Disable citizens have being considered as potential beneficiaries of teleworking. However, the subject raises several questions. Specifically, it is important to determine companies' willingness to adopt this new work modality, the activities they will consider to pass to external entities and the more appropriated model to adopt, when talking about teleworkers with special needs. On the other hand, it is necessary to determine and analyse perceptions and expectations, in order to manage eventual resistances and provide solutions liable to being adopted and used efficiently. This work reports the results of a study designed to find answers to these questions. It also allowed finding out the competences potential teleworkers need to have, enabling the progress of training actions and the development of insertion strategies adapted to the teleworkers and to the needs and expectations of employing companies.
Author
Disabilities; Occupation; Telecommunication

20040191650 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Defending Essential Processes
Alderson, Albert; ICEIS 2003; [2003], pp. 111; In English; See also 20040191598; Copyright; Avail: Other Sources

The essential purpose of a program makes up only a small part of the overall task. All of the complications in the program come from addressing what can go wrong. Where the essential business processes remain stable, close examination shows complex defensive mechanisms which change as new threats to the business develop. Norms derive from modelling social behaviour but are not absolute expressions of what will happen, people may act counter to the behaviour described in the norm. Many norms in business are concerned with defending against erroneous or illegal behaviour of staff and third parties. This paper uses a case study to illustrate the development of defensive norms and how these norms may be used in designing processes. Essential business processes cannot be improved by adding defensive norms but processes are usually more effective where security norms are implemented preventing the breaking of norms.
Author
Commerce; Security; Norms

20040191669 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

A Dynamic Role Based Access Control Model For Adaptive Workflow Management Systems

Domingos, Dulce; Veiga, Pedro; ICEIS 2003; [2003], pp. 116-117; In English; See also 20040191598; Copyright; Avail: Other Sources

Workflow management systems (WfMSs) support the definition, management and execution of business processes inside organisations. However, business processes are dynamic by nature, meaning that they must cope with frequent changes. As a consequence we have witnessed the development of new types of WfMSs, supporting adaptive workflows. These systems have specific access control requirements, which are not answered by traditional WfMSs access control models. In this paper we present a new model to deal with dynamic role based access control models for adaptive WfMSs, that adapts and extends the well-accepted role base access control principles in two directions. One direction consists in a modified interpretation of permissions by considering that the objects of adaptive WfMSs (e.g. process definition, process instances, activities and activity instances) and the operations performed on them like execute, change and read have to cope with dynamic permission updates. The function that maps a set of permissions into a role is extended to support exiting relations between workflow components. The second direction makes execution more adaptive to dynamic changes in organizations, by separating the role model from the resource model and supporting the definition of dynamic roles as functions that may access to external resource information systems. Our model also adapts the RBAC administrative model to support dynamic authorizations, that is, authorizations that can be defined and modified at run-time.

Author

Access Control; Commerce; Dynamic Control; Systems Management; Information Systems

20040191687 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal

How Digital is Communication in Your Organization? A Metrics and an Analysis Method

Palvarinta, Tero; Tyrvainen, Pasi; ICEIS 2003; [2003], pp. 112-113; In English; See also 20040191598; Copyright; Avail: Other Sources

Novel innovations in the area of digital media are changing the ways we communicate and organize. However, few practical measures exist for analysing the digitalization of organizational communication as an intermediate factor in the initiatives to adopt new information and communication technologies (ICT). Building upon the genre theory of organizational communication, a categorization of communication forms, and quantitative measures we suggest such metrics and a measurement method. A case study applying them in an industrial organization suggests the method and metrics to be applicable for quantifying how new information systems affect to organizational communication as well as for anticipating their digitalization impact prior to the implementation. The metrics provide a basis for further work on analysing correlation between organizational performance and adoption of information and communication technology.

Author

Pulse Communication; Organizations

20040191693 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal

Identifying Patterns of Workflow Design Relying on Organizational Structure Aspects

Thom, Lucineia; Iochpe, Cirano; ICEIS 2003; [2003], pp. 115; In English; See also 20040191598; Copyright; Avail: Other Sources

Modern organizations have demands of automation of their business processes, once they are highly complex and need to be efficiently executed. For this reason the number of systems based on information technologies able to provide a better documentation, standardization and co-ordination of the business process is increasing. In this context, workflow technology has been quite efficient, mainly for the automation of business processes. However, as it is an emergent technology and in constant evolution, workflow presents some limitations. One of the main limitations is the lack of techniques that guarantee correction and efficiency to the workflow project in the phases of requisite analysis and modeling. Taking into account these problems and having accomplished some studies, we formulated the hypothesis that it is possible to infer the specific workflow (sub) processes structure from knowledge on structural aspects of the organization and viceversa. We made the verification of such hypothesis through the identification of a set of dependency rules among the aspects of the organizational structure and workflow (sub) processes. This paper presents the set of rules and the description of the technique used for the identification.

Author

Management Methods; Information Management

20040191701 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal

Flexible Processes and Method Configuration: Outline of a Joint Industry-Academia Research Project

Moller, Kjell; Agerfalk, Par; Wistrand, Kai; Borjesson, Gregor; Karisson, Fredrik; Elmberg, Martin; ICEIS 2003; [2003], pp. 135; In English; See also 20040191598; Copyright; Avail: Other Sources

This paper outlines a joint industry-academia research project in the area of method engineering. Founded in practical experiences and emerging theoretical constructs, the project aims as developing theories, methods and tools to support the adaptation, integration and construction of method components for flexible configuration of system development methods. By explicating the possibilities of using method's inherent rationale, the possibilities to adopt rigorous methods (such as the Rational Unified Process) to comply with increasing demands of flexibility will be exploited. The paper also addresses the approach to technology transfer adopted in the project, viewing the project as existing in two different intellectual spheres, one academic and one industrial. The two spheres overlap in a space of conceptualization and interpretation shared by the practitioners and academic researchers involved. This way the project adopts an iterative process of reflection and application, generating knowledge directly applicable in industry as well as knowledge of theoretical and scientific importance.
Author

Management Methods; Research Management

20040200686 Porto Univ., Portugal

Effective Visualization Of Workflow Enactment

Lai, Wei; Yang, Yun; Shen, Jun; ICEIS 2004: Human-Computer Interaction; [2004], pp. 174; In English; See also 20040200666; Copyright; Avail: Other Sources

Although most existing teamwork management systems support user-friendly interface to some extent, few of them have take into consideration of the special requirements of workflow visualisation. This paper realises the unique features of visualisatiof for run-time workflow, i.e., workflow enactment and execution. We present a detailed discussion of the emerging problems against the general aesthetic criteria for drawing the workflow layout. In order to support most essential workflow enactment facilities, the following three mechanisms are provided. Firstly, Sugiyama algorithm has been systematically incorporated into our prototype to create well structured workflow layout initially. Secondly, when the workflow process dynamically changes, we can adjust workflow layout by our force-scan algorithm to retain the mental maps created earlier among team members. Thirdly, we have also applied the technique of the fisheye view to offer a context focus mechanism for workflow users and to utilise the screen size more effectively. The scenarios of the prototype are also presented.
Author

Management Systems; Algorithms; Layouts; Interfaces

20040200829 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

An Agent-Mediated Marketplace for Transportation Transactions

Lazanas, Alexis; Moraitis, Pavlos; Karacapilidis, Nikos; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 155; In English; See also 20040200825; Copyright; Avail: Other Sources

This paper reports on the development of an innovative agent-mediated electronic marketplace, which is able to efficiently handle transportation transactions of various types. Software agents of the proposed system represent and act for any user involved in a transportation scenario, while they cooperate and get the related information in real-time mode. Our overall approach aims at the development of a flexible framework that achieves efficient communication among all parties involved, constructs the possible alternative solutions and performs the required decision-making. The system is able to handle the complexity that is inherent in such environments, which is mainly due to the frequent need of finding a 'modular' transportation solution, that is one that fragments the itinerary requested to a set of sub-routes that may involve different transportation means (trains, trucks, ships, airplanes, etc.). The system's agents cooperate upon well-specified business models, thus being able to manage all the necessary freighting and fleet scheduling processes in wide-area transportation networks.
Author

Transportation Networks; Scheduling; Management Systems

20040200832 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Policies Composition Through Graphical Components

Lopes, Rui; Roque, Vitor; Oliveira, Jose Luis; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 170; In English; See also 20040200825; Copyright; Avail: Other Sources

Policy based management have gained a crescent importance in the two last years. New demands on internetworking, on services specification, on QoS achievement and generically on network management functionality, have driven this paradigm to a very important level. The main idea is to provide services that allow specifying management and operational rules in the same way people do business. Despite the main focus of this technology has been associated with network management solutions, its generality allows to extend these principles to any business process inside an organization. In this paper we discuss the main proposals in the field, namely the IETF/DMTF model, and we present a proposal that allows the. specification of policy rules through a user-friendly and component-oriented graphical interface.

Author

Policies; Management Systems; Networks

20040200838 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Intelligent Agents Supported Collaboration In Supply Chain Management

Wang, Min-Hong; Wang, Huai-Qing; Zheng, Hui-Song; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 157; In English; See also 20040200825; Copyright; Avail: Other Sources

In today's global marketplace, individual firms no longer compete as independent entities but rather as integral part of supply chain links. This paper addresses the approach of applying the technology of intelligent agent in supply chain management to cater for the increasing demand on collaboration between supply chain partners. A multi-agent framework for collaborative planning, forecasting and replenishment in supply chain management is developed. With the concerns for exception handling and flexible collaboration between partners, some function are proposed in the system such as product activity monitoring, negotiation within partners, supply performance evaluation, and collaboration plan adjustment.

Author

Replenishment; Supplying; Management Information Systems

20040200852 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

IT Infrastructure For Supply Chain Management In Company Networks With Small And Medium-Sized Enterprises

Stoer, Marcel; Nienhaus, Joerg; Birkeland, Nils; Menkhaus, Guido; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 163-164; In English; See also 20040200825; Copyright; Avail: Other Sources

The current trend of extending supply chain management beyond the company,s wall focuses on the integration of suppliers and consumers into a single information network. The objective is to optimize costs and opportunities for everyone involved. However, smallsized enterprises can rarely carry the high acquisition and introduction costs of hardware and software. This reduces the attractiveness of the small-sized enterprise as partner in a logistics and a production network. This article presents a lean IT infrastructure that targets small-sized enterprises. It allows flexible and configurable integration with the Internet, ERP systems and the secure communication of supply chain management data.

Author

Computer Programs; Information Systems; Computer Networks; Management Methods

20040200896 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

A Survey Research Of B2B In Iran

Asl, Javad Karimi; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 145; In English; See also 20040200825; Copyright; Avail: Other Sources

EC is relatively new concept in business domain (Wigand, 1997). While the consumer side of the Web explosion has been much touted, it is the Business-to-Business (B2B) market that has quietly surpassed expectations. This paper is based on a survey of 102 business managers (or IS) in Iran and discusses the management practices, application, problems and technical situations with regard to EC development in this country .In this paper was evaluated the B2B situation in Iran. This paper discusses about their business or Is manager's experiences, and satisfaction with current electronic-commerce (EC) solutions

in use. The finding of this paper are useful for both researchers and practitioners as they provide an insight for critical management issues which engage both under development countries' non-governmental organizations and policy makers. The result of this study shows that there are more differences between conditions of EC in developed and underdeveloping countries
Author
Electronic Commerce; Iran; Surveys; Research and Development

20040200900 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Software Agents To Support Administration In Asynchronous Team Environments
Tagg, Roger; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 163; In English; See also 20040200825; Copyright; Avail: Other Sources

Current economic pressures are causing severe problems for many enterprises in maintaining service standards with shrinking headcounts. Front-line workers have had to shoulder runaway workloads. Software Agent technologies have been widely advocated as a solution, but there are few reported success stories. In the author's previous work, a design was been proposed for a system to support front-line staff in a team teaching environment. This system is based on a domain-specific screen desktop with drop boxes supported by a number of types of agent. This paper analyses the work these agents have to do and the technology needed to support them.
Author
Software Engineering; Personnel; Teams

20040200901 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Toxic Farm: A Cooperative Management Platform for Virtual Teams and Enterprises
Skaf-Molli, Hala; Molli, Pascal; Ray, Pradeep; Rabhi, Fethi; Oster, Gerald; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 165-166; In English; See also 20040200825; Copyright; Avail: Other Sources

The proliferation of the Internet has revolutionized the way people work together for business. People located at remote places can collaborate across organizational and national boundaries. Although the Internet provides the basic connectivity, researchers all over the world are grappling with the problems of defining, designing and implementing web services that would help people collaborate effectively in virtual teams and enterprises. These problems are exacerbated by a number of issues, such as coordination, communication, data sharing, mobility and security. Hence there is a strong need for multiple services (to address above issues) though an open cooperative management platform to support the design and implementation of virtual teams and enterprises in this dynamic business environment. This paper presents a cooperative management platform called Toxic Farm for this purpose and discusses its application in business applications.
Author
Computer Information Security; Commerce; Internets

20040201435 Advanced Ceramics Research, Inc., Tucson, AZ, USA
University-Industry Initiatives to Enhance and Improve Enrollment of K-12 Students into Science and Engineering Programs
Vaidyanathan, Ranji; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 155-190; In English; See also 20040201420; No Copyright; Avail: CASI; A03, Hardcopy

Contents include the following: University-industry partnership. Started with Summer Engineering Academy, 1999. Included Computer Aided design (CAD), Rapid Prototyping (RP) and manufacturing. Annual program. For high school students nationwide. Modified to include middle school students and teachers. ONR funded Institute for SME Education Center.
CASI
Education; Computer Aided Design; Rapid Prototyping

20040201496 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA, USA
Green Engineering at Virginia Tech
Gregg, Michael H.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology Part 2; September 2004, pp. 687-695; In English; See also 20040201469; No Copyright; Avail: CASI; A02, Hardcopy

Virginia Polytechnic Institute and State University (Virginia Tech) is entering its 131st year. Founded in 1872 as Virginia's land-grant college with an initial enrollment of 43, Virginia Tech has grown to become the commonwealth's largest university with enrollment at roughly 26,000. The University offers over 200 degree programs through its seven undergraduate academic colleges. Its annual research expenditures exceed $150 million. Virginia Tech's College of Engineering accounts for about one quarter of university students, both undergraduate and graduate, as well as the lion's-share of research expenditures. The College of Engineering consists of 10 degree granting departments plus the Division of Engineering Fundamentals - the home of engineering s common-first-year program. Virginia Tech's College of Engineering is unusual in that, in addition to the multitude of special interest groups, labs and research areas, the college contains a Green Engineering Program.
Author
Engineering; Students

20040201612 Porto Univ., Portugal
Organizational and Technological Critical Success Factors Behavior along the ERP Implementation Phases
Esteves, Jose; Pastor, Joan; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 5; In English; See also 20040201585; Copyright; Avail: Other Sources

During the last years some researchers have studied the topic of critical success factors in ERP implementations. Up to this moment, there is not enough research on the management and operationalization of critical success factors within ERP implementation projects. The identification of factors leading to success or failure of ERP systems is an issue of increasing importance, since the number of organizations choosing the ERP path keeps growing. In this paper, we analyzed the evolution of organizational and technological factors along the ERP implementation phases. Our findings suggest that while both good organizational and technological perspectives are essential for a successful ERP implementation project, their importance shifts as the project moves through its lifecycle.
Author
Research Management; Organizations

20040201613 Porto Univ., Portugal
Reasons For ERP Acquisition
Sarpola, Sami; Laukkanen, Sanna; Halikainen, Petri; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 9; In English; See also 20040201585; Copyright; Avail: Other Sources

Numerous reasons for why organisations acquire Enterprise Resource Planning (ERP) systems have been proposed in prior research. In this paper we form a synthesis of these different reasons and categorize them into technological and business reasons for acquiring ERP. Further, we test the validity of these reasons with empirical data concerning the acquisition of ERP systems in 41 Finnish companies.
Author
Commerce; Data Acquisition; Organizations

20040201625 Porto Univ., Portugal
A Framework for Evaluating Difficulties in ERP Implementation
Montagna, Jorge Marcelo; Ferrario, Luis; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 15; In English; See also 20040201585; Copyright; Avail: Other Sources

Various sources point out very high percentages of failures to implement ERP systems. In this work, the main difficulties for this task are analyzed and a systematic classification of fundamental reasons is intended. By considering the reasons that lead to failure, a simple and effective mechanism is generated to evaluate in advance complications the project might present. In this way, the tools to be used can be adjusted to the specific characteristics of the project. Somehow, it is intended to solve the problem presented by general methodologies, which are used for any kind of enterprise, without previously considering its conditions and state to face this type of projects.
Author
Project Management; Failure Analysis

20040201675 Porto Univ., Portugal
Business Modeling Through Roadmaps
Albornoz, Judith Barrios; Calderon, Jonas Montiva; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 14; In English; See also 20040201585; Copyright; Avail: Other Sources

Business modelling is a central activity to many different areas, including Business Process Reengineering, Organisational Development, Enterprise Modelling & Integration, Business Process Management and Enterprise Application Integration. It is well known that the business domain is not easy to understand neither to represent even for specialised people. The success of most of the contemporary methods for modelling Business Organisations or Enterprise Information Systems (EIS) is strongly associated with the level of understanding that the modelling team can attain about the specific situation being modelled. This understanding is directly related with the degree of modelling experience that the team has, as well as their ability to work with the techniques and tools prescribed by a specific method. Nowadays, most of the existing business modelling methods are concentrated in what are the business concepts and how to represent them. But, they lack of process guidance, which is needed to help the team through the modelling process. We elaborated the method BMM for modelling business application domains that provides working guidelines for the modelling team. This method, based on method engineering concepts helps teams to, not only, get a comprehensive knowledge about the business domain being modelled, but also, about the process of modelling the domain itself. This paper concerns with the representation of the process of modelling a business by using a decision oriented process model formalism. It is represented at a higher level by a roadmap. The main contribution of our work is a set of roadmaps that contains the knowledge associated with team member's
Author
Information Systems; Organizations; Management Methods; Commerce; Models

20040201682 Porto Univ., Portugal
ERP Based Business Process Reengineering In A Human Resources Department: A Case Study Approach
Chatzikallia, Theodora; Chertouras, Konstantinos; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 5; In English; See also 20040201585; Copyright; Avail: Other Sources

Modern organizations are constantly facing new challenges regarding the reengineering of their business departments and processes. By the term Business Process we mean the profile of specific methods that can be employed to perform specific business tasks. In general, each Business Process is uniquely tailored to the organization it applies. Therefore, the resolution of a Business Process related problem is typically carried out with custom methods developed within organizations. In this paper we propose the use of Enterprise Resource Planning (ERP) as the basis for reengineering a business department and effectively the Business Process that it carries through. We discuss the application of ERP in the reengineering of the Business Process of a real world organization department (a Human Resources Department), which lead to a significant productivity enhancement.
Author
Human Resources; Organizations; Management

20040201691 Porto Univ., Portugal
Facilitating Business Process Management With Harmonized Messaging
Sadiq, Shazia; Orlowska, Maria; Sadiq, Wasim; Schulz, Karsten; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 32; In English; See also 20040201585; Copyright; Avail: Other Sources

Process communication is characterized by complex interactions between heterogeneous and autonomous systems within the enterprise and often between trading partners. A number of initiatives and proposals are underway to provide solutions for process specification and communication. However, the focus is often on defining APIs and interfaces rather than the semantics of the underlying message exchange. We see a great potential in the enhancement of current messaging infrastructure, in its new role in facilitating complex, long running interactions for dynamic and collaborative processes operating in decentralized environments like the World-Wide Web. In this paper, we primarily present a vision for a technology aimed at providing a level of business logic on the messaging layer, which we denominate as harmonisation of messages. We will provide the conceptual framework for the harmonized messaging technology and identify fundamental issues for the specification of complex interactions.
Author
Commerce; Management Methods; Messages

82
DOCUMENTATION AND INFORMATION SCIENCE

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

20040191598 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

ICEIS 2003

[2003]; 48 pp.; In English; ICEIS 2003, 23-26 Apr. 2003, Angers, France; See also 20040191599 - 20040191701; Copyright; Avail: Other Sources

Reports are presented from the 5th International Conference on Enterprise Information Systems, 2003. Main topic areas included: Databases and Information Systems Integration; Artificial Intelligence and Decision Support Systems; Information Systems Analysis and Specification; and Software Agents and Internet Computing. This report only consists of reports from the Information Systems Analysis and Specifications topic area. Other topic areas are covered in separate reports from this conference.

Derived from text

Information Systems; Systems Integration; Knowledge Bases (Artificial Intelligence)

20040191607 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Producing DTB From Audio Tapes

Carrico, Luis; Chambel, Teresa; Guimaraes, Nuno; Duarte, Carlos; ICEIS 2003; [2003], pp. 126-127; In English; See also 20040191598; Copyright; Avail: Other Sources

This paper presents a framework for the conversion of audiotape spoken books to full featured digital talking books. It is developed within the context of the IPSOM project. The introduction of search, cross-referencing and annotation mechanisms, with multimedia and trough multimodal capabilities are considered. Different formats and standards are taken into consideration, as well as different interaction alternatives. The resulting digital talking books aim the visually impaired community, but also situated applications and studies of cognitive aspects. The framework is part of a larger setting enabling the authoring, by reuse of and enrichment of multimedia units, of digital multimedia and multimodal documents.

Author

Audio Tapes; Multimedia; Alternatives; Format; Speech

20040191610 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Specifying a Knowledge Management Solution For The Construction Industry: The e-COGNOS Project

Rezgui, Yacine; Wetherill, Matthew; Kazi, Abdul Samad; ICEIS 2003; [2003], pp. 106-107; In English; See also 20040191598; Copyright; Avail: Other Sources

The paper focuses upon the contribution which adequate use of the latest development in Information and Communication Technologies can make to the enhancement, development and improvement of professional expertise in the Construction domain. The paper is based on the e-COGNOS project, which aims at specifying and developing an open model-based infrastructure and a set of tools that promote consistent knowledge management within collaborative construction environments. The specified solution emerged from a comprehensive analysis of the business and information/knowledge management practices of the project end-users, and makes use of a Construction specific ontology that is used as a basis for specifying adaptive mechanisms that can organise documents according to their contents and interdependencies, while maintaining their overall consistency. The e-Cognos web-based infrastructure will include services, which allow the creation, capture, indexing, retrieval and dissemination of knowledge. It also promotes the integration of third-party services, including proprietary tools. The e-COGNOS approach will be tested and evaluated through a series of field trials. This will be followed by the delivery of business recommendations regarding the deployment of e-COGNOS in the construction sector. The research is ongoing and supported by the European Commission under the IST programme - Key Action II.

Author

Information Management; Commerce; Procedures

20040191612 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Managing The Complexity Of Emergent Processes

Hawryszkiewycz, Igor; ICEIS 2003; [2003], pp. 109; In English; See also 20040191598; Copyright; Avail: Other Sources

Business processes in knowledge intensive environments often emerge rather than following predefined steps. Such emergence can result in disconnected activities, which result in complex interaction structures that require ways to maintain awareness across the activities and to coordinate the activities to a common goal. The paper suggests that new ways are needed to both model emergent processes and support and manage them using information technologies. The paper describes a metamodel, which includes the commands to create initial processes and to realize emergence. It then describes a prototype system that implements these semantics and realizes the creation of initial structures and their emergence and coordination. Author

Commerce; Coordination; Information Management; Management Systems

20040191613 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

A Temporal Reasoning Approach Of Communication Based Workflow Modeling

Aguayo, Andres; Carrillo, Antino; Galvez, Sergio; Guevara, Antonio; Caro, Jose L.; ICEIS 2003; [2003], pp. 99; In English; See also 20040191598; Copyright; Avail: Other Sources

Implementation of formal techniques to aid the design and implementation of workflow management systems (WfMS) is still required. We believe that formal methods can be applied in the field of properties demonstration of a workflow specification. This paper develops a formalization of the workflow paradigm based on communication (speech-act theory) by using a temporal logic, namely, the Temporal Logic of Actions (TLA). This formalization provides the basic theoretical foundation for the automated demonstration of the properties of a workflow map, its simulation, and fine-tuning by managers. Author

Communication Theory; Management Systems; Simulation; Temporal Logic

20040191628 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal

A Unified Tool for Editing Information of Different Levels of Abstraction

Kleschev, Alexander; Orlov, Vassili; ICEIS 2003; [2003], pp. 118-119; In English; See also 20040191598; Copyright; Avail: Other Sources

Ontology specification languages, ontologies of different levels of abstraction, enterprise knowledge and data are useful in the life cycle of enterprise information systems. Since methods of work with these kinds of information are in a research stage, new experimental models for representation of information are proposed. As a result, extra efforts on developing editing tools that are intended for editing information represented using new models are needed. These tools often turn out to be mutually incompatible. Meanwhile, the mentioned kinds of information are closely interrelated. This interrelation results in additional efforts on providing the editing tools compatibility. Users of the editing tools need essentially different intellectual support in the editing process. As a result, considerable efforts and resources are spent for development of experimental information editing tools that provide respective classes of users with intellectual support and for establishing the tools compatibility. This paper presents a model of a unified editing tool that is intended for solving this problem.
Author

Information Theory; Information Management

20040191642 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

Towards a Definition Of The Key-Problems In Information System Evolution: Formulating Problems To Better Address Information System Projects

Goepp, Virginia; Kiefer, Francois; ICEIS 2003; [2003], pp. 95-96; In English; See also 20040191598; Copyright; Avail: Other Sources

Through up the years, a lot of methods and approaches were proposed in the information system design (ISD) field. In spite of this variety and number of propositions, over 80 % of information system projects fail (Clancy 1995). On the one hand, this situation seems to be very surprising but on the other hand, this diversity of works let the research area in a state of fragmentation. A basic problem is the lack of consensus on the information system (IS) notion. However, according to Alter,

its comprehension is essential to better understand project failures. So, we come back up to this notion and show that IS have to fulfill contradictory roles linked to individual and collective aspects of information. This contradiction is the starting point for establishing a key-problem framework of IS in general. Indeed, the contradiction notion is an integrating part of TRIZ, Cyrillic acronym for 'Theory of Inventive Problem Solving', which is efficient for better formalize and address problems in technical system design. So, we analyse its potential contributions for developing modular and contingent IS project approaches, which are project success factors. Then, we apply the TRIZ approach on our first contradiction in order to obtain the key-problem framework. This one, based on three contradiction classes, is developed and presented. Each class of contradiction is linked with the semiotics features of information and enables to formalize the intrinsic problems of information systems. The potential applications of such a framework are also discussed.
Author
Information Systems; Systems Engineering; Fragmentation; Formulations

20040191647 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Aggregating Expert Profiles For Securing Aid
Delgado, Miguel; Bautista, Maria-Jose Martin; Sanchez, Daniel; Vila, Maria Amparo; ICEIS 2003; [2003], pp. 120; In English; See also 20040191598; Copyright; Avail: Other Sources

We present two different models to aggregate document evaluations and user profiles in the field of Information Retrieval. The main aim of this work is to discuss a general methodology to establish the most relevant terms to characterize a given 'topic' on an Information Retrieval System.We start from a set of documents from which a set of characteristic terms is selected, in such a way that the presence of any term in each document is known and we want to establish the most significant ones in order to select 'relevant' documents about a given 'topic' FI. For that, some experts, are required to assess the set of documents. By aggregating these assessments with the presence weight of terms, a measurement of their relevance in relation with FI may be obtained.The two presented models differ in the fact that the experts can query with the same terms (an unique query) to the system or with different terms (several queries). In each one of these cases, there are two possibilities: first aggregate the opinions of the experts about the documents, and then obtain the topic profile. The second possibility is to generate the expert profiles first, and then aggregate these profiles to obtain the topic profile.Several different situations arise according to the form in which the experts state their opinion, as well as from the approach to aggregate the opinions. An overview of these situations and a general methodology to cope with them for our model is presented here.
Author
Aggregates; Information Retrieval

20040191651 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Testing COTS With Classification-Tree Method
Leung, Hareton; Paramasivam, Prema; ICEIS 2003; [2003], pp. 111; In English; See also 20040191598; Copyright; Avail: Other Sources

This paper presents a new test method for COTS based on the classification-tree method. Information from the system specification and the COTS specification is used to guide the selection of test input. We can generate test cases that verify input outside the system specification but within the scope of COTS do not cause problem to the system, verify input required by the system specification and within the scope of COTS specification is providing correct results and verify input not within the scope of COTS specification is actually not required by the system specification. This paper presents our test selection method with the help of a case example.
Author
Classifications; Information Systems; Specifications

20040191652 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
A New User-Centered Design of Distributed Collaboration Environments: The Reciprocite Project
Derycke, Alain; Hoogstoel, Frederic; LePallec, Xaxier; Collet, Ludovic; ICEIS 2003; [2003], pp. 136; In English; See also 20040191598; Copyright; Avail: Other Sources

Designing collaborative applications is a hard task. Indeed, anticipating users' needs and help users understanding the process of proposed services are more difficult due to the group dimension. The Reciprocite project is a new way in designing

collaborative applications. It tries to reduce the two previous difficulties. In this paper, we present strong points of our approach: Peer-to-Peer (P2P), full-XML architecture, and tailorability mechanisms.
Author
Document Markup Languages; Information Systems

20040191692 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
A New Look at the Enterprise Information System Life Cycle: Introducing the Concept of Generational Change
Davis, Jon; Chalup, Stephan; Chang, Elizabeth; ICEIS 2003; [2003], pp. 115-116; In English; See also 20040191598; Copyright; Avail: Other Sources

This paper discusses the Enterprise Information System (EIS) life cycle and the phases of the EIS development life cycle. It details the stages in the EIS life cycle and the characteristics of phases in the system development life cycle and explains where it differs from traditional concepts of software engineering. In particular it defines the concept of generation change and when it is applied to a system. It also describes the nature of the rapid evolution of the EIS and how it results in version or generational change of the system, and how the EIS development life cycle involves a multitude of engineering processes, not just one. This new perspective could lead to the generation of new EIS development methodologies in business modelling, analysis, design, project management and project estimation.
Author
Information Systems; Information Management

20040191695 Ecole Superieure d'Ingenieurs en Electronique et Electrotechnique, Paris, France, Instituto Politecnico de Setubal, Setubal, Portugal
Developing Document and Content Management in Enterprises Using a 'Genre Lens'
Honkaranta, Anne; ICEIS 2003; [2003], pp. 131; In English; See also 20040191598; Copyright; Avail: Other Sources

A great deal of organizational information content is organized and produced as text and stored, understood and managed as documents - logical (sets of) content units meant for human comprehension. In some occasions content needed by human actors can be smaller or larger by it's grain size than that of a document. Dynamic nature of digital documents alongside with multiple technologies used for enacting them have made a document as an object of analysis fuzzy thus causing possibility that important information content can be overlooked within enterprise document management systems and development initiatives. I argue that enterprises need to find means for analyzing their information content independently from technologies and media; whether content is identified and managed as documents or not. For the purpose I introduce a theory of genres - typified communicative actions characterized by similar substance and form - as a 'lens' that can be operationalized for document and content analysis. In the paper I discuss how genres can be employed for document and content analysis by discussing the literature review I carried out. Research literature shows that theory of genres has been applied in multiple ways., such as for requirements analysis, identifying documents used in enterprise workgroups along with their metadata, analysis and design of information coordination, and so on. Multiple metadata frameworks have also been developed for classifying the communicational content within enterprises. Findings of the literature review implicate that genre 'lens' can be used for document and content analysis in multiple ways.
Author
Management Systems; Information; Systems Engineering; Metadata

20040200678 Porto Univ., Portugal
Information Systems Failure Explained Through The Lens Of The Cultural Web
Wilson, David; Avison, David; ICEIS 2004: Human-Computer Interaction; [2004], pp. 173-174; In English; See also 20040200666; Copyright; Avail: Other Sources

This paper provides a discussion of the Australian telecommunications company One.Tel Limited. The paper examines the information technology strategies employed by the company and assesses the extent to which a failure of those strategies may have contributed to, or precipitated, the downfall of the business. In particular, it looks at the company through the lens of Johnson and Scholes' (1993) cultural web. This perspective provides clear evidence of failings at the company, which were likely to have led to failure in its IT/IS policy and applications which, in turn, at least partly explains the downfall of the business.
Author
Information Systems; Failure; Telecommunication

20040200680 Porto Univ., Portugal

A Comparative Survey Of Activity-Based Methods For Information Systems Development

Shah, Hanifa; Quek, Amanda; ICEIS 2004: Human-Computer Interaction; [2004], pp. 177; In English; See also 20040200666; Copyright; Avail: Other Sources

The role of human factors and the importance of sociocultural and contextual issues in information systems (IS) development has long been recognized. However, these 'soft' details remain elusive and difficult to capture. Activity theory (AT) provides a framework with which to analyse and understand human behaviour in context. AT-based methods for IS development may therefore be a way forward. This paper presents a comparative survey of five AT-based methods. Each method is described, and its strengths and weaknesses briefly identified. The methods are then compared along nine key dimensions. As part of the findings, it is determined that most of the methods are selective in their use of AT, and are not sufficiently validated. Several correlations have also been noted across dimensions. Observations are presented on the limitations of existing methods, and suggestions are then made on possible ways forward.

Author

Human Factors Engineering; Information Systems; Systems Engineering

20040200687 Porto Univ., Portugal

An Innovative Vocal Interface For Automotive Information Systems

Olivero, Giuseppe; Costagliola, Gennaro; DiMartino, Sergio; Ferrucci, Filomena; ICEIS 2004: Human-Computer Interaction; [2004], pp. 186; In English; See also 20040200666; Copyright; Avail: Other Sources

The design of interfaces for automotive information systems is a critical task. In fact, in the vehicular domain the user is busy in the primary task of the driving, and any visual distraction inducted by the telematic systems can bring to serious consequences. Since road safety is paramount, it is needed to define new interaction metaphors, not affecting the driver's visual workload, such as auditory interfaces. In this paper we propose an innovative automotive auditory interaction paradigm, whose main goals are not to require visual attention, to be smart for expert users, as well as easy to use for inexperienced users. This is achieved by a new atomic dialogue paradigm, based on a help-on-demand mechanism, to provide a vocal support to users in trouble. Finally, we present some examples of dialogue based on such approach.

Author

Information Systems; Systems Engineering; Automobiles

20040200745 NASA Langley Research Center, Hampton, VA, USA

User Evaluation of the NASA Technical Report Server Recommendation Service

Nelson, Michael L.; Bollen, Johan; Calhoun, JoAnne R.; Mackey, Calvin E.; [2004]; 8 pp.; In English; 6th ACM International Workshop on Web Information and Data Management, 12-13 Nov. 2004, Washington, DC, USA

Contract(s)/Grant(s): 23-104-05-20-30

Report No.(s): Paper 37; Copyright; Avail: CASI; A02, Hardcopy

We present the user evaluation of two recommendation server methodologies implemented for the NASA Technical Report Server (NTRS). One methodology for generating recommendations uses log analysis to identify co-retrieval events on full-text documents. For comparison, we used the Vector Space Model (VSM) as the second methodology. We calculated cosine similarities and used the top 10 most similar documents (based on metadata) as 'recommendations'. We then ran an experiment with NASA Langley Research Center (LaRC) staff members to gather their feedback on which method produced the most 'quality' recommendations. We found that in most cases VSM outperformed log analysis of co-retrievals. However, analyzing the data revealed the evaluations may have been structurally biased in favor of the VSM generated recommendations. We explore some possible methods for combining log analysis and VSM generated recommendations and suggest areas of future work.

Author

Data Bases; Recommendations; Document Storage; Information Retrieval

20040200827 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal

The Future Of Telephony: The IP Solution

Fernandes, Silvia; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 147; In English; See also 20040200825; Copyright; Avail: Other Sources

Enterprises have begun to transform their working environment to meet not only the business world of today but also the

business world of tomorrow. The working methods are more flexible than ever before: some workers collaborate entirely from home and others work in several different offices circulating between remote workplaces. In a short time the way we work will be so radically different that working will be just what we do and no more where we are. As globalisation becomes a business reality and technology transforms communications, the world of data transmission together with wireless networks has progressed a lot instead of fixed and wire-line voice communications that have barely changed. However tariffs are still based on time and distance even though it does not make any sense in today's global marketplace, in spite of the reduced costs that have resulted from the deregulation process over public telephone networks.
Author
Data Transmission; Transformations (Mathematics); Voice Communication; Commerce

20040200842 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Toward a Classification Of Internet Scientific Conferences
Ouhelli, Abed; Bernard, Prosper; Plaisent, Michel; Maguiraga, Lassana; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 147; In English; See also 20040200825; Copyright; Avail: Other Sources

Since 1980, the classification of scientific production has been an constant concern for academics. Despite its growing importance in the last decade, Internet has not been investigated as an autonomous domain. This communication relates the efforts to develop a first classification of themes based on calls for paper submitted to the ISWORLD community in the last two years. The distribution of theme and sub-themes is presented and compared.
Author
Classifications; Internets

20040200854 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Building Supply Chain Relationships with Knowledge Management: Engineering Trust in Collaborative Systems
Perkins, John; Jorgensen, Ann-Karin; Barton, Lisa; Cox, Sharon; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 154-155; In English; See also 20040200825; Copyright; Avail: Other Sources

Collaborative systems are essential components of electronic supply chains. Barriers to collaboration are identified and a preliminary model for evaluating its characteristic features is proposed. Some features of knowledge management and knowledge management systems are briefly reviewed and the application of these to the needs of collaborative system evaluation is explored. A process for iterative evaluation and review of collaborative system performance is proposed. Finally, a case study in the retail industry is used to assess the contribution of knowledge management concepts and systems to develop improved e-commerce performance in collaborative value networks.
Author
Knowledge; Information Management

20040200903 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
An Extensible Tool For The Management Of Heterogeneous Representations Of XML Data
Torlone, Riccardo; Imperia, Marco; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 159; In English; See also 20040200825; Copyright; Avail: Other Sources

In this paper we present a tool for the management and the exchange of structured data in XML format, described according to a variety of formats and models. The tool is based on a novel notion of 'metamodel' that embeds, on the one hand, the main primitives adopted by different schema languages for XML and, on the other hand, the basic constructs of traditional database conceptual models. The metamodel is used as a level of reference for the translation between heterogeneous data representations. The tool enables the users to deal, in a uniform way, with various schema definition languages for XML (DTD, XML Schema and others) and the ER model, as a representative of a traditional conceptual model. The model translation facility allows the user to switch from one representation to another and accounts for possible loss of information in this operation. Moreover, the tool is easily extensible since new models and translations can be added to the basic set in a natural way. The tool can be used to support a number of involved e-Business activities like: information exchange between different organizations, integration of data coming from heterogeneous information sources, XML data design and re-engineering of existing XML repositories.
Author
Commerce; Data Bases; Information Systems; Organizations

20040200976 NASA Langley Research Center, Hampton, VA, USA

User Evaluation of the NASA Technical Report Server Recommendation Service

Nelson, Michael L.; Bollen, Johan; Calhoun, JoAnne R.; Mackey, Calvin E.; [2004]; 8 pp.; In English; 6th ACM International Workshop on Web Information and Data management, 12-13 Nov. 2004, Washington, DC, USA

Contract(s)/Grant(s): 23-104-05-20-30

Report No.(s): Paper 37; Copyright; Avail: CASI; A02, Hardcopy

We present the user evaluation of two recommendation server methodologies implemented for the NASA Technical Report Server (NTRS). One methodology for generating recommendations uses log analysis to identify co-retrieval events on full-text documents. For comparison, we used the Vector Space Model (VSM) as the second methodology. We calculated cosine similarities and used the top 10 most similar documents (based on metadata) as recommendations . We then ran an experiment with NASA Langley Research Center (LaRC) staff members to gather their feedback on which method produced the most quality recommendations. We found that in most cases VSM outperformed log analysis of co-retrievals. However, analyzing the data revealed the evaluations may have been structurally biased in favor of the VSM generated recommendations. We explore some possible methods for combining log analysis and VSM generated recommendations and suggest areas of future work.

Author

Information Systems; Data Bases; Metadata

20040201036 Research and Technology Organization, Neuilly-sur-Seine, France

Non-Lethal Weapons and Future Peace Enforcement Operations

November 2004; 66 pp.; In English

Report No.(s): RTO-TR-SAS-040; AC/323(SAS-040)TP/34; Copyright; Avail: CASI; C01, CD-ROM; A04, Hardcopy

The NATO Long Term Scientific Study (LTSS) SAS-040 has been tasked to prepare a Multinational Exercise (MNE) dedicated to the analysis of the use of non-lethal weapons in future peace enforcement operations. To achieve this aim, experts from various origins - military, lawyers, technical experts, representatives of industry, non-governmental organizations, etc. - have participated in this MNE. Three main themes have been adopted in tackling the use of NLW: Operational context, Technologies that can be envisaged, Legal and Political implications and constraints to be taken into account. This document presents the agreed output of the MNE. Specific chapters deal with the general aspects of the themes under consideration. A particular analysis of six concrete situations in which NLW might be used has been also realized. For each theme, conclusions and recommendations are developed in the last chapter of the document.

Author

Physical Exercise; Military Operations; User Requirements; Weapon Systems

20040201055 Naval Postgraduate School, Monterey, CA USA

Detection of Erroneous Payments Utilizing Supervised And Unsupervised Data Mining Techniques

Yanik, Todd E., Author; Sep. 2004; 94 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427220; No Copyright; Avail: Defense Technical Information Center (DTIC)

In this thesis we develop a procedure for detecting erroneous payments in the Defense Finance Accounting Service, Internal Review s (DFAS IR) Knowledge Base Of Erroneous Payments (KBOEP), with the use of supervised (Logistic Regression) and unsupervised (Classification and Regression Trees (C&RT)) modeling algorithms. S-Plus software was used to construct a supervised model of vendor payment data using Logistic Regression, along with the Hosmer-Lemeshow Test, for testing the predictive ability of the model. The Clementine Data Mining software was used to construct both supervised and unsupervised model of vendor payment data using Logistic Regression and C&RT algorithms. The Logistic Regression algorithm, in Clementine, generated a model with predictive probabilities, which were compared against the C&RT algorithm. In addition to comparing the predictive probabilities, Receiver Operating Characteristic (ROC) curves were generated for both models to determine which model provided the best results for a Coincidence Matrix s True Positive, True Negative, False Positive and False Negative Fractions. The best modeling technique was C&RT and was given to DFAS IR to assist in reducing the manual record selection process currently being used. A recommended ruleset was provided, along with a detailed explanation of the algorithm selection process.

DTIC

Data Mining; Data Processing; Finance; Information Retrieval; Regression Analysis

20040201061 Naval Postgraduate School, Monterey, CA USA

A Prototype Web-Enabled Information Management and Decision Support System for Army Aviation Logistics Management

Hoecherl, Joseph A., Author; Sep. 2004; 77 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427239; No Copyright; Avail: Defense Technical Information Center (DTIC)

The purpose of this thesis is to develop a prototype web-enabled database to improve the process flow of data collection and manipulation in support of Army aviation operations. Data collection is focused around routine aviation operations and aviation maintenance with the intention of identifying a feasible replacement for the existing redundant manual and automated collection procedures. The web interface has the potential to reduce the logistical burden on unit s data collection procedures and provides tailorable, near real time information about aircraft maintenance status, individual training, and unit training to decision makers at all levels as a decision support tool. This thesis will describe the design considerations for a web-enabled database to include the development of detailed data and process models.

DTIC

Decision Support Systems; Human-Computer Interface; Information Management; Logistics Management; Management Systems; Prototypes

20040201078 Maryland Univ., College Park, MD USA

Zoomable User Interfaces for the Semantic WEB

Gorniak, Mark J., Author; Sep. 2004; 15 pp.; In English; Original contains color illustrations

Contract(s)/Grant(s): F30602-03-2-0018; DARPA ORDER-P086; Proj-DAML

Report No.(s): AD-A427274; AFRL-IF-RS-TN-2004-1; No Copyright; Avail: Defense Technical Information Center (DTIC)

To retrieve information from databases, users must often understand the underlying data schemas. The University of Maryland, College Park (UMCP) developed an interface, to visualize the taxonomic hierarchy of data, and applied integrated searching and browsing so that users need not have complete knowledge either of appropriate keywords or the organization of the data. UMCP also conducted a qualitative user study of the interface to describe usage patterns and issues related to tree visualization of the data and domain. Interestingly, users with different levels of interest in the domain had different interaction preferences. The study provides further evidence for the value of integrated searching and browsing and interactive tree visualization for information retrieval and understanding.

DTIC

Biological Diversity; Hierarchies; Information Retrieval; Taxonomy

20040201159 Army Research Lab., Adelphi, MD USA

Protecting and Securing a Web Portal of Presidential Electronic Records Archives

Nguyen, Binh, Author; Nguyen, Son, Author; Racine, Glenn, Author; Sep. 2004; 42 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427419; ARL-TR-3338; No Copyright; Avail: Defense Technical Information Center (DTIC)

This document reports the findings of a 14-month study focused on the information-assurance (IA) tasks to enable the establishment of a secured Web portal of sensitive presidential that will be operating in a public internetworking environment, the Internet II. This work is part of the ARL cooperative agreement number DAAD19-03-2-0018, an enabling vehicle for a joint science-and-engineering research project of ARL and Georgia Tech Research institute (GTRI). The purpose of this collaborative work is to facilitate the processing and the protection of distributed authentic electronic records archives (ERA) for the U.S. National Archives and Records Administration (NARA). This IA research effort investigate security architecture, government-certified commercial IA products, and deployment issues.

DTIC

Documents; Internets; Presidential Reports

20040201194 Department of Defense, Washington, DC USA

Workbook for Uniform Federal Policy for Quality Assurance Project Plans: Evaluating, Assessing, and Documenting Environmental Data Collection and Use Programs. Part 2A: UFP-QAPP Workbook

Jul. 2004; 46 pp.; In English; Original contains color illustrations

Report No.(s): AD-A427486; No Copyright; Avail: Defense Technical Information Center (DTIC)

This Workbook for Uniform Federal Policy for Quality Assurance Project Plans is Part 2A of the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP). It provides examples of worksheets to assist with the preparation of QAPPs

in accordance with Part 1 of the UFP-QAPP (the UFP-QAPP manual) and Section 6 (Part B) of Quality Systems for Environmental Data and Technology Programs - Requirements with guidance for use, ANSI/ASQ E4 (February 2004). This Workbook may be used by the lead organization and its contractors to assist with the preparation of QAPPs for environmental data gathering activities. Each worksheet addresses specific requirements of the UFP-QAPP. Both the UFP-QAPP Manual and the Workbook are intended to be comprehensive and are not intended to be program-specific. Since the content and level of detail in a specific QAPP will vary by program, by the work being performed, and by the intended use of the data, specific worksheets may not be applicable to all projects. The ultimate success of an environmental program or project depends on the quality of the environmental data collected and used in decision-making, and this may depend significantly on the adequacy of the QAPP and its effective implementation. It is recommended that the individual worksheets included in this Workbook be taken to the project scoping and planning sessions. The use of the worksheets will aid in identifying the critical project information that will ensure that the right type, quality, and quantity of data are collected to meet all of the project's quality objectives. Though the format of each worksheet is not mandatory, the information required on the worksheets must still be presented in the QAPP, as appropriate to the project. In addition, QAPP preparers are encouraged to develop additional tables, as appropriate to the project.
DTIC
Data Acquisition; Policies; Quality Control; United States

20040201197 University of Southern California, Marina del Rey, CA USA
Template Enhancement Through Knowledge Acquisition (TEMPLE)
Gil, Yolanda, Author; Sep. 2004; 30 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): F30602-00-2-0513; Proj-ATEM
Report No.(s): AD-A427491; AFRL-IF-RS-TR-2004-262; No Copyright; Avail: Defense Technical Information Center (DTIC)

In this contract they developed Constable, a tool that enables users to extend existing templates by adding new constraints to be checked as they create plans from those templates. The constraints acquired specify desired qualities of the final plan, such as requiring the presence of a fires task for each attack task plan, or that the use of a resource or the overall cost be under a given threshold. Initially, the system has a pre-defined suite of constraints relevant to the domain that can be used to check a plan as it is being created by the user. The system also has an easy-to-use interface based on constrained English that guides users step by step (in a wizard-style interaction) to define additional new constraints that they would like the system to check.
DTIC
Augmentation; Knowledge Based Systems; Templates

20040201198 Academy of Sciences (USSR), Saint Petersburg, USSR
Formal Methods for Information Protection Technology. Task 2: Mathematical Foundations, Architecture and Principles of Implementation of Multi-Agent Learning Components for Attack Detection in Computer Networks. Part 2
Kotenko, I. V., Author; Nov. 2003; 84 pp.; In English; Original contains color illustrations
Report No.(s): AD-A427492; ISTC-1994P; EOARD-ISTC-00-7035; No Copyright; Avail: Defense Technical Information Center (DTIC)

The use of open computer networks as an environment for exchange of information across the globe in distributed applications requires improved security measures on the network, in particular, to information resources used in applications. Integrity, confidentiality and availability of the network resources must be assured. To detect and suppress different types of computer unauthorized intrusions, modern network security systems (NSS) must be armed with various protection means and be able to accumulate experience in order to increase its ability to front against known types of intrusions, and to learn new types of intrusions. The project will perform three main tasks. 1. Develop a mathematical model and a tool that simulates various coordinated intrusion scenarios against computer networks; 2. Develop the mathematical foundations, architecture, and principles of implementation of autonomous-software-tool technology implementing the learning system for intrusion detection; 3. Develop the fundamentals, architecture and software for the computer security system based on multi-level encoding for information protection in mass application. To detect and suppress different types of computer intrusions, modern NSS must be able to accumulate experience in order to increase its ability to front against known type of attacks/intrusions and to learn unknown simple and complex, local and distributed types of attacks. This requires the use of a powerful intelligent learning subsystem (LS) in NSS. That is why the second task of the project concerns to the development of the formal model,

architecture, and software prototype of the autonomous intelligent learning system for detection of the attacks/intrusions against computer network.
DTIC
Computer Information Security; Computer Networks; Information Systems; Protection

20040201253 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany
Personal- und Vorlesungsverzeichnis: Wintertrimester 2002 (Index of Faculty and Courses: Winter Trimester 2002)
Jan. 2002; 323 pp.; In German
Report No.(s): AD-A427625; No Copyright; Avail: CASI; A14, Hardcopy
Index contains the names of the faculty of the University of the Federal Armed Forces and the courses offered there in the Winter of 2002. Also furnished are maps of the campus and the names of the administrative staff.
DTIC
Winter

20040201254 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany
Personal- und Vorlesungsverzeichnis Wintertrimester 2004 (Index of Faculty and Courses: Winter Trimester 2004)
Jan. 2004; 318 pp.; In German
Report No.(s): AD-A427627; No Copyright; Avail: CASI; A14, Hardcopy
Index contains the names of the faculty of the University of the Federal Armed Forces and the courses offered there in the Winter of 2004. Also furnished are maps of the campus and the names of the administrative staff.
DTIC
Winter

20040201271 Naval War Coll., Newport, RI USA
Protecting Our Critical Information Technology Systems
Lenfant, Babette M., Author; May 2004; 30 pp.; In English
Report No.(s): AD-A427670; No Copyright; Avail: CASI; A03, Hardcopy
The USA' open society, coupled with its reliance on technology and information systems, represents a vulnerability which must be protected. Both the Federal Government and the Department of Defense have focused on the problem and have made strides in improving their information assurance and vulnerability assessment processes to better protect our nation's critical information technology systems. One of the main challenges of securing our information technology systems arises from the natural characteristic of vulnerabilities; they can only be fixed once identified. The growth of the internet, as well as our nation's reliance on information technology, however, makes the task even more daunting. Computers and the internet touch almost all aspects of our lives in the USA, from banking/finance to retail to education. The time sensitivity of getting the fixes applied requires seamless coordination among the key players in the Federal Government, military, and civilian sectors. Although efforts are underway to improve the processes and coordination, there is still considerable work to be done. The current processes often leave the combatant commander out of the information loop and blind to potential problems in his theater. This paper evaluates the current Department of Defense processes and structure and offers recommendations to improve the efficiency and effectiveness of our information assurance and vulnerability assessment process.
DTIC
Information Systems; Security

20040201504 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany
Personen- und Vorlesungsverzeichnis: Herbsttrimester 2001 (Index of Faculty and Courses: Fall Trimester 2001)
Jan. 2001; 357 pp.; In German
Report No.(s): AD-A427636; No Copyright; Avail: CASI; A16, Hardcopy
Index contains the names of the faculty of the University of the Federal Armed Forces and the courses offered there in the Fall of 2001. Also furnished are maps of the campus and the names of the administrative staff.
DTIC
Indexes; Armed Forces

20040201505 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany
Index of Faculty and Courses: Spring Trimester 2001
Jan. 2001; 357 pp.; In German
Report No.(s): AD-A427629; No Copyright; Avail: CASI; A16, Hardcopy

Index contains the names of the faculty of the University of the Federal Armed Forces and the courses offered there in the Spring of 2001. Also furnished are maps of the campus and the names of the administrative staff.
DTIC
Armed Forces; Indexes

20040201506 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany
Index of Faculty and Courses: Fall Trimester 2003
Jan. 2003; 366 pp.; In German
Report No.(s): AD-A427633; No Copyright; Avail: CASI; A16, Hardcopy

Index contains the names of the faculty of the University of the Federal Armed Forces and the courses offered there in the Fall of 2003. Also furnished are maps of the campus and the names of the administrative staff.
DTIC
Indexes; Armed Forces

20040201507 Universitaet der Bundeswehr Muenchen, Neubiberg, Germany
Index of Faculty and Courses: Fall Trimester 2000
Jan. 2000; 317 pp.; In German
Report No.(s): AD-A427626; No Copyright; Avail: CASI; A14, Hardcopy

Index contains the names of the faculty of the University of the Federal Armed Forces and the courses offered there in the Fall of 2000. Also furnished are maps of the campus and the names of the administrative staff.
DTIC
Indexes; Armed Forces

20040201545 CENDI Copyright and Intellectual Property Working Group, Washington, DC, USA
Don't Keep the Public Guessing: Best Practices in Notice of Copyright and Terms and Conditions of Use for Government Web Site Content
Klein, B.; Dec. 2004; 12 pp.; In English
Report No.(s): PB2005-101601; CENDI/2004-4; No Copyright; Avail: CASI; A03, Hardcopy

Users often assume that information on Federal agency web sites is in the public domain and unprotected by copyright. However, U.S. Government web sites may include information subject to terms and conditions of use based on private entity intellectual property rights. Under the law, the burden is on users of the information to identify the copyright and intellectual property status, but identifying the rights or how to obtain permission can be very difficult. As an initial step, government agencies should inform the public that information on agency web sites may be copyrighted or subject to other intellectual property rights, and are subject to terms and conditions of use.
NTIS
Copyrights; Intellectual Property; Identifying; Websites

20040201569 Savannah River Technology Center, Aiken, SC, USA
Comprehensive Environmental Management System Approach: The Right Tool for Stewardship
Cook, J. R.; 2003; In English
Report No.(s): DE2004-807131; WSRC-MS-2002-00651; No Copyright; Avail: National Technical Information Service (NTIS)

Expertise, methodologies and equipment from separate programs at the large Department of Energy sites can be combined to produce a powerful risk-based planning tool for stewardship. Modeling expertise has been developed while conducting required Performance Assessments and Composite Analyses. Data management and display capabilities of modern Geographical Information Systems can make the modeling results useful tools for planning and stewardship.
NTIS
Environment Management; Management Information Systems

20040201586 Porto Univ., Portugal

Information Technology Strategic Planning: Adapting Facts and Beliefs to Business Strategy Generation

Kerik, Julio Bernardo Clempner; Tornes, Agustin Francisco Gutierrez; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 4; In English; See also 20040201585; Copyright; Avail: Other Sources

This paper introduces a framework for adapting facts and beliefs to business strategy generation. The adaptation process model is supported by an information technology planning (ITSP) model and methodology. The aim of this paper is to validate the model. In the ITSP model, real world is composed by entities related in terms of goals, beliefs, etc., through interaction they incorporate or refuse facts or beliefs related to the environment conditions. The adaptation concept is proposed to generate business strategies. Two different methods are proposed: 1)an inference logic method, that employs facts related to the environment conditions to generate new business strategies; and 2) case-based reasoning, a stored cases recording specific prior episodes, that induce the incorporation of business strategies. Both methods are presented. The adaptation process is presented through application examples.

Author

Commerce; Information Systems; Technological Forecasting

20040201587 Porto Univ., Portugal

Incremental Data Quality In The Data Warehouse

Rasmussen, Karsten Boye; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 7; In English; See also 20040201585; Copyright; Avail: Other Sources

The data warehouse is the cornerstone for the production of business knowledge in the organization. The foundation of the quality of the business knowledge is the quality of the data in the data warehouse. Determination of dimensions of data quality in the data warehouse has been obtained through the intuitive, the empirical and the ontological approaches. The first point of this working paper is that data quality is not a static measure and that awareness of the data quality dimensions is a prerequisite to improve the data quality. The second point is that selection is the cornerstone of data quality in the data warehouse in relation to the quality dimensions. Thirdly, that post-load improvement of the data quality is obtainable. Metadata can be added incrementally containing information on the use of data - and thus the users' selections within the data warehouse - and on the users' judgment of the data.

Author

Information Systems; Quality Control; Commerce

20040201588 Porto Univ., Portugal

Distributed Database System of Agricultural Science and Technology Alliance of Universities in China

You, Long-Yong; Yuan, Jun-Jing; Wang, Jia-Yun; Zhang, Jian; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 9-10; In English; See also 20040201585; Copyright; Avail: Other Sources

There are three problems that need to be solved by establishing the Distributed Database System of the information platform of Chinese universities' Agricultural Science and Technology Alliance: distribution of the data resources, decomposition and optimization of the distributed query as well as safety of the data system. In this paper, firstly, through the overall analysis of the contents of Chinese universities' Agricultural Science and Technology Alliance, we establish the mixed data distributed system, make the database system more integrated, consistent and reliable, meanwhile improve efficiency of the local application. Secondly because the member of the alliance adopts different data mode, taking a query decomposition and optimization for overall mode in the way of extended semi-join will be the effective method to improve the system response time. Finally, utilizing the method of combining asymmetry encryption with symmetry encryption, we solve the safety problems of database identity validation, data transmission, visitation control and etc.

Author

Information Systems; Data Bases; Data Systems; Security

20040201589 Porto Univ., Portugal

Performance Indicators: Important Tool for Business Intelligence and Information Systems

Sene, Maria Luisa; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 13; In English; See also 20040201585; Copyright; Avail: Other Sources

In this paper is treated the importance of performance indicators in order to have a healthy organization. Also are given elements to understand why standardization is so related to this topic, and the most important thing, how all this contributes

to design an information system that will help the organization in the process of decision-making. Are included examples of performance indicators that can be applied in any organization.
Author
Commerce; Information Systems; Decision Making; Computer Systems Performance

20040201590 Porto Univ., Portugal
Audiovisual Archive with MPEG-7 Video Description and XML Database
Almeida, Pedro; Zagalo, Heider Troca; Pinto, Joaquim Sousa; Martins, Joaquin Amaldo; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 17; In English; See also 20040201585; Copyright; Avail: Other Sources

This article presents the work that has been developed in the creation of an audiovisual archive that uses the MPEG-7 standard to describe the video content and a XML database to store the video descriptions. It presents the model adopted to describe the video content, the framework of the audiovisual archive information system, a video indexing tool developed to allow the creation and manipulation of XML documents with the video descriptions and an interface to visualize the videos over the Web.
Author
Data Bases; Document Markup Languages; Information Systems

20040201591 Porto Univ., Portugal
Caching Strategies For Mobile Databases
deCamargo, Murilo; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 19; In English; See also 20040201585; Copyright; Avail: Other Sources

Caching remote data in local storage of a mobile client has been considered an effective solution to improve system performance for data management in mobile computing applications. In this paper, we propose a taxonomy for cache management in mobile database systems. The aim is to provide a unifying framework for the problem of caching in mobile computing, then a comparative review of the work done in this area up to now. Such a framework, with the associated analysis of the existing approaches, provides a basis for identifying strengths and weaknesses of individual methodologies, as well as general guidelines for future improvements and extensions.
Author
Data Management; Data Bases; Data Storage

20040201592 Porto Univ., Portugal
An Object Oriented Approach for Document Management
Adamu, Abdul; Khaddaj, Souheil; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 23-24; In English; See also 20040201585; Copyright; Avail: Other Sources

It is already widely accepted that the use of data abstraction in object oriented modelling enables real world objects to be well represented in information systems. In this work we are particularly interested with the use of object oriented techniques for document management. Object orientation is well suited for such systems, which require the ability to handle multiple types content. However, the matter of how to deal with the reuse and management of existing documents over time remains a major issue. This paper aims to investigate a conceptual model, based on object versioning techniques, that will represent the semantics in order to allow the continuity and pattern of changes of documents to be determined over time.
Author
Information Systems; Semantics; Object-Oriented Programming

20040201593 Porto Univ., Portugal
Relational Sampling for Data Quality Auditing and Decision Support
Oliveira, Jose Nuno; Cortes, Bruno; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 29-30; In English; See also 20040201585; Copyright; Avail: Other Sources

This paper presents a strategy for applying sampling techniques to relational databases, in the context of data quality auditing or decision support processes. Fuzzy cluster sampling is used to survey sets of records for correctness of business rules. Relational algebra estimators are presented as a data quality-auditing tool.
Author
Relational Data Bases; Data Sampling

20040201598 Porto Univ., Portugal

Developing a Corporate Information System Architecture: The Case of Eurostat

Vernadat, Francois; Pongas, Georges; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 44-45; In English; See also 20040201585; Copyright; Avail: Other Sources

The paper presents the vision being deployed at the Statistical Office of the European Communities (Eurostat) about a rationalized IT infrastructure for integrated operations of its various statistical production systems. The new architecture being implemented isolates physical data from applications and users, uses database federation mechanisms, strongly relies on the use of meta-data about storage systems, application systems and data life cycles, emphasises the use of thematic and support servers and will use a message-oriented middleware as its backbone for data exchange. Portal technology will provide the unique gateway both for internal and external users to have public or restricted access to information produced by over 130 statistical production systems working in the back-office. Architectural principles and solutions are discussed.

Author

Information Systems; Architecture (Computers)

20040201611 Porto Univ., Portugal

Evaluation of a Document Database Description by Different XML Schemas

Bazex, Pierre; Kenab, Madani; Braham, Tayeb Ould; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 6; In English; See also 20040201585; Copyright; Avail: Other Sources

A document database could be represented by different XML schemas, it depends on the content of the documents that it contains. From a simple conceptual schema of a database containing structured data that we represent in form of a document, we propose and evaluate different XML schemas describing this database in order to deduce the best one. For the building of these XML schemas we propose different descriptions of the key concepts of the relational model (relation, key and reference link). We also propose the description of different nestings between the elements of the document (total nesting, partial nesting and without nesting). We conclude that the best-adapted XML schema depends on the use that we wish to do with this database and it is a combination of the representation of different concepts. This work is a preliminary of the integration of a relational database thanks to the best XML schema.

Author

Document Markup Languages; Relational Data Bases

20040201614 Porto Univ., Portugal

Virtual Organizations and Database Access: A Case Study

Niinimaki, Marko; Pitkanen, Mikko; White, John; Niemi, Tapio; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 8-9; In English; See also 20040201585; Copyright; Avail: Other Sources

This paper presents a case study of using virtual organization technologies in database access. A virtual organization (VO) is a collection of people in the same administrative domain. A user can belong to many virtual organizations and have a different role (user, client, administrator,..) in each of them. An authorization of a user to different services within a VO is based on the user's identity and a service called a Virtual Organization Membership Service (VOMS) that maps these identities with roles. The user's identity can be established in two ways. If the user communicates with the service using his web browser, the user's certificate must be included in the browser. Another possibility is to use a proxy certificate. There, in the proxy creation process, the program that writes the proxy adds the user's proxy certificate information about his participation in different VO's and his role in each of them. In order to demonstrate using these VO proxy certificates, we have extended the functionality Spitfire, a relational database front end. This involves assigning the user a database role (read/write/update) based on the VO information in his certificate. There is also a GUI for creating the mappings between VO roles and database access roles.

Author

Data Bases; Relational Data Bases; Identities; Organizations

20040201615 Porto Univ., Portugal

Semi-Structured Information Warehouses: An Approach to a Document Model to Support Their Construction

Martinez, Juan Manuel Perez; Llavori, Rafael Berlanga; Cabo, Maria Jose Aramburu; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 32; In English; See also 20040201585; Copyright; Avail: Other Sources

During the last decade, data warehouse and OLAP techniques have helped companies to gather, organize and analyze the structured data they produce. Simultaneously, digital libraries have applied Information Retrieval mechanisms to query their

repositories of unstructured documents. In this context, the emergence of XML means the convergence of these two approaches, making possible the development of warehouses for semi-structured information. Although there exist several extensions of traditional data warehouse technology to manage semi-structured information, none of them are based on an underlying document model able to exploit this kind of information. Along this paper we present a set of requirements for semi-structured warehouses, as well as a document model to support their construction.
Author
Document Markup Languages; Information Retrieval; Data Bases; Models

20040201616 Porto Univ., Portugal
Information Invasion In Enterprise Systems
Crouch, Stephen; Henderson, Peter; Walters, Robert; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 23; In English; See also 20040201585; Copyright; Avail: Other Sources

With the proliferation of internet-based technologies within and between organisations, large-scale enterprise systems are becoming more interconnected than ever before. A significant problem facing these organisations is how their information systems will cope with inconsistency being introduced from external data sources. Major problems arise when low quality information enters an authoritative enterprise system from these external sources, and in so doing gains credibility. This problem is compounded by the propagation of this information to other systems and other enterprises, potentially 'invading' an inter-enterprise network. In this paper we will introduce and examine this behaviour, which we term 'information invasion'. Characterisation of systems that are most vulnerable from such an occurrence is provided, and details of an experiment are given which simulates information invasion on an example network topology.
Author
Information Systems; Internets; Organizations

20040201618 Porto Univ., Portugal
The Abortion Rate of Lazy Replication Protocols for Distributed Databases
Irun-Briz, Luis; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 26; In English; See also 20040201585; Copyright; Avail: Other Sources

Lazy update protocols have proven to have an undesirable behavior due to their high abortion rate in scenarios with high degree of access conflicts. In this paper, we present the problem of the abortion rate in such protocols from an statistical point of view, in order to provide an expression that predicts the probability of an object to be out of date during the execution of a transaction. It is also suggested a pseudo-optimistic technique that makes use of this expression to reduce the abortion rate caused by accesses to out of date objects. The proposal is validated by means of simulations of the behavior of the expression. Finally, the application of the presented results to improve lazy update protocols is discussed, providing a technique to theoretically determine the boundaries of the improvement.
Author
Data Bases; Failure Analysis; Protocol (Computers)

20040201620 Porto Univ., Portugal
A Hybrid Approach for Efficient Storage and Retrieval of Multidimensional Data
Jagdish, K. T.; Srivani, T. K.; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 29; In English; See also 20040201585; Copyright; Avail: Other Sources

Mapping from multidimensional data to one-dimensional using Hilbert Index has been studied as a way of indexing for storage and retrieval of multidimensional data. There are mainly two approaches towards Storage and Retrieval of Multidimensional data (Jurgens, 2002) one is the Tree Based Approach and other is Bitmap Indexing. One main benefit of the tree-based approach over the bit map indexing is that they have superior storage property and the insert/update operations are efficient on the other hand the bitmap indexing provides for faster retrieval. Our data structure is mainly based on the tree-based approach in which every node of the tree contains a bit array. The presence of a bit array in every node provides for faster retrieval thereby giving the benefit of both the approaches. In this paper, we present a tree (HT-tree) based on Hilbert Curves for efficient data storage and retrieval of Multidimensional data. The Hl--tree data search method mainly makes use of the bit representation of the Hilbert Index values to search for the data, instead of using conventional point search methods as used in most of the R-trees. The proposed data structure overcomes the disadvantages of the HG-tree namely, extra computation of minimum bounding rectangle from the range of Hilbert values required for point search, range search and

nearest neighbour search and also the problems occurring from the overlap area and redundant searches.
Author
Data Storage; Data Retrieval; Data Structures

20040201621 Porto Univ., Portugal
Using IUCLID For Worldwide Exchange Of Chemical And Toxicological Information
Scheer, Stefan; Allanou, Remi; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 17-18; In English; See also 20040201585; Copyright; Avail: Other Sources

A database management tool (IUCLID) has been created in order to provide with administering chemical and toxicological data sent in structured form due to existing EU legislation. This tool also offers - beyond the normal dataset administration functionality - mechanisms for data fusion, data reproduction and data deployment. Thus IUCLID is used not only by who has to receive submissions of that kind but also who has to produce such submissions. Hence this product is used by whoever is involved as stakeholder in the current legislative process, and even beyond that it has been recognized successfully. Consequently it was the worldwide acceptance that helped in promoting this software product ahead of its original purpose and to establish a network of exchange.
Author
Data Base Management Systems; Information Management; Data Integration

20040201622 Porto Univ., Portugal
Fuzzy Multiple-Level Sequential Patterns Discovery from Customer Transaction Databases
Ye, Hui-Lin; Chen, An; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 12; In English; See also 20040201585; Copyright; Avail: Other Sources

Sequential patterns discovery is a very important research topic in data mining and knowledge discovery, and it has been widely applied in business analysis. Previous works were focused on mining sequential patterns at a single concept level based on definite and accurate concept which may not be concise and meaningful enough for human experts to easily obtain nontrivial knowledge from the rules discovered. In this paper, we introduce concept hierarchies firstly, and then discuss a mining algorithm F-MLSPDA for discovering multiple-level sequential patterns with quantitative attribute based on fuzzy partitions.
Author
Data Bases; Data Mining; Hierarchies

20040201624 Porto Univ., Portugal
Automatic Discovery of Semantic Relationships Between Schema Elements
Rizopoulos, Nikos; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 14; In English; See also 20040201585; Copyright; Avail: Other Sources

The identification of semantic relationships between schema elements, or \schema matching, is the initial step in the integration of data sources. Existing approaches in automatic schema matching have mainly been concerned with discovering equivalence relationships between elements. In this paper, we present an approach to automatically discover richer and more expressive semantic relationships based on a bidirectional comparison of the elements data and metadata. The experiments that we have performed on real-world data sources from several domains show promising results, considering that we do not rely on any user or external knowledge.
Author
Domains; Metadata; Semantics

20040201626 Porto Univ., Portugal
Capability-Based Query Planning in Mediator Systems
Tang, Jiu Yang; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 16; In English; See also 20040201585; Copyright; Avail: Other Sources

This paper addresses the impact of capability description on query planning in heterogeneous data integration system. Query planning covers the selection of data sources related to the query and the determination of subgoals' execution orders. In the context of capability description, we propose a framework for data sources description towards generating good feasible query plans. Our approach uses information such as the semantic correspondences between local schemas and mediated schemas and the query capability descriptions to investigate factors that provide a good foundation for query planning. Finally,

the proposed approach is compared with the other capability description approaches described in the literature. The obtained results demonstrate that our approach will allow data sources to advertise their capabilities in a flexible way and help to efficiently query planning.
Author
Data Integration; Information Retrieval

20040201629 Porto Univ., Portugal
Information System for Supporting the Inclusion of Job Seekers to the Labor Market
Alevizos, Theodoros; Skourlas, Christos; Hadjidiakos, Paraskevas; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 43; In English; See also 20040201585; Copyright; Avail: Other Sources

In this paper, the interconnection and integration problem of disparate Information sources including multilingual information related to the Unemployed and Business is analyzed. A possible solution based on the use of the European curriculum vitae and the creation of Data Marts is briefly described. The approach is also influenced by well-known Cross-Lingual Information Retrieval (CLIR) techniques. We also focus on the creation of a pilot Information System for the Institute of Labour (INE) of the Greek General Confederation of Labour (GSEE). Eventually, our experience and a first evaluation of the system are discussed.
Author
Information Systems; Employment

20040201630 Porto Univ., Portugal
Organizational Information Systems Design and Implementation with Contextual Constraint Logic Programming
Abreu, Salvador; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 40; In English; See also 20040201585; Copyright; Avail: Other Sources

In this article we sustain that Contextual Constraint Logic Programming (CxCLP for short) is a useful paradigm in which to specify and implement Organizational Information Systems, particularly when integrated with the ISCO mediator framework. We briefly introduce the language and its underlying paradigm, appraising it from the angle of both of its ancestries: Logic and Object-Oriented Programming. An initial implementation has been developed and is being actively used in a real-world setting - Universidade de Evora's Academic Information System. We briefly describe both the prototype implementation and its first large-scale application. We conclude that the risk taken in adopting a developing technology such as the one presented herein for a mission-critical system has paid off, in terms of both development ease and flexibility as well as in maintenance requirements.
Author
Logic Programming; Information Systems; Computer Systems Design

20040201631 Porto Univ., Portugal
An Event Processing System for Rule-Based Component Integration
Urban, Susan; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 22; In English; See also 20040201585; Copyright; Avail: Other Sources

The IJK project has developed an environment in which active rules, known as integration rules, are used together with transactions to provide an event-driven, rule-based approach to the integration of black-box components. This paper presents the event processing system that supports the use of integration rules over components. The event processing system is composed of the language framework for the specification of different types of events, an event generation system for generating event instances, and an event handler for communicating the occurrence of events to the integration rule processor. The language framework supports the enhancement of EJB components with events that are generated before and after the execution of methods on components. Since integration rule support an immediate coupling mode and execute in the context of nested transactions, a synchronization algorithm has been developed to coordinate the execution of immediate integration rules with the execution of methods on components. The synchronization algorithm makes it possible to suspend and resume distributed application transactions to accommodate the nested execution of integration rules with an immediate coupling mode.
Author
Systems Integration; Rules; Events

20040201634 Porto Univ., Portugal

XRM: An XML-Based Language for Rule Mining Systems

Laurent, Dominique; Jen, Tao-Yuan; Cheriat, Ahmed; Bouchou, Beatrice; Halfeld-Ferrari, Mirian; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 17; In English; See also 20040201585; Copyright; Avail: Other Sources

In this paper, we present XRM, an XML-based language capable of promoting the collaboration among data mining systems. Indeed, KDD systems usually need a platform to integrate and exchange their results with different tools. XRM is a general framework to express any system results and/or data as logic formulas. In this way, XRM offers flexibility to represent data, constraints and patterns, and allows mining systems to present their results in an exchangeable format. In this work, we concentrate on the use of XRM to represent different forms of association rules. Association rule mining has evolved giving rise to sophisticate approaches that require interaction with other tools. XRM is built on XML Schema - in this way we can assure a certain level of correctness of data and mining results.

Author

Document Markup Languages; Data Mining

20040201635 Porto Univ., Portugal

Ontology-Based Requirement Elicitation

Wang, Cong; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 18; In English; See also 20040201585; Copyright; Avail: Other Sources

The key problem of information system development is how to acquire requirement. It has become the puzzled problem to the system developers for a long time. How to build a communication bridge between the developers and users has become a he issue in requirement engineering. Ontology defines the common concepts and the relationships among them. A communication bridge can be built between the domain users and the system developers. Therefore, the ontology can direct the users and the developers to construct the requirement model. According to the different views of the system, this paper provides ontologies named business ontology, technique ontology and functionality Ontology for requirement elicitation. Firstly, this paper defines the concept of the ontology. Second, we describe the three ontologies in detail. Finally, through the ontologies, this paper provides the domain requirement model.

Author

Information Systems; Systems Engineering

20040201636 Porto Univ., Portugal

A Transaction Model For Long Running Business Processes

Wang, Jin-Ling; Jin, Bei-Hong; Li, Jing; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 19; In English; See also 20040201585; Copyright; Avail: Other Sources

Many business processes in the enterprise applications are both long running and transactional in nature, but currently no transaction model can provide full transaction support for such long running business processes. In this paper, we proposed a new transaction model - PP/T model. It can provide structural transaction support for the long running business processes, so that application developers can focus on the business logic, with the underlying platform providing the required transactional semantics. Simulation results show that the model has good performance in processing the long running business processes.

Author

Data Simulation; Management Systems

20040201637 Porto Univ., Portugal

An APS Architecture for Web Services Based Enterprise Integration

Liu, William; Wang, Feng-Yu; Chua, Tay Jin; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 10-11; In English; See also 20040201585; Copyright; Avail: Other Sources

Web Services enabling technology is widely used to address enterprise integration within company or cross-organizations due to its language and operating system independency and support of loosely coupled integration. This paper presents an architecture for APS (Advanced Planning and Scheduling) system by describing an APS request handling engine and web services based functions, attempting to solve integration issues among APS, MES, ERP and other manufacturing systems that could not be handled properly using current approaches. In addition, as manufacturing planning has been extended to cover

entire supply chain, this paper also discusses the necessary changes of the proposed architecture to cater for the extension. That would be helpful to figure out capacity issue in a big picture.
Author
Scheduling; Systems Integration; Planning

20040201638 Porto Univ., Portugal
A Data Warehouse Architecture for Brazilian Science And Technology Environment
Menolli, Andre; Dias, Maria Madalena; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 10; In English; See also 20040201585; Copyright; Avail: Other Sources

Science and technology in Brazil are areas that have few available resources and many times these scarce resources are badly used. The data warehouse is a tool that can make possible a better distribution of these resources. In this article are considered some issues in the development of a data warehouse for Science & Technology management. The paper describes the necessity of a supporting system to the decision taking regarding the distribution of the resources destined to Science & Technology in Brazil, and also shows a data warehouse architecture that is being developed to support this system Data Modeling characteristics defined for the proposed data warehouse architecture are presented too.
Author
Brazil; Data Storage

20040201639 Porto Univ., Portugal
Component Based Information System Re-Engineering Approach
Khadraoui, Abdelaziz; Leonard, Michel; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 43; In English; See also 20040201585; Copyright; Avail: Other Sources

This paper presents a concept called Component Based Information System Re-Engineering (CISRE), which lays down the foundation of a new re-engineering approach. CISRE covers all the facets of an Information System at three levels: system, collaboration and organization. The proposed approach of IS Re-engineering distinguishes two main phases: the comprehension phase and the renovation one which are not disjointed. The cognitive space of the comprehension phase permits the clarification of links between legal texts (general procedures) and the IS. The main goal is to converge into a new IS, within a rapid evolving environment. Therefore, the new IS will be achieved on stable concepts based on invariants.
Author
Information Systems; Software Engineering

20040201641 Porto Univ., Portugal
Obtaining E-R Diagrams Semi-Automatically from Natural Language Specifications
Meziane, Farid; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 11; In English; See also 20040201585; Copyright; Avail: Other Sources

Since their inception, entity relationship models have played a central role in systems specification, analysis and development. They have become an important part of several development methodologies and standards such as SSADM. Obtaining entity relationship models, can however, be a lengthy and time consuming task for all but the very smallest of specifications. This paper describes a semi-automatic approach for obtaining entity relationship models from natural language specifications. The approach begins by using natural language analysis techniques to translate sentences to a meaning representation language called logical form language. The logical forms of the sentences are used as a basis for identifying the entities and relationships. Heuristics are then used to suggest suitable degrees for the identified relationships. This paper describes and illustrates the main phases of the approach and presents a summary of the results obtained when it is applied to a case study.
Author
Natural Language (Computers); Heuristic Methods

20040201642 Porto Univ., Portugal
Towards Conceptual Mediation
Delgado, Ismael Navas; Montes, Jose F. Aldana; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 11; In English; See also 20040201585; Copyright; Avail: Other Sources

Mediators are usually developed as monolithic systems which envelope the data source's semantics as well as its location. Furthermore, its architecture based on wrappers involves a high coupling degree among the mediator's components. This

coupling does not allow sharing services with other organizations or the dynamic integration of new data sources. Therefore, wrappers must be re-designed and manually added for each mediation system. We propose an architecture for conceptual mediation in which the sources' query capabilities are published as web services. These services can be registered in one or more resource directories (Semantic Directories), which are the core of this architecture because they provide the needed flexibility and scalability for dynamic integration. Finally, we show an application in a bioinformatics context to validate our approach.
Author
Information Retrieval; Systems Integration; Semantics

20040201644 Porto Univ., Portugal
Conv2XML: Relational Schema Conversion to XML Nested-Based Schema
Duta, Angela; Barker, Ken; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 22; In English; See also 20040201585; Copyright; Avail: Other Sources

Conversion of relational data to XML is a critical topic in the database area. This approach translates the rigid tabular structures of relational databases into hierarchical XML structures. Logical connections between bits of data depicted by relationships are represented more naturally by tree-like structures. Conv2XML and ConvRel are two algorithms for converting relational schema to XML Schema focusing on preserving the source relationships and their structural constraints. ConvRel translates each relationship individually into a nested XML structure. Conv2XML identifies complex nested structures capable of modeling all relationships existent in a relational database.
Author
Data Bases; Document Markup Languages; Data Structures

20040201645 Porto Univ., Portugal
Applying Cross-Topic Relationships to Searching with Incremental Relevance Feedback
Chan, Stephen; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 22-23; In English; See also 20040201585; Copyright; Avail: Other Sources

General purpose search engines such as Google and Yahoo define search topic hierarchies for document organization, yet such hierarchical structures cover only a portion of the possible relationships among search topics. It is believed that search effectiveness can be improved significantly by making better use of the semantic relations among search topics. In general, the is-child relation allows starting a search from general concepts, while the is-neighbor relation provides fresh information that can help users identify related search areas. This paper describes a topic network encompassing such relations, based on Bayesian networks techniques, to support searching, Our experiments show that making use of such a topic network can improve search effectiveness in a search engine using incremental feedback.
Author
Information Retrieval; Bayes Theorem

20040201648 Porto Univ., Portugal
A/D Case: A New Heart for FD3
Enciso, Manuel; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 28; In English; See also 20040201585; Copyright; Avail: Other Sources

In [anonymous] we introduce the Functional Dependencies Data Dictionary (FD3) as an architecture to facilitate the integration of database Systems. We propose the use of logics based on the notion of Functional Dependencies (FD) to allows formal specification of the objects of a data model and to conceive future automated treatment. The existence of a FD logic provides a formal language suitable to carry out integration tasks and eases the design of an automatic integration process based in the axiomatic system of the FD logic. Besides that, FD3, provides a High Level Functional Dependencies (HLFD) Data Model which is used in a similar way as the Entity/Relationship Model. In this paper, we develop a CASE tool named A/D CASE (Attribute/Dependence CASE) that illustrates the practical benefits of the FD3 architecture. In the development of A/D CASE we have taken into account other theoretical results which improve our original FD3 proposal [anonymous]. Particularly: * A new functional dependencies logic named SLfd, for removing redundancy in a database sub-model that we present in [anonymous]. The use of SLfd add formalization to software engineering process. * An efficient preprocessing transformation based on the substitution paradigm that we present in [anonymous]. Unlike A/D CASE is independent from

the Relational Model, it can be integrated into different database systems and it is compatible with relational DBMSs.
Author
Data Bases; Dictionaries; Systems Integration

20040201653 Porto Univ., Portugal
Adding Spatial Components To Scientific Data Warehouses
Deeb, Kevin; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 44; In English; See also 20040201585; Copyright; Avail: Other Sources

For many years universities and gow_rnment agencies have been collecting a wealth of scientific data. It is now time to transform these data into information and make them readily available in a common format that is easily accessible, fast, and bridges the islands of information that have evolved at each site. The best architecture for this application is the data warehouse that protects the confidentiality of data before it can be published by principal investigators, preserves the privacy of contributors, provides sufficient granularity to enable scientists to variously manipulate data, supports robust metadata services, and contains a standardized spatial component. The benefits of the warehouse can be further enhanced by adding spatial component so that the data clan be brought to life, overlapping layers of information in a format that is easily grasped by management, enabling them to tease out trends in their areas of expertise.
Author
Metadata; Standardization; Architecture (Computers)

20040201662 Porto Univ., Portugal
Comparison of Approaches in Data Warehouse Development in Financial Services and Higher Education
Benefelds, Janis; Niedrite, Laila; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 20; In English; See also 20040201585; Copyright; Avail: Other Sources

When a decision to develop a Data Warehouse is made, some sensitive factors should be evaluated to understand the tasks and prioritize them. Of course, priorities and conditions are unique in each Data Warehouse project development. In this paper we assume that there are common characteristics for companies of similar business activities and different for those with opposite activities. This article looks at the interpretation of the same criteria of two Data Warehouse projects in for-profit and not-for-profit areas. As representatives of for-profit and not-for-profit areas we selected financial services (banking) and higher education institutions. We have used the criteria from List to compare the results of the two projects. Each section of the paper describes this set of criteria for each of the two areas. The Data Warehouse development methodology used in each case is described too. An evaluation matrix is provided in Conclusion. The results shown there are not very different from Data Warehouse project development in an organization with respectively different behavior.
Author
Data Management; Project Management; Criteria

20040201664 Porto Univ., Portugal
A Transactional Multimode Model to Handle Overload in Distributed RTDBSS
Saad-Bouzefrane, Samia; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 15; In English; See also 20040201585; Copyright; Avail: Other Sources

Current applications, such as Web-based services, electronic commerce, mobile telecommunication systems, etc. are distributed in nature and manipulate time-critical databases. In order to enhance the performance and the availability of such applications, the major issue is to develop efficient protocols that cooperate with the scheduler to manage the overload of the distributed system. In order to help real-time database management systems (RTDBS) to maintain data logical consistency while attempting to enhance concurrency execution of transactions, we introduce a transactional multimode model to let the application transactions adapt their behavior to the overload consequences. In this paper, we propose for each transaction several execution modes and we derive an overload controller suitable for the proposed multimode model.
Author
Data Base Management Systems; Data Management

20040201667 Porto Univ., Portugal
A Metadata Repository for Image Retrieval Algorithms
Gonzalez, Sahudy Montenegro; Yamakami, Akebo; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 12-13; In English; See also 20040201585; Copyright; Avail: Other Sources

Many of the problems involved in image database applications require some form of retrieval based on image content. The explosion in availability of image content, due to recent developments in multimedia technology, demands the formulation of algorithms to facilitate content-based retrieval. Many image retrieval algorithms are implemented according to the needs of specific applications. Yet, there is currently no standard form of manipulation for these algorithms. This fact has a secure impact on the availability of algorithms beyond the bounds of the application for which they were originally designed. This work defines a general purpose repository for the algorithms involved in the process of Image Retrieval. The main goal of the repository is to provide the application developer with an infrastructure to manipulate and query image algorithms, allowing the integration of the image retrieval algorithms, the creation of a stock of algorithms available to multiple users, and to reuse/share algorithms for multiple applications. We define a standard set of metadata, applicable to image retrieval algorithms, providing uniform semantic support to understand these algorithms. This repository acts as a support to the development of image retrieval applications. The repository architecture is centered on providing distributed database functionality.
Author
Data Retrieval; Data Bases; Metadata; Images

20040201668 Porto Univ., Portugal
Managing Information Flow Dynamics with Agile Enterprise Architectures
Martakos, Drakoulis; Kanellis, Panagiotis; Alexopoulou, Nancy; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 15; In English; See also 20040201585; Copyright; Avail: Other Sources

New organization forms and ways of conducting business require architectures for enterprise systems that can support and not hinder entrepreneurial activities. Primarily this means that the information flow between both internal as well as crossenterprise processes must be managed by underlying systems that offer a high level of automation as well as being highly flexible and integrated. In this respect, we present an agile architecture that offers a coherent and high level conceptualisation of the above properties that enterprise information systems should display, consider a number of technologies as potential implementation candidates and demonstrate how the architecture addresses node density, velocity, viscosity and volatility as parameters for managing and controlling the dynamics of information flows.
Author
Information Flow; Information Management

20040201676 Porto Univ., Portugal
Access Model in Cooperative Information Systems
Disson, Eric; Boulanger, Danielle; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 13; In English; See also 20040201585; Copyright; Avail: Other Sources

This research focuses on access security in cooperating information systems. The offered modeling has to treat the interoperation of open and evolutive information systems and, moreover, has to guarantee the respect of various local security policies. The coexistence of heterogeneous information sources within an information systems framework involves homogenization problems between local security policies. We distinguish two types of heterogeneity: heterogeneity of the local access policies and semantic heterogeneity between object or subject instances of the local access schemas. To solve this twofold difficulty, we propose an original role model allowing a unified representation of local access schemas. This mode preserves the flow control properties in the three main access policies (discretionary, role based model and multilevel models) The described access schemas are enriched to establish intra-system access authorizations.
Author
Information Systems; Models; Security

20040201677 Porto Univ., Portugal
An Efficient B+- Tree Implementation in C++ Using the STL Style
Butler, Gregory; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 16; In English; See also 20040201585; Copyright; Avail: Other Sources

Database indexes are the search engines for database management systems. The B+- tree is one of the most widely used and studied data structures and provides an efficient index structure for databases. An efficient implementation is crucial for a B+- tree index. Our B+-tree index is designed to be a container by following the style of the C++ Standard Template Library (STL) and implemented efficiently by using design patterns and generic programming techniques. Therefore, our B+-tree index can adapt to different key types, data types, different queries, and different database application domains, and be easy

and convenient for developers to reuse just like other containers in the STL.
Author
Data Structures; C++ (Programming Language); Data Bases; Indexes (Documentation)

20040201678 Porto Univ., Portugal
Turning Information into Action: from Data to Business Processes through Web Services
Baghdadi, Youcef; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 30; In English; See also 20040201585; Copyright; Avail: Other Sources

Sharing Web services across the enterprise and to support business-to-business integration becomes more and more intensive and critical for businesses. This paper proposes a process to generate Web services from the attributes of the business objects and coordination artifacts as described in the highest abstraction level of a business model i.e. the universe of discourse where the elements are unique and not duplicated. Indeed, the elements of the information system, technology-based representation of the universe of discourse, are complex and redundant. The process is based on the concept of factual dependency. The factual dependency is a mechanism that allows aggregations of the attributes that are concerned by the same CRUD operations with respect to the time and the space. Factual dependencies are then validated with respect to the possible business events to keep only the relevant ones. Each distinct and specified operation in terms of input/output parameters generates a lowest level of granularity Web service. These Web services are then registered to be discovered ant (re)used at request by any business process.
Author
World Wide Web; Management Systems

20040201679 Porto Univ., Portugal
Cooperative Legacy Databases: An Ontology Based Context Mediation
Thiran, Phiippe; Benslimane, Djamal; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 39-40; In English; See also 20040201585; Copyright; Avail: Other Sources

Enterprise information systems contain collections of existing databases that must cooperate to carry out common tasks. Most often, these databases are legacy, autonomous and heterogeneous systems. In this paper, we focus on the semantic and dynamic aspects of legacy database interoperation. We present a context mediation approach to support legacy database interoperability, which is based on a conceptual level of database description and on a dynamic resolution of structural and semantic conflicts. An object oriented data model is described, which provides tools for a conceptually rich description of legacy database, and foundations for resolving semantic heterogeneities among systems.
Author
Data Bases; Information Systems; Interoperability

20040201680 Porto Univ., Portugal
LifeStreams: Brain-Friendly Data Access
Kangasharju, Jussi; Limberger, Tobias; Austaller, Gerhard; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 30; In English; See also 20040201585; Copyright; Avail: Other Sources

Modern databases are rapidly growing in size and complexity. However, many users do not have enough domain knowledge to formulate precise queries and are thus unable to use these databases to their full potential. In this paper we present our LifeStreams project which aims at a brain-friendly access to data using associations between documents. Associations in LifeStreams are based on examining similarities between documents in several metadata dimensions such as time, location, and keywords. We present a model for real world and abstract entities and discuss how the relationships between entities and documents can be established. We show how LifeStreams visualizes collections of documents using a 3-dimensional visualization technique. We also discuss real-world application scenarios for LifeStreams in a corporate environment.
Author
Data Bases; Data Retrieval

20040201681 Porto Univ., Portugal
Transaction Design for Databases with High Performance and Availability
Frank, Lars; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 6-7; In English; See also 20040201585; Copyright; Avail: Other Sources

When many concurrent transactions like ERP and E-commerce orders want to update the same stock records, long duration locking may reduce the availability of the locked data. Therefore, transactions are often designed without analyzing the consequences of loosing the traditional ACID (Atomicity, Consistency, Isolation and Durability) properties. In this paper, we will analyze how low isolation levels, optimistic concurrency control, short duration locks, and countermeasures against isolation anomalies can be used to design transactions for databases with high performance and availability. Long duration locks are defined as locks that are held until a transaction has been committed, i.e. the data of a record is locked from the first read to the last update of any data used by the transaction. This will decrease the availability of locked data for concurrent transactions, and, therefore, optimistic concurrency control and low isolation levels are often used. However, in systems with relatively many updates like ERP-systems and E-commerce systems, low isolation levels cannot solve the availability problem as all update locks must be exclusive. In such situations, we will recommend the use of short duration locks. Short duration locks are local locks that are released as soon as possible, i.e. data will for example not be locked across a dialog with the user. Normally, databases where only short duration locks are used do not have the traditional ACID properties as at least the isolation property is missing when locks are not hold across a dialog with the user. The problems caused by the missing ACID properties may be managed by using approximated ACID properties, i.e. from an application point of view the system should function as if all the traditional ACID properties had been implemented. Examples using E-commerce will illustrate how to use the transaction design recommended in this paper. We have cooperated with one of the major ERP software companies in designing our transaction model.
Author
Electronic Commerce; Data Bases; Isolation; Locking; Computer Information Security

20040201684 Porto Univ., Portugal
ACME-DB: An Adaptive Caching Mechanism Using Multiple Experts For Database Buffers
Kirchberg, Markus; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 5; In English; See also 20040201585; Copyright; Avail: Other Sources

An adaptive caching algorithm, known as Adaptive Caching with Multiple Experts (ACME), has recently been presented in the field of web-caching. We explore the migration of ACME to the database caching environment. By integrating recently proposed database replacement policies into ACME's existing policy pool, an attempt is made to gauge ACME's ability to utilise newer methods of database caching. The results suggest that ACME is indeed well-suited to the database environment and performs as well as the best currently caching policy within its policy pool at any particular moment in its request stream. Although execution time increases by integrating more policies into ACME, the overall processing time improves drastically with erratic patterns of access, when compared to static policies.
Author
Data Bases; Algorithms; Measuring Instruments

20040201690 Porto Univ., Portugal
Delegating Authority In a Distributed Information Management System
Barnett, Janet; Vivier, Barbara; Aggour, Kareem; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 9; In English; See also 20040201585; Copyright; Avail: Other Sources

The need to manage large information repositories securely in a distributed environment increases with the growth of the Internet. To address this need, a system capable of managing the contents of an LDAP directory over the Web has been designed and developed. This system allows for the directory's data to be divided into communities and supports the delegation of administrative authority over those communities to a distributed set of administrators. The communities may be subdivided recursively into subgroups, and rights over those subgroups also may be restricted. Thus, system administrators can dynamically delegate subsets of their permissions over a subset of their managed data, allowing for the effective control of permissions over the data within distributed organizations. The system solves the delegated administration problem for managing the contents of an LDAP directory in a distributed environment. Today, it supports the administration of over 20 production directories by well over 2000 distributed administrators.
Author
Information Management; Directories; Organizations; Security

20040201692 Porto Univ., Portugal
Mining Click-Stream-Based Data Cubes
Belo, Orlando; Aives, Ronnie; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 32-33; In English; See also 20040201585; Copyright; Avail: Other Sources

Clickstream analysis can reveal usage patterns on company's web sites giving highly improved understanding of customer behaviour, which can be used to improve customer satisfaction with the website and the company in general, yielding a great business advantage. Such summary information and rules have to be extracted from very large collections of clickstreams in web sites. This is challenging data mining, both in terms of the magnitude of data involved, and the need to incrementally adapt the mined patterns and rules as new data is collected. In this paper, we present some guidelines for implementing online analytical mining (OLAM) engines which means an integration of OLAP and mining techniques for exploring multidimensional data cube structures. In addition, we describe a data cube alternative for analyzing clickstreams. Besides, we discussed implementations that we consider efficient approaches on exploring multidimensional data cube structures, such as DBMiner, WebLobMiner, and OLAP-based Web Access Engine.
Author
Data Mining; Websites; Commerce

20040201693 Porto Univ., Portugal
New Fast Algorithm for Incremental Mining of Association Rules
El-Sonbaty, Yasser; Kashef, Rasha; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 26; In English; See also 20040201585; Copyright; Avail: Other Sources

Mining association rules is a well-studied problem, and several algorithms were presented for finding large itemsets. In this paper we present a new algorithm for incremental discovery of large itemsets in an increasing set of transactions. The proposed algorithm is based on partitioning the database and keeping a summary of local large itemsets for each partition based on the concept of negative border technique. A global summary for the whole database is also created to facilitate the fast updating of overall large itemsets. When adding a new set of transactions to the database, the algorithm uses these summaries instead of scanning the whole database, thus reducing the number of database scans. The results of applying the new algorithm showed that the new technique is quite efficient, and in many respects superior to other incremental algorithms like Fast Update Algorithm (FUP) and Update Large Itemsets (ULI).
Author
Data Mining; Algorithms

20040201700 Porto Univ., Portugal
A Data Warehouse for Weather Information
Torres-Jimenez, Jose; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 24; In English; See also 20040201585; Copyright; Avail: Other Sources

Data warehouse related technologies, allows to extract, group and analyze historical data in order to identify information valuable to decision making processes. In this paper the implementation of a weather data warehouse (WDW) to store Mexico's weather variables is presented. The weather variables data were provided by the Mexican Institute for Water Technologies (IMTA), the IMTA does research, development, adaptation, human resource formation and technology transfer to improve the Mexico's water management, and in this way contribute to the sustainable development of Mexico. The implemented WDW contains two dimension tables (one time dimension table and, one geographical dimension table) and one fact table (that stores the data values for weather variables). The time dimension table spans over ten years from 1980 to 1990. The geographical dimension table involves many Mexico's hydrological zones and comes from 5551 measuring stations. The WDW enables (through the dimensions navigation) the identification of weather patterns that would be useful for a) agriculture politics definition; b) climatic change research; and c) contingency plans over weather extreme conditions. Even it is well known, but it is important to mention, that the data warehouse paradigm (in many cases) is better to derivate knowledge from the data in comparison to the database paradigm, a fact that was confirmed through the WDW exploitation.
Author
Data Bases; Data Storage; Decision Making; Weather Data Recorders

20040201701 Porto Univ., Portugal
Improving View Selection in Query Rewriting Using Domain Semantics
Bai, Qingyuan; McTear, Michael F.; Hong, Jun; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 25-26; In English; See also 20040201585; Copyright; Avail: Other Sources

Query rewriting using views is an important issue in data integration. Several algorithms have been proposed, such as the bucket algorithm, the inverse rules algorithm, the SVB algorithm, and the MiniCon algorithm. These algorithms can be divided into two categories. The algorithms of the first category are based on use of buckets while the ones of the second

category are based on use of inverse rules. The bucket-based algorithms have not considered the effects of integrity constraints, such as domain semantics, functional and inclusion dependencies. As a result, they might miss query rewritings or generate redundant query rewritings in the presence of these constraints. A bucket-based algorithm consists of two steps. The first step is called view selection that selects views relevant to a given query and puts the views into the corresponding buckets. The second step is to generate all the posisible query rewritings by combining a view from each bucket. In this paper, we consider an improvement of view selection in the bucket-based algorithms using domain semantics. We use the resolution method to generate a pseudo residue for each view given a set of domain semantics. Given a query, the pseudo residue of each view is compared with it and any conflict that exists can be found. As a result, irrelevant views can be removed even before a bucket-based algorithm is used.
Author
Semantics; Data Integration; Algorithms

20040201702 Porto Univ., Portugal
Attenuating the Effect of Data Abnormalities on Data Warehouses
Belo, Orlando; Lourenco, Analia; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 28-29; In English; See also 20040201585; Copyright; Avail: Other Sources

Today's informational entanglement makes it crucial to enforce adequate management systems. Data warehousing systems appeared with the specific mission of providing adequate contents for data analysis, ensuring gathering, processing and maintenance of all data elements thought valuable. Data analysis in general, data mining and on-line analytical processing facilities, in particular, can achieve better, sharper results, because data quality is finally taken into account. The available elements must be submitted to an intensive processing before being able to integrate them into the data warehouse. Each data warehousing system embraces extraction, transformation and loading processes which are in charge of all the processing concerning the data preparation towards its integration into the data warehouse. Usually, data is scoped at several stages, inspecting data and schema issues and filtering all those elements that do not comply with the established rules. This paper proposes an agent-based platform, which not only ensures the traditional data flow, but also tries to recover the filtered data when a data error occurs. It is intended to perform the process of error monitoring and control automatically. Bad data is processed and eventually repaired by the agents, integrating it again into the data warehouse's regular flow. All data processing efforts are registered and afterwards mined in order to establish data error patterns. The obtained results will enrich the wrappers knowledge about abnormal situations' resolution. Eventually, this evolving will enhance the data warehouse population process, enlarging the integrated volume of data and enriching its actual quality and consistency.
Author
Data Storage; Data Management; Errors

20040201704 Porto Univ., Portugal
Semantic Integration of Disparate Data Sources in the COG Project
deBruijn, Jos; ICEIS 2004: Databases and Information Systems Integration; [2004], pp. 25; In English; See also 20040201585; Copyright; Avail: Other Sources

We present a novel approach to the integration of structured information sources in enterprises, based on Semantic Web technology. The semantic information integration approach presented in this paper was applies in the COG project. We describe Unicorn's Semantic Information Management along with the Unicorn Workbench tool, which is a component part of the Unicorn System, and how they were applied in the project to solve the information integration problem. We used the Semantic Information Management Methodology and the Unicorn Workbench tool to create an Information Model (an ontology) based on data schemas taken from the automotive industry. We map these data schemas to the Information Model in order to make the meaning of the concepts in the data schemas explicit and relate them to each other, thereby creating an information architecture that provides a unified view of the data sources in the organization.
Author
Semantics; Data Integration; Information Management

83
ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

20040196387 Colorado School of Mines, Golden, CO, USA
ISRU Technology Modeling and Analysis
Blair, B. R.; Diaz, J.; Ruiz, B.; Duke, M. B.; Space Resources Roundtable VI; 2004, pp. 11; In English; See also 20040196346; Copyright; Abstract Only; Available from CASI only as part of the entire parent document

A preliminary In Situ Resource Utilization (ISRU) technology matrix has been developed that identifies the type of technology, its applications, the rationale for wanting to improve performance, its current status and expected (or desired) future performance. This database can be utilized to determine where the most effective investments can be made in ISRU technologies (as opposed to ISRU systems). Technologies are sorted into demonstration of feasibility vs. performance improvement (optimality) categories through membership in a metric called critical path. Improvements and updates to the technology database will be solicited during SRR6 through a formal survey process. An approach to modeling the investment value for developing ISRU technology will also be presented, along with quantitative results for specific ISRU subsystems. The basis for the valuation of technology is performance per unit mass (also known as specific mass). The method used to derive value is sensitivity analysis of technical performance parameters within an integrated architectural and economic modeling for ISRU-based human lunar exploration. Changes in technical parameters are mapped directly into economic costs for the exploration scenario. Improvements in overall cost related to enhancing specific technical performance parameters are interpreted as total value of the new technology.
Author
In Situ Resource Utilization; Sensitivity Analysis; Data Bases

20040200837 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Customer Loyalty In E-Business
Raggad, Bel G.; Lawler, Jim; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 148-149; In English; See also 20040200825; Copyright; Avail: Other Sources

This study examines from simulation the effects of the privacy sensitivity of customers, the personalization practices or standards of retailers and the difficulty in locating favorable sites, on the loyalty of consumers to a Web site. The key finding of the study is that customer privacy sensitivity is a critical success factor that significantly impacts loyalty to a retailer. Customers have higher loyalty to sites that request the least information, while they have lower loyalty to sites that request the most information. Web retailers considering expanded personalization of products or services to customers, through increased personal information, need to rethink their practices. The study also found that difficulty in locating a favorable site is a success factor that impacts retailer loyalty, and that customers have higher loyalty to difficult to locate favorable sites on the Web. These findings are important at a time when consumers are empowered with Web technology to immediately shop competitor sites. The significance of privacy to loyalty is a factor that needs to be considered seriously by retailers, if they are to compete for loyal customers, and this study furnishes a framework to effectively research loyalty, personalization and privacy on the Web.
Author
Consumers; Websites; Electronic Commerce; Internet Resources

20040200853 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Analysis of Business to Business Electronic Markets in China: Theoretical and Practical Perspectives
Zhao, Jing; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 170-171; In English; See also 20040200825; Copyright; Avail: Other Sources

In China, electronic markets (e-markets) are in the early stages of development. It has unique characteristics in e-commerce activities and market mechanisms, which are largely a function of the current industry structure, financial infrastructure and organization structure. This paper addresses an interactive e-market space view and proposes the interactive e-commerce model for studying e-commerce activities and strategies in e-markets of China. Building on this theoretical insight the model draws attention to the e-commerce process in which buyers and sellers, virtual market manager and its business partners are linked and in which web-based communication and collaboration take place, and to the adopted

innovative market mechanisms. The e-commerce process can be modelled by separating main business activities into four phases designed to exploit business opportunities. The model is applied to analyze one successful B2B Exchange in China. It offers an effective approach to studying dynamic structure of transaction and a high performance e-commerce strategy. Our research identifies the four lever of e-market capability. These abilities imply e-market potential to achieving and sustaining a new level of e-commerce strategy performance, and a more competitive position in a rapidly changing B2B electronic market of China.
Author
Electronic Commerce; China; Market Research

20040200892 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
E-Commerce Payment Systems: An Overview
Fonseca, Pedro; Marques, Joaquim; Serrao, Carlos; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 142; In English; See also 20040200825; Copyright; Avail: Other Sources

Electronic Commerce is playing a growing importance on modern Economy since it provides a commodity way for consumers to acquire goods and services through electronic means - Internet and the WWW are the most important. However, this new way of trade raises important problems on the way payments are being made, and trust is one of the most important one. This paper starts by presenting some of the complexities related to Electronic Commerce payments in this New Economy, both on a consumer and seller perspective. Next, differences between the traditional and electronic payment systems are identified and how they both deal with the identified complexities. Electronic payment systems (EPS) are then identified referring the advantages presented to Electronic Commerce. Finally, a comparative EPS table is presented identifying strong and week points on each of the EPS and conclusions are drawn from this.
Author
Consumers; Electronic Commerce; World Wide Web

84
LAW, POLITICAL SCIENCE AND SPACE POLICY

Includes aviation law; space law and policy; international law; international cooperation; and patent policy.

20040196372 White (W. N.), Boulder, CO, USA
Space Law Update: Real Property Rights and Resource Appropriation
White, W. N.; Space Resources Roundtable VI; 2004, pp. 48; In English; See also 20040196346; Copyright; Abstract Only; Available from CASI only as part of the entire parent document

During the past year, real property rights has become the most important issue in the field of space law. Gregory Nemitz pursued his claim to Asteroid 433 Eros in Federal District Court, where his case was dismissed. That precedent-setting case, Nemitz vs. the USA, is now before the Ninth Circuit Court of Appeals. Also in the past year, the International Institute of Space Law, a member organization of the International Astronautical Federation, issued its first ever position paper, 'Statement of the Board of Directors Of the International Institute of Space Law (IISL) on Claims to Property Rights Regarding the Moon and Other Celestial Bodies'. Finally, the Report of the President's Commission on Implementation of USA Space Exploration Policy (the 'Aldridge Commission Report') said that 'it is imperative that [property rights] issues be recognized and addressed at an early stage in the implementation of the vision, otherwise there will be little significant private sector activity associated with the development of space resources, one of our key goals'. The author will discuss the implications of these developments, including the prospects for future U.S. legislation regarding property rights and mining law in outer space.
Author
Space Law; Space Exploration; Policies; International Law; Extraterrestrial Resources

20040196382 Senomix Software, Inc., Halifax, Nova Scotia, Canada
Lessons from Earth: Experiences Which can Guide Lunar and Asteroidal Development
ODale, C. D.; Space Resources Roundtable VI; 2004, pp. 35; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Although space-based projects face unique technical challenges, they will encounter many of the same regulatory, logistical and financial issues which other large-scale enterprises have been presented with in the past. Given this commonality, it is possible many of the same solutions engineered for issues confronted on Earth may be applied to the

challenges faced in space as well. This paper will examine the successes of a few key technologies, social policies and business frameworks of the past century and consider what lessons may be learned from those examples to assist public and private sector projects involving the Moon, Mars and Near Earth Asteroids. These examples will include: the development of global infrastructure for the Liquid Natural Gas industry; the increased effectiveness of asset use due to land title reform; the objective of resource claims for assets extracted from public land; asset distribution to citizens through the Alaska Permanent Fund Dividend Program; and the regulatory environment behind the rapid emergence of 802.11b / Wi-Fi technology. By looking to these past projects and social frameworks for examples of success in their respective fields of endeavour, the Space Resources Roundtable may assist national space agencies and emerging private sector enterprises by proposing policies and frameworks which draw upon the best of this industrial experience. Actions which may be taken within the scope of the SRR's activities over the next year to assist this goal will be proposed as part of this paper s conclusions.
Author
Extraterrestrial Resources; Asteroids; Moon; Policies

85
TECHNOLOGY UTILIZATION AND SURFACE TRANSPORTATION

Includes aerospace technology transfer; urban technology; surface and mass transportation. For related information see also *03 Air Transportation and Safety, 16 Space Transportation and Safety*, and *44 Energy Production and Conversion*. For specific technology transfer applications see also the category where the subject is treated.

20040200890 Ecole Superieure d'Electronique de l'Ouest, Angers, France, Instituto Politecnico de Setubal, Setubal, Portugal
Business Model Analysis Applied To Mobile Business
Camponovo, Giovanni; ICEIS 2003: Software Agents and Internet Computing; [2003], pp. 152-153; In English; See also 20040200825; Copyright; Avail: Other Sources

Mobile business is a young promising industry created by the emergence of wireless data networks. Similar to other emerging industries, it is characterized by a large number of uncertainties at different levels, in particular concerning technology, demand and strategy. This paper focuses on the strategic uncertainties, where a large number of actors are trying a number of strategic approaches to position themselves in the most favourable position in the value system. As a consequence, they are experimenting with a number of innovating business models. We argue that successful business models are likely to be the ones that best address the economic peculiarities underlying this industry, like mobility, network effects and natural monopolies. The paper presents the principal classes of actors that will participate in the mobile business industry and give an overview of their business models based on a formalized ontology.
Author
Commerce; Wireless Communication

20040200966 NASA Johnson Space Center, Houston, TX, USA
Johnson Space Center Research and Technology Annual Report 1998-1999
Abbey, George W. S.; January 2004; 137 pp.; In English
Report No.(s): NASA/TM-2000-209904; No Copyright; Avail: CASI; A07, Hardcopy

As the principle center for NASA's Human Exploration and Development of Space (HEDS) Enterprise, the Johnson Space Center (JSC) leads NASA development of human spacecraft, human support systems, and human spacecraft operations. An important element in implementing this mission, JSC has focused on developing the infrastructure and partnerships that enable the technology development for future NASA programs. In our efforts to develop key technologies, we have found that collaborative relationships with private industry and academia strengthen our capabilities, infuse innovative ideas, and provide alternative applications for our development projects. The American public has entrusted NASA with the responsibility for space technology development, and JSC is committed to the transfer of the technologies that we develop to the private sector for further development and application. It is our belief that commercialization of NASA technologies benefits both American industry and NASA through technology innovation and continued partnering. To this end, we present the 1998-1999 JSC Research and Technology Report. As your guide to the current JSC technologies, this report showcases the projects in work at JSC that may be of interest to U.S. industry, academia, and other government agencies (federal, state, and local). For each project, potential alternative uses and commercial applications are described. To aid in your search, projects are arranged according to the Major Product Groups used by CorpTech to classify and index types of industry. Some projects fall into multiple categories and are placed under the predominant category, for example, an artificial intelligence project is listed under

the Computer Software category, while its function is to automate a process (Automation category).
Author (revised)
Technology Utilization; Aerospace Technology Transfer; Product Development; NASA Programs

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*.

20040191795 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
A Reassessment of the Mars Ocean Hypothesis
Parker, T. J.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Initial work on the identification and mapping of potential ancient shorelines on Mars was based on Viking Orbiter image data (Parker et al., 1987, 1989, 1993). The Viking Orbiters were designed to locate landing site for the two landers and were not specifically intended to map the entire planet. Fortunately, they mapped the entire planet. Unfortunately, they did so at an average resolution of greater than 200m/pixel. Higher resolution images, even mosaics of interesting regions, are available, but relatively sparse. Mapping of shorelines on Earth requires both high-resolution aerial photos or satellite images and good topographic information. Three significant sources of additional data from missions subsequent to Viking are useful for reassessing the ocean hypothesis. These are: MGS MOC images; MGS MOLA topography; Odyssey THEMIS IR and VIS images; and MER surface geology at Meridiani and Gusev. Okay, my mistake: Four.
Author
Viking Orbiter Spacecraft; Mars Surface; Oceans; Viking Mars Program; Satellite Imagery; Landing Sites

20040196390 Boeing Co., Boulder, CO, USA
Exploration of the Impact of ISRU on Architectural System Mass and Cost
Reynerson, C. M.; Space Resources Roundtable VI; 2004, pp. 37; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

This paper addresses a concept-level model that produces technical design parameters and economic feasibility information addressing future Human Exploration platforms. A design methodology and analytical tool is used to create feasible concept design information for these space platforms at the architectural level. The design tool has been validated against a number of actual facility designs, and appropriate modal variables are adjusted to ensure that statistical approximations are valid for subsequent analyses. The tool is then employed in the examination of the impact of various payloads on the power, size (volume), and mass of the platform proposed. The development of the analytical tool employed an approach that accommodated possible payloads characterized as simplified parameters such as power, weight, volume, crew size, and endurance. In creating the approach, basic principles are employed and combined with parametric estimates as necessary. Key system parameters are identified in conjunction with overall system design. Typical ranges for these key parameters are provided based on empirical data extracted from actual human spaceflight systems. Using this tool a sample Exploration architecture is formulated with emphasis on cost minimization through variance of key mission requirements. Further, the use of ISRU (In Situ Resource Utilization) is considered to minimize the consumables needed for transport from Earth. A baseline architecture is compared to one that uses ISRU and the impact on system mass and cost is determined. This paper is based on work Dr. Reynerson completed at George Washington University in fulfillment for the degree of Doctor of Science in Astronautics. Dr. Mike Griffin, former head of NASA s Human Mars Mission, was a member of the dissertation committee.
Author
In Situ Resource Utilization; Systems Engineering; Manned Mars Missions; Economic Analysis

20040201039 Interface Video Systems, Inc., Washington, DC, USA
The Plasma Universe
[2004]; 2 pp.; In English; 1 hr., 59 min. playing time, in color, with sound; No Copyright; Avail: CASI; V04, Videotape-VHS

Dr. France Cordova, NASA's Chief Scientist, chaired this, the eighth seminar in the Administrator's Seminar Series. She introduced the NASA Administrator, Daniel S. Goldin, who, in turn, introduced the subject of plasma. Plasma, an ionized gas,

is a function of temperature and density. We ve learned that, at Jupiter, the radiation is dense. But, Goldin asked, what else do we know? Dr. Cordova then introduced Dr. James Van Allen, for whom the Van Allen radiation belt was named. Dr. Van Allen, a member of the University of Iowa faculty, discussed the growing interest in practical applications of space physics, including radiation fields and particles, plasmas and ionospheres. He listed a hierarchy of magnetic fields, beginning at the top, as pulsars, the Sun, planets, interplanetary medium, and interstellar medium. He pointed out that we have investigated eight of the nine known planets,. He listed three basic energy sources as 1) kinetic energy from flowing plasma such as constitutional solar wind or interstellar wind; 2) rotational energy of the planet, and 3) orbital energy of satellites. He believes there are seven sources of energetic particles and five potential places where particles may go. The next speaker, Dr. Ian Axford of New Zealand, has been associated with the Max Planck Institut fuer Aeronomie and plasma physics. He has studied solar and galactic winds and clusters of galaxies of which there are several thousand. He believes that the solar wind temperature is in the millions of degrees. The final speaker was Dr. Roger Blanford of the California Institute of Technology. He classified extreme plasmas as lab plasmas and cosmic plasmas. Cosmic plasmas are from supernovae remnants. These have supplied us with heavy elements and may come via a shock front of 10(sup 15) electron volts. To understand the physics of plasma, one must learn about x-rays, the maximum energy of acceleration by supernova remnants, particle acceleration and composition of cosmic rays, maximum acceleration, and how fast protons are heated by ions. He asked questions about where high energy cosmic rays are made, what accelerates electrons, radiates gamma rays, makes electronpositron plasma, and finally noted that pulsars are good time keepers, but we need a better understanding of their mechanism and of plasmas, both cosmic and ground-based. In the discussion period, Goldin asked if NASA should put up an x-ray interferometer. The answer was no; gamma rays are of greater interest just now. Goldin also asked what the assembled scientists would like to see for a future mission? They expressed an interest in learning more about the origin of galaxies, cosmic rays, solar systems, planets, the existence of life ‘out there’, gamma ray sources, the nature of gamma ray bursts, and the flow of gases around black holes. The discussion concluded with a suggestion that NASA should communicate to the general public more information regarding actual technological trials and tribulations involved in getting an experiment to work. The speakers thought that this would help non-scientists to better appreciate what it is that NASA does in connection with the benefits that are achieved.
Derived from text
Plasma Physics; Ionized Gases; Temperature Dependence; Density (Mass/Volume); Radiation Belts; Pulsars

89
ASTRONOMY

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

20040191713 Hawaii Univ., Honolulu, HI, USA
Buried Quasars in Ultraluminous Infrared Galaxies
Sanders, David B.; [2004]; 2 pp.; In English
Contract(s)/Grant(s): NAG5-13569; No Copyright; Avail: CASI; A01, Hardcopy

We were awarded l00OkS of INTEGRAL spacecraft time (Priority A) to observe the ultraluminous infrared galaxy (ULIG) Mrk 2273 in order io measure the integrated flux of the 20-1003 KeV gamma-Ray emission, and to use this information to search for the presence of an highly obscured active galactic nucleus (AGN). With this observation we hope to be able to better assess the role of AGN in the complete class of ULIGs and therefore to better constrain their contribution to the hard X-ray and soft gamma-ray backgrounds. Our Priority A 100 kS observation of Mrk 273 was successfully carried out during revolution #73 using 4 separate exposures with the IBIS camera during May, 2003. Our IBIS observations of Mrk 273 were successfully executed, and the source was properly centered in the Field-of-view of the detectors. We are still in the process of interpreting the IBIS gamma-ray data.
Author
Active Galactic Nuclei; Galaxies; Luminosity

90
ASTROPHYSICS

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

20040191808 Manchester Univ., UK
Nature of Xenon Isotopes in NWA 817: A Nakhlite from the Hot Desert
Mohapatra, R. K.; Crowther, S.; Gilmour, J. D.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

NWA 817, collected from the northwest African desert (Morocco) has been studied for nitrogen and noble gases by Mathew et al. They inferred the presence of xenon from the fission of now extinct Pu-244 (t(sub (1/2) = 82 Ma) in this meteorite as well as, unlike previous workers, in some of the other Nakhlites and shergottites. As part of an ongoing project to study xenon in the Nakhlites using RELAX, we have recently analyzed two pieces of NWA 817 (of weights 6 and 9 mg respectively), preliminary data from which are presented here.
Derived from text
Xenon Isotopes; Nitrogen; Meteorites; Plutonium 244

20040196361 Hawaii Univ., Honolulu, HI, USA
The Uncertain Nature of Polar Lunar Regolith
Taylor, G. Jeffrey; Neubert, Joshua; Lucey, Paul; McCullough, Edward; Space Resources Roundtable VI Program and Abstracts; 2004, pp. 45; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Lunar polar regions are receiving considerable attention because they might contain sizeable quantities of H2O, which could be useful for lunar development and space commerce. Plans to use those resources are limited by our ignorance of the nature of polar regions. Major uncertainties are outlined here. All can be addressed by missions to permanently shadowed polar regions on the Moon.
Author
Polar Regions; Lunar Rocks; Regolith

20040200986 Smithsonian Astrophysical Observatory, Cambridge, MA, USA
Physics of Galaxy Clusters and How it Affects Cosmological Tests
Oliversen, Ronald J., Technical Monitor; Vikhlinin, Alexey; December 2004; 2 pp.; In English
Contract(s)/Grant(s): NAG5-9217; No Copyright; Avail: CASI; A01, Hardcopy

The main activities in 2004 were focused on completion of the new 400 square degrees ROSAT PSPC survey for distant galaxy clusters. We observed and reduced optical spectra for all X-ray candidates and now we have complete identification for a statistically complete sample of distant 283 clusters. The papers describing the cluster catalog and first science results are in preparation and will be submitted in early 2005. We also completed a project to measure temperature and density profiles at large radii using Chandra observations of a 11 well exposed low-redshift clusters. We were able to demonstrate that the density, temperature, and total mass profiles are self-similar at large radii. This analysis has led to significant improvements in determination of the cluster baryon fraction as well as cosmologically important scaling relations, such as Mtot-T. The paper describing these results is submitted to ApJ in November, 2004. We continued to study evolution of the cluster scaling relations at high redshifts using Chandra and XMM data. We developed code for image and spectral deconvolution of the XMM observations. This code was used to reconstruct the distribution of baryons and total mass from observations of distant clusters which suffer from the finite size of the XMM PSF. This study allowed us to derive a high-redshift relation between cluster temperature and mass and compare it with the local relation obtained. The paper describing the first results is submitted to the ApJ. However, the project is still on-going as more distant cluster observations enter XMh4 and Chandra public data archives. We continued our work on improving techniques for accurate measurements of the cluster mass function and obtaining cosmological constraints from such observations. We published (ApJ, 601, 610) a study in which we derived the baryon mass function for a complete sample of low-redshift clusters. These papers argued that it was an excellent proxy for the total mass function. The baryon mass function can be used to constrain the amplitude and slope of the density fluctuation power spectrum on cluster scales. This method does not use observational determinations of the total mass and thus bypasses major uncertainties in the traditional analyses based on the X-ray temperature function. We derived the measurements for the

amplitude of density perturbations, sigma8 = 0.72 +/- 0.04 and the shape parameter Omega*h = 0.13 +/- 0.07, in good agreement with a number of independent methods.
Author
Galactic Clusters; X Rays; Temperature Profiles; Density Measurement

20040200987 Smithsonian Astrophysical Observatory, Cambridge, MA, USA
Research on Spectroscopy, Opacity, and Atmospheres
Oliversen, Ronald, Technical Monitor; Kurucz, Robert L.; December 2004; 8 pp.; In English
Contract(s)/Grant(s): NAG5-10864; No Copyright; Avail: CASI; A02, Hardcopy

I propose to continue providing observers with basic data for interpreting spectra from stars, novas, supernovas, clusters, and galaxies. These data will include allowed forbidden line lists both laboratory and computed, for the first five to ten ions of all atoms and for all relevant diatomic molecules. I will eventually expend to all ions of the first thirty elements to treat far UV end X-ray spectra, and for envelope opacities. I also include triatomic molecules providing by other researchers. I have made CDs with Partridge and Schwanke's water data for work on M stars.The luna data also serve as input to my model atmosphere and synthesis programs that generated energy distributions, photometry, limb darkening, and spectra that can be used for planning observations and for fitting observed spectra. The spectrum synthesis programs produce detailed plots with the line identified. Grids of stellar spectra can be used for radial velocity-, rotation-, or abundance templates and for population synthesis. I am fitting spectra of bright stars to test the data and to produce atlases to guide observer. For each star the whole spectrum is computed from the UV to the far IR. The line data, opacities, models, spectra, and programs are freely distributed on CDs and on my web site and represent a unique resource for many NASA programs.
Author
Atmospheric Models; Galactic Clusters; Star Clusters; Stellar Spectra

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*.

20040191714 NASA, Washington, DC, USA
Destinations
Morring, Frank, Jr.; [2004]; 6 pp.; In English; Copyright; Avail: Other Sources

This is an article from Aviation Week, & Space Technology, entitled 'Destinations'. The strains facing the U.S. agency are discussed, such as the choice regarding a vehicle to return lunar samples, and the mission dubbed MoonRise. The U.S. space agency has enlisted the aid of academia and industry in developing new strategic plans for 13 areas, including Solar System exploration, in light of the new space initiative. As the Solar System planners work, they may be guided by some new science from the beyond.
Derived from text
Space Exploration; Spacecraft; Lunar Exploration

20040191716 Aviation Week and Space Technology, New York, NY, USA
Probing a Comet
Scott, William B.; Aviation Week and Space Technology; December 13, 2004; Volume 161, No. 23, pp. 64-66; In English; Copyright; Avail: Other Sources

NASA's Deep Impact mission will not only give scientists a glimpse into the core of a comet, but should also provide clues about conditions that existed when the Solar System was formed. Now scheduled to launch on Jan. 8, the two-part Deep Impact spacecraft should reach Comet Tempel-1 next summer, when the 5-km.-wide (3.1-mi.) icy body is about 83 million miles from Earth. An 820-lb. impactor section will separate from the flyby vehicle 24 hr. prior to the encounter, align itself with the comet s trajectory, then smash into Tempel-1's surface at 22,800 mph. on July 4, 2005. The collision will have the energy-equivalent of about 4.5 tons of TNT, and should gouge a football field-size crater, exposing material below the crust. Debris thrown into the sky will be tracked by high- and medium-resolution telescopes and a spectrometer on the flyby spacecraft, which will pass as close as 270 naut. mi. from the comet. Spectral analyses of light reflected from the debris will enable identification of sub-surface materials. If successful, the dramatic $328 million mission will provide mankind's first detailed look at the composition of comets, many of which-including Tempel-1-were formed in the Oort Cloud at the edge

of our Solar System billions of years ago. Scientists believe comets' interiors have undergone very little change since then. 'This is a mission to discover what's at the core of a comet-the pristine material that existed at the formation of the Solar System,' explains Monte L. Henderson, Deep Impact deputy program manager for Ball Aerospace & Technologies Corp., which built the spacecraft. 'Using the spectrometer [on the flyby vehicle], we can determine what's in there.'
Derived from text
Comets; Solar System; NASA Space Programs; Space Missions

20040191770 Lunar and Planetary Inst., Houston, TX, USA
Second Conference on Early Mars: Geologic Hydrologic, and Climatic Evolution and the Implications for Life
2004; ISSN 1540-7845; In English; Second Conference on Early Mars: Geologic Hydrologic, and Climatic Evolution and the Implications for Life, 11-15 Oct. 2004, Jackson Hole, WY, USA; See also 20040191771 - 20040191856
Contract(s)/Grant(s): NCC5-679
Report No.(s): LPI-Contrib-1211; Copyright; Avail: CASI; C01, CD-ROM

Some of the topics addressed by the conference paper abstracts included in this document include: martian terrain, terrestrial biological activity and mineral deposits with implications for life on Mars, the martian crust and mantle, weathering and erosion on Mars, evidence for ancient martian environmental and climatic conditions, with implications for the existence of surface and ground water on Mars and the possibility for life, martian valleys, and evidence for water and lava flow on the surface of Mars.
Author
Mars (Planet); Planetary Geology; Planetary Evolution; Paleoclimatology; Mars Environment

20040191771 Paris-Sud Univ., Orsay, France
Impact Crater Paleolakes in Hellas and Thaumasia Areas, Mars
Ansan, V.; Mangold, N.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Impact crater paleolakes have been identified by morphological analysis on Viking images. These impact craters show not only an atypic morphology with an inner flat floor associated with sedimentary features such as alluvial fans, deltas, sedimentary terraces and lacustrine shore... but also one or a series of valleys converging towards their depression. The presence of these paleolakes indicates that hydrological cycle was related with erosion-transport and sedimentation cycle during their formation. Moreover, we can wonder when they formed, how long time they lived and in which climatic conditions they formed. The good spatial resolution (few m to 100 m/pixel) of MOC and THEMIS images improves the geomorphic analysis of erosional and sedimetary features in paleolakes. We focussed our study on a closed impact crater paleolakes, Terby crater, located at the northeastern part of Hellas basin and an opened paleolake located in Thaumasia region.
Author
Geomorphology; Mars Craters; Mars Photographs; Mars Surface

20040191772 Brown Univ., Providence, RI, USA
Magma Ocean Cumulate Overturn: Generation of an Early Crust
Elkins-Tanton, L. T.; Zaranek, S. E.; Parmentier, E. M.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Dynamical models of early Martian evolution need to be consistent with several major characteristics of Mars believed to have developed before 4.0 Ga: differentiation of mantle source regions into compositionally distinct reservoirs; development of an early, strong magnetic field; and the formation of an early crust to record that field. The conversion of kinetic energy to heat during accretion and the potential energy release of core formation should have caused significant and perhaps complete melting of the large terrestrial planets. Previous results indicate that magma ocean crystallization and subsequent overturn on Mars could be fast and complete and is consistent with magma source region differentiation and the development of an alumina-poor Martian mantle. The further results presented here demonstrate that magma ocean crystallization and overturn can produce an early crust consistent with known constraints.
Author
Planetary Crusts; Planetary Geology; Magma; Mars (Planet); Planetary Evolution

20040191773 Arizona State Univ., Tempe, AZ, USA

The 'Brine Splat' Hypothesis for Features Observed at the Opportunity Landing Site

Knauth, L. P.; Burt, D. M.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

We present here a very different explanation for the features observed at the Opportunity lander site that does not involve deposition from standing, moving, or evaporating bodies of water. The presence of hematite, cross-bedding, jarosite, salts, and embedded spherules (blueberries) does not require deposition from water at this site. All of these features can be more easily understood as consequences of previously inferred aspects of martian geologic and hydrologic history. Specifically, we suggest that all photos and data released at the time of this writing can be readily understood in terms of mechanical emplacement of basaltic materials, brine, salts, and ice following impacts into a megaregolith holding concentrated brines, salts, and ice.
Derived from text

Brines; Landing Sites; Mars Surface; Mars Roving Vehicles; Planetary Geology; Mineralogy

20040191774 MDS Research, Saint Petersburg, FL, USA

The Origin and Distribution of Methane Hydrate in the Martian Crust

Max, Michael D.; Clifford, Steve; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Methane recently detected in the Martian atmosphere is generally regarded as leaking from a subsurface source. The possibility of methane and substantial methane hydrate has immense implications for exploration of Mars.
Author

Methane; Mars Atmosphere; Hydrates; Mars Surface

20040191775 NASA Johnson Space Center, Houston, TX, USA

Chemical and Isotopic Study of Lab-formed Carbonates Under Cryogenic and Hydrothermal Conditions

Niles, P. B.; Leshin, L. A.; Socki, R. A.; Guan, Y.; Golden, D. C.; Ming, D. W.; Gibson, E. K.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Aqueous environments on early Mars were probably relatively short-lived and localized, as evidenced by the lack of abundant secondary minerals detected by the TES instrument. In order to better understand the aqueous history of early Mars we need to be able to interpret the evidence preserved in secondary minerals formed during these aqueous events. Carbonate minerals, in particular, are important secondary minerals for interpreting past aqueous environments as illustrated by the carbonates preserved in ALH84001. Carbonates formed in short-lived, dynamic aqueous events often preserve kinetic rather than equilibrium chemical and isotopic processes, and predicting the behavior of such systems is facilitated by empirical data.
Derived from text

Carbonates; Chemical Reactions; Isotopes; Mars Environment

20040191778 NASA Johnson Space Center, Houston, TX, USA

The First Billion Years of Martian History as Seen from the SNC Meteorites: A Review

Jones, J. H.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

There are currently 28 known, distinct samples of Mars that have been liberated from that planet by impacts and subsequently delivered to the Earth. The formation ages of these samples range from 4.5 b.y. to 180 m.y. Collectively, these samples are called SNC meteorites after the major petrologic subdivisions: Shergottite, Nakhlite, Chassigny. Texturally, most of these meteorites are cumulates or partial cumulates. However, a few may represent real melt compositions: EET79001B, Y9800459, QUE94201, and the groundmass of EET79001A.
Author

SNC Meteorites; Mars (Planet); Evolution (Development)

20040191780 NASA Ames Research Center, Moffett Field, CA, USA

Erosional History of the Martian Highlands During the Noachian and Hesperian

Howard, A. D.; Moore, J. M.; Craddock, R. A.; Irwin, R. P., III; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The environment and erosional history of Mars early in its history has been a subject of debate since the first global imaging from Mariner 9. We present a synthesis that reflects our conclusion that fluvial erosion was widespread and intensive throughout the Noachian, extending into the Hesperian.

Author

Erosion; Planetary Evolution; Imaging Techniques; Mars (Planet); Mars Surface

20040191784 NASA Ames Research Center, Moffett Field, CA, USA

The Effect of Impacts on the Early Martian Climate

Colaprete, A.; Haberle, R. M.; Segura, T. L.; Toon, O. B.; Zahnle, K.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The first images returned by the Mariner 7 spacecraft of the Martian surface showed a landscape heavily scared by impacts. Mariner 9 imaging revealed geomorphic features including valley networks and outflow channels that suggest liquid water once flowed at the surface of Mars. Further evidence for water erosion and surface modification has come from the Viking Spacecraft, Mars Pathfinder, Mars Global Surveyor's (MGS) Mars Orbiter Camera (MOC), and Mars Odyssey's THEMIS instrument. In addition to network channels, this evidence includes apparent paleolake beds, fluvial fans and sedimentary layers. The estimated erosion rates necessary to explain the observed surface morphologies present a conundrum. The rates of erosion appear to be highest when the early sun was fainter and only 75% as luminous as it is today. All of this evidence points to a very different climate than what exists on Mars today. The most popular paradigm for the formation of the valley networks is that Mars had at one time a warm (T average \g 273), wetter and stable climate. Possible warming mechanisms have included increased surface pressures, carbon dioxide clouds and trace greenhouse gasses. Yet to date climate models have not been able to produce a continuously warm and wet early Mars. The rates of erosion appear to correlate with the rate at which Mars was impacted thus an alternate possibility is transient warm and wet conditions initiated by large impacts. It is widely accepted that even relatively small impacts (approx. 10 km) have altered the past climate of Earth to such an extent as to cause mass extinctions. Mars has been impacted with a similar distribution of objects. The impact record at Mars is preserved in the abundance of observable craters on it surface. Impact induced climate change must have occurred on Mars.

Author

Mars Environment; Paleoclimatology; Mars Craters; Water

20040191785 NASA Ames Research Center, Moffett Field, CA, USA

Updating the Evidence for Oceans on Early Mars

Fairen, Alberto G.; Dohm, James M.; Oner, Tayfun; Ruiz, Javier; Rodriguez, Alexis P.; Schulze-Makuch, Dirk; Ormoe, Jens; McKay, Chris P.; Baker, Victor R.; Amils, Ricardo; Second Conference on Early Mars: Geologic Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Different-sized bodies of water have been proposed to have occurred episodically in the lowlands of Mars throughout the planet's history, largely related to major stages of development of Tharsis and/or orbital obliquity. These water bodies range from large oceans in the Noachian-Early Hesperian, to a minor sea in the Late Hesperian, and dispersed lakes during the Amazonian. To evaluate the more recent discoveries regarding the oceanic possibility, here we perform a comprehensive analysis of the evolution of water on Mars, including: 1. Geological assessment of proposed shorelines; 2. A volumetric approximation to the plains-filing proposed oceans; 3. Geochemistry of the oceans and derived mineralogies; 4. Post-oceanic (i.e., Amazonian) evolution of the shorelines; and 5. Ultimate water evolution on Mars.

Derived from text

Mars Surface; Extraterrestrial Oceans; Planetary Geology; Water

20040191786 NASA Ames Research Center, Moffett Field, CA, USA

A Subsurface Soil Composition and Physical Properties Experiment to Address Mars Regolith Stratigraphy

Richter, L.; Sims, M.; Economou, T.; Stoker, C.; Wright, I.; Tokano, T.; Second Conference on Early Mars: Geologic,

Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Previous in-situ measurements of soil-like materials on the surface of Mars, in particular during the on-going Mars Exploration Rover missions, have shown complex relationships between composition, exposure to the surface environment, texture, and local rocks. In particular, a diversity in both compositional and physical properties could be established that is interpreted to be diagnostic of the complex geologic history of the martian surface layer. Physical and chemical properties vary laterally and vertically, providing insight into the composition of rocks from which soils derive, and environmental conditions that led to soil formation. They are central to understanding whether habitable environments existed on Mars in the distant past. An instrument the Mole for Soil Compositional Studies and Sampling (MOCSS) - is proposed to allow repeated access to subsurface regolith on Mars to depths of up to 1.5 meters for in-situ measurements of elemental composition and of physical and thermophysical properties, as well as for subsurface sample acquisition. MOCSS is based on the compact PLUTO (PLanetary Underground TOol) Mole system developed for the Beagle 2 lander and incorporates a small X-ray fluorescence spectrometer within the Mole which is a new development. Overall MOCSS mass is approximately 1.4 kilograms. Taken together, the MOCSS science data support to decipher the geologic history at the landing site as compositional and textural stratigraphy if they exist - can be detected at a number of places if the MOCSS were accommodated on a rover such as MSL. Based on uncovered stratigraphy, the regional sequence of depositional and erosional styles can be constrained which has an impact on understanding the ancient history of the Martian near-surface layer, considering estimates of Mars soil production rates of 0.5... 1.0 meters per billion years on the one hand and Mole subsurface access capability of approximately 1.5 meters. An overview of the MOCSS, XRS instrument accomodation and the impact that these instruments have on Mars science is discussed.

Derived from text

Mars Surface; Planetary Geology; Regolith; Soil Science; Stratigraphy; Thermophysical Properties; Mars Surface Samples

20040191787 NASA Ames Research Center, Moffett Field, CA, USA

Noachian-Hesperian Transition and a Possible Climatic Optimum: Evidence from Landforms

Moore, J. M.; Howard, A. D.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

A climatic optimum? The often strong contrast between the pristine and degraded Noachian channels and craters might be due to a gradual climatic change superimposed upon an episode of mantling associated with early Hesperian volcanism. On the other hand, one or more episodes of volcanism or large impacts could have induced global warming and produced a relatively short-lived optimum for precipitation and runoff. The rapid cutoff of fluvial activity following the development of the later pristine fluvial features is consistent with this scenario. We discuss the changing style of erosion in the highlands during the Noachian and early Hesperian in a companion abstract to this workshop. Here we review the some of the morphologic evidence for a possible Noachian-Hesperian (N-H) climate optimum.

Author

Climatology; Landforms; Mars Surface; Planetary Geology; Geomorphology

20040191788 European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk, Netherlands

Gusev Crater and Early Martian History: Clues from Mars-Express and MGS Study

Foing, B. H.; Zegers, T. E.; vanKan, M.; Pischel, R.; Martin, P.; Jaumann, R.; Hauber, E.; Greeley, R.; Hoffmann, H.; Neukum, G.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The Gusev crater and surrounding terrains contain the geological record of Martian processes from approximately 3.9 Ga to present. This record includes the Noachian evolution of the Martian Highlands, fluvial processes in the Hesperian, and more recent aeolian processes.

Author

Mars Craters; Planetary Geology

20040191789 Lunar and Planetary Inst., Houston, TX, USA
Terrestrial Acid Lakes and Streams: Analogs for the Meridiani Outcrops? [#8090]
Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

No abstract available

Lakes; Mars Surface; Outcrops; Streams; Acids; Analogs

20040191790 Lunar and Planetary Inst., Houston, TX, USA
Variations in Clast Morphometrics Along the Spirit Rover Traverse [#8089]
Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

No abstract available

Rocks; Mars Roving Vehicles; Variations; Planetary Geology

20040191791 Arizona State Univ., Tempe, AZ, USA
Martian Subsurface Waters: Alkaline and Reduced Throughout History
Zolotov, M. Yu.; Shock, E. L.; Niles, P.; Leshin, L.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Throughout the history of Mars, aqueous solutions should have existed at some depths below the surface. On early Mars, high geothermal gradients and intensive volcanic activity would have favored near-surface existence of aqueous solutions and sapping of ground water (e.g., [1]). During later epochs, solutions could have been stable deep below the surface, usually below ice-bearing rocks, and only episodically released on the surface, as at present. Valley networks and especially outflow channels demonstrate the effects of released waters on surface morphology. Release of subsurface waters should also have affected surface chemistry and mineralogy via processes of water-atmosphere inter-action, dissolution of surface minerals, exchange of elements between solutions and minerals, and mineral deposition. Despite the importance for surface chemistry and mineralogy, the composition of deep martian subsurface waters is not known. Here we argue that in contrast to surface and near-surface aqueous solutions, which could have been episodic, oxidized, and acidic; deep subsurface waters are likely to have been alkaline, reduced, and may have contained dissolved H2, CH4 and organic species of abiotic and/or biotic origin.
Author

Mars Environment; Ground Water; Surface Water; Aqueous Solutions

20040191792 Search for Extraterrestrial Intelligence Inst., Moffett Field, CA, USA
What Iron Oxides/Oxyhydroxides Can Tell Us about Surface Alteration, Aqueous Processes and Life on Mars
Bishop, J. L.; Dyar, M. D.; Parente, M.; Drief, A.; Mancinelli, R. L.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

We have performed oxidation and reduction reactions on the hydrated ferric oxide minerals ferrihydrite and goethite in order to investigate how these minerals might alter under a variety of conditions on the surface of Mars. Our experiments showed that heating these minerals in a dry oxidizing environment produces fine-grained hematite, while heating these minerals in a reducing environment produces fine-grained magnetite. Under Mars-like oxidation levels this magnetite then oxidizes to maghemite. These reactions are dependent on the presence of water and organic material that can act as a reductant. We are using reflectance and Mossbauer spectroscopy to characterize the reaction products and TEM to analyze the sample texture. Our preliminary results indicate that magnetite and magnetite could be formed in the soil on Mars from ferrihydrite and goethite if organics were present on early Mars.
Author

Iron Oxides; Hydroxides; Planetary Composition; Mars (Planet)

20040191793 California Inst. of Tech., Pasadena, CA, USA
Stratigraphic Analysis of the Distributary Fan in Holden NE Crater Using Stereo Imagery
Lewis, K.; Aharonson, O.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The distributary fan within Holden NE crater is a unique sedimentary structure that undoubtedly holds a wealth of information about the history of liquid water on Mars. Several papers have been written about the significance of this fan, which shows evidence of meandering channels, indicative of persistent flow through the system. In addition, we have previously described the extraction of topographic data from a MOC Narrow Angle stereo pair at the edge of the fan. Here, further analysis of this data is presented, with a focus on the structure of the layers exposed at the distal end of the fan. These layers potentially contain important information about the formation of the Holden NE fan. There are dozens of layer outcrops exposed along the edge of the deposits, and they occur within a wide range of orientations and elevations. This is an ideal situation for studying their overall structure, as insight can be gained into the depositional environment, which varies both spatially (laterally) and temporally (in elevation). Stereoderived topographic data is used to get a quantitative assessment of the structure of these layered deposits.
Author
Stratigraphy; Stereoscopy; Fans (Landforms); Mars Craters

20040191794 Bergen Univ., Norway
Potential for Early Life Hosted in Basaltic Glass on a Wet Mars
Banerjee, N. R.; Muchlenbachs, K.; Furnes, H.; Staudigel, H.; deWit, M.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Recent evidence for the presence of liquid water and the formation of palagonite during the evolution of Mars has sparked considerable interest in determining if life could have existed early in the planet's history. Previous indications of life in Martian meteorite ALH84001 have been criticized and new studies have been looking for terrestrial proxies for life on Mars. Evidence for early life on Earth has also proven to be controversial. We have recently discovered indicators of early life in the formerly glassy rims of approx. 3500 million year old basaltic pillow lavas. Ancient volcanic glass represents a previously unexplored setting in the search for early life on Earth. The cratered surface of Mars likely hosts countless glassy basaltic impact breccias that may have been submerged in water for extended periods of time. Such rocks represent a viable habitat for early life on Mars.
Author
Extraterrestrial Life; Mars (Planet); Biomarkers

20040191796 Arizona Univ., Tucson, AZ, USA
Accretion, Bulk Composition, and Volatile Inventories
Drake, M. J.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Mars formed about 4.55 Ga ago in the same general region as Earth. Dynamical studies suggest substantial mixing of material in the inner solar system, yet Earth, Mars, and the asteroids have distinctive compositions. Mars like Earth underwent a magma ocean epoch. The Martian atmosphere and hydrosphere outgassed within 100 my of nucleosynthesis of 129I. Below I discuss the evidence for these conclusions.
Derived from text
Mars Atmosphere; Outgassing; Magma; Evolution (Development)

20040191797 NASA Johnson Space Center, Houston, TX, USA
Crystallization Age of NWA 1460 Shergottite: Paradox Revisited
Nyquist, L. E.; Shih, C-Y.; Reese, Y. D.; Irving, A. J.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

We have determined the Rb-Sr age of basaltic shergottite NWA 1460 to be 312 +/- 3 Ma, and the Sm-Nd age to be 352 +/- 30 Ma. The initial Sr and Nd isotopic compositions of NWA 1460 suggest it is an earlier melting product of a Martian mantle source region similar to those of the Iherzolitic shergottites and basaltic shergottite EETA79001, lithology B. The new ages of NWA 1460 and other recently analyzed Martian meteorites leads us to reexamine the paradox that most of the Martian meteorites appear to be younger from the majority of the Martian surface. This paradox continues to pose a challenge to determining a reliable Martian chronology.
Author
Rubidium; Strontium; Basalt; Chronology; Crystallization; Mars Surface; Planetary Mantles

20040191798 NASA Goddard Space Flight Center, Greenbelt, MD, USA

Impact Constraints on Major Events in Early Mars History

Frey, H. V.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

MOLA data have revealed a large population of 'Quasi-Circular Depressions' (QCDs) with little or no visible expression in image data. These likely buried impact basins have important implications for the age of the lowland crust, how that compares with original highland crust, and when and how the crustal dichotomy may have formed. The buried lowlands are of Early Noachian age, likely slightly younger than the buried highlands but older than the exposed (visible) highland surface. A depopulation of large visible basins at diameters 800 to 1300 km suggests some global scale event early in martian history, maybe related to the formation of the lowlands and/or the development of Tharsis. A suggested early disappearance of the global magnetic field can be placed within a temporal sequence of formation of the very largest impact basins. The global field appears to have disappeared at about the time the lowlands formed. It seems likely the topographic crustal dichotomy was produced very early in martian history by processes which operated very quickly. Thus there appears to have been a northern lowland throughout nearly all of martian history, predating the last of the really large impacts (Hellas, Argyre and Isidis) and their likely very significant environmental consequences.

Author

Evolution (Development); Mars Surface; Crusts; Population Theory; Structural Basins

20040191799 Kentucky Univ., Lexington, KY, USA

Remote Spectral Imaging with Active Excitation Diode Arrays Using Integrated Sensing and Processing

Harris, J. Clay; Lodder, Robert A.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Long Martian winters and rough terrain limit the amount of data that can be obtained from different locations using a roving vehicle that must contact a target to sample it. The search for indigenous life signatures near locations where water may be intermittently present demands the ability to sense water and residues of life farther from the vehicle. Spectral imaging instruments originally designed to search for biofilms in pharmaceutical cleaning validation can be modified and used to remotely sense astrobiologically interesting sites (in a geologic and/or biologic context). If detected, the vehicle could then navigate to the site and conduct further in-situ sampling. On a nuclear-powered vehicle, the instrument could be designed to operate at night where lighting conditions would be ideal for spectral imaging with specific wavelength solid-state illuminators in the UV, visible, and near-infrared spectral regions.

Derived from text

Imaging Techniques; Remote Sensing; Planetary Geology; Mars Surface

20040191800 Southwest Research Inst., Boulder, CO, USA

Evolution of Valley Network Formation: Surface Runoff to Groundwater Discharge

Harrison, K. P.; Grimm, R. E.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The ubiquitous Martian valley networks have traditionally been used to invoke a warm, wet early climate on Mars. This hypothesis has been complicated with each successive improvement in imaging data. Mariner 9 and Viking images revealed the importance of groundwater sapping morphology, typified by abrupt, alcove-like terminations, small numbers of tributaries, and poor interfluve dissection. High resolution MGS MOC data revealed a more complex picture of groundwater processes, including evidence of erosion downstream of groundwater sources in addition to headward erosion through sapping. MOC images also showed denser networks suggestive of surface runoff. Martian valley networks can thus be separated into two groups: dense valley networks influenced by surface runoff and sparse networks influenced predominantly by groundwater processes. We propose that the two groups mark a temporal shift in fluvial erosion processes spanning the late Noachian and early-to-late Hesperian. The details of this hypothesis may be described in relation to a warm or cold early climate as follows.

Author

Mars Environment; Valleys; Morphology; Mars Surface; Ground Water

20040191801 Colorado Univ., Boulder, CO, USA

Extensive Bedrock Throughout Terra Meridiani, Mars: Implications for Regional Hydrologic Processes

Hynek, B. M.; Jakosky, B. M.; Putzig, N. T.; Mellon, M. T.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The mineral gray hematite was discovered in the Terra Meridiani region of Mars by the TES aboard the Mars Global Surveyor spacecraft. The hematite occurs on a broad plain that rests unconformably on the underlying Noachian cratered terrain and covers an area of approx. 1 x 10(exp 5) sq km. Formation of this mineral often requires the presence of water for extended periods of time, making the site of high astrobiological importance and the destination of the 2003 Mars Exploration Rover (MER) named Opportunity. The Opportunity Rover has since found light-toned bedrock outcrops in the walls of craters where it landed and in situ analysis strongly suggests that they have been altered, and perhaps formed, by long-term interaction with water. In this paper, we use remote sensing data to argue that these outcrops are seen across the entire hematite-bearing plain and well beyond it. Thus, whatever water-driven process acted to alter these materials did so on a regional, not local, basis.

Author

Mars Exploration; Mars Surface; Minerals; Water

20040191802 Lockheed Martin Corp., Denver, CO, USA

The Salts of Mars: Update 2004

Clark, Benton C.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Abstract Only; Available from CASI on CD-ROM only as part of the entire parent document

Anomalously high abundances of the salt-forming elements S, Cl and Br, in martian soils is now established for all five sites visited by Landers with appropriate analytical capabilities. Although the variability of concentrations is by a factor of two for the major components, this is far less than expected if salts were produced and concentrated locally. Duricrust has been shown (at one site, at least) to be further enriched in these elements. Based upon these elements alone, salt abundances can approach 15% by weight of salts compared to silicate and iron minerals. Additional contributions by carbonate and nitrate salts may occur. These results have now been extended by the discovery of even higher sulfate and chloride concentrations in outcrop materials at Meridiani Planum; by significant traces of bromides in igneous rocks at Gusev Crater; and by emerging discoveries of isolated sulfate deposits from orbital observations. The implications for the past history of water on Mars, including its destruction and current reservoirs; the ramifications on the required physiological characteristics of any surviving indigenous biota; the consequences for the potential spread of terrestrial microbe contaminants; and the range in models for explanation of salt enrichments will be discussed.

Author

Bromides; Carbonates; Chlorides; Mars Surface; Soils; Salts

20040191803 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Mars Exploration Rover Mission

Adler, M.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Abstract Only; Available from CASI on CD-ROM only as part of the entire parent document

Two rovers with a sophisticated geological payload have been operating on the surface of Mars since January of 2004. Future missions and their related technology developments will benefit from the lessons learned during these surface operations. The planning cycle was dictated by the communications opportunities and the times of day that the rovers could operate, and the team and tools were tuned to optimize the mission return for that cycle time. The ability to traverse and to approach and perform in situ investigations on targets was limited in speed by the same cycle time, due to required human involvement in the related planning and risk decisions. In addition traverse was limited by the speed of the on-board terrain and hazard assessment, and in situ operations were limited by a lack of autonomy. Different planning cycles and levels of autonomy should be considered for future surface missions, which will result in different approaches to science decision making.

Author

Decision Making; Geology; Mars Exploration; Mars Surface

20040191804 Museum of Natural History, London, UK

Fe Isotopes in Martian Meteorites: Role of Water and Possibility of Life on Mars

Anand, M.; Mullane, E.; Grady, M.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The suggestion of McKay et al. that one of the Martian meteorites (ALH 84001) has preserved traces of Martian bacterial life led to a surge in scientific research on Martian meteorites. This has also resulted in the discovery and identification of more Martian meteorites from various places on the Earth. The total number of Martian meteorites known till date stands at 30 (53 numbered individuals); almost a three-fold increase in the total number of known Martian meteorites in the last decade. The majority of these are shergottites, which account for 22 samples. The next most common group of meteorites are nakhlites (6), followed by a sample each of Chassigny and ALH 84001.

Derived from text

Iron Isotopes; Mars (Planet); Meteorites; Water; Extraterrestrial Life

20040191805 Tokyo Univ., Hongo, Japan

Control of Exposed and Buried Impact Craters and Related Fracture Systems on Hydrogeology, Ground Subsidence/ Collapse, and Chaotic Terrain Formation, Mars

Rodriguez, J. A. P.; Sasaki, S.; Dohm, J. M.; Tanaka, K. L.; Miyamoto, H.; Baker, V.; Skinner, J. A., Jr.; Komatsu, G.; Fairen, A. G.; Ferris, J. C.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Mars is a planet enriched by groundwater. Control of subsurface hydrology by tectonic and igneous processes is widely documented, both for Earth and Mars. Impact craters result in extensive fracturing, including radial and concentric peripheral fault systems, which in the case of Earth have been recognized as predominantly strike-slip and listric extensional, respectively. In this work we propose that basement structures of Mars largely result from impact/induced tectonism, except in regions that are dominated by magmatic-driven activity such as Tharsis and/or possible plate tectonism during the extremely ancient period of Mars e.g. In many cases, impact-induced faults appear to have been reactivated and/or displaced by subsequent magmatic-driven ground-water flow and collapse processes.

Author

Collapse; Craters; Hydrology; Mars Surface

20040191806 Washington State Univ., Pullman, WA, USA

Strategy for Detecting Hydrothermal Activity on Mars

Schultze-Makuch, D.; Fairen, A. G.; Dohm, J. M.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Recent Mars Rover results, which included the detection of the mineral jarosite and sulfur-rich salt layers, indicate the presence of ancient acidic hot springs, such has been proposed related to both magmatic- and impact-related processes and/or mixing with episodic water masses on the surface of Mars. Another recent finding is the detection of methane in the Martian atmosphere, which if confirmed, would hint toward volcanic activity (alternative possibilities would be geochemical reactions in the Martian crust or microbial activity). Although the methane detection is observed globally, it may be associated with hydrothermal activity occurring locally at the episodically active Tharsis magmatic complex (a primary release of the internal heat of Mars since the Middle Noachian), which may still be active today. Although the THEMIS spectrometer onboard the Mars Odyssey spacecraft has not identified current hydrothermal activity on the Martian surface, it may currently occur at moderate temperatures (10 - 40 C) in a salt-rich soil or be fully confined to the Martian subsurface, thus preventing direct detection via thermal IR bands. The Gamma Ray Spectrometer onboard the Mars Odyssey spacecraft, however, reveals the northwestern slope valleys to be highly elevated in chlorine when compared to the rest of Mars. This region has been proposed as a prime candidate site for exploration based on its recorded geologic and paleohydrologic histories, including hydrothermal activity, and may mark recent and possibly active magmatic-driven activity. Though, other factors such as atmospheric processes should also be considered as a potential contributor to the elevated signature.

Derived from text

Gamma Ray Spectrometers; Geochemistry; Mars Atmosphere; Mars Surface; Microorganisms

20040191807 Cornell Univ., Ithaca, NY, USA

Analysis of a Spectrally Unique Deposit in the Dissected Noachian Terrain of Mars

NoeDobrea, E. Z.; Bell, J. F., III; McConnochie, T. H.; Bandfield, J. L.; Malin, M.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Dark intracrater deposits are pervasive throughout a great fraction of the large craters on Mars, and in many cases are the origin of dark streak fields. High resolution MOC imagery of these deposits shows that they are made up of dune fields at least 100 m thick. Despite their ubiquity, the origin of the material in intracrater deposits is not known, primarily because they have not been found to be directly associated to any specific morphologic feature in the area. Recently, discovered in MGS wide angle data a 'blue' color unit associated with a low-albedo intracrater deposit in the southern highlands. In addition to its unique color, this particular unit is spatially associated to a fan-shaped deposit of similarly unique spectral character located sat the mouth of a small channel. In this report, we discuss the use of Odyssey/ THEMIS and MGS/TES data to constrain the mineralogy of this spectrally unique intracrater deposit and the associated fan. Data sets: We use a combination of high spatial Author

Albedo; Data Structures; Deposits; Mars Craters; Mars Surface; Terrain

20040191809 Arizona Univ., Tucson, AZ, USA

Impactites on Mars: What Should We Expect and What is the Role of Volatiles?

Osinski, G. R.; Melosh, H. J.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Mars possesses the most diverse impact cratering record of any planetary object in the Solar System. Impact craters are also one of the most common geological landforms on Mars. Furthermore, impact craters offer a window into the subsurface, and their characteristics provide insights as to the composition, structure, and physical characteristics of the martian crust and its volatile inventory. The diversity of martian impact craters and their associated deposits (impactites) have been attributed, in part, to the widespread presence of volatiles in the martian subsurface. It is well known that volatiles play an important role in the impact cratering process; in particular, with respect to impact melt generation and ejecta deposition. The terrestrial impact cratering record currently provides the only ground-truth data on the effects of impacts into volatile-rich (i.e., sedimentary) targets. The aim of this paper is to provide an up-to-date assessment of the processes and products of impacts in to volatile-rich targets on Earth and to apply this knowledge to the martian impact cratering record. Some predictions as to the type of impactites that should be found on Mars will also be made.

Author

Impact Melts; Mars Craters; Mars Surface; Volatility

20040191810 Los Alamos National Lab., NM, USA

Early Mars, Hydrothermal Convective Plumes, and 'Columns of Life'

Travis, B. J.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

A great deal of evidence supports the statement that water was abundant on Mars in its early history and that much of that inventory still exists today as ice and permafrost in the sub-surface, very likely with liquid water below that. A recent study suggests that the geothermal gradient of Mars is sufficient even today, and certainly in Mars early history, to drive subsurface hydrothermal convection. Subsurface convective flow patterns for Mars conditions are of the roll and plume types, with warm, upwelling plumes melting through permafrost and approaching closer to the surface and exhibiting higher upward flow rates than rolls. Water temperatures within upwelling plumes can range from 40 - 100 C, at their base, to 0 - 10 C at their top (even colder for saline solutions), depending on local heat flux and permeability structure of the host rock. These convective patterns are stable and long-lasting, and could provide a potential habitat for microbial life by bringing nutrients to and through microbial communities living in subsurface soil and rock. Upwelling plumes could function as columns of life . Further, for the higher geothermal heat fluxes of the past, flow will be episodic, characterized by occasional periods of enhanced flow rates and re-organization of the spatial arrangement of plumes, possibly providing a stimulus for evolution.

Derived from text

Hydrothermal Systems; Mars Environment; Microorganisms; Plumes

20040191811 Michigan State Univ., East Lansing, MI, USA

Fossilization of Microorganisms in One Year Under Extremely Reducing Geochemical Aquifer Conditions: Implications for Mars Astrobiology

Velbel, M. A.; McGuire, J. T.; Brandt, D. S.; Madden, A. S.; Long, D. T.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Morphological features suggestive of microbial origin have been observed by scanning electron microscopy (SEM) in several categories of meteorites, including meteorites thought to have originated on Mars (including ALH84001 and Nakhla) and some carbonaceous chondrites. In ALH84001, the putative fossil microbes occur in carbonate globules distributed along fractures. Contentious issues include: (1) the origin of the morphological features (microbial or inorganic); (2) whether the carbonate with which they are associated formed at temperatures conducive to life; (3) whether the putative microbes were indigenous to the rock or were introduced post-mortem. Observations relevant to some of these questions

Derived from text

Carbonaceous Chondrites; Microorganisms; Mars Surface; Fossils

20040191815 Lunar and Planetary Inst., Houston, TX, USA

The Early Climate of Mars: Warm, Cold or Forever Unknowable? Ambiguities Resulting from Impact Seismicity and Hydrothermal Activity

Clifford, S. M.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The resemblance of the Martian valley networks to terrestrial runoff channels, and their almost exclusive occurrence in the planet's ancient cratered terrain, has suggested to some that the networks are the relics of a substantially warmer and wetter greenhouse climate that may have existed throughout much of the Noachian. Additional support for this possibility is provided by the apparent deficit of craters with diameters \h30 km, and the poor preservation state of most large craters, within the intercrater plains. These observations have been cited as possible evidence of a dense early atmosphere that both warmed the early climate and accelerated the rates of fluvial and eolian erosion. Skeptics of the warm early Mars hypothesis have noted the theoretical difficulty of creating and sustaining an atmospheric greenhouse sufficient to raise surface temperatures above 273 K particularly in light of the early Sun s expected approx. 25% lower luminosity.

Author

Seismology; Mars Surface; Craters; Erosion; Planetary Craters; Surface Temperature; Terrain

20040191816 California Univ., Davis, CA, USA

Jarosite Stability on Mars

Forray, F. L.; Navrotsky, A.; Drouet, C.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770

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Jarosite, KFe3(SO4)2(OH)6, a hydrated sulfate of iron and potassium is a widespread mineral in nature, mostly connected with alteration of sulfides and present in acid mine drainages or connected with volcanic or postvolcanic activity (alteration of volcanic rocks in acid fumaroles, or hydro-thermal activity) with or without implication of bacterial activity. Jarosite has recently been found in out- crops on the Martian surface. This identification is based on Mossbauer spectroscopy, alpha particle X- ray spectrometry, and infrared spectroscopy on the Opportunity rover. The presence of this hydrous sulfate and the morphology of the deposit strongly suggest its formation from aqueous solution, implying a wetter and potentially life-friendly environment on Mars in the past. The mineralogical fingerprints on planets can indicate the past thermo-baric and atmospheric chemistry changes, and can be used for study of the history of the planets. Due to the low pressure on Mars surface, the low temperature does not automatically imply jarosite stability. The goal of this study was to calculate the stability of jarosite in Martian environment and discuss some of the informations (fingerprints) it carries.

Author

Mars Environment; Atmospheric Chemistry; Bacteria; Extraterrestrial Life

20040191817 Search for Extraterrestrial Intelligence Inst., Moffett Field, CA, USA

Hydrothermal Deposits Within Martian Impact Craters: Significance, Location, and Sampling Strategy

Osinski, G. R.; Lee, P.; Melosh, H. J.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Hydrothermal deposits offer one of the most promising locations to search for evidence of life on Mars. In this paper, we discuss the significance and characteristics of hydrothermal deposits associated with meteorite impact craters and the possibility of locating such lithologies on Mars.

Author

Extraterrestrial Life; Meteorite Collisions; Hydrothermal Systems; Deposits; Craters; Mars (Planet)

20040191818 Arizona Univ., Tucson, AZ, USA

Numerical Modeling of Impact-induced Hydrothermal Activity on Early Mars

Abramov, O.; Kring, D. A.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Recent research suggests that impact generated hydrothermal systems may have played an important role on early Earth and potentially early Mars. Several lines of evidence point to a dramatic increase in the number of impact events at approx. 3.9 Ga, which coincides remarkably well with the earliest isotopic evidence of life at approx. 3.85 Ga. This period, often referred to as the Lunar Cataclysm, lasted 20 to 200 million years, during which time hydrothermal heat generated by impact events may have exceeded that generated by volcanic activity. These impacts would have resurfaced most of Earth and Mars, and may have vaporized any existing oceans for short periods of time, virtually eliminating surface habitats. At the same time, an abundance of subsurface habitats in the form of large subsurface hydrothermal systems would have been created. These habitats could have provided sanctuary for existing life or perhaps the site of life s origin. Genetic evidence in the form of phylogenies that suggest that Archaea, Bacteria, and Eukarya have a common ancestor comparable to present day thermophilic or hyperthermophilic organisms, further underscores the potential importance of hydrothermal systems in general, and impact-induced hydrothermal systems in particular, at the dawn of life.

Derived from text

Mathematical Models; Hydrothermal Systems; Impact; Mars (Planet)

20040191819 New Mexico Univ., Albuquerque, NM, USA

Hydrothermal Environments and Chemical Transport Due to Impacts and Volcanism on Early Mars

Newsom, H. E.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The combination of hot rocks and water inevitably leads to hydrothermal alteration. Early in Mars history water was more abundant and hot rocks were supplied by impacts and volcanism. Hydrothermal deposits including precipitates and evaporites are important exploration targets to examine for evidence of biotic or prebiotic organic chemistry. Hydrothermal alteration could also lead to trapping of water in the crust of Mars. In addition, the breakdown of minerals and mesostasis due to hydrothermal alteration in igneous and impact derived rocks released mobile elements that helped enrich the surface in sulfur, chlorine, and other mobile elements. The resulting presence of toxic mobile elements in surface fines may constrain future human exploration and utilization of Mars.

Author

Crusts; Deposits; Volcanology; Hydrothermal Systems; Sedimentary Rocks; Planetary Geology; Mars Surface; Organic Chemistry

20040191821 Arizona Univ., Tucson, AZ, USA

Climatological and Hydrological Evolution of Early Mars as Inferred from the Geological Record

Baker, Victor R.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Exciting new results from current Mars missions are transforming our understanding of Mars early planetary history. Current news releases to the contrary, many geological investigators have known for thirty years that Mars had an early history

with aqueous activity on its surface. However, new mission results are only now revealing the extensive sedimentary and geochemical evidence for that history. The new results strongly corroborate the long-standing geological and geomorphological inferences that early Mars had extensive lakes and probably transient seas ('oceans') that were associated with a climate capable of generating the precipitation and runoff to sculpt its landscape and to transport materials to sedimentary basins. Well-preserved alluvial fans and fluvial deltas show that early Mars was surprisingly Earth-like in its geological processes.
Author
Climatology; Hydrology; Evolution (Development); Mars (Planet); Geology

20040191822 Planetary Science Inst., Tucson, AZ, USA
Reconstructing Geologic Activity History of Early Mars
Hartmann, W. K.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

By combining the resurfacing rates in different geologic periods of Mars, with recent estimates of the durations of the periods, it is possible to reconstruct a first-order history of the resurfacing of Mars by various processes, such as fluvial, periglacial, and volcanic activity. The result shows that all these rates were one to two orders of magnitude higher in the Noachian than in the Amazonian, with the Hesperian as a transition period . This first-order result seems to be robust under various plausible assumptions and solutions for the timescale. Our work on the Meridiani Planum area, for example, has suggested very early, possibly lacustrine environment about 3.5 - 4.5 Gy ago (based on very high densities of very degraded craters), which was covered by sediments and very recently exhumed (based on a distinct, low density population of sharp, fresh-appearing craters. This interpretation appears supported by results from the Opportunity rover, with its finding of sulfate-rich rocks. In the nearby region of Aram Chaos, a large equatorial crater was filled in early times with ice-rich sediments. The ice apparently melted, causing collapse (forming the chaos), ponding on the crater's east side, breaking through the east wall, eroding a dramatic canyon, and flowing into Ares Vallis. Freestanding kilometer-scale blocks of sediment have relatively youthful-looking gullies on their slopes, similar to the better-known high-latitude gullies. This supports the interpretation that these equatorial sediments were ice-rich.
Derived from text
Mars Surface; Planetary Geology; Planetary Evolution; Mars Craters; Planetary Meteorology

20040191823 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
New Perspectives on Ancient Mars
Solomon, Sean C.; Aharonson, O.; Aurnou, J. M.; Banerdt, W. B.; Carr, M. H.; Dombard, A. J.; Frey, H. V.; Golombek, M. P.; Hauck, S. A., II; Head, J. W., III, et al.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Global data sets returned by the Mars Global Surveyor (MGS), Mars Odyssey, and Mars Express spacecraft and recent analyses of Martian meteorites suggest that most of the major geological events of Martian history occurred within the first billion years of solar system formation. This period was a time of heavy impact bombardment of the inner solar system, a process that strongly overprinted much of the Martian geological record from that time. Geophysical signatures nonetheless remain from that period in the Martian crust, and several geochemical tracers of early events are found in Martian meteorites. Collectively, these observations provide insight into the earliest era in Martian history when the conditions favoring life were best satisfied.
Author
Planetary Geology; Planetary Evolution; Mars (Planet)

20040191824 Nevada Univ., Reno, NV, USA
'Blueberries': A Summary of the Hematite Concretions Found at the Opportunity Landing Site
Calvin, W.; Squyres, S.; Arvidson, R.; Bell, J.; Christensen, P.; Herkenhoff, K.; Jolliff, B.; Klingelhoeffer, G.; Farmer, J.; Farrand, W., et al.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The thermal infrared spectral signature of bulk, grey hematite was the chemical 'beacon' that focused the selection of

Meridiani Planum as the landing site for MER-B, Opportunity. Although processes from anhydrous volcanic to aqueous sedimentary were possible for the origin of the bulk hematite, aqueous processes, and in particular deposition in basins, were preferred. Orbital data suggesting more bound water in accessory minerals at the hematite sites also supported this interpretation. After landing January 24, 2004, the Mini-TES instrument on Opportunity rapidly confirmed the thermal spectral signature of bulk hematite in soils on the plains surrounding Eagle crater and unevenly distributed within the crater. Approach and observations of the outcrop within Eagle crater soon uncovered unusual millimeter sized spherical grains in abundance surrounding the outcrop and Microscopic Imager (MI) showed these grains eroding from within these rocks. They were dubbed 'blueberries' by the team due to their spherical nature and their grey or blue appearance compared to their surroundings in various color composites of Pancam images. This term was also easier on the tongue in early science discussions than spherules or spherical grains, and avoided connotations of origin as would be implied by lapilli or oolites. Although some initial debate existed as to the carrier of the thermal infrared hematite signature, extensive observations within and around Eagle crater and especially of the 'Berry Bowl' confirmed with the Mossbauer, Alpha-Particle X-ray Spectrometer (APXS) and Mini-TES instruments that the 'blueberries' are the source of hematite. Pancam spectra of individual blueberries also match laboratory spectra of hematite.
Author
Mars Landing Sites; Hematite; Spherules

20040191825 Brown Univ., Providence, RI, USA
Magma Ocean Cumulate Overturn: Generation of an Early Magnetic Field
Elkins-Tanton, L. T.; Zaranek, S. E.; Parmentier, E. M.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Dynamical models of Martian differentiation and early evolution need to be consistent with several major attributes of Mars believed to have developed before 4.0 Ga: differentiation of mantle source regions into isotopically distinct reservoirs; development of an early, brief, strong magnetic field; and the formation of an early crust to record that field. Significant and perhaps complete melting of the large terrestrial planets is expected due to the conversion of kinetic energy to heat during accretion of planetesimals, and to the potential energy release of core formation. Previous results of Martian magma ocean investigations indicate that magma ocean crystallization and subsequent overturn on Mars could be fast and complete, and is consistent with magma source region differentiation and the development of an alumina-poor Martian mantle. The further results presented here demonstrate that magma ocean crystallization and overturn can produce a magnetic field of between 10 and 50 million years duration.
Derived from text
Magma; Planetary Geology; Planetary Magnetic Fields; Mars Surface; Oceans

20040191826 Utah Univ., Salt Lake City, UT, USA
Spectral Analysis of Diagenetic Minerals in the Jurassic Navajo Sandstone: Implications for Paleo-Groundwater Geochemistry and Hematite on Mars
Beitler, B.; Chan, M. A.; Parry, W. T.; Ormoe, J.; Komatsu, G.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Identifying diagenetic mineralogy on Mars is essential for understanding the history of groundwater geochemistry and fluid flow related alteration. Hyperspectral imaging spectroscopy provides a diagnostic tool for identifying chemical diagenetic alteration in sedimentary rocks. In situ, airborne, and satellite spectral analysis of iron oxide mineralization and related chemical alteration within the Jurassic Navajo Sandstone in southern Utah provide remote methods for evaluating spatial variations in paleo-groundwater geochemistry. Remote sensing provides a non-destructive way of identifying regional and local geochemistry based on spectral characteristics of minerals. The semi-arid climate and relative lack of vegetation on the early Jurassic strata of southern Utah provide unique conditions, suitable for remote mineral identification. Diagenesis within the Navajo Sandstone is the result of a complex history of groundwater flow and involved multiple episodes of mineral precipitation, dissolution, and reaction. Iron oxides, carbonates, and clays have been mobilized and re-precipitated several times within the interstitial system, indicating a multi-phase history of basin-wide fluid rock interactions. Formation-wide relationships between mineralogy and geochemistry allow for identification of several diagenetic facies. These diagenetic facies have diagnostic geochemical signatures, as well as distinctive spectral signatures. The concepts, methodologies and

implications for Paleo-Groundwater Geochemistry and Hematite on Mars are presented
Author
Hematite; Mars Surface; Mineralogy; Planetary Geology; Sandstones; Spectrum Analysis; Remote Sensing; Sedimentary Rocks; Ground Water

20040191827 Florida Space Inst., Cape Canaveral, FL, USA
On the Possibility of a Stable Greenhouse Regime on Mars
Brandenburg, J. E.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

It has long been recognized that warmer wetter conditions existed on early Mars than at present. This has been evidenced by the presence of many extinct water channels on ancient terrains in the South of Mars and even what appear to be dendritic networks suggesting precipitation. However, evidence for an extinct paleo-ocean has been found in the Northern younger terrains indicating the possibility that conditions allowing liquid water may have been present until the early Amazonian. Recent imagery has suggested that precipitation existed in the Late Hesperian. The simplest explanation for such such warmer wetter climate in Mars Past is that a Carbon dioxide greenhouse existed. However, such CO2 greenhouse models are subject to short term pressure and temperature instability in the presence of insolation and large impacts. In the long term such a CO2 greenhouse is chemically unstable because CO2 in the presence of liquid water and warm temperatures yields carbonic acid solution which attacks Ferro Magnesian silicates to form siderites, such as are found in the primordial mars meteorite ALH84001, and thus rapidly depletes the CO2 until the greenhouse fails. Given the lack of Plate Tectonics on Mars, no mechanism is known to exist for recycling the CO2 into the atmosphere. Thus even a greenhouse that went through several episodes of warm temperatures driven by insolation would eventually end with the bulk of CO2 bound irretrievably in the rocks and present Mars conditions but with large amounts of surface carbonates. Thus, the absence of large amounts of carbonates on the Martian surface and in Mars meteorites creates a mystery: what process can create a long-lived greenhouse on Mars and what would be its signature? In this abstract the model is proposed that a strong oxygen component in the Mars atmosphere, by raising surface components to high oxidation states, can stabilize the carbon dioxide atmosphere and prevent is capture by surface minerals. In addition, the presence of a paleo-ocean, by its thermal and atmospheric buffering can stabilize the greenhouse against short-term pressure and temperature perturbations.
Author
Greenhouse Effect; Paleoclimatology; Mars Environment; Mars Atmosphere

20040191828 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Validating Ancient Age of the Buried Floor of the Northern Lowlands, Mars
Buczkowski, D. L.; Frey, H. V.; Roark, J. H.; McGill, G. E.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Hesperian and Amazonian plains units cover the northern lowlands but little is known about what this surface covers. Models for the creation of the lowlands and the dichotomy boundary implement mechanisms which vary from internal processes, such as plate tectonics or first-order mantle convection, to external processes, such as a single large impact or multiple impacts. Different models require different time scales for low-land formation; determining the age of the buried low-land surface would help constrain the formation models. The Mars Orbiting Laser Altimeter (MOLA) has yielded a high-precision, topographic gridded data set that reveals the presence of Quasi-Circular Depressions (QCDs) in both the southern highlands and the northern lowlands. Most of these roughly circular depressions have no corresponding visible structural feature on the surface. It is proposed that these QCDs are the surface representation of buried impact craters. Based on this assumption, cumulative number vs. diameter curves were constructed, which placed the age of the buried surface of the northern lowlands in the Early or pre-Noachian. A Noachian basement is supported by the remnants of large craters and multi-ring basins discovered in earlier research, but the QCDs provide the first evidence of this for the entire lowland. Constraining the age of the basement floor to the earliest Noachian, however, would require that the process that formed the northern lowlands either occurred in the early Noachian or involves removal of material from the bottom of the crust without destroying the previously formed craters to achieve the modeled crustal thinning. But can we establish that the QCDs do in fact represent buried impact craters, and thus validate an Early Noachian age for the buried lowland floor?
Author
Mars Surface; Plains; Planetary Geology; Structural Basins; Geochronology

20040191829 National Museum of Natural History, Washington, DC, USA

Implications for the Abundance of Water on Early Mars as Evidenced by the Presence of Secondary Minerals in Martian Meteorite Allan Hills 84001

Corrigan, C. M.; Harvey, R. P.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Although numerous lines of evidence suggest that Mars must have been a 'wet' planet at some time in its past, there is no universal agreement on the volume of hydrous activity, its style, or the characteristics of the corresponding climates through time. Morphological evidence for the presence of surface water on Mars is abundant as is evidence for the existence of ground ice. Evidence for glacial activity on Mars supports a colder, though still hydrous planet. Other features suggest that some fluid and ground ice activity on Mars has not been limited to the ancient past. Mineralogical and geochemical evidence for a wet Mars arise from hematite deposits found on the surface and from igneous minerals in the martian meteorites. The question, therefore, is not whether water existed on Mars, but when it existed, in what state, its abundance, the locations of reservoirs (both spatially and in terms of depth), and if/when this water became less active. Interpretations of the martian hydrologic history range from a warm and wet Mars with oceans and an active hydrologic cycle to a drier planet, where short-term hydrospheres were activated by impact events, to a frozen Mars where a water is present as a frozen subsurface layer. Estimates for the abundance of water on Mars range from an initial 3.6 m to a current 0.2 m global thickness layer to an initial depth of \g 100 km accreted and lost early to a current subsurface 1400 m. A global layer of frozen, saturated ground ice has been proposed. Little of this hydrous inventory is available for direct inspection. Only in the last few years have we been able to quantitatively measure the abundance of water in the outermost surface layers by remote means though remotely sensed images have provided us with evidence for decades.

Author

SNC Meteorites; Paleoclimatology; Meteoritic Composition; Water; Mars Environment

20040191830 National Museum of Natural History, Washington, DC, USA

Evaluating a Potential Link Between Crustal Aqueous Processes and Surface Fines on Mars Using Hyperspectral Data Analysis

Vicenzi, E. P.; Rost, D.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

While our knowledge of the aqueous processes beneath the surface of Mars is rather limited, pre-terrestrially altered portions of the SNC meteorites provide an opportunity to directly examine the chemistry of low temperature reactions in the Martian crust. Alternatively, our knowledge of the chemistry of the surface materials stems from direct analysis using instruments aboard the Viking, Pathfinder, and MER spacecrafts. Some authors have suggested a similarity in the major element composition of the aqueous alteration found in the meteorite collection and the surface fines, or globally distributed dust, found at most landing sites. We are constructing an analytical protocol to provide an improved estimate of the local bulk composition of microscale features in Martian meteorite secondary mineral veinlets to further test this proposed linkage.

Author

SNC Meteorites; Meteoritic Microstructures; Planetary Geology; Planetary Crusts

20040191831 California Univ., Mammoth Lakes, CA, USA

The Formation of Tharsis in the Early Noachian: What the Line-of-Sight Gravity is Telling Us

Williams, J.-P.; Moore, W. B.; Nimmo, F.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Tharsis is a vast, complex topographic rise on Mars that has undergone protracted volcanic and tectonic activity spanning nearly the entirety of Mars history. The Thaumasia region that defines the southeastern most portion of Tharsis can been seen as being topographically coherent with the main central rise containing the Tharsis Montes (Ascraeus, Pavonis, and Arsia). This region is identified as an arcuate mountain belt, the Thaumasia Highlands, which extends southward from the region of the Tharsis Montes (containing Claritas Fossae) that then curves northeastward in a scorpion tail pattern to form a quasi-circular feature. The Thaumasia highlands, the oldest preserved portion of Tharsis, contains heavily cratered Noachian terrains that have survived resurfacing by younger volcanic flows presumably because of their high elevation. These mountains, standing 4-5 kilometers above the surrounding cratered highlands, bound an interior plateau that includes Solis, Sinai, and Syria Planum. Immediately adjacent to the Thaumasia Highlands in the surrounding cratered plains, a negative

free-air gravity anomaly flanks the high standing topography. This gravity anomaly reveals a possible flexural trench created by the loading of the lithosphere by Thaumasia that has undergone subsequent burial by lava flows and debris.
Author
Gravitation; Line of Sight; Mars Surface; Planetary Geology; Topography; Mars Volcanoes; Tectonics

20040191832 Guigne International Ltd., Paradise, Newfoundland, Canada
Ancient Ice-covered Lakes in the Echus/Kasei Valley System, Mars
Woodworth-Lynas, Christopher; Guigne, Jacques Yves; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

From analyses of Mars Global Surveyor Mars Orbiter Camera (MOC) images of the Echus Chasma/Kasei Valles valley system we present further, new observations of surficial Martian features that are interpreted to be the result of interactions between the keels of flat-bottomed floating ice floes with a submerged sediment surface. Curvilinear ice keel scour mark troughs and ice floe grounding pits are proxy indicators of three basic environmental conditions: the former presence of a water body; the water body was seasonally, or perhaps permanently, covered by ice floes; the water area was large enough for winds, currents or both to drive the floes forward during ice/lakebed interaction. Originally we had expected to find evidence of the former presence of floating ice preserved, at least in some places, on the seafloor of an ancient north polar ocean. It is reasonable to expect that there may have been seasonal or permanent floating sea ice, and possibly icebergs, in such an ocean as is the case for the Arctic and Southern Oceans on Earth. Kreslavsky and Head present a model for catastrophic submergence of the north polar basin and, geologically, rapid freezing of the entire water column to the seabed and eventual sublimation of this thick ice mass. For this scenario the conditions for creating and preserving ice keel scour marks and ice floe grounding pits are absent. To date we have found no evidence for the presence of floating ice in the north polar basin.
Derived from text
Mars Surface; Mars Volcanoes; Sea Ice; Lakes; Planetary Geology; Valleys

20040191833 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Tumbleweed: Wind-propelled Surficial Measurements for Astrobiology and Planetary Science
Kuhlman, K. R.; Behar, A. E.; Jones, J. A.; Carsey, F.; Coleman, M.; Bearman, G.; Buehler, M.; Boston, P. J.; McKay, C. P.; Rothschild, L., et al.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Tumbleweed is a wind-propelled long-range vehicle based on well-developed and tested technology, instrumented to perform surveys Mars analog environments for habitability and suitable for a variety of missions on Mars. Tumbleweeds are light-weight and relatively inexpensive, making it very attractive for multiple deployments or piggy-backing on a larger mission. Tumbleweeds with rigid structures are also being developed for similar applications. Modeling and testing have shown that a 6 meter diameter Tumbleweed is capable of climbing 25 hills, traveling over 1 meter diameter boulders, and ranging over a thousand kilometers. Tumbleweeds have a potential payload capability of about 10 kilograms with approximately 10-20 Watts of power. Stopping for science investigations can also be accomplished using partial deflation or other braking mechanisms. Surveys for Astrobiology and other applications of tumbleweeds are shown.
CASI
Planetary Geology; Propellers; Wind (Meteorology); Inflatable Structures; Mars Surface; Space Erectable Structures; Exobiology

20040191834 Museum of Natural History, London, UK
Terrestrial Lacustrine Sedimentary Deposits as Martian Analogs?
Nussbaumer, J.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Sedimentary rocks at the Meridiani landing site show a broad diversity of sedimentary structures suggesting aqueous sedimentation of still unknown duration, timing, and nature. Many of these structures have well known terrestrial analogies owing to different flow-conditions, atmospheric conditions, sediment composition and different locations in lake basins. Lacustrine sediment facies include mainly the beach, shallow shorelines, the deeper part of the lake and inflowing rivers forming deltas. Uppercarbonic lacustrine sediments in Argentina (28 deg 45 min S, 66 deg 21 min W) show some analogies

to martian sediments and may be helpful to understand climatic conditions and the duration of aqueous activity on early Mars. These lake sediments were deposited in a tectonic graben-structure, between migmatites and quarzites. They passed different climatic phases and water levels, showing warve-like layers, aeolian dunes, deltaic sequences and ripple-like sedimentary structures. A detailed discussion on beach and dune sediments, shallow water sediments, deep water sediments and delta sediments is presented.
Derived from text
Sedimentary Rocks; Mineral Deposits; Mars Surface; Analogs; Planetary Geology

20040191835 Tokyo Univ., Japan
Channel Sources, Reactivation and Chaos Formation, Xanthe Terra, Mars
Rodriquez, J. A. P.; Sasaki, S.; Dohm, J. M.; Tanaka, K. L.; Miyamoto, H.; Baker, V.; Skinner, J. A., Jr.; Komatsu, G.; Fairen, A. G.; Ferris, J. C.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The formation of outflow channels is classically attributed to the catastrophic discharge of groundwater. Documented modes of confinement and release of groundwater, trapped within the Martian cryosphere include: catastrophic release of groundwater from confined aquifers, both catastrophic and non-catastrophic release of groundwater segregated from the permafrost into confined caverns, and catastrophic release of groundwater extracted from the permafrost by thermal convection. Multiple events groundwater release resulted in the collapse of plateau materials, and the formation of chaotic terrains, which are mostly located at the head source regions of the outflow channels. Crater counting of the outflow channel floors indicates a late Hesperian age, though outflow activity may have started as early as the late Noachian. Based on geologic mapping and geomorphic assessment using Viking-, Mars Global Surveyor-, and Mars Odyssey-based information of a highland region located east of Valles Marineris and bounded to the south, west, and north by Aureum, Hydraotes, and Hydaspis Chaos, respectively (hereafter referred to as the subsided plateau region--SPR), we propose new hypotheses, which can potentially explain the following unresolved issues: (1) sources for the large volumes of water required to carve the outflow channels, (2) mechanisms of outflow reactivation, which do not involve recharging of the head source region, and (3) an alternative mode of formation for chaotic terrains.
Derived from text
Mars Surface; Channel Flow; Planetary Geology; Catastrophe Theory; Planetary Cryospheres

20040191836 Centre National de la Recherche Scientifique, Villeurbanne, France
Paleolake and Dense Valley Networks Originated by Precipitations Within Melas Chasma, Valles Marineris
Quantin, C.; Allemand, P.; Mangold, N.; Dromart, G.; Delacourt, C.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The paleo-valley networks on Mars are the most obvious features attesting that water cycle was different than today. These water-worn features are mainly contained in the Noachian highlands could have been induced by atmospheric precipitation contributing to the hypothesis of a warm and wet early Mars. Such conditions imply that the atmosphere was denser than today with an efficient green house effect to allow an elevation of the surface temperature. If such conditions occurred during the Noachian, several geological processes must have been active over this period like the deposition of carbonates. Currently, no evidence of such processes has been found. Moreover, climatic models predict that Mars has always been cold and dry as today. All this considerations leaded to alternative interpretations of the origin of Martian valley networks as ground water sapping or subglacial valleys. After this debated Early Mars, the Hesperian and Amazonian period would have been dry and cold. Valles Marineris, dated at Hesperian period, displays many enigmatic sedimentary figures whose formation under warm and wet conditions is controversial because of their age. Here, we report evidences of dense valley networks issue from atmospheric precipitations connected to a paleolake within Valles Marineris.
Derived from text
Mars Surface; Precipitation (Meteorology); Valleys; Planetary Geology; Climatology

20040191837 Paris-Sud Univ., Orsay, France
New Observations of Valley Networks Using THEMIS (Mars Odyssey) and HRSC Data (Mars Express)
Masson, Ph.; Ansan, V.; Lanz, J.; Mangold, N.; Quantin, C.; Neukum, G.; Hauber, E.; Jaumann, R.; Second Conference on Early Mars: Geologic Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Valley networks on Mars have been the subject of considerable debates since three decades. They have been first attributed to fluvial processes under conditions 3.5 Gy ago that were warmer than the present cold climate. However, many other hypothesis like geothermal activity, subglacial melting or sapping processes have been proposed because valleys are often poorly dendritic. The THEMIS images of the Mars Odyssey mission are thermal images of the surface which create strong contrasts difference between rocks and mantling by sand and dust. This dataset allows us to identify new valley networks that are strongly dendritic. They have the characteristics of valleys formed by surface run off like a high drainage density, sinuous shapes and widths increasing to the mouth of the main valley. Some of these valleys are observed on the High Resolution Stereo and Color imager (HRSC) of the Mars Express mission. This dataset permits a closer observation at a higher resolution and estimations of valley depths are possible using DTM of the resolution of about 50 meters.
Author
Planetary Mapping; Mars Photographs; Valleys

20040191838 National Air and Space Museum, Washington, DC, USA
Channels in Martian Valley Networks: Discharge and Runoff Production
Irwin, R. P., III; Craddock, R. A.; Howard, A. D.; Maxwell, T. A.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Prior to this study, at least eight interior channels had been identified on the floors of small valleys, by Pieri, Carr, Malin and Edgett, and Irwin and Howard. We have identified ten additional channels. Using a terrestrial empirical relationship between channel width and discharge, scaled to Martian gravity, we have estimated bankfull discharge in 17 of the 18 channels identified to date. The contributing area above the channel exposure was measured for 11 drainage basins, which allowed a bankfull runoff production rate (discharge/ sq m) to be estimated. Within the limitations imposed by few observations, scatter in the data, the empirical equation used, and post-flow degradation of the channels, the results can be used to test water supply mechanisms on Mars and to constrain the efficiency of runoff production to first order.
Author
Mars Surface; Valleys; Drainage; Water Runoff

20040191839 Arizona Univ., Tucson, AZ, USA
Rock Weathering and Geomorphology of the Columbia Hills: The Role of Groundwater
Rice, J. W., Jr.; Squyres, S. W.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Abstract Only; Available from CASI on CD-ROM only as part of the entire parent document

The second phase of the MER Spirit mission, in Gusev crater, began when the rover entered the province of the Columbia Hills. The rover traveled over 3km to arrive at this destination. The Columbia Hills rise up to 90m above the basaltic plains that Spirit spent the first 5 months investigating. These plains appear to be impact gardened lava flows that have subsequently undergone aeolian reworking. The Columbia Hills are embayed by the plains and are therefore much older materials. The origin and composition of the Columbia Hills, as of this writing, are still unknown. Several possible origins have been considered: eroded and partially buried impact crater rim, central peak of former crater, volcanic construct, or remnant of a formerly extensive crater fill deposit. The slopes of the Hills are covered with boulders and outcroppings of rock appear to be present along the flanks. Heretofore previously unseen deep cavernous weathering (case hardening and core softening) of rocks was observed upon crossing the contact with the plains. This type of weathering typically involves groundwater and salts. Several of these rocks have unusual morphologies (pedestals or fingers projecting away from rock's center with terminal clumps) that are somewhat similar in appearance to rocks seen at Meridiani Planum. Immediate plans are to perform IDD work on outcrop material and then ascend the summit of Husband Hill, which is the highest peak in the Columbia Hills, and winter over here.
Author
Planetary Geology; Geomorphology; Weathering; Ground Water; Mars Surface

20040191840 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Surficial Geology of the Spirit Rover Traverse in Gusev Crater: Dry and Desiccating Since the Hesperian
Golombek, M. P.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The Spirit rover landed successfully in a low albedo portion of Gusev crater at 14.5692 deg S, 175.4729 deg E on January 3, 2004 and has traversed about 3.5 km over 180 sols through cratered plains to Bonneville crater and the Columbia Hills. Gusev, a 160 km diameter Noachian crater that lies at the terminus of the 900 km long Ma'adim Vallis, was selected as a landing site to search for evidence of previous liquid water flow and/or ponding. Although no clear evidence of fluvial or lacustrine activity has been identified in the cratered plains (excepting rocks in the Columbia Hills), their surficial geology strongly limits any warmer and/or wetter period of Mars history (e.g., observed at Meridiani Planum) to be pre-Late Hesperian. This paper will review the surficial geology of Gusev crater as observed along the traverse by Spirit with special reference to the derived gradation history that strongly argues for a dry and desiccating environment since the Late Hesperian.
Author
Mars Roving Vehicles; Mars Surface; Mars Landing Sites; Planetary Geology

20040191841 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Deflections in Lava Flow Directions Relative to Topography in the Tharsis Region of Mars: Indications of Post-Flow Tectonic Motion
Chadwick, D. J.; Hughes, S. S.; Sakimoto, S. E. H.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

High-resolution topographic data from the Mars Orbiter Laser Altimeter (MOLA), and imagery from the Mars Orbiter Camera (MOC) and the Thermal Emission Imaging System (THEMIS) allow for the first accurate assessment of lava flow directions relative to topographic slopes in the Tharsis region. Tharisis has long been recognized as the dominant tectonic and volcanic province on the planet, with a complex geologic history. In this study, lava flow directions on Daedalia Planum, Syria Planum, Tempe Terra, and near the Tharsis Montes are compared with MOLA topographic contours to look for deviations of flow directions from the local slope direction. The topographic deviations identified in this study are likely due to Tharsis tectonic deformation that has modified the regional topography subsequent to the emplacement of the flows, and can be used to model the mechanisms and magnitudes of relatively recent tectonism in the region. A similar approach was used to identify possible post-flow tectonic subsidence on the Snake River Plain in Idaho.
Author
Mars Surface; Lava; Fluid Flow; Topography; Planetary Geology

20040191842 Utah Univ., Salt Lake City, UT, USA
Utah Marbles and Mars Blueberries: Terrestrial Analogs for Hematite Concretions on Mars
Chan, Marjorie A.; Beitler, Brenda; Perry, W. T.; Ormo, Jens; Komatsu, Goro; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Images of in situ and loose accumulations of abundant, hematite-rich spherical 'blueberries' (\h0.5 cm) from the Mars Exploration Rover 'Opportunity' landing site at Meridiani Planum bear a striking resemblance to diagenetic (post-depositional), iron oxide-cemented 'marbles' that are common in southern Utah. The Jurassic Navajo Sandstone in Utah contains a great variety of well-exposed iron oxide concretionary forms. We present a conceptual groundwater flow model for the production of these concretions, and suggest the implications for analogous hematite concretions on Mars. Although host rock compositions as well as iron sources and mobilization mechanisms may differ, the morphology, character and distribution of Navajo hematite concretions allow us to infer host rock properties, and subsurface fluid processes necessary for similar features to develop on Mars. Hematite is one of few minerals found on Mars that can be linked directly to water-related processes. The potential role of biomediation in the precipitation of some terrestrial hematite concretions can hold important clues in the search for extraterrestrial life. The study of the terrestrial analogs will increase our insight to understanding fluid flow history and the possibilities of life on Mars.
Author
Hematite; Earth Analogs; Planetary Geology; Mars (Planet)

20040191843 Southwest Research Inst., Boulder, CO, USA
Mars Cratering Issues: Secondary Cratering and End-Noachian Degradation
Chapman, Clark R.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Since the formation of impact craters is a well characterized physical process (primary impacts form explosion craters with characteristic initial shapes, distributed at random across a planet's surface), they provide a baseline for many fundamental issues involving the geological evolution of the surface. I explore two of these issues here, both of which have important implications for understanding the early history of Martian geology: The first issue concerns the possible importance, or even dominance, of crater populations by secondary craters. If many or most craters are secondaries, then the presumption of randomness (among other attributes of primary craters) is wrong, undercutting long used methods of relative and absolute age dating of geologic units on Mars. The second issue concerns a long-standing question about the nature and duration of a major episode of crater obliteration (relative to the cratering rate) that occurred toward the end of the Noachian. The hypothesis, developed from crater morphology data measured from Mariner 9 images, was never reevaluated in the post-Viking timeframe. With exquisite images now available from MOC and THEMIS, the time is overdue to evaluate the global obliteration episode in the context of our more recent, higher resolution understandings of Martian surface processes.
Derived from text

Degradation; Mars Surface; Planetary Geology; Mars Craters; Geochronology

20040191844 Paris XI Univ., Orsay, France

Identification of Sulfate Deposits on Mars by OMEGA/Mars Express

Gendrin, A.; Bibring, J.-P.; Gondet, B.; Langevin, Y.; Mangold, N.; Mustard, J. F.; Poulet, F.; Quantin, C.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

We report here the identification of sulfates by the OMEGA/Mars Express instrument, in Mars orbit since December 2003. These sulfates are associated with layered deposits, which have been extensively studied.
Author

Mars Express; Planetary Geology; Sulfates; Mineral Deposits; Identifying

20040191845 Northern Illinois Univ., De Kalb, IL, USA

Hypsometric Analyses of Martian Valley Networks at Watershed Basin Scale

Luo, W.; Arvidson, R. E.; Howard, A. D.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

There is continued debate about the origin of Martian valley networks. Whether they are formed predominantly by groundwater sapping or surface fluvial runoff has profoundly different implications for the climatic history of Mars and the possible evolution of life there. The purpose of this abstract is to present some preliminary results of hypsometric analyses of Martian valley networks at watershed basin scale. The improvements over previous study include adding the Moon data to establish discriminant functions and using posterior probability in the discriminant analysis as a quantitative measure of the relative role of groundwater sapping vs. surface runoff in forming each basin.
Author

Hypsography; Valleys; Mars Surface; Ground Water; Surface Water

20040191846 Lamont-Doherty Geological Observatory, Palisades, NY, USA

Some Applications of CO2-H2O Phase Equilibria to the Composition and Evolution of the Martian Atmosphere

Longhi, J.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

CO2-H2O phase equilibria dictate that although H2O abundances would have proportionately higher in thick, ancient atmospheres, the H2O concentrations would have been generally similar to present levels. Also, basal melting of CO2 polar deposits formed during periods of low obliquity provides a mechanism for long-term removal of CO2 from the atmosphere, formation of intra-crustal carbonates, and acceleration of extruding ground water.
Derived from text

Mars Atmosphere; Atmospheric Composition; Carbon Dioxide; Water

20040191847 Space Science Inst., Boulder, CO, USA

In Situ and Displaced Rocks Exposed on Meridiani Planum, Mars as Observed by the Mars Exploration Rover Opportunity: Chemistry, Mineralogy and Physical Properties

Farrand, W. H.; Jolliff, B. L.; Bell, J. F., III; Grotzinger, J.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The Meridiani Planum landing site for the Mars Exploration Rover Opportunity was chosen largely on the basis of compositional uniqueness as determined from orbital observations. The MGS TES detected spatially extensive exposures of a surface cover unit with spectral emittance properties consistent with coarse gray hematite (grain size \g 10 m). TES results indicated the gray hematite was a significant fractional component of an overall basaltic surface unit with a spectral signature consistent with the 'surface type 1' or Syrtis Major unit. Meridiani Planum had previously been noted as a location with significant exposures of layered rocks [3,4,5]. Opportunity landed in a small 20 m diameter crater, since named Eagle Crater. After spending the first 56 sols of the mission examining rock outcrops and soils exposed in that crater, Opportunity traversed across approximately 750 m of the plains to the 140 m diameter Endurance Crater. From the start of the mission to the time of the writing of this abstract, Opportunity has encountered three types of 'rocks' (materials the size of pebbles or larger). These are: (1) The in situ exposures of light-toned rocks examined at Eagle crater, observed at scattered exposures during the traverse and on the outer flanks and upper inner walls of Endurance crater; (2) The 5 mm (on average) diameter spherules that have been observed to be weathering out of the light-toned rocks and which litter the plains; (3) Dark pebble to cobble sized rocks which, based on Pancam VNIR spectra and one in situ examination are basaltic in composition. In this paper, the chemistry, mineralogy and physical properties of the light-toned rocks and basaltic cobbles will be discussed. The spherules associated with the light-toned rocks are covered in greater detail in another paper presented at this workshop.

Author

Mars Landing Sites; Mars Surface; Planetary Geology; Plains; Rocks

20040191848 National Air and Space Museum, Washington, DC, USA

The Fate of Channel Deposits under Shifting Climate Conditions on Earth and Mars

Maxwell, Ted A.; Irwin, Rossman, III; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Since Mariner 9, the origin of Mars channels has been debated, with one of the key unknowns being the fate of the massive amounts of eroded material that should have emanated from the mouths of both the outflow channels, and highland valleys. Since these sedimentary deposits should record geologic evidence for prior climates as well as the potential for being prime prospecting locations for fossil life, it is important to recognize the presence of such deposits, as well as key locations where they are absent. Based on topographic data in association with highland channels, we have noted several areas that likely were depocenters for highland fluvial and lacustrine deposits, but where MOC images suggest instead that the floors of the internally drained basins consist of highly cratered terrain. Terrestrial experience in the northeast Sahara where climate has oscillated over the past half million years suggests that meters of unconsolidated sediments are easily eroded under conditions of wetting and drying. Here we compare common valley network terminations and basin floors on Mars with arid zone playas in Egypt, where aeolian processes inhibit development of deltas and maintain enclosed basins through deflation.

Author

Valleys; Paleoclimatology; Mars Environment; Earth Analogs; Structural Basins; Playas

20040191849 Arizona State Univ., Tempe, AZ, USA

Antarctic Soil Derived from the Ferrar Dolerite and Implications for the Formation of Martian Surface Materials

McAdam, A. C.; Leshin, L. A.; Harvey, R. P.; Hoffman, E. J.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Investigation of terrestrial analogs to Martian surface materials can be used to gain insight into potential weathering processes that have operated and/or still operate on Mars, as well as assist in the interpretation of remote sensing data. Several studies have been performed of materials from different terrestrial environments, to gain insight into the nature of Martian surface materials and processes. In this study, we are investigating the mineralogical and physiochemical properties of fine size fractions of a soil weathered from the Ferrar Dolerite. The soil was collected near Lewis Cliff in the Transantarctic Mountains, at an elevation \g 2000 m, where conditions are more severe than in the Dry Valleys. The Ferrar shows mineralogical similarities to Martian basaltic lithologies (as represented by the shergottites) and therefore the production of a soil from this

protolith, in the very cold, dry Antarctic environment indicates that these fines warrant investigation as a Mars analog material. Also, these materials were altered in a colder, drier environment than several other materials studied as Mars analogs, such as Hawaiian palagonitic tehpras (e.g. JSC Mars-1). Very limited work has been done on the soils produced from the weathering of the Ferrar Dolerite in Antarctica. Detailed studies of these fines allow several questions to be addressed. What is the relative significance of inherited, primary phases and secondary phases produced by chemical weathering? What is the nature of any secondary phases (crystallinity, chemistry, etc.)? What are the spatial relationships between different minerals? What does the mineralogy and chemistry tell us about the weathering processes? Results and progress to date on addressing these questions is discussed below.
Author
Antarctic Regions; Mars Surface; Earth Analogs

20040191850 Montana State Univ., Bozeman, MT, USA
Microbial Life in Blood Falls: An Ancient Antarctic Ecosystem
Mikucki, J. A.; Priscu, J. C.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 1 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Blood Falls is a unique subglacial discharge at the terminus of Taylor Glacier in the McMurdo Dry Valleys of Antarctica. Ice penetrating radar data and geochemical analyses of Taylor's subglacial outflow strongly implicate the presence of ancient entrapped marine waters below the glacier. These waters are thought to originate from the Pliocene Epoch (approx. 5 Mya) when the dry valleys were fjord-like. Blood Falls, an iron-rich salt cone, accumulates where subglacial flow meets the ice surface at the snout of Taylor Glacier. The episodic release of subglacial water provides a sample of potentially ancient seawater and of the subglacial ecosystem lying beneath Taylor Glacier. Biogeochemical measurements, culture-based techniques, and molecular analysis (based on 16S rDNA sequences), have been used to characterize microbes and chemistry associated with outflow waters. In the absence of direct samples from below Taylor Glacier, these data allow us to infer the composition of this microbial subglacial niche. Additional information is included in the original extended abstract.
Author (revised)
Antarctic Regions; Mars Environment; Earth Analogs; Microorganisms

20040191851 Marburg Univ., Germany
Could Martian Strawberries Be? Prebiotic Chemical Evolution on an Early Mars
Lerman, L.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Pre-biotic chemical evolution presupposes successive generations of increasingly complex organic molecules combinatorially synthesized from previous generations. Not so obvious is how this combinatorial chemistry occurred; or how the overall process of chemical self-organization was functionally supported at each stage of its occurrence on an earlier, much wetter Mars. Yet just as the biochemistry of contemporary organisms can be viewed as a 'fossil' record of biogenesis, so the geochemical physics of the contemporary Earth and Mars is an indicator of the self-organizing dynamic processes underlying prebiotic chemistry. Independent of chemical details, the universalities of chemical physics strongly suggest that past Martian weather cycles offered functional support for organic chemical self-organization, the assumed predecessor to an independent 'origin' of life. The key element is the existence of an air-water interface at a variety of physical scales.
Author (revised)
Chemical Evolution; Geochemistry; Mars Environment; Hydrological Cycle

20040191852 Marburg Univ., Germany
Do Martian Blueberries Have Pits?...Artifacts of Martian Water Past
Lerman, L.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The universalities of chemical physics offer considerable insights into the intimate details of hydrology cycles possible in Mars' past. Local 'organic weather cycles' inevitably form when the Rayleigh-Taylor instability in water is metastabilized by simple organic compounds, in turn leading to a complex set of mutually transforming phase transitions. In so doing these early Martian weather cycles would have also provided functional support for organic chemical self-organization, the assumed

predecessor to an independent 'origin' of Martian life. The existence of a significant subset of these cycles (both weather and organic self-organization) is likely even if surface waters were of such limited distribution as short time-scale lakes and intermittent turbulent flows. One of a number of potential artifacts of these processes is the possibility that Martian blueberries have nucleated around organic cores, similar to the terrestrial concretions that appear to be their closest terrestrial analog. Other important implications for Mars mission planning follow.
Author
Mars Environment; Paleoclimatology; Hydrological Cycle

20040196346 Lunar and Planetary Inst., Houston, TX, USA
Space Resources Roundtable VI
2004; ISSN 0161-5297; 57 pp.; In English; Space Resources Roundtable VI, 1-3 Nov. 2004, Golden, CO, USA; See also 20040196347 - 20040196391
Contract(s)/Grant(s): NCC5-679
Report No.(s): LPI-Contrib-1224; Copyright; Avail: CASI; A04, Hardcopy

The topics addressed in the conference paper abstracts contained in this document include: extracting resources from the Moon and Mars, equipment for in situ resource utilization, mission planning for resource extraction, drilling on Mars, and simulants for lunar soil and minerals.
CASI
In Situ Resource Utilization; Extraterrestrial Resources; Lunar Resources; Lunar Bases; Mars Exploration; Mission Planning

20040196347 Johns Hopkins Univ., Laurel, MD, USA
The Lunar Polar Illumination Environment: What We Know and What We Don't
Bussey, D. B. J.; Spudis, P. D.; Space Resources Roundtable VI; 2004, pp. 14; In English; See also 20040196346; Copyright; Avail: CASI; A01, Hardcopy

The Moon's spin axis is nearly perpendicular to the ecliptic plane which results in unusual lighting conditions at the lunar poles. Areas which have low elevation, such as the floors of impact craters, may never see the Sun, i.e. they are permanently shadowed, whilst regions of high elevation, relative to the local terrain, may be permanently illuminated. The polar illumination conditions represent a key resource with respect to returning to the Moon. Possible ice deposits must be located in areas of permanent shadow, whilst the existence of a region in permanent sunshine has ramifications as a future base site.
Author
Moon; Polar Regions; Sunlight; Craters

20040196348 Hawaii Univ., Honolulu, HI, USA
Remote Sensing Assessment of Lunar Resources: We Know Where to Go to Find What We Need
Gillis, J. J.; Taylor, G. J.; Lucey, P. G.; Space Resources Roundtable VI; 2004, pp. 20; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

The utilization of space resources is necessary to not only foster the growth of human activities in space, but is essential to the President s vision of a 'sustained and affordable human and robotic program to explore the solar system and beyond.' The distribution of resources will shape planning permanent settlements by affecting decisions about where to locate a settlement. Mapping the location of such resources, however, is not the limiting factor in selecting a site for a lunar base. It is indecision about which resources to use that leaves the location uncertain. A wealth of remotely sensed data exists that can be used to identify targets for future detailed exploration. Thus, the future of space resource utilization pre-dominantly rests upon developing a strategy for resource exploration and efficient methods of extraction.
Derived from text
Remote Sensing; Lunar Bases; Extraterrestrial Resources

20040196349 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Tumbleweed: A New Paradigm for Surveying the Surface of Mars for In-Situ Resources
Kuhlman, K. R.; Behar, A. E.; Jones, J. A.; Carsey, F.; Hajos, G. A.; Flick, J. J.; Antol, J.; Space Resources Roundtable VI; [2004]; 1 pp.; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Inflatable and rigid Tumbleweeds are wind-propelled long-range vehicles based on well-developed and field tested technology. Different Tumbleweed configurations can provide the capability to operate in varying terrains and accommodate

a wide range of instrument packages making them suitable for autonomous surveys for in-situ natural resources. Tumbleweeds are lightweight and relatively inexpensive, making them very attractive for multiple deployments or piggy-backing on larger missions. Modeling and testing have shown that a 6 meter diameter Tumbleweed is capable of climbing 25 degree hills, traveling over 1 meter diameter boulders, and ranging over a thousand kilometers. Tumble-weeds have a potential payload capability of about 10 kg with approximately 10-20 Watts of power. Stopping for measurements can be accomplished using partial deflation or other braking mechanisms.
Derived from text
Mars Surface; Inflatable Structures; In Situ Resource Utilization; Rigid Structures

20040196350 sysRAND Corp., Parker, CO, USA
Telepossession Transforms Asteroids into Resources
Rodriguez, Gary; Space Resources Roundtable VI; 2004, pp. 39; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

A deep-space probe with integral RADAR transponders should be a sufficient improvement to a space rock to qualify as a resource mining claim. Such a legal device would allow Aldrin (Earth-Mars) Cycler Orbiters to develop the asteroids, widely viewed as a menace to Earth, into valued resources. Technologies and Capabilities are outlined to encourage new legal conversations.
Author
Asteroids; Deep Space; Transponders; Space Probes

20040196351 NASA Johnson Space Center, Houston, TX, USA
The Nature of Lunar Soil: Considerations for Simulants
Taylor, Lawrence A.; McKay, David S.; Carrier, W. David, III; Carter, James L.; Weiblen, Paul; Space Resources Roundtable VI Program and Abstracts; 2004, pp. 46; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

It is obvious that many factors must be considered in making lunar simulants for various ISRU projects. This subject is of major importance (also, see abstract by Carter et al., this meeting) as we move into the near-future endeavors associated with a return to the Moon. Herein, we address the detailed geologic specifics of lunar soil and list many of the geotechnical properties that should be considered before we produce simulants for definitive study purposes.
Author
Lunar Soil; Weather

20040196352 Galactic Mining Industries, Inc., Denver, CO, USA
Steel Production Utilizing Iron Extracted from Lunar Ores and Soils
Westfall, Richard; Jenkin, William C.; Space Resources Roundtable VI; 2004, pp. 47; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

The research proposal submitted to NASA (Steel Production Utilizing Iron Extracted from Lunar Ores and Soils) will in Phase I look in detail at the extraction of Iron from lunar simulants. We will examine a matrix of processing conditions and hardware configurations that can be scaled up to produce flight hardware that can be tested in space and on the Moon. In Phase I, iron extraction will be examined in detail. In Phase I we will also explore rudimentary deposition hardware and basic deposition conditions to a limited degree. In Phase II, we will manufacture and test apparatus capable of extracting iron from lunar simulants and we will expand our research into the deposition of various steel compositions. The first depositions inside of cylindrical inflatables will be carried on in Phase II of the research program, with a sample pressure vessel as one of the deliverables to NASA at the end of the Phase II work. Phase III will actually involve the manufacture of flight hardware suitable for launch and testing in Earth orbit and on the Moon.
Author
Steels; Iron Ores; Lunar Bases; Lunar Resources

20040196353 Marine Desalination Systems, LLC, Saint Petersburg, USA
The Identification of Gas Hydrate Resources on Mars: Implications for Human Exploration and Long-term Habitation
Max, M. D.; Clifford, S.; Space Resources Roundtable VI; 2004, pp. 31; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Terrestrial experience, and the recent discovery of trace amounts of methane in the Martian atmosphere that is almost

certainly leaking from subsurface Mars, suggests that Mars may be rich in a primary natural resource that could aid future human exploration and long-term habitation. This resource would be methane hydrate. Deposits similar to those found on Earth may provide potable water for drinking, agriculture and oxygen, fuel for return trips and outward exploration as well as local power, and industrial feedstock for manufacturing plastic products such as building, vehicle, and utility components. Derived from text

Hydrates; Mars Atmosphere; Methane; In Situ Resource Utilization; Extraterrestrial Resources; Mars (Planet)

20040196354 Guigne Space Systems Inc., Golden, CO, USA

Concept for Landed Measurements of Mars that will Help Identify and Characterize Potential Surface Resources

Woodworth-Lynas, C. M. T.; Guigne, J. Y.; Hart, D.; Davidson, R.; Space Resources Roundtable V; 2004, pp. 49; In English; See also 20040196346; Copyright; Avail: CASI; A01, Hardcopy

We describe the concept for a very shallow seismic subsurface imaging capability (\h 10 m, equivalent to - 10-20 ms) based on proven concepts and commercial techniques with the scientific goal of studying very near-surface planetary structure. The technical goal is to develop a miniaturized percussion-seismic source and geophone receivers, with a long-term goal of full integration with a Mars rover. The seismic system may be used to image the very shallow subsurface region of Mars to detect specific boundaries such as near-surface permafrost and buried layers that may contain easily accessible mineral resources that could be used for in situ fabrication and repair of facilities. These near-surface layers may then be reached for direct in situ sampling using a mechanical percussion seismic source as a shallow drill or by a customized piezoelectric shallow drilling tool, such as a small Ultrasonic/Sonic Driller/Corer (USDC).

Author

Solenoids; Imaging Techniques; Mars Surface

20040196355 Texas Univ., Austin, TX, USA

Mars Deep Drilling Remains a High Priority

Mandell, Humboldt C.; Space Resources Roundtable VI; [2004], pp. 29; In English; See also 20040196346; Copyright; Abstract Only; Available from CASI only as part of the entire parent document

In 1992, The University of Texas Center for Space Research (CSR) submitted a proposal to the NASA Scout Program to drill a deep well on Mars. The proposal was unsuccessful. However, the mission remains viable, and can still be accomplished for a very low cost. The science of this mission remains of utmost interest to the science community, and no deep drilling mission is scheduled currently. Deep drilling is the only way to verify the character of the Martian subsurface, particularly to characterize any water to be found there, and eventually to explore for liquid water. During the preparation of the Scout proposal, a very strong team was forged, and several of the team members, including NASA Centers, have expressed a strong interest in pursuing this mission in the near future. In its existing programs (GRACE, ICESAT, others), CSR has developed strong international ties, particularly with Germany. The GRACE partnership resulted in a sharing of mission expenses between the two countries. This type of partnership remains very viable for a Mars Deep Drilling Mission. Baker Hughes, Inc., and the NASA Johnson Space Center have built and tested a prototype Mars deep drill, so the technology risk has been greatly reduced. All of these factors come together to suggest that a very low cost, low risk mission can be proposed to NASA, either in response to a future Scout mission call, or as an independent international mission.

Author

Mars Missions; Mars (Planet); Drilling

20040196357 High Frontier, Inc., USA

Economic Laws and the Lunar Imperative: Outline of Components for a Sustained Development Strategy

Heiss, Klaus P.; Space Resources Roundtable VI; January 2004, pp. 22; In English; See also 20040196346

Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

With the renewed attention to Space Exploration and the role of humans in Space questions of the uses of the Moon and other bodies of the Solar system have come to the forefiont: is human Space flight but a romantic quest of childhood dreams or are there key opportunities to be opened and explored for the benefit of mankind - on Earth or in Space. Economic laws - which apply in Space as well as on Earth - will limit beneficial uses of Space for Earth to the immediate vicinity of Earth in the solar system, the Moon. These constraints will limit the uses for Earth to essentially observations, communications and energy - all commodities with low mass and speed of light transmission. The revolutionary concept of a condominium of observation facilities is proposed for observations of the universe, the sun and the Earth - providing a stable, nearly limitless aperture across the electromagnetic spectrum with huge advantages in reliability, costs and assurance of continuity of

observations. Similarly, communications, navigation, command and control of civil and scientific activities on the Moon and for Cis-.and Translunar space will change fundamentally. Beyond these uses, the tapping of the vast Solar energy resources available on the Moon promises fundamental changes in Space operations, Space transportation and potentially clean energy supplies across all regions of Earth. E.g. with 1 GWe supply on the Moon a new age of fuel less space transportation across Cis- and Translunar space is enabled, ultimately allowing speeds of up to one third the speed of light for missions to nearby solar systems. Last and not least, with such assured energy supplies, all the lunar resources can be tapped for the establishment of Closed Ecological Life Support Systems (CELSS) leading to the first settlement independent of Earth - a most historic step for mankind to assuring its survival and expansion into Space.
Author
Economics; Lunar Resources; Space Exploration; In Situ Resource Utilization; Extraterrestrial Resources

20040196359 Pratt and Whitney Aircraft, USA
Power Lander for Support of Long-Term Lunar Presence
Joyner, Russ; Rodriguez, Gary; Space Resources Roundtable VI; 2004, pp. 40; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Emerging industrial base and the consequent sustained manned Lunar presence will require consistent high power capacities. This paper proposes a first iteration design of a flyable electric power platform which could serve as an enabler of Lunar Development and Exploration. It is intended to support a small facility solo or an emerging industrial base as part of a grid. Lunar Missions, Habitats and Facilities stand to benefit from an expected decade of non-stop operation, the economics of scale, Commercial Off-The-Shelf (COTS) availability, standardization of design, and logistical support for Lunar encampments provided by this architecture. The unattended and unmanned vehicle design is to be man- and robotics-serviceable after delivery by current and proposed heavy-lift boosters. Design continuity within a family of systems will improve reliability through 'lessons learned' in the field. Further, various configurations of the proposed scalable architecture will provide reference platforms for the indigenous construction, of similar power plant facilities from in-situ Lunar resources (ISRU). The baseline design should be directed towards those materials available on the Moon and expected to be manufacturable on-site within the first decade of operation.
Author
Lunar Exploration; Iteration; Electric Power Supplies

20040196360 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Dielectric Constant Measurements on Lunar Soils and Terrestrial Minerals
Anderson, R. C.; Buehler, M. G.; Seshardri, S.; Schaap, M. G.; Space Resources Roundtable VI; 2004, pp. 7; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

The return to the Moon has ignited the need to characterize the lunar regolith using in situ methods. An examination of the lunar regolith samples collected by the Apollo astronauts indicates that only a few minerals (silicates and oxides) need be considered for in situ resource utilization (ISRU). This simplifies the measurement requirements and allows a detailed analysis using simple methods. Characterizing the physical properties of the rocks and soils is difficult because of many complex parameters such as soil temperature, mineral type, grain size, porosity, and soil conductivity. In this presentation, we will show that the dielectric constant measurement can provide simple detection for oxides such as TiO2, FeO, and water. Their presence is manifest by an unusually large imaginary permittivity.
Author
Lunar Soil; In Situ Resource Utilization; Grain Size; Regolith; Silicates; Minerals

20040196362 NASA Ames Research Center, Moffett Field, CA, USA
Drilling to Extract Liquid Water on Mars: Feasible and Worth the Investment
Stoker, C.; Space Resources Roundtable VI; 2004, pp. 44; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

A critical application for the success of the Exploration Mission is developing cost effective means to extract resources from the Moon and Mars needed to support human exploration. Water is the most important resource in this regard, providing a critical life support consumable, the starting product of energy rich propellants, energy storage media (e.g. fuel cells), and a reagent used in virtually all manufacturing processes. Water is adsorbed and chemically bound in Mars soils, ice is present near the Martian surface at high latitudes, and water vapor is a minor atmospheric constituent, but extracting meaningful

quantities requires large complex mechanical systems, massive feedstock handling, and large energy inputs. Liquid water aquifers are almost certain to be found at a depth of several kilometers on Mars based on our understanding of the average subsurface thermal gradient, and geological evidence from recent Mars missions suggests liquid water may be present much closer to the surface at some locations. The discovery of hundreds of recent water-carved gullies on Mars indicates liquid water can be found at depths of 200-500 meters in many locations. Drilling to obtain liquid water via pumping is therefore feasible and could lower the cost and improve the return of Mars exploration more than any other ISRU technology on the horizon. On the Moon, water ice may be found in quantity in permanently shadowed regions near the poles.
Derived from text
Drilling; Life Support Systems; Mars Exploration; Mars Surface; Lunar Environment; Drills; In Situ Resource Utilization; Extraterrestrial Resources; Manned Mars Missions

20040196363 State Dept., Washington, DC, USA
Rocks to Robots: A Biological Growth Approach to Rapid Lunar Industrialization or How to Realize Von Neumann's Vision
Morin, L. M. E.; Space Resources Roundtable VI; 2004, pp. 33; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

We propose a strategy for rapidly attaining and maximizing lunar industrial capability. Consider a series of 1000 kg EELV (Evolved Expendable Launch Vehicle) lunar payloads. These payloads bring the following technologies: Telepresence robotics for mining and material manipulation, ISRU (In Situ Resource Utilization) production of solar electric power, solar furnaces for fusion of regolith ceramics, and electrolytic reduction of metals from regolith. Using telepresence, regolith is mined on a kilogram scale for ISRU. Telepresence-operated ISRU apparatus immediately produces metals and ceramics, also on kilogram scales. Metals, particularly iron, are shaped using casting, powder metallurgy, and light machining methods. This produces a versatile kit of assorted stock mechanical components. These lunar kits, together with required earth-based components, are assembled by telepresence to generate additional mining and fabrication equipment, as well as more telepresence robots. Re-supply missions provide critical earth-based ingredients, such as miniature cameras, computer controllers, reagents for thin-film solar cell production, electrodes, forming dies, and tool bits. However, the overall proportion of earth-based content is reduced as rapidly as possible by several strategies. Designs maximize use of lunar iron, the first metal that will be produced. Simple mechanical devices, built with lunar materials using methods at hand, are favored over more sophisticated earth-based technologies. As mining operations are scaled up, more elements and minerals become available, which provides more options to eliminate earth-based content. Accumulating know-how also yields new methods of substituting lunar for earth-based content.
Author
Lunar Rocks; Lunar Soil; Industrial Management; Biology; Miniaturization; Powder Metallurgy

20040196366 Pennsylvania State Univ., University Park, PA, USA
Intelligent Excavation for the Moon
Schissler, A.; Kecojevic, V.; Space Resources Roundtable VI; 2004, pp. 41; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Intelligent Excavation (IE) is an emerging technology on earth. This technology is being utilized by Fortune 200 mining companies. IE has application to the intensified NASA objective of space exploration. Mining on the moon will require precise spatial reference of mineralization, as identified by evasive and remote sensing exploration methodologies. During the actual extraction process, mining and haulage machines will also require real-time spatial reference, and remote mineral inventory management. Existing mining information technology in the form of IE offers adaptability to geo-base moon requirements. Researching existing earth-based Intelligent Excavation system capacity and accuracy for alteration for mining on the moon offers promise. Such a program meets NASA s Technology Readiness Levels 1 - 5. These readiness levels have as a benchmark; ground truth earth-based evaluation and synthesis into space environments. IE technology is available to meet this in-process research protocol. The benefit of IE to the extraction process is a reduction in cost per unit mined.
Author
Moon; Lunar Mining; Lunar Resources; Mines (Excavations); In Situ Resource Utilization

20040196367 Wisconsin Univ., Madison, WI, USA
Solar Wind Helium Concentrations in Undisturbed Lunar Regolith
Schmitt, H. H.; Space Resources Roundtable VI; 2004, pp. 42; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Considerations of the geology of helium in the lunar regolith strongly indicate that agitation of regolith samples before laboratory analysis has caused the loss of solar wind volatiles. For example, the undisturbed concentration of Apollo 11 helium-3 subject to recovery through mining and processing of titanium-rich areas of Mare Tranquillitatis is significantly higher than the 11.8 wppb average measured for samples of Apollo 11 fines. A similar conclusion appears to hold for solar wind helium-4 and hydrogen. A review of analyses of samples of Apollo 11 and other regolith fines as a function of grain-size fraction offer insights into the concentrations of volatiles in undisturbed regolith. For example, the finest size fraction, less than 20 microns, of 10084,18 show the helium-3 and helium-4 concentrations 27-35% and 19-39% greater, respectively, than the sample as a whole. (1) In the analysis of 10084,47 grain sizes less than 1.4 pm, the concentrations reach 221 wppm and 71 wppb, respectively.(2) Similarly, analysis of 10087,8 grain sizes less than 5 pm, shows the concentrations are 76.1 wppm and 20.1 wppb, respectively.(3) These results almost certainly reflect the increase in total surface area with decreased grain size fraction. On the other hand, helium-3 and helium-4 concentrations in 10084 reach minimums at about 150 microns that are respectively 78-83% and 7734% lower than in the less than 20 microns fraction. Concentrations then increase in the coarser factions suggesting that agitation affects the intermediate size fractions more that the small and large fractions. Data also show a correlated decrease in 4He/3He mass ratios with increased grain size fraction in regolith fines, changing from about 3500 to about 3300 before again increasing in the courser fractions. These concentration vs. grain size relationships may reflect the interplay of implantation energy vs. particle mass vs. surface area during repeated agitation as samples were handled and processed from the undisturbed regolith on the Moon to the analyst's mass spectrometer.
Derived from text
Solar Wind; Helium Isotopes; Concentration (Composition); Regolith; Lunar Rocks

20040196369 NASA Johnson Space Center, Houston, TX, USA
Lunar Simulants: JSC-1 is Gone; The Need for New Standardized Root Simulants
Carter, James L.; McKay, David S.; Taylor, Lawrence A.; Carrier, W. David, III; Space Resources Roundtable VI; 2004, pp. 15; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

A workshop was held in 1991 to evaluate the status of simulated lunar regolith material and to make recommendations on future requirements and production of such material. As an outgrowth of that workshop, a group centered at Johnson Space Center (JSC) teamed with James Carter of the University of Texas at Dallas and Walter Boles of Texas A&M University to produce and distribute a new standardized lunar regolith simulant termed JSC-1. Carter supervised the field collection, shipping, processing, and initial packaging and transportation of JSC-1. Boles stored and distributed JSC-1. About 25 tons were created and distributed to the lunar science and engineer community; none is left for distribution. JSC-1 served an important role in concepts and designs for lunar base and lunar materials processing. Its chemical and physical properties were described by McKay et al., with its geotechnical properties described by Klosky et al.. While other lunar regolith simulants were produced before JSC-1, they were not standardized, and results from tests performed on them were not necessarily equivalent to test results performed on JSC-1. JSC-1 was designed to be chemically, mineralogically, and texturally similar to a mature lunar mare regolith (low titanium). The glass-rich character of JSC-1 (approx. 50%) produced quite different properties compared to other simulants that were made entirely of comminuted crystalline rock, but properties similar to lunar mare near surface regolith.
Author (revised)
Regolith; Lunar Rocks; Simulation

20040196373 Boeing Co., Houston, TX, USA
Near Earth Object Characterization, Exploration and Exploitation
Klaus, Kurt; Space Resources Roundtable VI; 2004, pp. 25; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

The purpose of this paper is to outline how asteroid exploration can leverage from Project Constellation technologies and the benefits to space exploration that can result from exploiting asteroid resources. There are multiple reasons for exploring these bodies: 1) Little is known about their characteristics to help us with mitigation strategies in the event of an impact threat; 2) Many Near Earth Asteroids (NEAs) contain raw material and ore required for manufacturing, fuel production and a basis for testing in situ resource utilization concepts (consider the case of Iron/Nickel asteroids); 3) Asteroid exploration provides unique opportunities to further expand the human/robotic interaction required for advanced exploration; 4) Some of these objects are relatively close especially when considering human missions to Mars; 5) There is a great deal to be learned about the origin of the solar system and primordial history of the planets through the study of asteroids; 6) Asteroid rendezvous

missions are a logical step in a spiral approach to human deep space missions.
Derived from text
Asteroids; Near Earth Objects; Space Exploration; Solar System; Exploitation

20040196374 ATH Ventures, Inc., Hampton Bays, NY, USA
Mission Design for Economically Self-Supporting Large Scale Lunar Telepresence
Konesky, G. A.; Space Resources Roundtable VI; 2004, pp. 26; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

Telepresence provides the ability to sense and interact with a potentially hostile environment without the difficulties of getting there, being there, and then returning. Given the limitations of the speed of light, the Moon, which is approximately two and a half seconds round trip distant, is accessible to near-real time telepresence. In addition to the obvious scientific motivations to further explore the surface of the Moon, there is also substantial mass appeal among the general public to interact. The popular access of live pictures over the internet from various Mars Rover missions exemplifies this and demonstrated a level of internet activity that was (and still is) without precedent. A mission design is presented to provide on-going large scale telepresence opportunities on the lunar surface at various levels of interaction with an access fee structure to provide economic self-support. A baseline study includes 10 rover vehicles, each carrying 50 independently controlled stereoscopic camera heads, collectively supporting 500 simultaneous Earth-bound users. A Lander acts as an Earth relay link, permitting the rovers to be relatively simple, light weight, and low cost. The Lander, which provides terminal transport of the rover fleet to the lunar surface, can be relocated, expanding the exploration area. The entire operation is solar powered and without consumables. Rover steering and camera pan and tilt commands are up linked from Earth-bound users over relatively low bandwidth RF to the Lander, and relayed to the rover fleet. Stereoscopic camera feeds from the 50 camera heads on each rover are relayed to the Lander, which combines them with those of the other rovers, and down links them to the Earth over a high bandwidth optical data link. A one watt Laser (820 nm) on the Moon, transmitted through a one meter telescope, and received on the Earth by a similar sized telescope, results in a positive link margin.
Author
Economics; Lunar Surface; Mission Planning; Teleoperators; Topography

20040196377 Wisconsin Univ., Madison, WI, USA
Simulation of Helium-3 Extraction from Lunar Ilmenite
Kuhlman, K. R.; Kulcinski, G. L.; Schmitt, H. H.; Space Resources Roundtable VI; [2004], pp. 28; In English; See also 20040196346; Copyright; Avail: CASI; A01, Hardcopy

Knowledge of the trapping mechanisms and diffusion characteristics of solar-wind implanted isotopes in the minerals of the lunar regolith will enable the optimization of the processes to extract solar wind gases from regolith particles. Extraction parameters include the temperature and duration of extraction, particle size, and gas yield. Diffusion data will increase the efficiency and profitability of future mining ventures. This data will also assist in optimizing the evaluations of various potential mining sites based on remote sensing data. For instance, if magnesian ilmenite (Mg,Fel.,Ti03) is found to retain He better than stoichiometric ilmenite (FeTi03), remote sensing data for Mg could be considered in addition to Ti and maturity data. The context of the currently discussed work is the mining of helium-3 for potential use as a fuel for fusion energy generation. However, the potential resources deposited by the solar wind include hydrogen (and derived water), helium-4, nitrogen and carbon. Implantation experiments such as those performed for helium isotopes in ilmenite are important for the optimized extraction of these additional resources. These experiments can easily be reproduced for most elements or isotopes of interest.
Author
Extraction; Helium Isotopes; Ilmenite; Lunar Rocks; Lunar Mining; Space Commercialization; Mining

20040196384 NASA Ames Research Center, Moffett Field, CA, USA
SILVER: Surface Imaging for Lunar Volatiles, Resources, and Exploration
Pappalardo, R. T.; Cobabe-Ammann, E.; Cook, A. C.; Greeley, R.; Gulick, V. C.; McClintock, W. E.; Moore, J. M.; Stern, S. A.; Vasavada, A. R.; McClelland, M., et al.; Space Resources Roundtable VI; 2004, pp. 36; In English; See also 20040196346
Contract(s)/Grant(s): NCC5-679; Copyright; Avail: CASI; A01, Hardcopy

The Surface Imaging for Lunar Volatiles, Exploration, and Resources (SILVER) instrument is a proposed imaging investigation for the 2008 Lunar Reconnaissance Orbiter (LRO) mission. SILVER and its experienced Measurement Team will prepare for and support future lunar human exploration activities, especially landing site identification and certification on the

basis of potential resources. SILVER combines a high-resolution pushbroom visible imaging channel (SILVER-HR) and a wide-field-of-view (45 deg) framing imaging channel (SILVER-WF). SILVER-HR will obtain a single-detector 6 km imaging swath of 12,228 pixels at 0.5 m/pixel to image greater than 100 sq km target areas from 50 km altitude, imaging greater than 15% the lunar surface during a 1 year nominal mission. SILVER-HR has excellent stray-light rejection and its imaging detector has selectable time delay integration (TDI) with up to 128 stages for extreme low-light sensitivity, permitting direct imaging of permanently shadowed polar regions in scattered sunlight or earthshine. SILVER-WF will obtain geodetic framing images in a 2048 x 2048 format at 20m/pixel, with 60% along-track overlap stereo for imaging context and for derivation of a global digital elevation model of meter-scale lunar topography.
Author
Lunar Exploration; Lunar Geology; Lunar Surface; Lunar Topography; Remote Sensing

20040196388 Colorado School of Mines, Golden, CO, USA
Costs and Benefits of ISRU-Based Human Space Exploration
Blair, B. R.; Duke, M. B.; Diaz, J.; Ruiz, B.; Space Resources Roundtable VI; 2004, pp. 12; In English; See also 20040196346; Copyright; Abstract Only; Available from CASI only as part of the entire parent document

A three phase 10-year scenario for In Situ Resource Utilization (1SRU)-based human exploration architecture will be introduced as a foundation for an economic cost/benefit model of the value of the use of space resources, including infrastructure and capability growth through time. This architecture is generally consistent with the development of a self-sufficient outpost on the Moon during the period 2020-2030, Cycle 2 of the current NASA exploration vision. A preparatory set of robotic missions has also been assumed to emplace ISRU capabilities as well as infrastructure in preparation for the first human missions. Models for both performance benefits (e.g. the amount of mass that has to be transported from Earth to achieve the desired lunar capability) and relative costs, compared to alternative scenarios that do not utilize ISRU have been developed. Economic differences between the ISRU architecture and the all-expendable baseline will be presented, which provide the basis for quantifying the benefits of ISRU development. Sensitivity analysis of the integrated architectural/economic model will be used to recommend priorities for future research and modeling. Economic conclusions that will be presented include expected product unit costs and rate of return analysis.
Author
In Situ Resource Utilization; Space Exploration; Manned Space Flight; Cost Effectiveness

20040200915 Lunar and Planetary Inst., Houston, TX, USA
Workshop on Hemispheres Apart: The Origin and Modification of the Martian Crustal Dichotomy
2004; ISSN 0161-5297; 86 pp.; In English; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy, 30 Sep. - 1 Oct. 2004, Houston, TX, USA; See also 20040200916 - 20040200951
Contract(s)/Grant(s): NCC5-679
Report No.(s): LPI-Contrib-1213; Copyright; Avail: CASI; A05, Hardcopy

This volume contains abstracts that have been accepted for presentation at the Workshop on Hemispheres Apart: The Origin and Modification of the Martian Crustal Dichotomy, September 30-October 1, 2004, Houston, Texas.
Author
Mars (Planet); Planetary Crusts; Hemispheres; Planetary Evolution; Planetary Geology; Geomorphology

20040200916 Purdue Univ., West Lafayette, IN, USA
The Crustal Dichotomy as a Trigger for Edge Driven Convection: A Possible Mechanism for Tharsis Rise Volcanism?
King, S. D.; Redmond, H. L.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 35-36; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

A vertical constant temperature boundary is convectively unstable and drives convective motion. This is the essence of the Edge Driven Convection (EDC) hypothesis. On Earth, cratonic keels and continent-ocean boundaries are locations where small-scale convection could be triggered from the vertical step in the thermochemical boundary layer at the surface. Because Earth has global, plate-scale motion, it isn't clear whether EDC instabilities can form at all (or any?) passive margins or cratonic keels; although seismic evidence supporting EDC has been observed under the African cratons. While a mantle plume has been argued as the source of the volcanism that formed Tharsis rise, there are concerns that the plume model may not be consistent with other observations (e.g., thermal history calculations, the fact that there is a single large volcanic swell on the planet, and the ability to explain present day topography and gravity with crustal variations alone). While none of these observations are strong enough to completely rule out a plume origin for the formation of Tharsis, the spatial correlation of

the crustal dichotomy boundary and Tharsis rise is intriguing and a relationship between these has been suggested by a number of investigators.
Author
Mars (Planet); Geodynamics; Planetary Crusts; Mars Volcanoes

20040200917 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Crustal Evolution of the Protonilus Mensae Area, Mars
McGill, G. E.; Smrekar, S. E.; Dimitriou, A. M.; Raymond, C. A.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 42-43; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Despite research by numerous geologists and geo- physicists, the age and origin of the martian crustal dichotomy remain uncertain. Models for the origin of this dichotomy involve single or multiple impact, mantle megaplumes, primordial crustal asymmetry, and plate tectonics. Most of these models imply a Noachian age for the dichotomy. A major problem common to all genetic models is the difficulty separating the features resulting from the primary cause for the dichotomy from features due to younger fault- ing, impact cratering, volcanism, deposition, and erosion. highlands (the dichotomy boundary) approximates a small circle that ranges in latitude from about -10 deg. in Elysium Planitia to about +45 deg. north of Arabia Terra. For much of its length the boundary is characterized by relatively steep scarps separating highland plateau to the south from lowland plains to the north, generally with a complex transition zone on the lowland side of these scarps. These scarps are almost certainly due to normal faulting. The type fretted terrain, which defines the boundary in north-central Arabia Terra, also is characterized by scarps but has under- gone a more complex history of faulting and dissection [13]. In some places, notably in the Acidalia Planitia region, the dichotomy boundary is gradational. In the Tharsis region the boundary is obscured by younger volcanics.
Derived from text
Mars Surface; Planetary Crusts; Planetary Evolution; Terrain; Geological Surveys

20040200918 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Topographic Change of the Dichotomy Boundary Suggested by Crustal Inversion
Neumann, G. A.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 46-47; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Linear negative gravity anomalies in Acidalia Planitia along the eastern edge of Tempe Terra and along the northern edge of Arabia Terra have been noted in Mars Global Surveyor gravity fields. Once proposed to represent buried fluvial channels, it is now believed that these gravity troughs mainly arise from partial compensation of the hemispheric dichotomy topographic scarp. A recent inversion for crustal structure finds that mantle compensation of the scarp is offset from the present-day topographic expression of the dichotomy boundary. The offset suggests that erosion or other forms of mass wasting occurred after lithosphere thickened and no longer accomodated topographic change through viscous relaxation.
Author
Topography; Dichotomies; Boundaries; Mars Surface

20040200919 California Univ., Berkeley, CA, USA
Effect of the Dichotomy on Mantle Plume Locations
Wenzel, M. J.; Manga, M.; Jellinek, A. M.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 74-75; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Martian crustal thickness is dichotomous. As the crust is expected to be enriched in heat-producing elements, the temperature at the base of the thicker crust of the southern highlands will be higher than at the base of the northern lowlands. This is analogous to an insulating lid on part of the mantle. It is also possible the martian mantle is compositionally layered. These two effects strongly influence mantle dynamics, including the location and longevity of upwelling plumes. We perform a series of analogue laboratory experiments to examine these effects.
Author
Planetary Mantles; Planetary Structure; Planetary Geology

20040200920 Carnegie Institution of Washington, Washington, DC, USA
Endogenic Mechanisms for the Formation of the Martian Crustal Dichotomy: Hypotheses and Constraints
Solomon, Sean C.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 62-63; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The southern uplands and northern lowlands of Mars differ markedly in average elevation and crustal thickness. This crustal dichotomy, recognized following the first global observations of the planet by Mariner 9, has variously been attributed to internal and external processes, but no single hypothesis for its formation has heretofore been fully persuasive. This paper offers a review of proposed endogenic formation mechanisms for the dichotomy, as well as the geophysical and geochemical constraints that these hypotheses must satisfy.
Author
Dichotomies; Crusts; Mars Surface

20040200922 Rice Univ., Houston, TX, USA
Depth-dependent Rheology and the Wavelength of Mantle Convection with Application to Mars
Lenardic, A.; Richards, M. A.; Busse, F. H.; Morris, S. J. S.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 39-40; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Numerical simulations have shown that depth-dependent viscosity can increase the wavelength of mantle convection. The physical mechanism behind this observation and, by association, its robustness remain to be fully elucidated. Towards this end, we develop theoretical heat flow scalings for a convecting fluid layer with depth-dependent viscosity. Bottom and internally heated end-members are considered. For the former, the viscosity structure consists of a high viscosity central region bounded from above and below by horizontal low viscosity channels. For internally heated cases, only a surface low viscosity channel is present. The theoretical scalings show how depth-dependent rheology lowers the lateral dissipation associated with convective cells. This allows longer aspect ratio cells to form as the viscosity contrast between the channels and the central region is increased. The maximum cell extent is determined by the condition that the pressure gradients that drive lateral flow in the channels do not become so large as to inhibit vertical flow into the channels. Scaling predictions compare favorably to results of numerical simulations at low to moderate Rayleigh numbers. As the Rayleigh number driving convection is increased, time dependence sets in in the form of small scale boundary layer instabilities. This increases lateral dissipation within the channels and the maximum cell extent decreases as a result. Internally heated simulations show that a near surface high viscosity layer, a lithosphere analog, can suppress these small scale instabilities. This allows a low viscosity channel to maintain large aspect ratio cells at high Rayleigh numbers.
Author
Planetary Mantles; Planetary Geology; Rheology; Convection; Mars (Planet)

20040200923 Colorado Univ., Boulder, CO, USA
On the Dynamic Origin of the Crustal Dichotomy and Its Implications for Early Mars Evolution
Zhong, Shi-Jie; Roberts, James H.; McNamara, James H.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 76-77; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The crustal dichotomy and Tharsis Rise are the most important large-scale tectonic features on the Martian surface. An understanding of their formation has important implications for understanding thermal evolution of Mars and the Martian gravity anomalies, tectonics, volcanism, and volatiles losing history. Both endogenic and exogenic processes were proposed for the formation of the crustal dichotomy. In this study, we focus on endogenic processes. Two different endogenic processes were proposed: crustal erosion derived from degree-1 mantle convection and plate tectonics, both proposed before the MGS missions. With the MGS high resolution data, there are a number of studies on the nature of Martian crust, crustal dichotomy and Tharsis rise that should be considered in any attempts to unravel the formation of crustal dichotomy and the evolution of early Mars. 1) The discovery of abundant buried ancient impact craters in the northern plains indicates that the crust of the northern hemisphere is of the middle Noachian or as old as that of the southern hemisphere, if not older. 2) The topography and gravity anomalies suggest a pole-to-pole gradual and smooth variation of crustal thickness. 3) The topography and gravity anomalies suggest that Martian crust is on average \g50 km thick and is thicker than the elastic plate (or the layer that is capable of supporting long-term geological loads) Not only the surface but also the bulk of the crust may have been produced quite early on (in the first 0.5 Ga), according to the thermal evolution modeling. 4) Significant tectonic deformation occurred along the crustal dichotomy in late Noachian and early Hesperian. 5) The surface tectonics suggest that the bulk of the Tharsis rise was formed by the late Noachian, similar to the formation time of crustal dichotomy. Modeling the Tharsis topography and gravity indicates that the Tharsis rise is mostly supported by surface loads on elastic plate with little or no dynamic contribution from a plume.
Author
Planetary Crusts; Planetary Evolution; Mars (Planet)

20040200924 Brown Univ., Providence, RI, USA

Mars Dichotomy Boundary Degradational Processes: Evidence for Extensive Amazonian Glaciation

Head, J. W.; Agnew, M. C.; Fassett, C. I.; Marchant, D. R.; Kreslavsky, M. A.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 25-26; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Among the hallmark morphologies of the dichotomy boundary, particularly at higher latitudes are 1) the debris aprons the surround many of the massifs and valley walls, and 2) the lineated valley fill that occurs in many of the valleys themselves. New THEMIS, MOLA and MOC data provide additional perspectives on the origin of the debris aprons and lineated valley fill, suggesting that at least in some areas, glaciation (accumulation of snow and ice to sufficient thickness to cause its local and regional flow) may have played a significant role. We have analyzed numerous areas along the dichotomy boundary north of 30 degrees north latitude and present the results from one area as an example. In this region just south of Deuteronilus Mensae, a T-shaped valley occurs just south of a large depression. The walls of the large depression are characterized by debris aprons and there is a break in the southern rim of the depression that leads to the top of the T-shaped valley (about 100 km across). A topographic profile from the floor of the large depression across the southern wall, across the top of the T and along the vertical part of the T shows 1) the flat floor of the large depression, 2) the classic convex upward slope of the debris apron, 3) the elevated floor of the top of the T, 4) the convex upward slope of the vertical part of the T. Note that the floor of the T-shaped valley along the top of the T lies at elevations as high as -2600 m, almost a kilometer above the large depression floor. Note too, that the bottom of the valley along the vertical part of the T is almost at the same level as the floor of the large depression. THEMIS data superposed on MOC altimetry and viewed perspectively shows strong evidence for flow lineations, their characteristics and their directions; details of the lineations are shown in the MOC images.

Derived from text

Mars (Planet); Planetary Crusts; Glaciers

20040200925 Museum of Natural History, London, UK

Glacial Modification of the Martian Crust in Aeolis Region, Mars

Nussbaumer, J.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 50-51; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

New Mars orbital data show evidence for widespread glaciation in Aeolis Region. Geomorphic features like tunnel channels, and drumlins suggest a formation mechanism associated with subglacial high water pressures. Viscous flow features and moraines indicate ongoing sublimation and a rather young age for the retreating ice. These observations complement previous studies that report evidence for glaciation in southern Elysium Planitia.

Author

Mars Surface; Planetary Crusts; Glaciers; Planetary Geology

20040200926 Brown Univ., Providence, RI, USA

Mars Dichotomy Boundary Degradational Processes in Space and Time: Clues to Global Climate Evolution

Head, James W.; Fassett, Caleb I.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 29-30; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

It has long been known that the boundary between the northern lowlands and the southern uplands (the dichotomy boundary) is characterized by both a generally distinctive topographic change, as well as characteristic geological units that appear to represent processes of weathering, topographic degradation and scarp retreat southward from the dichotomy boundary. We first examine the nature and distribution of the units that characterize this boundary and then discuss how modification processes have vaned over time and space.

Author

Mars Surface; Terrain; Planetary Geology

20040200927 Brown Univ., Providence, RI, USA

Martian Early Magnetic Field as a Result of Magma Ocean Cumulate Overturn

Elkins-Tanton, L. T.; Zaranek, S.; Parmentier, E. M.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 15-16; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Dynamical models of Martian differentiation and early evolution need to be consistent with several major attributes of Mars that are believed to have developed before 4.0 Ga: differentiation of mantle source regions into isotopically distinct reservoirs; development of an early, brief, strong magnetic field; and the formation of an early crust to record that field.

Significant and perhaps complete melting of the large terrestrial planets is expected due to the conversion of kinetic energy to heat during accretion of planetesimals, and to the potential energy release of core formation. Previous results of Martian magma ocean investigations indicated that magma ocean crystallization and subsequent overturn on Mars could be fast and complete, and is consistent with magma source region differentiation and the development of an alumina-poor Martian mantle. The further results presented here demonstrate that magma ocean crystallization and overturn can produce a magnetic field of between 10 and 50 million years duration.
Author
Mars (Planet); Magma; Ocean Models; Planetary Mantles; Planetary Magnetic Fields

20040200928 Brown Univ., Providence, RI, USA
Magnetic Anomalies North of the Dichotomy Boundary: Possible Evidence for Dichotomy Retreat?
Fassett, C. I.; Head, J. W., III; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 17-18; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The Mars Global Surveyor magnetometer experiment revealed strong crustal magnetic anomalies, predominately in the southern highlands. It is generally believed that these anomalies were emplaced quite early in Mars' history given the apparent demagnetization of the major impact basins. Besides the correspondence of the major basins with regions of low magnetism and the broad difference between hemispheres, there are relatively few correlations between the crustal magnetic signature and other geological features. A particular region of interest where remanent magnetism is poorly correlated with geology is observed near the dichotomy boundary, especially in the region from 60 deg. to 160 deg. E. A magnetic signature appears to extend at least 500 km north from the present dichotomy. At present, we are attempting to understand the implications that this observation may have for helping to unravel the complicated history of the dichotomy boundary, as well as for understanding of the magnetic anomalies and their modification history. In what follows, we briefly outline several possible models.
Author
Magnetic Anomalies; Magnetic Properties; Structural Basins; Dichotomies

20040200929 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Impact Constraints on the Age and Origin of the Crustal Dichotomy on Mars
Frey, H. V.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 19-20; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

MOLA data have revealed a large population of 'Quasi-Circular Depressions' (QCDs) with little or no visible expression in image data. These likely buried impact basins have important implications for the age of the lowland crust, how that compares with original highland crust, and when and how the crustal dichotomy may have formed. The buried lowlands are of Early Noachian age, likely slightly younger than the buried highlands but older than the exposed (visible) highland surface. A depopulation of large visible basins at diameters 800 to 1300 km suggests some global scale event early in martian history, maybe related to the formation of the lowlands andor the development of Tharsis. A suggested early disappearance of the global magnetic field can be placed within a temporal sequence of formation of the very largest impact basins. The global field appears to have disappeared at about the time the lowlands formed. It seems likely the topographic crustal dichotomy was produced very early in martian history by processes which operated very quickly. This and the preservation of large relic impact basins in the north- em hemisphere, which themselves can account for the lowland topography, suggest that large impacts played the major role in the origin Mars fundamental crustal feature.
Author
Crusts; Dichotomies; Magnetic Fields; Mars Surface; Structural Basins; Impact

20040200930 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Constraints on Early Mars Evolution and Dichotomy Origin from Relaxation Modeling of Dichotomy Boundary in the Ismenius Region
Guest, A.; Smrekar, S. E.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 21-22; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The Martian dichotomy is a global feature separating the northern and southern hemispheres. The 3.5 - 4 Gyr old feature is manifested by a topographic difference of 2-6 km and crustal thickness difference of approx. 15 - 30 km between the two hemispheres. In the Ismenius region, sections of the boundary are characterized by a single scarp with a slope of approx. 20 deg. - 23 deg. and are believed to be among the most well preserved parts of the dichotomy boundary. The origin of the

dichotomy is unknown. Endogenic hypotheses do not predict the steep slopes (scarps) of the dichotomy boundary. Exogenic models for forming the northern lowlands by impact cratering, associate the scarps along the dichotomy boundary with craters' rims, but are not globally consistent with the topography and gravity. In order to better understand the origin of the Martian dichotomy, it is necessary to know if the steep scarps along the boundary represent the original shape of the dichotomy. Smrekar et al. presented evidence showing that the boundary scarp in Ismenius is a fault along which the highland crust was down faulted. We test whether the relaxation process could produce faulting along the dichotomy boundary and examine the crustal and mantle conditions that would allow for faulting to occur within 1 Gyr and preserve the long wavelength topography over another 3 Gyr. We approach the problem by a combination of numerical and semi-analytical modeling. We test different viscosity profiles and crustal thicknesses by comparing our modeled magnitude, location and timing of plastic strain and displacements to detailed geologic observations in the Ismenius region.
Author
Mars (Planet); Evolution (Development); Dichotomies; Boundaries

20040200931 Planetary Science Inst., Tucson, AZ, USA
Geomorphic Analyses of Debris Aprons Along the Martian Dichotomy Boundary, Tempe Terra/Mareotis Fossae Region, Mars
Chuang, F. C.; Crown, D. A.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 7-8; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Geomorphic indicators of sub-surface ice on Mars are currently the subject of intense study in the planetary community. Lobate debris aprons, thick accumulations of mass-wasted material with lobate fronts, along with heated valley fill and concentric crater fill, were first identified in regions of Martian fretted terrain along the highland-lowland boundary. Squyres and others postulated that features of this suite were saturated with ice and moved downslope by creep. Globally, debris aprons are found poleward of 30 N and 30 S latitude with several regions having high concentrations of these features. The abundance of debris aprons along portions of the dichotomy boundary provide important clues about the types of geologic materials present in the region and the role that volatiles play in the modification of the boundary over time. In this study, we use the abundance of new Mars orbital data to assess the geomorphic and geologic characteristics of debris aprons in the Tempe Terra/Mareotis Fossae region of Mars (43 - 55 N, 274 - 294 E). Comparison of apron populations from different parts of Mars will allow us to evaluate regional geologic controls and potential climatic differences on apron development.
Author
Ice; Mars Surface; Planetary Geology; Terrain; Craters

20040200932 Lunar and Planetary Inst., Houston, TX, USA
Loading-induced Stresses and Topography Near the Martian Hemispheric Dichotomy Boundary
McGovern, P. J.; Watters, T. R.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 44-45; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The dichotomy between the north- em and southern hemispheres of Mars is one of the fundamental physiographic features of the planet. The dichotomy is manifested in the topography, geology, tectonics, cratering record, magnetic field, and crustal structure. The origin of the crustal dichotomy between northern (relatively thin, constant thickness) and southern (relatively thick and thickening southward) crustal provinces appears to date to the earliest Noachian, a period with scant remaining traces in the geologic record. However, subsequent geologic and tectonic events may contain clues as to the nature of the hemispheric dichotomy. The Eastern Hemisphere Dichotomy Boundary (or 'EHDB') of Mars between 40 deg. E (western Arabia Terra) and 160 deg. E (Terra Cimmeria) is characterized by a prominent topographic scarp (several km in height), compressional features on the highlands side and ex- tensional features on the boundary ramp. Load- ing of the lithosphere due to emplacement of volcanic or sedimentary material on the lowlands side, erosion on the highlands side, and an episode of global compression in the Hesperian may be responsible for the observed topography and tectonics. A broken-plate flexural model with elastic lithosphere thickness T, = 31 - 36 km provided a good fit to Mars Orbiter Laser Altimeter (MOLA) topography data across the EHDB.
Author
Boundaries; Dichotomies; Magnetic Field Configurations; Topography; Mars Surface

20040200933 Buenos Aires Univ., Argentina
Triggering the End of Plate Tectonics by Forced Climate Changes
Spagnuolo, M. G.; Dohm, J.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 64-65; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Several investigators have suggested that plate tectonics was an active process, recently proposed for extremely ancient Mars. Based on the assumption that accretion and subduction were active processes in the extremely ancient past, and plate tectonism ended in the formation of the southern cratered highlands, we propose that the cratered highlands represents a supercontinent that formed through plate tectonism and that it had a significant influence on the subsequent evolution of the planet, which includes catastrophic global climate change. This work brings together some exogenic- and endogenic-derived evidences to propose a new global dynamic model.
Author
Climate Change; Dynamic Models; End Plates; Tectonics

20040200934 Spexarth (G. R.), Houston, TX, USA
Mars Impact Energy Analysis in Support of the Origin of the Crustal Dichotomy and Other Anomalies
Spexarth, G. R.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 66-67; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

By analyzing Mars from an engineering perspective, a violent and cataclysmic past is unveiled. This paper looks at multiple anomalies of Mars, shows how they may be inter-related, and describes a very possible scenario, supported by analysis, that could have led to a violent and sudden destruction.
Author
Mars (Planet); Dichotomies; Crusts

20040200935 Brown Univ., Providence, RI, USA
Application of Recent Mission Results to the Origin and Evolution of the Dichotomy
Head, J. W.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 23-24; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The origin of the dichotomy boundary and the processes that have been responsible for its modification since its formation have been a matter of debate and speculation ever since the distinctive contrast the northern lowlands and cratered southern uplands was first discovered. Part of the difficulty in making significant advances on these problems has been the lack of new data. The recent focus on the exploration of Mars has considerably changed this and the prospect of even more new data promises to bring major advances in the characterization of the crust of this region and new insight into its origin and evolution. The purpose of this contribution is to review some of these new data and to point out where new advances are likely to be made.
Author
Boundaries; Craters; Crusts; Dichotomies

20040200936 Brown Univ., Providence, RI, USA
Mars Dichotomy Boundary Degradational Processes: Model of the Noachian-Hesperian Hydrological Cycle
Head, James W.; Carr, Michael H.; Fassett, Caleb I.; Russell, Patrick S.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 27-28; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The global climate of Mars is thought by many to have changed to its present cold and dry state from warmer and wetter conditions earlier in its history during the Noachian. Here we summarize evidence for a major transition in near-surface hydrogeologic conditions in the Late Noachian, and a fundamental change in the martian hydrological cycle. Hydrogeologic conditions then were characterized by five main domains: 1) an accumulation zone at higher altitudes, where atmospheric water entered the system through pluvial/nivial activity and was transported laterally by valley networks for tens to hundreds of kilometers before evaporating, sublimating, or completely reentering the vadose zone, 2) an upper mid-altitude region dominated by the vadose zone where pluvial/nivial activity was less important, and valley networks were much less common, 3) a lower mid-altitude region where the groundwater table occasionally reached the surface and theater-headed valleys and large fretted channels formed by groundwater sapping and headward retreat, 4) a lower altitude region, where the groundwater table normally (the dichotomy boundary) and where fretted and knobby terrain formed by large-scale groundwater sapping, and 5) a very low altitude region (the northern lowlands), largely below the groundwater table, where groundwater discharge accumulated. Changing atmospheric and near-surface conditions at the end of this period resulted in the freezing of the outer layers of the crust to form a global cryosphere. At the end of this period, the hydrological cycle changed from one which was vertically interconnected from the atmosphere through the surface and subsurface to the groundwater system, to a horizontally

layered one in which the groundwater reservoir is separated from the surface reservoir by a global cryosphere, a condition that that still characterizes Mars today, approx. 3.5 billion years later.
Author (revised)
Mars (Planet); Planetary Crusts; Hydrological Cycle; Mars Environment; Paleoclimatology

20040200937 Academy of Sciences (Russia), Moscow, Russia
The Martian Relief's Dichotomy and Planetary Axial Structural Symmetry
Makarenko, G. F.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 41; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The basic property of the Earth is axial structural symmetry of its outer shell. This indisputable phenomenon is not visible fiom the space (oceans). Rejecting the displacement of earthen shell (plate drifting) only allows to compare Earthen tectonic traceries with the seams on other planets. Similarity of large dislocated zones position on the Earth and Mars are reflected in relief, in faults picture and in Earthen structures without relief. Confront the 60 martian meridian with the 0 Earthen meridian. We see the coincidence of huge arcs on the planets in their south hemispheres, arcs bend near 0 and 180 meridians of the Earth. Here we have ocean ridges curves. The form of the south arc on the Mars is accented by the margin of Argir depression and on the other globe side -by Eridania stair, eastwards of crater Kepler. Alike near latitude planet fault systems are placed around the equator. On the Mars their images are fault seams (Mariner canyon; on another planet side - Amentes set-off and Eolyda rise). They have branches to NE also around 60 and 260-240 meridians accordingly. Olimp is a huge martian volcanoe, with ambient rings with lavas. Let us 'relax' the volcanic 'disk' (altitude to basis ratio 1:20), i.e. embed it to the martian entrails. Their images on the Earth are the rears of hercinides of Apallachians and Uoashito with their coats of ocean and Mexican Bay s lavas. On the other Earthen side there are basalt lavas of Eymeshan Plat0 at the Sikkan-Yuan fold zone rear. Southwards we see young lavas among the young island arcs. Patera Alba is an appreciable volcanic place. Its reflection on the Earth are basalts of Atlantic arc Corner-Miln and lavas in the Japan Isles rear. Additional information is included in the original extended abstract.
Author
Mars (Planet); Earth Analogs; Planetary Crusts; Tectonics

20040200938 California Univ., Los Angeles, CA, USA
Tectonic Consequences of Dichotomy Modification by Lower Crustal Flow and Erosion
Nimmo, F.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 48-49; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The hemispheric dichotomy shows compressional lobate scarps approx. 100-500 km south of the dichotomy boundary, and extensional features along the boundary itself. Modification of the original boundary by lower crustal flow results in stresses which can explain the origin of both extensional and compressional features. Erosion would lead to extension to the south of the dichotomy, and compression to the north.
Author
Mars Surface; Planetary Crusts; Tectonics; Erosion; Planetary Geology

20040200939 Colorado Univ., Boulder, CO, USA
Degree-1 Mantle Convection as a Process for Generating the Martian Hemispheric Dichotomy
Roberts, James H.; Zhong, Shijie; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 52-53; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The crustal dichotomy is one of the most significant topographic and tectonic features on Mars. The gradual pole-to-pole crustal thickness variations inferred from MGS topography and gravity data do not seem to support an exogenic origin, such as giant impacts. We therefore seek to explain this as an endogenic feature, resulting from a degree-1 convection pattern in the mantle. We propose and test two hypotheses for how degree-1 mantle convection may lead to the crustal dichotomy. In the first scenario, the planet starts with no crust at all. Partial melt occurs in a degree-1 plume, where upwelling material is above the solidus. This melt is then extracted to form crust above the plume. In the second scenario, a uniform crust overlies a mantle containing a single convection cell. The Martian crust is thought to be at least 50 km thick. Early in Martian history, the base of such a thick crust may have been so warm as to be ductile. An upwelling mantle plume would erode the lower crust above it and move it laterally to be deposited at the base of the crust above the downwelling. As the interior cools, the crust would lose its mobility and this degree-1 pattern would be frozen in. For either hypothesis to be tested, it is first necessary to have degree-1 convection in the mantle. We modeled stagnant lid convection in a primitive mantle to test the first

hypothesis. In the second scenario, the warm, ductile lower crust may be decoupled from the mantle. The mantle is thus warm enough to be in the mobile-lid regime and we model it as such, overlain by a uniform crustal layer. We used finite-element convection code to solve the equations of mass, momentum, and energy in 2D axisymmetric and 3D spherical geometry. The mantle was heated both from below and within and cooled from above. The viscosity was both temperature and pressure-dependent, following an Arrhenius Law. We used non-Newtonian activation parameters appropriate for a wet mantle scaled to Newtonian rheology. We used depth-dependent thermal expansivity and diffusivity and considered the effects of adiabatic and frictional heating.
Derived from text
Mars Surface; Planetary Geology; Planetary Mantles; Convection Cells; Dichotomies; Hemispheres

20040200941 Academy of Sciences (Russia), Moscow, Russia
Mars and Earth: Two Dichotomies, One Cause
Kochemasov, G. G.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 37-38; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The wave planetology is based on this fundamental thesis: orbits make structures. It means that inertia-gravity forces arising in planetary bodies due to their movements in non-round (elliptical, parabolic) keplerian orbits with periodically changing curvatures and accelerations produce in planetary spheres oscillations. Having standing character and four directions (ortho- and diagonal) these oscillations (waves) interfere forming uplifting (+), subsiding (-) and neutral compensated (0) tectonic blocks. These blocks, naturally, are regularly disposed and their sizes depend on wavelengths. The longest fundamental wave 1 (long 2xR, where R is a body radius) inevitably produces tectonic dichotomy with one hemisphere rising (+) and another falling (-). The rising (continental) hemisphere increases its planetary radius thus occupying larger space (surface) and tending to extend itself. That is why it is normally profoundly and intensively cracked (rifted) giving way up to deep-seated (mantle) melts; volcanoes, plateau flood basalts appear, intrusions fill weakness zones. The falling (oceanic) hemisphere diminishes its planetary radius thus occupying smaller space (surface) and tending to contract itself. As all planetary bodies rotate, tectonically and hypsometrically different levels blocks (hemispheres) must regulate (equilibrate) their angular momenta: otherwise a globe will tend to fall to pieces (destroy itself). As the angular velocity of rotation of all blocks in one body is the same, the equilibration must be done by play between radii and densities. The subsiding blocks thus must be denser than the uplifting blocks. Our observations confirm this: at Earth oceans are basaltic and continents are on average andesitic. Mars also obeys this law: the northern lowlands are Febasaltic and the southern highlands are andesitic at least at the dichotomy boundary (Pathfinder) and must be else less dense further south (we proposed albitites, syenites and granites as candidates to these low density rocks.
Author (revised)
Mars (Planet); Planetary Crusts; Earth Crust; Planetology; Geodynamics

20040200942 Geological Survey, Flagstaff, AZ, USA
Topographic and Geomorphic Modification History of the Highland/Lowland Dichotomy Boundary of Mars, II, Hesperian and Amazonian Periods
Tanaka, K. L.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 70-71; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Modification of the highland/lowland boundary (HLB) on Mars is a long, complex story involving a large portion of the planet as well as the entire span of recorded geologic history of the planet. The Noachian history is described in a companion abstract and involves much of the first-order form and relief of the HLB and characterization of the materials forming the ancient crust. This paper addresses how the HLB was subsequently modified during the Hesperian and Amazonian Periods. Recent geologic mapping and topical studies based largely on Mars Orbiter Laser Altimeter elevation data have contributed to new perspectives on this history.
Author
Dichotomies; Geomorphology; Highlands; Mars Surface; Topography; Geochronology

20040200943 National Air and Space Museum, Washington, DC, USA
Long Wavelength Topography of the Dichotomy Boundary in Northern Terra Cimmeria: Evidence for Flexure of the Southern Highlands
Watters, T. R.; McGovern, P. J.; Irwin, R. P.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 72-73; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

In the eastern hemisphere of Mars, the dichotomy boundary is expressed by a significant change in elevation greater than 2 kilometers. The dichotomy boundary in this hemisphere is also marked by tectonic features. Fault-controlled fretted valleys or extensional troughs are found in the lowlands and lobate scarp thrust faults are found in the adjacent highlands. Extensional and compressional deformation along the dichotomy boundary appears to have occurred during the late Noachian to early Hesperian. This suggests that tectonism played a role in shaping the present-day dichotomy boundary in the eastern hemisphere. The population of ancient buried impact basins in the northern lowlands suggests that the lowlands crust and the crustal dichotomy formed in the early Noachian. A number of lines of evidence suggest that the slopes of the ancient dichotomy boundary are still preserved. Thus, the present-day boundary in the eastern hemisphere may be the result of late Noachian-early Hesperian tectonic modification of the ancient highlands-lowlands crustal boundary.
Derived from text
Boundaries; Dichotomies; Flexing; Highlands; Mars Surface; Topography; Wavelengths

20040200944 Geological Survey, Flagstaff, AZ, USA
Topographic and Geomorphic Modification History of the Highland/Lowland Dichotomy Boundary of Mars: I. Noachian Period
Tanaka, K. L.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 68-69; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Formation of the Martian hemispheric highland/lowland boundary (HLB) may be the earliest recorded landscape-producing event on the planet. The boundary traverses a somewhat sinuous path that encircles about one-third of the planet's surface, separating the -2000 to -6000 m lowlands from highlands that average several thousand meters higher in elevation. The HLB has a regional slope that averages approximately 1.0 degree across a few hundred kilometers; however, it varies in detail from a relatively abrupt scarp (e.g., Isidis, Elysium, and Amazonis Planitiae), to an abrupt top scarp having lower, beveled ledges or benches (e.g., Utopia basin), to a gentle slope (parts of northwest Arabia and northeast Tempe Terrae, and southeastern Elysium Planitia). Both impact and tectonic origins for the dichotomy remain in vogue to account for the low topography, thin crust, and low remanent magnetization of the northern lowlands. Either type of origin likely produced extensive fault and fracture systems and rock units, which have long-since been obscured by subsequent geologic activity. However, ancient, impact-related structure and rock units, perhaps highly altered, may be preserved at depth. Here I discuss the earliest geomorphic modification of the highland/lowland topographic boundary as recorded in the extant Noachian surface geology; a companion abstract describes younger, Hesperian and Amazonian modification.
Derived from text
Dichotomies; Geomorphology; Mars Surface; Topography; Boundaries; Geochronology

20040200945 National Air and Space Museum, Washington, DC, USA
Crustal Dichotomy Boundary and Fretted Terrain Development at Aeolis Mensae, Mars
Irwin, R. P., III; Watters, T. R.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 31-32; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The origin of Martian fretted and knobby terrain has remained uncertain since the landforms were first described by Sharp in 1973. As a control on modeling efforts, it is important to establish the relationship of these landforms, if any, to the origin of the crustal dichotomy. Most studies have focused on fretted terrain in northern Arabia Terra, where investigators generally agree that ground ice has been important in modifying precursor knobs and fretted valleys. The initial processes that isolated mesas from the high-standing terrain are less certain. Characteristics of some fretted valleys suggest an origin by fluvial erosion, despite their poorly developed drain- age networks. Other proposed mechanisms include crustal extension and structural control of sapping. Situated near the martian equator at the crustal dichotomy boundary, Aeolis Mensae provides a pristine example of fretted terrain development without the younger landforms attributed to ground ice. We examined an area bounded by 15 deg. S, 15 deg. N, 120 deg. E, and 150 deg. E, adjacent to the cratered and dissected area described by Irwin and Howard. Our observations indicate that Aeolis Mensae fretted terrain developed in a thick aeolian sedimentary deposit of late Noachian/early Hesperian age, which was emplaced along an older dichotomy boundary. Sediments were emplaced and eroded as fluvial activity declined, with minimal influence from highland valley networks.
Derived from text
Crusts; Dichotomies; Mars Surface; Terrain; Planetary Geology; Topography; Fretting; Boundaries

20040200946 Lunar and Planetary Inst., Houston, TX, USA

Gravity Modeling of the Isidis/Syrtis Major Region of Mars: Implications for Lithospheric Properties and for the Origin and Evolution of the Dichotomy Boundary

Kiefer, Walter S.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 33-34; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Analysis of the gravity and topography of Mars provides our best view of the internal structure of Mars. In this work, I model the gravity of the martian hemispheric dichotomy boundary in the region near the Isidis impact basin and Syrtis Major. I focus on two tasks. First, I estimate how the lithosphere's elastic thickness varies with location in this region of the dichotomy boundary. This constrains the thermal structure at the time the bulk of the topography was emplaced, roughly the first few hundred million years of martian history. Second, I develop models for the mascon beneath Isidis. The long-term preservation of this mascon constrains the thermal structure at the time of basin formation. Taken together, these results constrain the early thermal history of this portion of the dichotomy boundary. I use gravity model JGM951-01, obtained from the Planetary Data System. Results presented here are for spherical harmonic degrees 2 to 60, because the amplitude of terms above degree 60 are restricted by imposition of a power-law constraint in the gravity inversion.

Author

Mars (Planet); Planetary Gravitation; Mascons; Planetary Structure

20040200947 Tokyo Univ., Japan

Control of Exposed and Buried Impact Craters and Related Fracture Systems on Hydrogeology, Ground Subsidence/ Collapse, and Chaotic Terrain Formation, Mars

Rodriquez, J. A. P.; Sasaki, S.; Dohm, J. M.; Tanaka, K. L.; Miyamoto, H.; Baker, V.; Skinner, J. A., Jr.; Komatsu, G.; Fairen, A. G.; Ferris, J. C.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 54-55; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Mars is a planet enriched by groundwater. Control of subsurface hydrology by tectonic and igneous processes is widely documented, both for Earth and Mars. Impact craters result in extensive fracturing, including radial and concentric peripheral fault systems, which in the case of Earth have been recognized as predominantly strike-slip and listric extensional, respectively. In this work we propose that basement structures of Mars largely result from impact-induced tectonism, except in regions that are dominated by magmatic-driven activity such as Tharsis and/or possible plate tectonism during the extremely ancient period of Mars. In many cases, impact-induced faults appear to have been reactivated and/or displaced by subsequent magmatic-driven groundwater- flow and collapse processes.

Derived from text

Mars Surface; Planetary Geology; Mars Craters; Hydrogeology; Terrain; Fracturing

20040200948 Geological Survey, Flagstaff, AZ, USA

Mass-Wasting of the Circum-Utopia Highland/Lowland Boundary: Processes and Controls

Skinner, J. A., Jr.; Tanaka, K. L.; Hare, T. M.; Kargel, J.; Neukum, G.; Werner, S. C.; Rodriquez, J. A. P.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 58-59; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

Utopia Planitia forms a large (approx. 3300 km diameter), plate-shaped depression interpreted as an ancient impact basin based on its regional gravitational expression and its distribution of knobs, mesas, and partly buried craters. Gravity studies indicate the basin may contain \g 10 km of material (approx. 50 x 10(exp 6) cu km). The southern and western boundary of the basin is rimmed by a approx. 400 km wide, arcuate exposure of the highland/lowland boundary (HLB) that extends \g 4000 km from Nepenthes to Protonilus Mensae (circum-Utopia HLB). The materials generally consist of fractured highland materials, degraded mesas and knobs, interposed slope materials, and smooth to undulating plains. These materials are variably interpreted as marginal marine features, lava flows, mass-wasting materials, and mud volcanoes. However, these interpretations do not fully address the long-lived modification of the regional HLB and the massive infill of the Utopia impact basin. We outline observations and offer hypotheses that suggest the circum-Utopia HLB has undergone long-term mass-wasting since the pre-Noachian formation of the Utopia impact basin. These processes are thermally driven, directly affect the ancient structural and stratigraphic framework of the circum-Utopia HLB, appear to be self-propagating, and are able to move massive volumes of material downslope.

Author

Mars Surface; Structural Basins; Planetary Geology

20040200949 Tokyo Univ., Hongo, Japan

Outflow Channel Sources, Reactivation and Chaos Formation, Xanthe Terra, Mars

Rodriguez, J. A. P.; Sasaki, S.; Dohm, J. M.; Tanaka, K. L.; Miyamoto, H.; Baker, V.; Skinner, J. A., Jr.; Komatsu, G.; Fairen, A. G.; Ferris, J. C.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 56-57; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The formation of outflow channels is classically attributed to the catastrophic discharge of groundwater. Documented modes of confinement and release of groundwater, trapped within the Martian cryosphere include: catastrophic release of groundwater from confined aquifers, both catastrophic and non-catastrophic release of groundwater segregated from the permafrost into confined caverns, and catastrophic release of groundwater extracted from the permafrost by thermal convection. Multiple events groundwater release resulted in the collapse of plateau materials, and the formation of chaotic terrains, which are mostly located at the head source regions of the outflow channels. Crater counting of the outflow channel floors indicates a late Hesperian age, though earlier channeling events may have occurred. Based on geologic mapping and geomorphic assessment using Viking-, Mars Global Surveyor-, and Mars Odyssey-based information of a highland region located east of Valles Marineris and bounded to the south, west, and north by Aureum, Hydraotes, and Hydaspis Chaos, respectively (hereafter referred to as the subsided plateau region--SPR),we propose new hypotheses, which can potentially explain the following unresolved issues: (1) sources for the large volumes of water required to carve the outflow channels, (2) mechanisms of outflow reactivation, which do not involve recharging of the head source region, and (3) an alternative mode of formation for chaotic terrains.

Author

Mars Surface; Estuaries; Valleys; Ground Water; Floods; Water Flow; Planetary Geology

20040200950 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Subsurface Structure of the Ismenius Area and Implications for Evolution of the Martian Dichotomy and Magnetic Field

Smrekar, S. E.; Raymond, C. A.; McGill, G. E.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 60-61; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The Martian dichotomy divides the smooth, northern lowlands from the rougher southern highlands. The northern lowlands are largely free of magnetic anomalies, while the majority of the significant magnetic anomalies are located in the southern highlands. An elevation change of 2-4 km is typical across the dichotomy, and is up to 6 km locally. We examine a part of the dichotomy that is likely to preserve the early history of the dichotomy as it is relatively unaffected by major impacts and erosion. This study contains three parts: 1) the geologic history, which is summarized below and detailed in McGill et al., 2) the study of the gravity and magnetic field to better constrain the subsurface structure and history of the magnetic field (this abstract), and 3) modeling of the relaxation of this area. Our overall goal is to place constraints on formation models of the dichotomy by constraining lithospheric properties. Initial results for the analysis of the geology, gravity, and magnetic field studies are synthesized in Smrekar et al..

Author

Mars (Planet); Planetary Magnetic Fields; Planetary Geology; Planetary Gravitation

20040200951 NASA Goddard Space Flight Center, Greenbelt, MD, USA

A Magnetic Perspective on the Martian Crustal Dichotomy

Connerney, J. E. P.; Acuna, M. H.; Ness, N. F.; Mitchell, D. L.; Lin, R. P.; Reme, H.; Workshop on Hemispheres Apart: The Origin and Modification of The Martian Crustal Dichotomy; 2004, pp. 11-12; In English; See also 20040200915; Copyright; Avail: CASI; A01, Hardcopy

The Mars Global Surveyor spacecraft has completed two Mars years in nearly circular polar orbit at a nominal altitude of 400 km. The Mars crust is at least an order of magnitude more intensely magnetized than that of the Earth, and intriguing in both its global distribution and geometric properties. Measurements of the vector magnetic field have been used to map the magnetic field of crustal origin to high accuracy. This most recent map is assembled from \g 2 full years of MGS night-side observations, and uses along-track filtering to greatly reduce noise due to external field variations. Additional information is included in the original extended abstract.

Author

Mars (Planet); Planetary Crusts; Planetary Magnetic Fields; Planetary Evolution

20040200959 NASA Johnson Space Center, Houston, TX, USA
Lunar Receiving Laboratory Project History
Mangus, Susan; Larsen, William; June 2004; 76 pp.; In English
Report No.(s): NASA/CR-2004-208938; S-924; Copyright; Avail: CASI; A05, Hardcopy

As early as 1959, the Working Group on Lunar Exploration within NASA advocated that 'one of the prime objectives of the first lunar landing mission should be the collection of samples for return to Earth, where they could be subjected to detailed study and analysis.' Within NASA, neither this group nor any other scientists working with the Agency were concerned about back contamination issues. Outside of NASA, back contamination concerns had been raised as early as 1960. Although NASA did not seem to pay any attention to the concerns at that time, the scientific community continued to be interested in the topic. In 1962 and again in 1963, as the Apollo Program loomed large, further discussions were held. These early discussions of back contamination did not make their way into NASA's administration, however, and when Manned Spacecraft Center personnel began to articulate early concepts for the Lunar Receiving Laboratory (LRL), the back contamination issue was not considered. Once this concern became a major focus, however, the LRL's development became increasingly complex. This is the history of that development.
Author
Lunar Receiving Laboratory; Planetary Protection; Contamination; Protection

20040200962 Interface Video Systems, Inc., Washington, DC, USA
Probing the Primordial Constituents of Our Solar System
October 30, 1995; 1 pp.; In English; 2 hrs. playing time, in color, with sound; No Copyright; Avail: CASI; V04, Videotape-VHS

Dr. France Cordova, NASA's Chief Scientist, chaired this, another seminar in the Administrator's Seminar Series. She introduced NASA Administrator, Daniel S. Goldin, who greeted the attendees, and noted that, from the day people first looked into the sky, they've wondered what was up there, who or what created it, is Earth unique, what shaped the solar system, what is the Kuiper Belt and why is it there, and what are the solar system's building blocks. NASA's missions may discover some of the answers. Dr. Cordova then introduced Dr. Anita Cochran, research scientist at the University of Texas. Dr. Cochran has been searching for some of this information. She is especially interested in finding out when various planets and asteroids were discovered, what their orbits are, when the solar system was formed, and more about the comets in the Kuiper Belt. Are they icy planetisimals that helped form our solar system? Dr. Toby Owen of the University of Hawaii faculty spoke next. He believes that life on Earth exists because comets brought water and a variety of light elements to Earth from the outer parts of the solar system. Without them, we couldn't exist. He noted that noble gases don't mix with other gases. Gases come to Earth via rocks and by bombardment. Ice can trap argon and carbon, but not neon. Dr. Owens concluded with comments that we need 'better numbers for the Martian atmosphere', and it would be good to get samples of material from a comet. The third speaker was Dr. Eugene Shoemaker of the Lowell Observatory and the U.S. Geological Survey. He is credited with discovering more than 800 asteroids and learning about the Oort Cloud, which is believed to be a cloud of rocks and dust that may surround our solar system and be where comets originate. Comet storms reoccur about every 30 million years. Dr. Shoemaker suggested that since we are presently in a period of comet showers, it would be good to get a comet sample. It might provide insight regarding the origin of life. Additional information is included in the original extended abstract.
Author
Solar System Evolution; Comets; Planetary Composition; Cometary Collisions

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SOLAR PHYSICS

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

20040201034 NASA Goddard Space Flight Center, Greenbelt, MD, USA
Solar Phenomena Associated with 'EIT Waves'
Biesecker, D. A.; Myers, D. C.; Thompson, B. J.; Hammer, D. M.; Vourlidas, A.; Astronomical Journal; April 20, 2002; ISSN 0004-637X; Volume 569, No. 2, Pt. 1, pp. 1009-1015; In English; Copyright; Avail: Other Sources; Abstract Only

In an effort to understand what an 'EIT wave' is and what its causes are, we have looked for correlations between the initiation of EIT waves and the occurrence of other solar phenomena. An EIT wave is a coronal disturbance, typically appearing as a diffuse brightening propagating across the Sun. A catalog of EIT waves, covering the period from 1997 March through 1998 June, was used in this study. For each EIT wave, the catalog gives the heliographic location and a rating for each

wave, where the rating is determined by the reliability of the observations. Since EIT waves are transient, coronal phenomena, we have looked for correlations with other transient, coronal phenomena: X-ray flares, coronal mass ejections (CMEs), and metric type II radio bursts. An unambiguous correlation between EIT waves and CMEs has been found. The correlation of EIT waves with flares is significantly weaker, and EIT waves frequently are not accompanied by radio bursts. To search for trends in the data, proxies for each of these transient phenomena are examined. We also use the accumulated data to show the robustness of the catalog and to reveal biases that must be accounted for in this study.
Author
Solar Activity; Ultraviolet Astronomy; Solar Radio Emission; Solar Corona

93
SPACE RADIATION

Includes cosmic radiation; and inner and outer Earth radiation belts. For biological effects of radiation on plants and animals see *51 Life Sciences*; on human beings see 52 Aerospace Medicine. For theory see *73 Nuclear Physics*.

20040191812 NASA Ames Research Center, Moffett Field, CA, USA
An Impact Triggered Runaway Greenhouse on Mars
Segura, T. L.; McKay, C. P.; Toon, O. B.; Second Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life; 2004; 2 pp.; In English; See also 20040191770; Copyright; Avail: CASI; A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

When a planet is in radiative equilibrium, the incoming solar flux balances the outgoing longwave flux. If something were to perturb the system slightly, say the incoming solar flux increased, the planet would respond by radiating at a higher surface temperature. Since any radiation that comes in must go out, if the incoming is increased, the outgoing must also increase, and this increase manifests itself as a warmer equilibrium temperature. The increase in solar flux would correspond to an increase in temperature, which would increase the amount of water vapor in the atmosphere due to increased evaporation. Since water vapor is a greenhouse gas, it would absorb more radiation in the atmosphere leading to a yet warmer equilibrium temperature. The planet would reach radiative equilibrium at this new temperature. There exists a point, however, past which this positive feedback leads to a 'runaway' situation. In this case, the planet does not simply evaporate a little more water and eventually come to a slightly higher equilibrium temperature. Instead, the planet keeps evaporating more and more water until all of the planet's available liquid and solid water is in the atmosphere. The reason for this is generally understood. If the planet's temperature increases, evaporation of water increases, and the absorption of radiation increases. This increases the temperature and the feedback continues until all water is in the atmosphere. The resulting equilibrium temperature is very high, much higher than the equilibrium temperature of a point with slightly lower solar flux. One can picture that as solar flux increases, planetary temperature also increases until the runaway point where temperature suddenly 'jumps' to a higher value, in response to all the available water now residing in the atmosphere. This new equilibrium is called a 'runaway greenhouse' and it has been theorized that this is what happened to the planet Venus, where the surface temperature is more than 700 K (427 C).
Author
Solar Flux; Greenhouse Effect; Radiation Absorption; Surface Temperature; Evaporation

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GENERAL

Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs such as Apollo, Gemini, and Mercury spacecraft, Earth Resources Technology Satellite (ERTS), and Skylab; NASA appropriations hearings.

20040196356
Using Spent Fuel Tanks as Habitats
Wray, Tom; Rodriquez, Gary; Space Resources Roundtable VI; [2004], pp. 50; In English; See also 20040196346; Copyright; Abstract Only; Available from CASI only as part of the entire parent document

The idea of using an expended liquid fuel rockets as a serviceable container for human habitation and technical spaces is a recurring topic. With the advent of Dr. Robert Zubrin's simulated habitats the concept has achieved a certain credibility, even acceptance, as a state-of-the-art practice. This paper outlines some design considerations for habitats and supporting

structures in low-gravity, and is intended to encourage architects with other constraints and considerations to join the conversation.
Author
Fuel Tanks; Habitats; In Situ Resource Utilization; Microgravity

20040201428 Old Dominion Univ., Norfolk, VA, USA
Discovering the Secrets of the Wright Brothers
Ash, Robert L.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 63-92; In English; See also 20040201420; No Copyright; Avail: CASI; A03, Hardcopy

This viewgraph presentation contains information on the research and development process undergone by the Orville and Wilbur, the Wright brothers, in preparation for their first successful airplane flight. The presentation includes images of contemporary winged vehicles.
CASI
Aircraft Design; Research and Development; Histories

20040201444 Norfolk Public Schools, VA, USA
Integrating Material Science into the 6th Grade Curriculum, Norfolk Public School System/Introduction of Technology
Goodman, Tyrone; Abramson, Paul J.; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 1; September 2004, pp. 257-261; In English; See also 20040201420; No Copyright; Avail: CASI; A01, Hardcopy

Mr. Goodman and I went to an all day workshop at Landstown High School in Virginia Beach concerning Materials Science used at the high school level. We were so impressed with the input, problem solving, and output of the seminar that we decided to try to integrate material science into the 6th grade level technology course. The output was so positive, we are now rewriting and instigating material science projects to cover the Sols taught at the middle school level technology curriculum. The curriculum is in progress and is now being written. In the curriculum, math and science Sols will be listed and correlated to state standards. Middle school technology students are full of energy and need to be directed with hands on projects. They are visual learners. Material science projects fit in perfectly with deep problem solving procedures we want them to learn. By teaching material science projects and theories at the middle school level, they are more prepared for problem solving in the future. They will learn molecular structure, the periodic table, math theories, law of relativity plus almost all the Sols used in Math and Science at the middle school level.
Derived from text
Education; Molecular Structure; Problem Solving; Relativity

20040201497 Norfolk State Univ., VA, USA
Polycrystalline Bismuth Filters for the Filter Analyzer Neutron Spectrometer (FANS)
Pierce, Thomas A., Jr.; Zeittoun, Ramsey; National Educators' Workshop: Update 2003. Standard Experiments in Engineering, Materials Science, and Technology, Part 2; September 2004, pp. 605-610; In English; See also 20040201469; No Copyright; Avail: CASI; A02, Hardcopy

This planned cooperation stems from a research project that aims to fill a requirement for polycrystalline Bismuth filters for application in the Filter Analyzer Neutron Spectrometer (FANS) that is currently installed at BT4 in the NCNR. The size and shape of the desired filters is a straightforward geometric matter, best described by a truncated pyramid with a 2 fold axis (unlike Cheops, which has a 4-fold axis and is not truncated). There is no final design available, but the path to that, however time consuming, is straightforward. The currently adopted fabrication method is cold pressing of granular Bismuth, which considering the melting temperature of Bismuth -- in metallurgical terms -- is probably close to a 'hot' process, thus opening up the possibility that recrystallization takes place at room temperature. The base materials utilized: 200 mesh powder, 100 mesh powder, and water quenched maggot shaped/sized granules. All base metals are specified to be 99.9% bismuth or better. For characterization (using neutrons to measure the material-characteristic absorption edge) purposes, a laboratory pressing die was employed (like the ones used for infrared spectroscopy specimens) and loaded in a 20 ton Carver hydraulic press. Creating consistently sound samples regardless of base material used have been quite successful. All trials thus far have taken place at room temperature. We reach a density of about 99.5% of theoretical in cylindrical samples of 25 mm diameter and 25 mm high.
Author
Cold Pressing; Powder Metallurgy; Recrystallization; Infrared Spectroscopy; Material Absorption

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