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Information Program Office**

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

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

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

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

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Subject Divisions

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F. Life Sciences
G. Mathematical and Computer Sciences
H. Physics
I. Social and Information Sciences
J. Space Sciences
K. General

Indexes

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

Subject Term Index
Personal Author Index

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Subject Categories of the Division A. Aeronautics

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01 Aeronautics (General) 1

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

02 Aerodynamics 1

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

03 Air Transportation and Safety 2

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

04 Aircraft Communications and Navigation 4

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

05 Aircraft Design, Testing and Performance 5

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*.

06 Avionics and Aircraft Instrumentation 7

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

07 Aircraft Propulsion and Power 7

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

08 Aircraft Stability and Control 8

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

09 Research and Support Facilities (Air) 9

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

Subject Categories of the Division B. Astronautics

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14 Ground Support Systems and Facilities (Space) 9

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)*.

15 Launch Vehicles and Launch Operations 10

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

16 Space Transportation and Safety 10

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

18 Spacecraft Design, Testing and Performance 11

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

20 Spacecraft Propulsion and Power 11

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

Subject Categories of the Division C. Chemistry and Materials

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

24 Composite Materials 13

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

25 Inorganic, Organic, and Physical Chemistry 17

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

26 Metals and Metallic Materials 19

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

27 Nonmetallic Materials 22

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

28 Propellants and Fuels 24

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

29 Space Processing 25

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

Subject Categories of the Division D. Engineering

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

31 Engineering (General) 25

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

32 Communications and Radar 26

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

33 Electronics and Electrical Engineering 28

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

34 Fluid Mechanics and Thermodynamics 38

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

35 Instrumentation and Photography 40

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

36 Lasers and Masers 44

Includes lasing theory, laser pumping techniques, maser amplifiers, laser materials, and the assessment of laser and maser outputs. For cases where the application of the laser or maser is emphasized see also the specific category where the application is treated. For related information see also *76 Solid-State Physics*.

37 Mechanical Engineering 46

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*.

39 Structural Mechanics 48

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

Subject Categories of the Division E. Geosciences

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

42 Geosciences (General) 49

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

43 Earth Resources and Remote Sensing 49

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

44 Energy Production and Conversion 51

Includes specific energy conversion systems, e.g., fuel cells; and solar, geothermal, windpower, and waterwave conversion systems; energy storage; and traditional power generators. For technologies related to nuclear energy production see *73 Nuclear Physics*. For related information see also *07 Aircraft Propulsion and Power; 20 Spacecraft Propulsion and Power*, and *28 Propellants and Fuels*.

45 Environment Pollution 52

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

46 Geophysics 56

Includes earth structure and dynamics, aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism. For related information see *47 Meteorology and Climatology;* and *93 Space Radiation*.

47 Meteorology and Climatology 81

Includes weather observation forecasting and modification.

48 Oceanography 82

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

Subject Categories of the Division F. Life Sciences

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

51 Life Sciences (General) 83

Includes general research topics related to plant and animal biology (non–human); ecology; microbiology; and also the origin, development, structure, and maintenance, of animals and plants in space and related environmental conditions. For specific topics in life sciences see *categories 52 through 55*.

52 Aerospace Medicine 88

Includes the biological and physiological effects of atmospheric and space flight (weightlessness, space radiation, acceleration, and altitude stress) on the human being; and the prevention of adverse effects on those environments. For psychological and behavioral effects of aerospace environments see *53 Behavioral Sciences*. For the effects of space on animals and plants see *51 Life Sciences*.

53 Behavioral Sciences 88

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

54 Man/System Technology and Life Support 89

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

Subject Categories of the Division G. Mathematical and Computer Sciences

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

60 Computer Operations and Hardware 91

Includes hardware for computer graphics, firmware and data processing. For components see *33 Electronics and Electrical Engineering*. For computer vision see *63 Cybernetics, Artificial Intelligence and Robotics*.

61 Computer Programming and Software 92

Includes software engineering, computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM. For computer software applied to specific applications, see also the associated category.

62 Computer Systems 98

Includes computer networks and distributed processing systems. For information systems see *82 Documentation and Information Science*. For computer systems applied to specific applications, see the associated category.

63 Cybernetics, Artificial Intelligence and Robotics 101

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

64 Numerical Analysis 103

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

65 Statistics and Probability 104

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

66 Systems Analysis and Operations Research 105

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

Subject Categories of the Division H. Physics

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

70 Physics (General) 106

Includes general research topics related to mechanics, kinetics, magnetism, and electrodynamics. For specific areas of physics see *categories 71 through 77*. For related instrumentation see *35 Instrumentation and Photography;* for geophysics, astrophysics or solar physics see *46 Geophysics*, *90 Astrophysics*, or *92 Solar Physics*.

71 Acoustics 107

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

72 Atomic and Molecular Physics 108

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

74 Optics 109

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

75 Plasma Physics 112

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

76 Solid-State Physics 113

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

Subject Categories of the Division I. Social and Information Sciences

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

80 Social and Information Sciences (General) 116

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

81 Administration and Management 117

Includes management planning and research.

82 Documentation and Information Science 117

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

83 Economics and Cost Analysis 119

Includes cost effectiveness studies.

85 Technology Utilization and Surface Transportation 119

Includes aerospace technology transfer; urban technology; surface and mass transportation. For related information see also *03 Air Transportation and Safety, 16 Space Transportation and Safety, and 44 Energy Production and Conversion.* For specific technology transfer applications see also the category where the subject is treated.

Subject Categories of the Division J. Space Sciences

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

89 Astronomy 120

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

90 Astrophysics 121

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

91 Lunar and Planetary Science and Exploration 125

Includes planetology; selenology; meteorites; comets; and manned and unmanned planetary and lunar flights. For spacecraft design or space stations see *18 Spacecraft Design, Testing and Performance*.

92 Solar Physics 125

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

93 Space Radiation 126

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

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

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01
AERONAUTICS (GENERAL)

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

20020043601 Dayton Univ. Research Inst., Research Inst., OH USA
Point of Maintenance Spiral One Usability Study ***Interim Report, Sep. 2000-Aug. 2001***
Donahoo, Carlton; Gorman, Megan; Kancler, David; Quill, Laurie; Revels, Allen R.; Aug. 2001; 34p; In English
Contract(s)/Grant(s): F33615-99-D-6001; Proj-1710
Report No.(s): AD-A400397; AFRL-HE-WP-TR-2002-0008; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The goal of the Point of Maintenance (P-O-Mx) program is to demonstrate timely, accurate, and effective data collection, and logistics operations processing to meet the maintainer's needs at the point of origin. The Spiral One Usability Test consisted of human factors and user-centered evaluations of the P-O-Mx activity. User level evaluations were conducted to determine the maintenance effectiveness of P-O-Mx devices in presenting, modifying, and transmitting maintenance and service data. The evaluations were administered to technicians in the real-world maintenance environment. The purpose of the evaluation was to compare five hardware platforms (Libretto, Itronix, FM-Net, Xybernaut-Wrist, Xybernaut-Head) for opening work orders from the flightline aircraft location. Previous empirical studies conducted by the Air Force Research Laboratory Logistics Readiness Branch (AFRL/HESR) have evaluated both portable maintenance aids and wearable computers for flightline maintenance. Both platforms have been shown to improve maintenance performance over use of paper-based platforms. While these empirical studies have compared wearable computer technologies with portable computers, usability inspection methods (such as usability testing) have not compared these devices. This study demonstrates the usability comparisons of the five hardware platforms using Usability Test Methods.
DTIC
Aircraft Maintenance; Computers; Armed Forces (USA)

02
AERODYNAMICS

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

20020043944 Naval Surface Warfare Center, Dahlgren, VA USA
The 2002 Version of the Aeroprediction Code. Part 1., Part 1, Summary of New Theoretical Methodology ***Final Report***
Moore, Frank G.; Hymer, Thomas C.; Mar. 2002; 226p; In English
Report No.(s): AD-A400445; NSWCDD/TR-01/108-Pt-1; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

A new version of the aeroprediction code (APC), the AP02, has been developed to address the requirements arising from advanced weapon concepts. The AP02 was formed by adding significant new technology and several productivity improvements to the previous version of the APC, the AP98. New technology added included 6 and 8 fin aerodynamics, improved nonlinear aerodynamics, improved pitch damping predictions, improved power-on base drag estimates, base-bleed effect on base drag estimation, improved axial force of nonaxisymmetric bodies and trailing-edge flap capability. Other improvements and

productivity enhancements include an aerodynamic smoother, ballistic and three degree-of-freedom simulation modules as well as refinements for the pre- and post-processor for inputs and outputs of the AP02. Comparison of the predicted aerodynamics of the AP02 to AP98 and experimental data showed the AP02 to be slightly better than the AP98 in most cases that both codes would handle. However, due to the additional new technology incorporated into the AP02, many new options are available in the AP02 that are not available in the AP98. Therefore, the AP02 is more robust and, on average, is slightly more accurate than the AP98 in predicting aerodynamics of weapons.
DTIC
Aerodynamic Drag; Aerodynamics; Predictions; Weapons; Aerodynamic Characteristics

20020043977 Tsentralni Aerogidrodinamicheskii Inst., USSR
Experimental and Theoretical Investigation of The Weakly Ionized Non-Equilibrium Plasma Influence On A Flow Over Bodies of Simple Forms *Final Report*
Makachev, Nicolai; Aug. 2000; 77p; In English; Original contains color images
Contract(s)/Grant(s): F61775-99-WE046
Report No.(s): AD-A400033; SPC-99-4046; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
This report results from a contract tasking TsAGI as follows: The contractor will investigate the effects of plasma discharge on aerodynamic bodies. He will perform experiments in the supersonic and subsonic wind tunnels at TsAGI. His proposed investigation will answer fundamental questions such as: 1) Nature of the observed behavior of shock waves in (or after) clouds of gas-discharge plasma; 2) The possible influence of gas-discharge plasma on aerodynamic characteristics of simple bodies; 3) Influence of gas molecules vibrational excitation on boundary layer flow properties. He will also perform numerical investigation using algorithms of non-stationary two- and three-dimensional Euler equations and two-dimensional Navier-Stokes equations for vibrationally excited gas. Level-by-level kinetic model and appropriate turbulence model to account for turbulent transfer of excited components will also be developed. The technical approach is outlined in his proposal. Payment will be made upon receipt and acceptance of first preliminary report. Due no later than 4 months after contract award.
DTIC
Plasmas (Physics); Wind Tunnel Tests; Computational Fluid Dynamics; Gas Discharges

03
AIR TRANSPORTATION AND SAFETY

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

20020043237 General Accounting Office, Accounting and Information Management Div., Washington, DC USA
FAA Computer Systems: Limited Progress on Year 2000 Issue Increases Risk Dramatically
Jan. 1998; 26p
Report No.(s): PB2002-105199; GAO/AIMD-98-45; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Time is running out. In 2 years, hundreds of computer systems that are critical to Federal Aviation Administration (FAA) operations such as those used to monitor and control air traffic and those used to target airline inspections--could fail to perform as needed unless proper date-related calculations can be assured. In many systems, the year 2000 could be indistinguishable from 1900 because many systems use only two digits to designate the year. In this case, both would read 00, causing systems to malfunction or fail unless corrections are made. In response to your September 4, 1997, letter, we reviewed the effectiveness of FAAs Year 2000 program, including the reliability of its Year 2000 cost estimate.
NTIS
Information Systems; Computer Information Security; Airline Operations; Malfunctions; Reliability

20020043246 Federal Aviation Administration, Office of the Inspector General, Washington, DC USA
FAA Alleged Waste and Mismanagement of Air Route Traffic Control Centers Critical and Essential Power Systems Project
Oct. 16, 1996; 22p; In English
Report No.(s): PB2002-104319; ES-FA-7-003; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report responds to a complaint received by the Office of Inspector General (OIG), Department of Transportation, from Congressman Deal on behalf of a constituent. The constituent provided information and specific examples concerning problems on the first two Air Route Traffic Control Centers Critical and Essential Power Systems (ACEPS) installation sites: (1) the Seattle, Washington, Air Route Traffic Control Center (ARTCC); and (2) the Southern California (SoCAL) Terminal Radar Approach Control (TRACON) in San Diego. The constituent alleges FAA failed to provide adequate oversight of design specifications, test procedures, and overtime and warehouse costs, resulting in unnecessary delays and costs.
NTIS
Air Traffic Control; Management Methods; Costs

20020043248 General Accounting Office, Washington, DC USA
Aviation Safety: FAA Generally Agrees With But Is Slow in Implementing Safety Recommendations
Sep. 1996; 66p; In English
Report No.(s): PB2002-104544; GAO/RCED-96-193; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche
This report focuses on two questions. What has FAAs overall record been in responding to, agreeing with, and implementing significant recommendations concerning aviation safety made by GAO and DOTs Inspector General from 1990 through 1994, as well as recommendations made by NTSB or added to NTSBs Most Wanted lists of safety recommendations from 1990 through 1994. to what extent have GAOs specific recommendations in the areas of aircraft certification, airline inspections, and oversight of foreign carriers and NTSBs recommendations concerning safety on runways been fully implemented.
NTIS
Aircraft Safety; Flight Safety; Airline Operations

20020043262 Federal Aviation Administration, Office of Aviation Policy and Plans, Washington, DC USA
Office of Aviation Policy and Plans: Aviation Industry Overview, *FY 1998*
Feb. 1999; 30p; In English
Report No.(s): PB2002-104490; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The report consists of tables of statistical data on airline operations for fiscal year 1998. Statistics are given on numbers of departures, arrivals, passengers, aircraft orders, traffic demand, airline operations at major hubs, etc. Data is provided for most U.S. Carriers.
NTIS
Air Traffic; Airline Operations; Statistical Analysis

20020043266 Center for Transportation and the Environment, Ames, IA USA
Acceptable Method of Counting Aircraft Operations at Non-Tower Airports *Final Report*
Jun. 1996; 20p; In English
Report No.(s): PB2002-104908; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Accurate information on aircraft activity at non-towered airports is of significant concern to airport owners and operators as well as to those responsible for planning, developing, and administering these facilities. Unfortunately, without on-site air traffic controllers it is not possible to accurately record aircraft activities. This report summarizes the current state-of-the-practice for counting airport operations at non-towered airports. Five primary areas are addressed: (1) current procedures for counting airport activity, (2) current data collection practices in Iowa and other midwestern states, (3) review of existing literature and research on this topic, (4) available technology and technology providers, and (5) alternatives and recommendations for future data collection.
NTIS
Airports; Air Traffic Controllers (Personnel); Data Acquisition; Flight Operations

20020043310 NASA Ames Research Center, Moffett Field, CA USA
Korean Air Lines Flight 007: Lessons from the Past and Insights for the Future
Degani, Asaf, NASA Ames Research Center, USA; [2001]; 46p; In English
Contract(s)/Grant(s): RTOP 711-41-12; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The majority of the problems pilot encounter when using automated systems center around two factors: (1) the pilot has an incomplete and inadequate model of how the autopilot works; and (2) the displays and flight manuals, provided to the pilot, are inadequate for the task. The tragic accident of Korean Air Lines Flight 007, a Boeing 747 that deviated from its intended flight path, provides a compelling case-study of problems related to pilots' use of automated systems. This paper describes what had happened and exposes two types of human-automation interaction problems: (1) The pilots of KAL were not provided with

adequate information about the actual behavior of the autopilot and its mode transition logic; and (2) The autopilot onboard KAL 007 did not provide adequate information to the flight crew about its active and armed modes. Both factors, according to the International Civil Aviation Organization (1993) report on the accident, contributed to the aircraft's lethal navigation error.
Derived from text
Automatic Pilots; Flight Management Systems; Boeing 747 Aircraft; Korea; Airline Operations; Flight Paths

20020043800 NASA Langley Research Center, Hampton, VA USA
Flight Test Evaluation of the Airborne Information for Lateral Spacing (AILS) Concept
Abbott, Terence S., NASA Langley Research Center, USA; April 2002; 26p; In English
Contract(s)/Grant(s): RTOP 727-01-26-01
Report No.(s): NASA/TM-2002-211639; NAS 1.15:211639; L-18175; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Airborne Information for Lateral Spacing (AILS) concept is designed to support independent parallel approach operations to runways spaced as close as 2,500 feet. This report briefly describes the AILS operational concept and the results of a flight test of one implementation of this concept. The focus of this flight test experiment was to validate a prior simulator study, evaluating pilot performance, pilot acceptability, and minimum miss-distances for the rare situation in which an aircraft on one approach intrudes into the path of an aircraft on the other approach. Although the flight data set was not meant to be a statistically valid sample, the trends acquired in flight followed those of the simulator and therefore met the intent of validating the findings from the simulator. Results from this study showed that the design-goal mean miss-distance of 1,200 feet to potential collision situations was surpassed with an actual mean miss-distance of 1,859 feet. Pilot reaction times to the alerting system, which was an operational concern, averaged 0.65 seconds, were well below the design goal reaction time of 2.0 seconds. From the results of both of these tests, it can be concluded that this operational concept, with supporting technology and procedures, may provide an operationally viable means for conducting simultaneous, independent instrument approaches to runways spaced as close as 2500 ft.
Author
Flight Tests; Flight Simulators; Aircraft Approach Spacing; Lateral Control; Aircraft Maneuvers

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.

20020043267 Department of Transportation, Office of Research and Special Programs, Washington, DC USA
Federal Radionavigation Plan (2001)
Mar. 19, 2002; 68p; In English
Report No.(s): PB2002-104945; No Copyright; Avail: National Technical Information Service (NTIS)

The report is the official source of radio navigation policy and planning for the Federal Government and is required by the National Defense Authorization Act for Fiscal year 1998. It is prepared jointly by the Departments of Defense (DoD) and Transportation (DOT) with the assistance of other government agencies. This edition of the FRP updates and replaces the 1999 FRP and covers common-use radio navigation systems (i.e. systems used by both civil and military sectors). Systems used exclusively by the military are covered in the Chairman, Joint Chiefs of Staff (CJCS) Master Positioning, Navigation, and Timing Plan (MPNTP). Beginning with this edition, Federal radio navigation information previously contained in a single document will be published in two separate documents: The FRP and a companion document entitled 'Federal Radionavigation Systems' (FRS). The FRP includes the introduction, policies, operating plans, and research and development sections and will allow more efficient and responsive updates of policy and planning information.
NTIS
Radio Navigation; Security; Transportation; Industries

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.

20020043250 NASA Ames Research Center, Moffett Field, CA USA
Vortex Wake Geometry of a Model Tilt Rotor in Forward Flight
Wadcock, Alan J., Aerospace Computing, Inc., USA; Yamauchi, Gloria K., NASA Ames Research Center, USA; [2001]; 3p; In English
Contract(s)/Grant(s): RTOP 712-20-22; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

A full-span 0.25-scale V-22 tiltrotor was tested in the NASA Ames 40-by 80-Foot Wind Tunnel in November 2000. The main objective of the test was to acquire a comprehensive database to validate tiltrotor analyses. Figure 1 shows the model installed in the Ames 40- by 80-Foot Wind Tunnel. Rotor and vehicle performance measurements were taken in addition to wing pressures, acoustics, and flow visualization. A dual acoustic traverse system was installed to measure blade-vortex interaction (BVI) noise levels and directivity. Test conditions included hover and forward flight in helicopter mode. Angle-of-attack and thrust sweeps for three tunnel speeds were acquired before model problems caused the premature conclusion of the test. The test will resume in the Ames 80- by 120-Foot Wind Tunnel in late 2001. This paper will focus on the wake geometry measurements that were acquired during the test. The wake geometry measurements were a small subset of a larger matrix of planned measurements designed to study the development and structure of the dual vortex system generated during BVI conditions. The present paper will provide wake geometry data for four test conditions. In addition, the data will be compared with previously acquired wake measurements from an isolated tiltrotor
Derived from text
Tilt Rotor Aircraft; Blade-Vortex Interaction; Wakes; Vortices; Flow Visualization

20020043372 NASA Dryden Flight Research Center, Edwards, CA USA
In-Flight Vibration Environment of the NASA F-15B Flight Test Fixture
Corda, Stephen, NASA Dryden Flight Research Center, USA; Franz, Russell J., NASA Dryden Flight Research Center, USA; Blanton, James N., NASA Dryden Flight Research Center, USA; Vachon, M. Jake, NASA Dryden Flight Research Center, USA; DeBoer, James B., NASA Dryden Flight Research Center, USA; February 2002; 31p; In English
Contract(s)/Grant(s): RTOP 710-35-14-M1-00-38
Report No.(s): NASA/TM-2002-210719; H-2468; NAS 1.15:210719; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Flight vibration data are analyzed for the NASA F-15B/Flight Test Fixture II test bed. Understanding the in-flight vibration environment benefits design and integration of experiments on the test bed. The power spectral density (PSD) of accelerometer flight data is analyzed to quantify the in-flight vibration environment from a frequency of 15 Hz to 1325 Hz. These accelerometer data are analyzed for typical flight conditions and maneuvers. The vibration data are compared to flight-qualification random vibration test standards. The PSD levels in the lateral axis generally are greater than in the longitudinal and vertical axes and decrease with increasing frequency. At frequencies less than approximately 40 Hz, the highest PSD levels occur during takeoff and landing. Peaks in the PSD data for the test fixture occur at approximately 65, 85, 105-110, 200, 500, and 1000 Hz. The pitch-pulse and 2-g turn maneuvers produce PSD peaks at 115 Hz. For cruise conditions, the PSD level of the 85-Hz peak is greatest for transonic flight at Mach 0.9. From 400 Hz to 1325 Hz, the takeoff phase has the highest random vibration levels. The flight-measured vibration levels generally are substantially lower than the random vibration test curve.
Author
F-15 Aircraft; Vibration Tests; Flight Tests; Random Vibration; Fixtures; Power Spectra

20020043477 Naval Research Lab., Washington, DC USA
Feasibility of a Passive Collision Avoidance System (PCAS) Based on Staring Infrared Sensors
Takken, E. H.; Stone, E. J.; Priest, R. G.; Kershenstein, J. C.; Jan. 1998; 21p; In English
Report No.(s): AD-A400263; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report finds that a light weight, passive collision avoidance (PCAS) system based on uncooled LWIR sensors is feasible for Hunter/Predator class UAVs. The candidate PCAS system is analyzed using a statistical measure based on warning time

provided. Typically warning times of 10s of seconds could be provided with very low probability of missed detection due to encounters with light aircraft under contrast reversal conditions.
DTIC
Collision Avoidance; Infrared Detectors; Feasibility Analysis; Passivity; Remotely Piloted Vehicles

20020043667 Department of the Navy, Program Executive Office, Patuxent River, MD USA
Naval UAV Programs: Sea Based UAV's
Whitmer, Lynden D.; Feb. 26, 2002; 4p; In English; Presented at the Engineering the Total Ship (ETS) Symposium held in Gaithersburg, MD, 26-27 Feb. 2002
Report No.(s): AD-A399983; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche
The purpose of this document is to state the importance of having an evolving sea based UAV program to aid in the development of successive sea based UAV systems. The Pioneer use on hoard LPDs and changing requirements helped shape the VTUAV development. Currently the program of record does not field VTUAV, it completes EMD only, and the next sea based capability is delayed until UCAV in 2015. Thus taking a giant step from LPDs in 2000 to carrier in 2015, which may he a technological and cultural leap to tar without evolution. Using lessons learned from prior sea based systems will ease future operations and significantly reduce shipboard integration issues.
DTIC
Remotely Piloted Vehicles; Pilotless Aircraft

20020043669 Naval Air Systems Command, Joint Strike Fighter Program Office, Arlington, VA USA
The Influence of Ship Configuration on the Design of the Joint Strike Fighter
Ryberg, Eric S.; Feb. 26, 2002; 12p; In English
Report No.(s): AD-A399988; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
While the implications of shipboard compatibility have long influenced the design of maritime-based aircraft, the Joint Strike Fighter (JSF) is unique in that the program is centered on the concurrent development of a family of highly common aircraft variants, two of which are to operate from distinctly different ship types. This procurement strategy poses a formidable challenge to the aircraft designer: Flow to design an air system that meets the unique needs of its multiple warfighter customers while preserving enough commonality to reap the benefits of the family" approach to design, manufacture, and operational sustainment. This paper describes how the configurations of the USA Navy's aircraft carriers and amphibious assault ships, as well as the United Kingdom Royal Navy's INVINCIBLE-class of carriers, have influenced the basic configurations of the catapult launch/arrested landing (CV) and the short takeoff/vertical landing (STOVL) variants of the 3SF. From these discussions, the designers of future air capable ships can better understand which characteristics of current ship designs impose the most significant constraints for the aircraft based aboard them, and where ship/air interface considerations should play.
DTIC
Aircraft Carriers; Ships; V/STOL Aircraft; Aircraft Design; Fighter Aircraft

20020044029 Moscow State Univ., Dept. of Physics, Russia
Investigation of Discharges Influence on Boundary Layer in Supersonic Airflow ***Final Report, 1 Oct. 2000-1 Oct 2001***
Shibkov, Valery; Oct. 2001; 116p; In English; Original contains color images
Report No.(s): AD-A400104; EOARD-ISTC 00-7005; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche
This report results from a contract tasking Moscow State University (MSU) as follows: The contractor will develop methods of creation of plasmas of different types of gas discharges near the surface of airplanes and in the boundary layers. He will also develop methods of analysis of plasma properties in plasma regions near the surface. The following experimental work will be done in supersonic air flow (Mis less than 2) at pressures between 1 and 200 Torr: a) measurement of friction drag on a flat plate without plasma flow; b) same as (a) with plasma jet flow, and with corona discharge; and c) measurement of friction drag of the plate treated with plasma. A theoretical analysis of the obtained results will also be delivered.
DTIC
Boundary Layers; Gas Discharges; Supersonic Flow

06
AVIONICS AND AIRCRAFT INSTRUMENTATION

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.

20020043464 Little (Arthur D.), Inc., Cambridge, MA USA
Wireless Sensor Review ***Final Report, May 2000-Mar. 2001***
Fricke, Robert; Mar. 2001; 59p; In English
Contract(s)/Grant(s): F33615-99-D-6001; Proj-1710
Report No.(s): AD-A400392; 71228-02; AFRL-HE-WP-TR-2001-0167; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The goal of this study was to investigate wireless sensor products and technologies for use in the prediction of component failure for legacy aircraft. Further, the study was to rank the identified products and technologies and select those that held the most promise for the intended maintenance task. Finally, based on the selected subset, demonstrations were to be arranged either at the vendor site, at Arthur D. Little (ADL), or at the Air Force Research Laboratory (AFRL). The commercial systems that were identified to be most applicable to aircraft maintenance were the WINS system from Sensoria, the CrossNet from Crossbow Technologies, the ATI rotating sensor system, and the CSI line of machine diagnostics products. Demonstrations were arranged for all but the CSI systems. The technology identified to be most applicable to aircraft maintenance included three patents from Raytheon and one from The Aerospace Corporation. Raytheon has subsequently sold the rights to one of the patents to CBL Systems. The remaining two are still held by Raytheon. The Aerospace Corporation patent is available royalty free to the Air Force, since it was developed under government funding.
DTIC
Aircraft Maintenance; Remote Sensors; Transducers; Systems Health Monitoring; Component Reliability

07
AIRCRAFT PROPULSION AND POWER

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

20020044007 American Inst. of Aeronautics and Astronautics, Reston, VA USA
Fifteenth International Symposium on Air Breathing Engines ***Final Report, 3-7 Sep. 2001***
Waltrup, Paul J.; Sep. 2001; ISBN -56347-515-4; 227p; In English
Contract(s)/Grant(s): N68171-01-M-5527
Report No.(s): AD-A400306; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

The 15th International Symposium on Air Breathing Engines (XV ISABE) was held at Bangalore, India on September 2-7, 2001, organized by the Indian National Organizing Committee under the sponsorship of various professional organizations across the world, various industries and academic institutions in India, and the governmental authorities in India. The symposium was also supported by various agencies of the U.S. government including the Department of Defense and the National Aeronautics and Space Administration.
DTIC
Air Breathing Engines; Cycles; Fatigue (Materials)

08
AIRCRAFT STABILITY AND CONTROL

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

20020043212 Louisiana State Univ., Electrical and Computer Engineering Dept., LA USA
X-33 Ascent Flight Controller Design by Trajectory Linearization: A Singular Perturbational Approach ***Final Report***
Zhu, J. Jim, Louisiana State Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-53; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

The flight control of X-33 poses a challenge to conventional gain-scheduled flight controllers due to its large attitude maneuvers from liftoff to orbit and reentry. In addition, a wide range of uncertainties in vehicle handling qualities and disturbances must be accommodated by the attitude control system. Nonlinear tracking and decoupling control by trajectory linearization can be viewed as the ideal gain-scheduling controller designed at every point on the flight trajectory. Therefore it provides robust stability and performance at all stages of flight without interpolation of controller gains, and eliminates costly controller redesigns due to minor airframe alteration or mission reconfiguration. A prototype trajectory linearization design for X-33 ascent flight controller was designed and tested with 3-DOF and 6-DOF simulations during the 10 weeks SFFP. It is noted that the 6-DOF results were obtained from the 3-DOF design with only a few hours of tuning, which demonstrates the inherent robustness of the design technique. It is this ”plug-and-play” feature that is much needed by NASA for the development, test and routine operations of the RLVs. Plans for further research are also presented.
Author
Ascent; Flight Control; Linearization; Trajectories; X-33 Reusable Launch Vehicle; Control Systems Design

20020044005 Oklahoma State Univ., School of Electrical and Computer Engineering, Stillwater, OK USA
Health Monitoring on Vibration Signatures ***Final Report, 1 Aug. 1997-31 Jul. 2001***
Yen, Gary G.; Feb. 26, 2002; 239p; In English
Contract(s)/Grant(s): F49620-98-1-0049
Report No.(s): AD-A400329; AFRL-SR-BL-TR-02-0123; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

This final report covers the entire contracting effort from August 1, 1997 to July 31, 2001 (with an extended year at no cost to the program). The progress made is primarily targeted to establish the fundamental bases from analytical and simulation studies. In addition, we have moved forward to validate the algorithms developed in several experimental testbeds. To consolidate the technical efforts dedicated to the theoretical developments appropriate for vibration monitoring in Air Force structures (e.g., aircraft, rotorcraft and RLVs (reusable launch vehicles)), a comprehensive ’modular’ approach is taken. The tasks as outlined include Wavelet feature extraction, sensor validation, feature selection, fault detection, identification and classification, knowledge representation, multi-model on-line control autonomy, nonlinear system identification, adaptive critic fault tolerant control and multi objective optimization design. The approach is evolving as more mathematical analyses are accomplished and desired specifications are defined. The methodology proposed is generic and applicable to a wide variety of industrial applications - (e.g., chemical fluidized processes, semiconductor RIE (reactive ion etching) facility), medical-assisted monitoring (e.g., EKG (electrocardiogram), intra-cranial pressure monitoring) and environmental assessment (e.g., frog/bird call monitoring). The vibration data set used for preliminary test is derived from U.S. Navy CH-46E Chinook helicopters available in public domain; commonly know as the Westland data set. The data set (four-second time series) is available in public domain and has been used for benchmark comparison by researchers within this community. The data set is clean and complete as opposed to the USAF (USA Air Force) Academy bearing data set, which is highly noisy and sparse.
DTIC
Maintenance; Early Warning Systems; Fault Detection; Systems Health Monitoring; Vibration Measurement

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).

20020043263 General Accounting Office, Washington, DC USA
Airport and Airway Trust Fund: Effects of the Trust Fund Taxes' Lapsing on FAA's Budget
Apr. 1996; 18p; In English
Report No.(s): PB2002-104541; GAO/RCED-96-130; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Airport and Airway Trust Fund (Trust Fund) was established by the Airport and Airway Revenue Act of 1970 (P.L. 91-258) to finance the Federal Aviation Administrations (FAA) investments in the airport and airway system, such as construction and safety improvements at airports and technological upgrades to the air traffic control system. In March 1996, you requested that we provide you with information on the status of the Trust Fund, including the implications of reinstating or not reinstating the taxes on FAA's budget.
NTIS
Air Traffic Control; Construction; Finance

20020043406 Computer Sciences Corp., Moffett Field, CA USA
Accessing Wind Tunnels From NASA's Information Power Grid
Becker, Jeff, Computer Sciences Corp., USA; [2002]; 9p; In English; WWW2002, 7-11 May 2002, Honolulu, HI, USA
Contract(s)/Grant(s): DTTS59-99-D-0043; NASA Order A-61812-D; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The NASA Ames wind tunnel customers are one of the first users of the Information Power Grid (IPG) storage system at the NASA Advanced Supercomputing Division. We wanted to be able to store their data on the IPG so that it could be accessed remotely in a secure but timely fashion. In addition, incorporation into the IPG allows future use of grid computational resources, e.g., for post-processing of data, or to do side-by-side CFD validation. In this paper, we describe the integration of grid data access mechanisms with the existing DARWIN web-based system that is used to access wind tunnel test data. We also show that the combined system has reasonable performance: wind tunnel data may be retrieved at 50Mbits/s over a 100 base T network connected to the IPG storage server.
Author
Wind Tunnels; Data Storage; Supercomputers; Wind Tunnel Tests; Computational Grids

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).

20020043396 NASA Kennedy Space Center, Cocoa Beach, FL USA
Quadrupole Ion Trap Mass Spectrometry for Space Shuttle Ground Support
Ottens, Andrew K., Florida Univ., USA; Harrison, W. W., Florida Univ., USA; Griffin, Timothy P., DYNACS Engineering Co., Inc., USA; Helms, W., NASA Kennedy Space Center, USA; [2002]; 18p; In English; 3rd Annual Harsh Environment Mass Spectrometry Workshop, 26-27 Mar. 2002, Pasadena, CA, USA
Contract(s)/Grant(s): NAS10-98001; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This paper presents viewgraphs of Quadrupole Ion Trap Mass Spectrometry for Space Shuttle Ground Support. The cryogenic fuel system and instrumentation for leak detection are also described.
CASI
Mass Spectroscopy; Quadrupoles; Space Shuttles; Ground Support Systems

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.

20020043222 Alabama Univ., Dept. of Electrical and Computer Engineering, Huntsville, AL USA
Reusable Launch Vehicle Control in Multiple Time Scale Sliding Modes ***Final Report***
Shtessel, Yuri, Alabama Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-44; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

A reusable launch vehicle control problem during ascent is addressed via multiple-time scaled continuous sliding mode control. The proposed sliding mode controller utilizes a two-loop structure and provides robust, de-coupled tracking of both orientation angle command profiles and angular rate command profiles in the presence of bounded external disturbances and plant uncertainties. Sliding mode control causes the angular rate and orientation angle tracking error dynamics to be constrained to linear, de-coupled, homogeneous, and vector valued differential equations with desired eigenvalues placement. The dual-time scale sliding mode controller was designed for the X-33 technology demonstration sub-orbital launch vehicle in the launch mode. 6DOF simulation results show that the designed controller provides robust, accurate, de-coupled tracking of the orientation angle command profiles in presence of external disturbances and vehicle inertia uncertainties. It creates possibility to operate the X-33 vehicle in an aircraft-like mode with reduced pre-launch adjustment of the control system.
Author
Control Theory; Computerized Simulation; X-33 Reusable Launch Vehicle; Angular Velocity

20020043473 California Univ., San Diego, Center for Astrophysics and Space Sciences, La Jolla, CA USA
Forecasting Heliospheric Structure Using the Solar Mass Ejection Imager (SMEI) ***Interim Report***
Jackson, Bernard V.; Buffington, Andrew; Hick, P. P.; Webb, David F.; Aug. 15, 2001; 36p; In English; Original contains color images
Contract(s)/Grant(s): AF49620-98-1-0062
Report No.(s): AD-A400244; AFRL-SR-BL-TR-02-0113; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Solar disturbances produce major effects in the corona, its extension into the interplanetary medium, and ultimately, the Earth's environment. The ability to forecast the arrival at Earth of these disturbances and to determine their effects on the geospace environment is of primary interest to the Air Force, which communicates through and maintains satellites within this environment. We have developed imaging and other techniques for use in mapping these disturbances (mainly coronal mass ejections or CMEs) as they move away from the Sun. This capability has begun to revolutionize the study of large-scale heliospheric space plasma interactions. The Solar Mass Ejection Imager (SMEI), now being developed and constructed, will have an angular and temporal resolution far better than the data sets (interplanetary scintillation and Thomson scattering observations from the HELIOS photometers) for which our imaging techniques were originally developed. SMEI will produce a thousand times as much data as previously available, exceeding our current data analysis capabilities. The development of adequate analysis and modeling techniques for SMEI data is a serious challenge, which must be addressed in order to maximize the scientific return from the SMEI mission, in particular with respect to our ability to accurately forecast the arrival of heliospheric disturbances at Earth.
DTIC
Heliosphere; Imaging Techniques; Sun; Coronal Mass Ejection

16
SPACE TRANSPORTATION AND SAFETY

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

20020043232 Iowa State Univ. of Science and Technology, Ames, IA USA
A Further Look at X-33 Entry Guidance and Beyond ***Final Report***
Lu, Ping, Iowa State Univ. of Science and Technology, USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-29; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

An entry guidance design developed at Iowa State University (ISU) for the X-33 advanced technology demonstrator is outlined and compared with the X-33 entry guidance algorithms developed at NASA Marshall. Both designs are based on the Space Shuttle entry guidance concept, but significant improvements have been made to enhance the performance and reduce the complexity. The ISU design was incorporated into MAVERIC, a high fidelity vehicle simulation software for the X-33, and evaluated in Monte Carlo simulations against random dispersions in propulsion system, wind and atmospheric properties, aerodynamic coefficients, interaction between propulsion and aerodynamics, and navigation data. The simulations clearly demonstrated the capability and precision of the ISU entry guidance design in successfully guiding the X-33 in some rather difficult flight scenarios. As the entry guidance development for the X-33 is completing, this report also offers some review of the strength and limitations of the current Shuttle-based entry guidance framework, and finally some potential candidates for next generation of more capable and cost-effective entry guidance designs are discussed.
Author
Atmospheric Entry; X-33 Reusable Launch Vehicle; Computerized Simulation; Algorithms

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.

20020043301 Belmont Univ., Nashville, TN USA
Statistical Analysis of Complexity Generators for Cost Estimation ***Final Report***
Rowell, Ginger Holmes, Belmont Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-39; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Predicting the cost of cutting edge new technologies involved with spacecraft hardware can be quite complicated. A new feature of the NASA Air Force Cost Model (NAFCOM), called the Complexity Generator, is being developed to model the complexity factors that drive the cost of space hardware. This parametric approach is also designed to account for the differences in cost, based on factors that are unique to each system and subsystem. The cost driver categories included in this model are weight, inheritance from previous missions, technical complexity, and management factors. This paper explains the Complexity Generator framework, the statistical methods used to select the best model within this framework, and the procedures used to find the region of predictability and the prediction intervals for the cost of a mission.
Author
Cost Estimates; Statistical Analysis; Generators; Spacecraft Equipment

20
SPACECRAFT PROPULSION AND POWER

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

20020043210 Vanderbilt Univ., Mechanical Engineering Dept., TN USA
Raman Spectroscopy for Instantaneous Multipoint, Multispecies Gas Concentration and Temperature Measurements in Rocket Engine Propellant Injector Flows ***Final Report***
Wehrmeyer, Joseph A., Vanderbilt Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-48; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Propellent injector development at MSFC includes experimental analysis using optical techniques, such as Raman, fluorescence, or Mie scattering. For the application of spontaneous Raman scattering to hydrocarbon-fueled flows a technique needs to be developed to remove the interfering polycyclic aromatic hydrocarbon fluorescence from the relatively weak Raman signals. A current application of such a technique is to the analysis of the mixing and combustion performance of multijet, impinging-jet candidate fuel injectors for the baseline Mars ascent engine, which will bum methane and liquid oxygen produced

in-situ on Mars to reduce the propellent mass transported to Mars for future manned Mars missions. The present technique takes advantage of the strongly polarized nature of Raman scattering. It is shown to be discernable from unpolarized fluorescence interference by subtracting one polarized image from another. Both of these polarized images are obtained from a single laser pulse by using a polarization-separating calcite rhomb mounted in the imaging spectrograph. A demonstration in a propane-air flame is presented.
Author
Injectors; Raman Spectroscopy; Gas Composition; Rocket Propellants; Temperature Measurement

20020043218 New York City Technical Coll., Dept. of Physical and Biological Science, Brooklyn, NY USA
Beyond the Solar System: A Challenge for Space Propulsion ***Final Report***
Matloff, Gregory L., New York City Technical Coll., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-30; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Scientific exploration beyond the confines of our solar system has recently become a near-term goal for NASA. Early robotic probes beyond the Sun's heliopause [a few hundred Astronomical Units (AU) from the Sun] are planned for the first decade of the 21st century. A leading propulsion system for these early interstellar efforts is the solar sail unfurled as close to the Sun as possible. This report discusses the basic physics of the solar sail, the rationale for interstellar exploration, a recent materials breakthrough influencing solar-sail design concepts, and solar sail kinematics (for the case of sail unfurlment at perihelion from an initially parabolic solar orbit and sail orientation normal to the Sun). A number of possible mission scenarios to distances up to 1,000 AU are presented as is a short discussion of what we must learn to extend our exploratory reach to 10,000 AU.
Author
Astronomy; Solar System; Space Exploration; Spacecraft Propulsion

20020043231 Richland Community Coll., Decatur, IL USA
Inertial-Electrostatic Confinement (IEC) Fusion for Space Propulsion ***Final Report***
Nadler, Jon, Richland Community Coll., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-31; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
An Inertial-Electrostatic Confinement (IEC) device was assembled at the Marshall Space Flight Center (MSFC) Propulsion Research Center (PRC) to study the possibility of using EEC technology for deep space propulsion and power. Inertial-Electrostatic Confinement is capable of containing a nuclear fusion plasma in a series of virtual potential wells. These wells would substantially increase plasma confinement, possibly leading towards a high-gain, breakthrough fusion device. A one-foot in diameter IEC vessel was borrowed from the Fusion Studies Laboratory at the University of Illinois@Urbana-Champaign for the summer. This device was used in initial parameterization studies in order to design a larger, actively cooled device for permanent use at the PRC.
Author
Electrostatics; Inertial Confinement Fusion; Spacecraft Propulsion; Plasmas (Physics)

20020043283 Christian Brothers Univ., Memphis, TN USA
Data Reduction Methods Applied to the Fastrac Engine ***Final Report***
Santi, L. Michael, Christian Brothers Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-42; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
The Fastrac rocket engine is currently being developed for the X-34 technology demonstrator vehicle. The engine performance model must be calibrated to support accurate performance prediction. Data reduction is the process of estimating hardware characteristics from available test data, and is essential for effective performance model calibration and prediction. A new data reduction procedure was developed, implemented, and tested using data from Fastrac engine tests. The procedure selects hardware and test measurements to use in the reduction process based on examination of the model influence matrix condition number. Predicted hardware characteristics are recovered from the solution of a quadratic programming problem. Computational tests indicate that the new procedure provides a significant improvement in test data reduction capability. Enhancements include improved test data utilization and time history data reduction capability. The new method is generically applicable to other systems.
Author
Data Reduction; Rocket Engines; X-34 Reusable Launch Vehicle; Engine Tests; Systems Engineering

20020043303 Pennsylvania State Univ., Dept. of Physics, PA USA
Enabling Exploration of Deep Space: High Density Storage of Antimatter ***Final Report***
Smith, Gerald A., Pennsylvania State Univ., USA; Kramer, Kevin J., Pennsylvania State Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-45; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

Portable electromagnetic antiproton traps are now in a state of realization. This allows facilities like NASA Marshall Space Flight Center to conduct antimatter research remote to production sites. MSFC is currently developing a trap to store 10(exp 12) antiprotons for a twenty-day half-life period to be used in future experiments including antimatter plasma guns, antimatter-initiated microfusion, and the synthesis of antihydrogen for space propulsion applications. In 1998, issues including design, safety and transportation were considered for the MSFC High Performance Antimatter Trap (HiPAT). Radial diffusion and annihilation losses of antiprotons prompted the use of a 4 Tesla superconducting magnet and a 20 KV electrostatic potential at 10(exp -12) Torr pressure. Cryogenic fluids used to maintain a trap temperature of 4K were sized accordingly to provide twenty days of stand-alone storage time (half-life). Procurement of the superconducting magnet with associated cryostat has been completed. The inner, ultra-high vacuum system with electrode structures has been fabricated, tested and delivered to MSFC along with the magnet and cryostat. Assembly of these systems is currently in progress. Testing under high vacuum conditions, using electrons and hydrogen ions will follow in the months ahead.
Author
Antiprotons; Matter-Antimatter Propulsion; Electromagnetism; Fabrication; Cryogenic Fluids; Deep Space

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COMPOSITE MATERIALS

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

20020043215 University of Southern Illinois, Dept. of Mechanical Engineering and Energy Processes, IL USA
Permeability Measurements in Carbon-Epoxy Composites ***Final Report***
Zdenek, Michael J., University of Southern Illinois, USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-19; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

To determine the permeability of the composite feedline, that is proposed to be used in the X-33 Reusable Launch Vehicle (RLV), three 8 x 8-in. coupons were constructed. Two of the coupons were layed-up with 4 plies of plain weave prepreg [0/90, plus or minus 45, plus or minus 45, 0/90] and the other one layed-up with 4 plies of unidirectional prepreg [0, 90, 90, 0]. The coupons were vacuumed bagged and cured to manufactures specifications. The coupons were then placed in an apparatus to test for permeability. Nitrogen gas was used to permeate through the coupons at a pressure of 5 psig. A manometer was placed on the opposite side of the coupons and was used to measure the height of the fluid with respect to time. From this data the mass flow rate of the gas could be calculated since the area of the manometer and the density of the gas is known. The results of the test are given. The permeability constant was calculated using Darcy's law, which related the pressure drop, flow rate of the permeating gas and resistance to flow through the coupon created. to put the results into prospective the permeability of sand stone and granite is 1E-15 and 1E-20 respectively.
Author
Epoxy Matrix Composites; Permeability; Feed Systems

20020043226 University of Southern Illinois, Dept. of Mechanical Engineering and Energy Processes, Carbondale, IL USA
Stress Analysis and Permeability Testing of Cryogenic Composite Feed Line ***Final Report***
Chu, Tsuchin Philip, University of Southern Illinois, USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-16; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

For the next generation Single-Stage-to-Orbit (SSTO) Reusable Launch Vehicle (RLV), the use of advanced composite materials is highly desirable and critical to the success of the mission. NASA Marshall Space Flight Center (MSFC) has been working with the aerospace industry for many years to develop and demonstrate the cryogenic composite propellant tanks and feed lines technologies. A 50.8-mm diameter composite feed line for the Clipper Graham (DCY.A) was developed and tested. The purpose of the program is to demonstrate the LH2 permeability, composite to composite and metal joints, as well as composite flange interface of the composite feed line. Stress analysis and permeability testing have been performed on this article. Recently, a larger composite feed line design is being investigated and developed at MSFC for potential use in future RLV. The diameter

of the feed line is 203 mm and the overall length is approximately 2.2 meters. This one piece unlined feed line consists of three straight tubular sections joined by two 90 degree elbows. The material chosen is IM7/977-3 prepreg fabric. The lay-up pattern is [0/90, plus or minus 45]s and is built up to 18 plies to the flanges at both ends. A preliminary stress analysis has been conducted to identify potential critical stresses and to develop the finite element analysis (FEA) capability of composite feed lines. As expected, the critical stresses occurred at the rims of some flange holes and the onset of the tapered tubular sections. Further analysis is required to determine the loads, flange deflection, vibration, and combined maximum loads. Two permeability-testing apparatuses were also designed for both flat panel specimens and curved feed line sections after impact damage. A larger permeant gas exposed area is required to accurately determine the effect of impact damage on the permeability of the feed line materials. The flat panel tester was fabricated and assembled. Three test coupons were made of graphite/epoxy plain weave prepreg and unidirectional prepreg. The flow rate was calculated by measuring the change of manometer fluid height per unit time. The permeability of the coupons is then calculated according to Darcy's Law. The pressure increase due to the head rise in the manometer was not considered for the initial estimation. The result of the unidirectional composite coupon agreed with that obtained from the DC-XA feed line testing of a similar material. Further improvement on the design may be required to improve the accuracy and efficiency of permeability testing.
Author
Cryogenics; Permeability; Stress Analysis; Fabrication; Manometers

20020043279 Vanderbilt Univ., Dept. of Civil and Environmental Engineering, TN USA
Design and Development of Lightweight Composite Tanks for the Mars Ascent Propulsion Technology ***Final Report***
Estrada, Hector, Vanderbilt Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-18; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
The investigation presented here focuses on the design and development of lightweight composite tanks for the Mars ascent propulsion technology. The proposed tanks are fabricated using the filament winding technique. The tanks will be used in the experimental permeability characterization of composite pressure vessels pressurized using cryogenic and kerosene fluids. We considered the geometry and composite material tailorability in the preliminary design formulation to obtain an isotensoid tank. The design formulation is based on membrane shell analysis. The tanks also include circular openings at the apex of the end caps for the installation of polar bosses. The development of a polar boss system was also investigated, and led to an innovative polar boss system that applies a uniform pressure on the o-ring gaskets. The permeability of these tanks was also considered and recommendations for improvement are presented.
Author
Mars (Planet); Propulsion; Ascent; Technology Utilization; Storage Tanks; Cryogenic Fluids

20020043304 Alabama Univ., Dept. of Civil and Environmental Engineering, Huntsville, AL USA
Effect of High Temperature on the Tensile Behavior of CFRP and Cementitious Composites ***Final Report***
Toutanji, Houssam A., Alabama Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-47; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Concrete and other composite manufacturing processes are continuing to evolve and become more and more suited for use in non-Earth settings such as the Moon and Mars. The fact that structures built in lunar environments would experience a range of effects from temperature extremes to bombardment by micrometeorites and that all the materials for concrete production exist on the Moon means that concrete appears to be the most feasible building material. it can provide adequate shelter from the harshness of the lunar environment and at the same time be a cost effective building material. With a return to the Moon planned by NASA to occur after the turn of the century, it will be necessary to include concrete manufacturing as one of the experiments to be conducted in one of the coming missions. Concrete's many possible uses and possibilities for manufacturing make it ideal for lunar construction. The objectives of this research are summarized as follows: i) study the possibility of concrete production on the Moon or other planets, ii) study the effect of high temperature on the tensile behavior of concrete, and iii) study the effect of high temperature on the tensile behavior of carbon fiber reinforced with inorganic polymer composites. Literature review indicates that production of concrete on the Moon or other planets is feasible using the indigenous materials. Results of this study has shown that both the tensile strength and static elastic modulus of concrete decreased with a rise in temperature from 200 to 500 C. The addition of silica fume to concrete showed higher resistance to high temperatures. Carbon fiber reinforced inorganic

polymer (CFRIP) composites seemed to perform well up to 300 C. However, a significant reduction in strength was observed of about 40% at 400 C and up to 80% when the specimens were exposed to 700 C.
Author
High Temperature; Tensile Strength; Carbon Fiber Reinforced Plastics; Cements; Composite Materials; Lunar Environment

20020043393 NASA Ames Research Center, Moffett Field, CA USA
Thermal Protection Materials for Reentry Applications
Johnson, Sylvia M., NASA Ames Research Center, USA; Stackpoole, Mairead, Eloret Corp., USA; Gusman, Mike, Eloret Corp., USA; Loehman, Ron, Sandia National Labs., USA; Kotula, Paul, Sandia National Labs., USA; Ellerby, Donald, NASA Ames Research Center, USA; Arnold, James, NASA Ames Research Center, USA; Wercinski, Paul, NASA Ames Research Center, USA; Reuthers, James, NASA Ames Research Center, USA; Kontinos, Dean, NASA Ames Research Center, USA; [2001]; 36p; In English; Structural Ceramics and Ceramic Composites for High-Temperature Applications Conference, 11 Oct. 2001, Seville, Spain; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Thermal protection materials and systems (IRS) are used to protect spacecraft during reentry into Earth's atmosphere or entry into planetary atmospheres. As such, these materials are subject to severe environments with high heat fluxes and rapid heating. Catalytic effects can increase the temperatures substantially. These materials are also subject to impact damage from micrometeorites or other debris during ascent, orbit, and descent, and thus must be able to withstand damage and to function following damage. Thermal protection materials and coatings used in reusable launch vehicles will be reviewed, including the needs and directions for new materials to enable new missions that require faster turnaround and much greater reusability. The role of ablative materials for use in high heat flux environments, especially for non-reusable applications and upcoming planetary missions, will be discussed. New thermal protection system materials may enable the use of sharp nose caps and leading edges on future reusable space transportation vehicles. Vehicles employing this new technology would have significant increases in maneuverability and out-of-orbit cross range compared to current vehicles, leading to increased mission safety in the event of the need to abort during ascent or from orbit. Ultrahigh temperature ceramics, a family of materials based on HfB2 and ZrB2 with SiC, will be discussed. The development, mechanical and thermal properties, and uses of these materials will be reviewed.
Author
Thermal Protection; Spacecraft Reentry; Reusable Launch Vehicles; Planetary Atmospheres; Ablative Materials

20020043672 Army Research Lab., Computational and Information Sciences, Aberdeen Proving Ground, MD USA
Process Modeling of Composites by Resin Transfer Molding: Sensitivity Analysis for Isothermal Considerations
Henz, Brian J.; Tamma, Kumar K.; Kanapady, Randev; Ngo, Nam D.; Chung, Peter W.; Mar. 2002; 41p; In English
Report No.(s): AD-A400222; ARL-TR-2686; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The resin transfer molding (RTM) manufacturing process consists of either of two considerations; the first is the fluid flow analysis through a porous fiber preform where the location of the flow front is of fundamental importance, and the second is combined flow/heat transfer analysis. For preliminary design purposes and the case of relatively large molds, isothermal considerations seem fairly representative of the physical situation. The continuous sensitivity formulations are developed for the process modeling of composites manufactured by RTM to predict, analyze, and the optimize the manufacturing process. Attention is focused here on developments for isothermal flow simulations, and illustrative examples are presented for sensitivity analysis applications which help serve as a design tool in the process modeling stages.
DTIC
Resin Transfer Molding; Composite Materials; Sensitivity Analysis

20020043673 Army Research Lab., Computational and Information Sciences, Aberdeen Proving Ground, MD USA
Process Modeling of Composites by Resin Transfer Molding: Sensitivity Analysis for Non-Isothermal Considerations
Henz, Brian J.; Tamma, Kumar K.; Mohan, Ram; Ngo, Nam D.; Mar. 2002; 42p; In English
Report No.(s): AD-A400221; ARL-TR-2685; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The resin transfer molding (RTM) manufacturing process consists of either of two considerations. The first is the fluid flow analysis where tracking of the flow fronts are of primary importance, and the second is the combined multi-disciplinary flow/thermal analysis, where kinetics and cure need to be accounted for in the process modeling stages. In the combined multi-disciplinary flow/thermal analysis, viscosity is a function of temperature. The so-called continuous sensitivity formulations are developed for the latter case of non-isothermal process modeling of composites manufactured by RTM to predict, analyze,

and optimize the manufacturing process. Attention is focused on developments for non-isothermal process modeling simulations, and numerical illustrative examples are presented for the sensitivity analysis of structural composites manufactured by RTM.
DTIC
Resin Transfer Molding; Composite Structures; Sensitivity Analysis; Thermal Analysis

20020043830 Dayton Univ. Research Inst., Research Inst., OH USA
Effect of Surface Preparation on Fatigue Durability of Bonded Composite Repair Patches. Volume 6 - Delivery Order 4, Task 1 ***Final Report, 1 MAy 1998-30 Aug. 1999***
Askins, D. R.; Nov. 1999; 73p; In English
Contract(s)/Grant(s): F33615-95-D-5616; Proj-4349
Report No.(s): AD-A400387; UDR-TR-1999-00054; AFRL-ML-WP-TR-2000-4154; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche
A test program was conducted to investigate two issues: (a) Whether fatigue testing could discriminate between optimum and inferior surface preparations. (b) Whether a correlation exists between wedge and fatigue test results. Wedge and fatigue specimens were prepared with two surface preparations. One was considered to be highly durable and one to have poor durability in hot-wet environments. The highly durable preparation involved a Grit-Blast Silane (GBS) surface treatment with BR127 primer. The poor durability preparation consisted of Scuff Sanding (55) with no primer. The fatigue specimens consisted of an aluminum panel with a bonded boron/epoxy composite patch. The wedge specimens behaved as expected, with the GBS/BR127 surface preparation exhibiting low-crack growth and cohesive failure while the SS/no primer surface preparation exhibited high-crack growth and interfacial failure. The fatigue performance was quantified by obtaining periodic C-scans during the tests and determining the percentage of the patch bond area that was degraded as fatigue cycling progressed. Comparison of these C-scan results, as well as failure modes, with the wedge test results, indicated that there was relatively good correlation between wedge and fatigue behavior for the two extremes of surface preparation investigated here.
DTIC
Surface Finishing; Surface Treatment; Surface Cracks; Fatigue Tests; Crack Propagation; Boron-Epoxy Composites

20020044004 Nottingham Univ., School of Mechanical Materials Manufacturing Engineering and Management, UK
Feasibility of Low Cost Fabrication of Lightweight, Protective Structures using Thermoplastic Matrix Composites ***Final Report, 15 Sep. 2000-15 Sep 2001***
Rudd, C. D.; Manwaring, A. M.; Brooks, R.; Sep. 2001; 22p; In English
Contract(s)/Grant(s): N68171-00-M-6228
Report No.(s): AD-A400326; 0F8A3; R/D-8859-MS-01; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
An investigation has been carried out into the low cost fabrication of lightweight thermoplastic composites for ballistic protection. Panels have been manufactured over a range of conditions using lightweight ballistic reinforcement, interleaved with polymer films. The ease of production is promising, and even at relatively low molding pressures and times the panels are well consolidated. Quasi-static penetrative tests were carried out using a Fragment Simulating Projectile (FSP) and have established correlation with other studies in terms of the mechanism of failure during penetration. Energy absorbance shows some relation to molding parameters although further testing would be required to draw any substantial conclusions. Cone formation and back-face deformation was also observed for S2-glass/LDPE (Low Density Polyethylene) panels and has been reported in the literature as being one of the major methods of energy absorption. Ballistic evaluation is still to be carried out on such panels, but following completion of the data set an appendix will be issued with results and discussion updated appropriately.
DTIC
Composite Materials; Thermoplastic Resins; Panels

20020044033 Raytheon Systems Co., Focal Plane Array Business, Dallas, TX USA
Isolation and Control of Voids and Void-Hillocks during Molecular Beam Epitaxial Growth of HgCdTe
Chandra, D.; Frazier, J.; Orent, T. W.; Aqariden, F.; Gutzler, S.; Jan. 1998; 19p; In English
Contract(s)/Grant(s): DAAL01-96-20-0001
Report No.(s): AD-A400076; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Void defects were demonstrated to form away from the substrate-epifilm interface during the molecular beam epitaxial growth of mercury cadmium telluride on cadmium zinc telluride substrates. These were smaller in size compared to voids which nucleated at the substrate-epifilm interface, which were also observed. Once nucleated, voids usually replicated all the way to the surface even if the flux ratios were modified to prevent additional nucleation of voids. Occasionally, void defects which close before reaching the top surface without leaving any perturbations on the surface, have also been observed. The voids which form

away from the substrate-epi interface, nucleate on defects, frequently hillocks, introduced into the film already grown, leading to formation of defect complexes. These voids can be smaller than 1 mm and appear almost indistinguishable from unaccompanied simple voids. However, these void-hillock complexes displayed a nest of dislocations decorating these defects, which become apparent upon dislocation etching, whereas unaccompanied simple voids did not. The nests could extend as much as 25 mm from the individual void-hillock complex. The density of dislocations within the nest exceeded 5 x 10 (exp 6) cm (exp -2), whereas the dislocation density outside of the nest could decrease to less than 2 x 10 (exp 5) cm(exp -2).
DTIC
Molecular Beam Epitaxy; Voids; Defects

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INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY

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

20020043217 Austin Peay State Univ., Dept. of Chemistry, Clarksville, TN USA
Materials Compatibility in High Test Hydrogen Peroxide ***Final Report***
Gostowski, Rudy, Austin Peay State Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-22; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Previous ratings of the compatibility of high test hydrogen peroxide (HTP) with materials are not adequate for current needs. The goal of this work was to develop a new scheme of evaluation of compatibility of HTP with various materials. Procedures were developed to enrich commercially available hydrogen peroxide to 90% concentration and to assay the product. Reactivity testing, accelerated aging of materials and calorimetry studies were done on HTP with representative metallic and non-metallic materials. It was found that accelerated aging followed by concentration determination using refractive index effectively discriminated between different Class 2 metallic materials. Preliminary experiments using Differential Scanning Calorimetry (DSC) suggest that a calorimetry experiment is the most sensitive means to assay the compatibility of HTP with materials.
Author
Aging (Materials); Compatibility; Hydrogen Peroxide; Heat Measurement

20020043244 Galaxy Scientific Corp., Egg Harbor Township, NJ USA
Molar Group Contributions to the Heat of Combustion
Walters, R. N.; Sep. 2001; 22p; In English
Report No.(s): PB2002-103685; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Experimental results for the gross heat of combustion of over 140 commercial and developmental polymers and small molecules of known chemical structures were used to derive additive molar group contributions. Predicted gross heats of combustion were within 2.5 percent of the values measured by oxygen bomb calorimetry.
NTIS
Polymers; Heat of Combustion; Heat Measurement

20020043274 Georgia Inst. of Tech., School of Earth and Atmospheric Sciences, Atlanta, GA USA
Development of a Computational Chemical Vapor Deposition Model: Applications to Indium Nitride and Dicyanovinylaniline ***Final Report***
Cardelino, Carlos, Georgia Inst. of Tech., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-12; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
A computational chemical vapor deposition (CVD) model is presented, that couples chemical reaction mechanisms with fluid dynamic simulations for vapor deposition experiments. The chemical properties of the systems under investigation are evaluated using quantum, molecular and statistical mechanics models. The fluid dynamic computations are performed using the CFD-ACE program, which can simulate multispecies transport, heat and mass transfer, gas phase chemistry, chemistry of adsorbed species, pulsed reactant flow and variable gravity conditions. Two experimental setups are being studied, in order to fabricate films of: (a) indium nitride (InN) from the gas or surface phase reaction of trimethylindium and ammonia; and (b) 4-(1,1)dicyanovinyl-dimethylaminoaniline (DCVA) by vapor deposition. Modeling of these setups requires knowledge of three

groups of properties: thermodynamic properties (heat capacity), transport properties (diffusion, viscosity, and thermal conductivity), and kinetic properties (rate constants for all possible elementary chemical reactions). These properties are evaluated using computational methods whenever experimental data is not available for the species or for the elementary reactions. The chemical vapor deposition model is applied to InN and DCVA. Several possible InN mechanisms are proposed and analyzed. The CVD model simulations of InN show that the deposition rate of InN is more efficient when pulsing chemistry is used under conditions of high pressure and microgravity. An analysis of the chemical properties of DCVA show that DCVA dimers may form under certain conditions of physical vapor transport. CVD simulations of the DCVA system suggest that deposition of the DCVA dimer may play a small role in the film and crystal growth processes.
Author
Computational Fluid Dynamics; Mathematical Models; Microgravity; Quantum Mechanics; Indium Compounds; Nitrides; Vapor Deposition

20020043289 Calhoun Community Coll., Div. of Natural Sciences, Decatur, AL USA
Electron Microscopy and Image Analysis for Selected Materials ***Final Report***
Williams, George, Calhoun Community Coll., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-49; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
This particular project was completed in collaboration with the metallurgical diagnostics facility. The objective of this research had four major components. First, we required training in the operation of the environmental scanning electron microscope (ESEM) for imaging of selected materials including biological specimens. The types of materials range from cyanobacteria and diatoms to cloth, metals, sand, composites and other materials. Second, to obtain training in surface elemental analysis technology using energy dispersive x-ray (EDX) analysis, and in the preparation of x-ray maps of these same materials. Third, to provide training for the staff of the metallurgical diagnostics and failure analysis team in the area of image processing and image analysis technology using NIH Image software. Finally, we were to assist in the sample preparation, observing, imaging, and elemental analysis for Mr. Richard Hoover, one of NASA MSFC's solar physicists and Marshall's principal scientist for the agency-wide virtual Astrobiology Institute. These materials have been collected from various places around the world including the Fox Tunnel in Alaska, Siberia, Antarctica, ice core samples from near Lake Vostoc, thermal vents in the ocean floor, hot springs and many others. We were successful in our efforts to obtain high quality, high resolution images of various materials including selected biological ones. Surface analyses (EDX) and x-ray maps were easily prepared with this technology. We also discovered and used some applications for NIH Image software in the metallurgical diagnostics facility.
Author
Scanning Electron Microscopy; Imaging Techniques; X Rays; Applications Programs (Computers)

20020043678 Perugia Univ., Dipt. di Chimica, Perugia Italy
26TH International Symposium on Free Radicals. Assisi, Italy, 2-7 September 2001. Book of Abstracts
Sep. 07, 2001; 227p; In English
Contract(s)/Grant(s): N68171-01-M-5899
Report No.(s): AD-A400318; R/D-9198-CH-02; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche
Sessions: (1) Reaction Dynamics: Experiment and Theory. Reactivity of the O(D1) atom: from state-to-state dynamics to multiple pathway chemistry; Quantum dynamics on some atom-hydrogen insertion reactions; UV and near-UV photodissociation dynamics of small hydrocarbon free radicals. (2) Spectroscopy. Some 'radical' new experiments in molecular spectroscopy; Linear triatomic radicals containing transitions metal atoms: a case history of vibronic coupling; Fourier-transform microwave spectroscopy of the acetyl radical. (3) Astrochemistry. Low temperature reactions of free radicals and their role in the chemistry of interstellar clouds; Fast-flow studies of the C+H2S, C2H2 and C2H4 reactions: A comparison between experimental and theoretical determinations of atomic hydrogen production; Detailed SACM modeling of the reactions O + OH right & left arrows O2 + H and O + OD right & left arrows O2 + D at 0 less than or equal to T less than or equal to 300 K. (4) Spectroscopy, Kinetics and Combustion. Infrared laser spectroscopy and chemical kinetics of free radicals; Experimental and computational studies of free radical reactions of importance in combustion; Infrared frequency-modulation probing of product information in reactions of alkyl radicals with O2. (5) Molecular Ions. Three-body breakup in dissociative recombination of molecular ions; Photelectron-photofragment coincidence studies of the energetics and dynamics of alkoxy radicals; laboratory and raio-astronomical spectroscopy of the hyperfine structure of N2D(+). (6) Photodissociation. Photodissociation of the free radicals HNCN and HCNN; Photoinitiated dissociation and isomerization of the hydroxmethyl radical; Inner-shell studies of free radicals and transient species by Synchrotron radiation. (7) Spectroscopy and Stereodynamics. Laser spectroscopy of free radicals in

hydrocarbon oxidation; Sterodynamics of OH; State-to-state inelastic collisional energy transfer in electronically excited CH radicals.
DTIC
Free Radicals; Reaction Kinetics; Photodissociation; Molecular Spectroscopy; Quantum Mechanics

20020043946 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA
Enzymatic Degradation of HD ***Final Report, 1 Sep.-1 Nov. 2001***
Harvey, Steven P.; Dec. 2001; 16p; In English
Report No.(s): AD-A400437; ECBC-TR-220; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
An enzyme, derived from a Rhodococcus bacterium, was found to have catalytic activity with HD as the substrate. The enzyme has previously been characterized as a hydrolytic dehalogenase and apparently catalyzes the hydrolysis reaction of HD, because chloride is released stoichiometically. The enzyme is precipitated between 60 and 100% ammonium sulfate saturation, binds to Q Sepharose and elutes at an ammonium sulfate concentration of about 0.1%. The enzyme exhibits saturation kinetics with HD as its substrate. The Km is about 15 mM HD and the V(sub max) occurs at about 25 mM. It exhibits fairly conventional temperature and pH effects with a temperature optimum of about 35 deg C and a pH optimum of about 7.0.
DTIC
Degradation; Hydrolysis; Enzymes

20020043957 Naval Research Lab., Washington, DC USA
Infrared-Transmitting Fibers
Aggarwal, I. D.; Busse, L. E.; Sanghera, J. S.; Aug. 1998; 10p; In English; Original contains color images
Report No.(s): AD-A400149; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
Chalcogenide glass fibers have been fabricated with minimum optical loss of 0.23 dB/m in the 1 - 6 mm region. NRL reports on results of applications of these fibers including IRCM and chemical sensing. For IRCM, they have demonstrated high power transmission through selected fibers using an Optical Parametric Oscillator with output in the 3 - 5 mm wavelength region. The maximum peak power used was 26.9 kW and the peak power density at the focus into the fiber was 1.07 GW/sq cm, which to NRL's knowledge is the highest reported for these types of fibers. Analysis of the near field profile exiting the fibers showed that there was no speckle observed, which is highly desirable for this application. For chemical sensing, results of infrared reflectance spectroscopy and evanescent spectroscopy will be described wherein the application is the detection of toxic chemicals in soil or ground water.
DTIC
Glass Fibers; Infrared Radiation; Transmission

26
METALS AND METALLIC MATERIALS

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

20020043260 Tennessee Technological Univ., Dept. of Mechanical Engineering, Cookeville, TN USA
1-D Numerical Analysis of ABCC Engine Performance ***Final Report***
Holden, Richard, Tennessee Technological Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-7; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
ABCC engine combines air breathing and rocket engine into a single engine to increase the specific impulse over an entire flight trajectory. Except for the heat source, the basic operation of the ABCC is similar to the basic operation of the RBCC engine. The ABCC is intended to have a higher specific impulse than the RBCC for single stage Earth to orbit vehicle. Computational fluid dynamics (CFD) is a useful tool for the analysis of complex transport processes in various components in ABCC propulsion system. The objective of the present research was to develop a transient 1-D numerical model using conservation of mass, linear momentum, and energy equations that could be used to predict flow behavior throughout a generic ABCC engine following a flight path. At specific points during the development of the 1-D numerical model a myriad of tests were performed to prove the program produced consistent, realistic numbers that follow compressible flow theory for various inlet conditions.
Author
Numerical Analysis; Rocket-Based Combined-Cycle Engines; Computational Fluid Dynamics; Air Breathing Engines; Engine Tests; Propulsion System Performance

20020043290 Tennessee Technological Univ., Dept. of Mechanical Engineering, Cookeville, TN USA

Hydrostatic Stress Effects in Metal Plasticity ***Final Report***

Wilson, Christopher D., Tennessee Technological Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-50; In English

Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

Since the 1940s, the theory of plasticity has assumed that hydrostatic stress does not affect the yield or postyield behavior of metals. This assumption is based on the early work of Bridgman. Bridgman found that hydrostatic pressure (compressive stress) does not affect yield behavior until a substantial amount of pressure (greater than 100 ksi) is present. The objective of this study was to determine the effect of hydrostatic tension on yield behavior. Two different specimen geometries were examined: an equal-arm bend specimen and a double edge notch specimen. The presence of a notch is sufficient to develop high enough hydrostatic tensile stresses to affect yield. The von Mises yield function, which does not have a hydrostatic component, and the Drucker-Prager yield function, which includes a hydrostatic component, were used in finite element analyses of the two specimen geometries. The analyses were compared to test data from IN 100 specimens. For both geometries, the analyses using the Drucker-Prager yield function more closely simulated the test data. The von Mises yield function lead to 5-10% overprediction of the force-displacement or force-strain response of the test specimens.

Author

Metals; Plastic Properties; Tensile Stress; Hydrostatic Pressure

20020043309 Florida Univ., Mechanical Engineering Dept., FL USA

Fatigue Failure Criteria for Single Crystal Nickel Superalloys ***Final Report***

Arakere, Nagaraj K., Florida Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-4; In English

Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

High Cycle Fatigue (HCF) induced failures in aircraft gas-turbine and rocket engine turbopump blades is a pervasive problem. Single crystal turbine blades are being utilized in rocket engine turbopumps and jet engines throughout industry and NASA because of their superior creep, stress rupture, melt resistance and thermomechanical fatigue capabilities over polycrystalline alloys. Single-crystal materials have highly orthotropic properties making the position of the crystal lattice relative to the pan geometry a significant factor in the overall analysis. The failure modes of single crystal turbine blades is complicated to predict due to the material orthotropy and variations in crystal orientations. A fatigue failure criteria based on the maximum shear stress amplitude [delta t max] on the 30 slip systems, is presented for single crystal nickel superalloys (FCC crystal). This criteria reduces the scatter in uniaxial LCF test data, for four different specimen orientations, for PWA 1484 at 1200 F in air, quite well. A power law curve fit of the failure parameter, delta t max, vs. cycles to failure is presented.

Author

Single Crystals; Fatigue (Materials); Nickel; Heat Resistant Alloys; Failure Modes; Rotor Blades (Turbomachinery)

20020043651 Helsinki Univ. of Technology, Lab. of Engineering Materials, Espoo, Finland

Manufacturing Sandwich Structures by Means of Superplastic Forming

Pimenoff, J.; 2000; 114p; In English

Report No.(s): PB2002-103501; TKK-MTR-3/00; Copyright; Avail: National Technical Information Service (NTIS), Microfiche

This thesis investigates the feasibility of manufacturing sandwich structures from commercial grade metal alloys by means of superplastic forming. The material studied is EN AW-5083, a magnesium Alloyed aluminium base alloy. The literature review of the thesis is devoted to superplasticity and superplastic forming. The microstructural prerequisites for fine structure superplasticity are listed. Superplastic flow and failure are dealt with, as well as post-formed material properties. The superplastic properties of commercial grade alloys EN AW-5083 and austenitic stainless steel UNS S30400 are discussed and compared. Future prospects of superplasticity are also reviewed. Forming techniques used in superplastic forming are studied along with tooling and machinery. Essential process variables and their definition by numerical simulation are viewed. Finally, the pros and cons of superplastic forming are assessed from an industrial point of view. Plates of EN AW-5083 in as-received annealed state were subjected to various combinations of thermomechanical treatment in order to achieve a suitable microstructure for superplastic deformation. X-ray diffraction was used to measure crystalline texture in the rolled and annealed specimens.

NTIS

Thermomechanical Treatment; Sandwich Structures; Manufacturing; Feasibility Analysis; Aluminum Alloys; Magnesium Alloys; Forming Techniques

20020043963 Edgewood Chemical Biological Center, Aberdeen Proving Ground, MD USA
Maximizing Infrared Extinction Coefficients for Metal Discs, Rods, and Spheres ***Final Report, Oct. 2000-Sep. 2001***
Embury, Janon; Feb. 2002; 77p; In English
Contract(s)/Grant(s): DA Proj. 060-2622-A-552
Report No.(s): AD-A400404; ECBC-TR-226; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

Infrared spectral extinction coefficients, extinction cross sections per volume of material, are computed for metal disks, rods, and spheres as a function of dimensions, conductivity, and wavelength. Computations for rods use a combination of infinite cylinder and Rayleigh finite and perfectly conducting prolate spheroid scattering theories. Disk computations use a combination of diffraction, thin film optics, Rayleigh finite, and perfectly conducting oblate spheroid scattering theories. Sphere computations use a combination of Geometric Optics, Anomalous Diffraction, and Rayleigh scattering theories. Complex conductivities are predicted as a function of wavelength using the Drude model along with thin wire and thin film models for boundary limited electron mean free path. Spectral extinction coefficients are maximized using surface plots to identify optimal ranges for particle dimensions and conductivities at a particular wavelength.
DTIC
Coefficients; Extinction; Infrared Radiation; Spheres; Electromagnetic Properties; Metal Joints

20020044003 NASA Lewis Research Center, Lewis Research Center, Cleveland, OH USA
Compatibility of Tantalum Columbium, and Their Alloys with Hydrogen in Presence of Temperature Gradient
Stephens, Joseph R.; Garlick, Ralph G.; Aug. 1966; 26p; In English
Report No.(s): AD-A400423; NASA-TN-D-3546; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

An investigation on the compatibility of tantalum and columbium with hydrogen in the presence of a temperature gradient was conducted to determine the suitability of these materials for use in a hydrogen-cooled nuclear rocket nozzle. Specimens having a temperature gradient from room temperature to approximately 30000 F were heated in a hydrogen atmosphere, held for a predetermined time, and cooled in hydrogen at rates from 250 to 15000 F per minute. Results showed that neither tantalum nor columbium is compatible with hydrogen under these conditions. A brittle hydride phase usually formed upon cooling below about 200 F in that portion of the specimen which had been held above about 15000 F. Hydrogen absorption and subsequent hydride formation in this part of the specimen is believed to be enhanced by removal of a surface oxide film during heating at elevated temperatures in hydrogen. Disintegration commonly accompanied formation of the hydride phase. Bend tests showed that hydrogen present in solution and as a hydride produced embrittlement and resulted in a ductile-brittle transition at room temperature for a hydrogen content as low as 2 atom percent (110 and 220 ppm by weight in tantalum and columbium, respectively).
DTIC
Hydrogen; Tantalum; Temperature Gradients; Niobium Alloys; Tantalum Alloys

20020044014 Dayton Univ. Research Inst., Research Inst., OH USA
The Surface Preparation of Aluminum Alloys Using the Phosphoric Acid Containment System for Repair ***Interim Report, 1 Jun. 1992-31 Dec. 1993***
Saliba, Susan S.; Sep. 1994; 54p; In English
Contract(s)/Grant(s): F33615-89-C-5643; AF Proj. 2418
Report No.(s): AD-A400284; UDR-TR-94-113; WL*-TR-94-4112; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The Phosphoric Acid Containment System (PACS) was developed by The Boeing Company and is intended to provide on-aircraft phosphoric acid anodization of aluminum surfaces. The first objective of this investigation was to determine if the PACS produces a surface equivalent to the phosphoric acid tank system. The second objective was to evaluate the PACS procedure against Air Force maintenance criteria and ascertain if operator sensitivity is an issue. In addition, the PACS unit was used to study the effects of various operating parameters on the quality of the prepared aluminum surface. The operating, or processing, variables examined included voltages/currents other than those recommended in the operating procedure, anodization time/acid flow rate over the aluminum, orientation of the surface being anodized, temperature of the surface being anodized, effect of a delay between completion of acid flow and initiation of rinse, effect of fasteners on vacuum integrity and methods to seal leaks, effect of screen type, effect of type and amount of breather material, effect of the addition of sodium bicarbonate to the rinse water, and the size of the surface being anodized. Wedge test panels were made with the PACS-prepared surfaces to determine the integrity of the bond between the surface preparation and the adhesive. In addition, the surface morphology of the aluminum surface was characterized. Wedge test results indicated that the PACS-prepared aluminum surfaces were as good as those prepared using the standard phosphoric acid anodize (PAA) procedure. In addition, the morphology of the PACS and PAA surfaces were similar in

overall oxide layer structure, but differed in oxide layer thickness. Based on the wedge test results, the ranges for the PACS operating or processing parameters were determined.
DTIC
Panels; Anodic Coatings; Metal Finishing; Phosphoric Acid; Containment; Aluminum Alloys

20020044019 Massachusetts Inst. of Tech., Dept. of Mechanical Engineering, Cambridge, MA USA
Three Dimensional Printing
Sachs, Emanuel; May 30, 2001; 39p; In English; Original contains color images; Report contains viewgraphs only. See Also ADM001348, Thermal Materials Workshop 2001, held in Cambridge, UK on May 30-June 1, 2001. The original document contains color images. Additional papers can be downloaded from: http:/ /www-mech.eng.cam.ac.u
Report No.(s): AD-A400235; No Copyright; Avail: CASI; A03, Hardcopy
3D Printing is an SFF Process which creates parts in layers. Each layer is formed by spreading powder and selectively joining the powder by ink-jet printing of a binder material.
DTIC
Printing; Powder (Particles); Thermodynamic Properties

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.

20020043211 University of Southeastern Louisiana, Dept. of Chemistry and Physics, Hammond, LA USA
Seeded Growth of Colloidal Silica Particles *Final Report*
Wurm, David B., University of Southeastern Louisiana, USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-51; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
The method of seeded growth was studied for producing mondisperse colloidal silica particles. It was shown that particle size as well as weight percent solids could be controlled by using this method. The particles were characterized by transmission electron microscopy (TEM) and quasielastic light scattering (QELS). The particles were found to have a bimodal size distribution when examined by TEM. The particle size as determined by QELS was found to be roughly 10-20% larger than the particle size as determined by TEM. Furthermore, the polydispersity (standard deviation/mean particle size) as determined by QELS was found to be significantly lower than the polydispersity as determined by TEM. This underscores the importance of using TEM as a characterization technique for determining particle monodispersity. It was also noted that there was an increase in particle roughness as the weight percent of the silica particles increased and a new nucleation of particles was observed as the weight percent approached 13%. A recipe for producing monodisperse silica particles in the 150 nm size range is presented.
Author
Colloids; Silicon Dioxide; Transmission Electron Microscopy; Crystal Growth; Nucleation

20020043220 Rensselaer Polytechnic Inst., Dept. of Chemical Engineering, Troy, NY USA
Aerogel Materials by Evaporative Drying: Potential for Space Applications *Final Report*
Plawsky, Joel L., Rensselaer Polytechnic Inst., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-35; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Aerogel wafers were made using an evaporative drying procedure. The main steps were sol formulation, gelation, aging, capping, and drying. of these, the most critical step was drying. Both the rate of evaporation and temperature of the system must be controlled for best results. Aerogel materials should be benchmarked against more traditional foams and current systems may have to be redesigned to make best use of aerogel strengths. Finally, the flexibility of this procedure lends itself to producing aerogel materials for many uses other than insulation. Such uses may include catalysis, sensing, and composite materials.
Author
Aerogels; Drying; Evaporation; Technology Utilization

20020043299 North Carolina Univ., Dept. of Chemistry and Physics, Pembroke, NC USA

Growth and Characterization of Bulk GeSi Solid Solutions ***Final Report***

Ritter, Timothy M., North Carolina Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-37; In English

Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

In this work we have grown and characterized several GeSi samples in order to investigate the effects that Silicon concentration, applied magnetic field, and liquid encapsulation have on crystalline quality. Characterization techniques include NDIC microscopy and microprobe spectroscopy. Two samples were grown with a Silicon concentration of approximately 3% and are compared to previous growths having a Silicon fraction of approximately 5%. Growth conditions for one of these samples was varied with the presence of an external applied magnetic field to investigate the possibility of magnetic field damping. A comparison between these two ingots, and with previously grown material, revealed no clear improvement in sample crystalline quality. Three additional samples were grown using a CaCl2 liquid encapsulation technique that produced GeSi material with improved structural quality over previous samples. Comparisons to prior non-encapsulation grown material, details of our methodology, and suggestions for further improvements are discussed.

Author

Solid Solutions; Silicon; Germanium; Crystal Growth; Microscopy

20020043394 NASA Langley Research Center, Hampton, VA USA

Equivalent-Continuum Modeling With Application to Carbon Nanotubes

Odegard, Gregory M., NASA Langley Research Center, USA; Gates, Thomas S., NASA Langley Research Center, USA; Nicholson, Lee M., Institute for Computer Applications in Science and Engineering, USA; Wise, Kristopher E., NASA Langley Research Center, USA; March 2002; 30p; In English

Contract(s)/Grant(s): RTOP 703-63-51-03

Report No.(s): NASA/TM-2002-211454; L-18152; NAS 1.15:211454; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A method has been proposed for developing structure-property relationships of nano-structured materials. This method serves as a link between computational chemistry and solid mechanics by substituting discrete molecular structures with equivalent-continuum models. It has been shown that this substitution may be accomplished by equating the vibrational potential energy of a nano-structured material with the strain energy of representative truss and continuum models. As important examples with direct application to the development and characterization of single-walled carbon nanotubes and the design of nanotube-based devices, the modeling technique has been applied to determine the effective-continuum geometry and bending rigidity of a graphene sheet. A representative volume element of the chemical structure of graphene has been substituted with equivalent-truss and equivalent continuum models. As a result, an effective thickness of the continuum model has been determined. This effective thickness has been shown to be significantly larger than the interatomic spacing of graphite. The effective thickness has been shown to be significantly larger than the inter-planar spacing of graphite. The effective bending rigidity of the equivalent-continuum model of a graphene sheet was determined by equating the vibrational potential energy of the molecular model of a graphene sheet subjected to cylindrical bending with the strain energy of an equivalent continuum plate subjected to cylindrical bending.

Author

Carbon Nanotubes; Continuum Modeling; Solid Mechanics; Nanotechnology; Graphite

20020044015 Urals A. M. Gorky State Univ., Sverdlovsk, USSR

Short-Pitch Periodically Poled Lithium-Niobate and Lithium Tantalate ***Final Report, 1 May 1999-31 Oct. 1999***

Chour, Vladimir Y.; Oct. 31, 1999; 64p; In English; Original contains color images

Contract(s)/Grant(s): F61775-99-WE037

Report No.(s): AD-A400251; EOARD-SPC-99-4037; No Copyright; Avail: CASI; A04, Hardcopy

This report results from a contract tasking Ural State University as follows: The contractor will further investigate the back-switched poling method for periodic domain patterning with shorter domain periods in thick lithium niobate and lithium tantalate substrates.

DTIC

Lithium Niobates; Tantalum Compounds

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.

20020043228 Colorado Univ., Lab. for Atmospheric and Space Physics, Boulder, CO USA
Inertial Electrostatic Confinement Fusion: The Laser Elevator Solar System Survey for Propellants Abstract ***Final Report***
Pryor, Wayne, Colorado Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-36; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

Dr. Wayne Pryor worked on three projects this summer. These were: 1) Inertial Electrostatic Confinement; 2) The Laser Elevator; and 3) Solar System Survey for Propellants Abstract. We Assisted Jon Nadler from Richland Community College in assembling and operating a table-top nuclear fusion reactor. We successfully demonstrated neutron production in a deuterium plasma. Pryor also obtained basic spectroscopic information on the atomic and molecular emissions in the plasma. The second project consisted of the completion of a paper on a novel propulsion concept (due to Tom Meyer of Colorado, the first author): a laser sail that bounces light back to the laser source. Recycling the photons from source to sail perhaps 100-1000 times dramatically improves the energy efficiency of this system, which may become very important for high-velocity missions in the future. Lastly, we compiled a very basic inventory of solar system propellant resources, their locations, and their accessibility. This initial inventory concentrates on sunlight availability, water availability, and the difficulty (delta-velocity requirement and radiation environment) in getting there.
Author (revised)
Solar System; Inertial Confinement Fusion; Laser Outputs; Electrostatics; Deuterium Plasma

20020043238 General Accounting Office, Washington, DC USA
Motor Fuels: California Gasoline Price Behavior
Apr. 2000; 34p; In English
Report No.(s): PB2002-105209; GAO/RCED-00-121; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Concerned about the higher gasoline prices and the extent of price spikes in California, you asked us to analyze the behavior of gasoline prices in the state. Because we found no standard definition of a gasoline price spike, for this report, we define a spike as an increase of at least 6 cents per gallon in a 4- to 21-week period. As agreed with your office, this report addresses the following questions: (1) to what extent do retail gasoline prices spike more frequently and higher in California than they do in the rest of the United States, and what factors account for any difference; (2) Do retail gasoline prices in California rise faster than they fall in response to increases and decreases in the wholesale price of gasoline and, if so, why; and (3) What factors account for differences in the retail prices of gasoline between San Francisco and Los Angeles.
NTIS
Fuels; Gasoline; Costs

20020043239 Energy Information Administration, Washington, DC USA
International Petroleum Monthly, January 2002
Jan. 2002; 82p; In English
Report No.(s): PB2002-105242; No Copyright; Avail: National Technical Information Service (NTIS)

The International Petroleum Monthly is a monthly publication that provides current international oil data. This report is published for the use of Members of Congress, Federal agencies, State agencies, industry, and the general public. The International Petroleum Monthly presents data on international oil production, demand, imports, and stocks. The report has four sections. Section 1 contains time series data on world oil production, and on oil demand and stocks in the Organization for Economic Cooperation and Development (OECD). Section 2 presents an oil supply/demand balance for the world. Section 3 presents data on oil imports by OECD countries. Section 4 presents annual time series data on world oil production and oil stocks, demand, and trade in OECD countries.
NTIS
Economic Development; Crude Oil; Fuel Production

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.

20020043306 Illinois Univ., Dept. of Mechanical Engineering, Chicago, IL USA
Development of Optical Diagnostic Techniques for Microgravity Materials Processing ***Final Report***
Cha, Soyoung Stephen, Illinois Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-14; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

Materials processing including crystal growth, either under a gravity environment on ground or a microgravity environment in space, involves complicated phenomena of fluid motions in gas or liquid phases as well as interaction of various species. to obtain important physical insight, it is very necessary to provide gross-field optical diagnostics for monitoring various physical properties. Materials processing inhibits easy access by ordinary instruments and thus characterizing gross-field physical properties is very challenging. Typical properties of importance can be fluid velocity, temperature, and species concentration for fluids, and surface topology and defects for solids. Observing surface grow rate during crystal growth is also important. Material microstructures, i.e., integrity of crystal structures, is strongly influenced by the existence of thermally-induced flow as well as local nucleation of particles during solidification, which may act in many detrimental ways. In both ground-based and microgravity experiments, the nature of product property changes resulting from three-dimensional fluid or particle motions need be characterized. Gross-field diagnostics is thus required to identify their effects on product defects and process deficiencies. The quantitative visualization techniques can also be used for validation of numerical modeling. For optical nonintrusive gross-field diagnostic techniques, two approaches were developed as summer projects. One optical approach allows us to provide information of species concentration and temperature for monitoring in real time. The other approach, that is, the concept which is formulated for detection of surface topography measurement can provide unprecedented spatial resolution during crystal growth.
Author
Mathematical Models; Microgravity; Nucleation; Crystal Growth; Microstructure; Optical Properties

31
ENGINEERING (GENERAL)

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

20020043224 Alabama A & M Univ., Dept. of Technology, AL USA
Flow Trajectories in Friction Stir Welding ***Final Report***
Bernstein, Edward L., Alabama A & M Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-6; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

In the Friction Stir Welding (FSW) process, a rotating, shouldered tool with a threaded pin is inserted under pressure along the seam of two pieces of metal which are tightly clamped together, and secured against a rigid anvil underneath. The rotating pin travels along the seam and through a combination of pressure and friction heating produces a zone of plastic deformation around the pin within the workpiece on either side of the seam. As the pin is moved in the direction of welding, the plasticised material moves around the tool and bonds together behind it. The elements of the material flow behavior are a combination of three elements. There is a rotational transport of material being carried around the tool, extrusion of material being forced around the pin on both sides into the cavity created behind it, and a lifting and dropping of material as it is stirred and mixed by the rotating action of the pin. It was assumed that rotational motion of the plastic zone is the primary mechanism for transport of material around the welding tool. A kinematic mathematical model was used to compute trajectories of material movement for various distributions of rotational slip within the plastic zone. These trajectories were then compared with the results of an experiment that produced radiographs of markers embedded in a workpiece that was welded with the FSW process. It was assumed that the copper wire markers retained their original length as the aluminum material flowed around them. The kinematic model included a constraint so that the displacements were such that the total length of the wire markers did not increase after deformation. There was good agreement between the calculated trajectories for the case of localized slip at the outer surface of the plastic deformation zone and the radiographs of the copper wire markers. The trajectories differed markedly from the radiograph traces when a

distributed slip zone was assumed. It was concluded that the flow field could be described generally by a rotating plug model with slip occurring on the surface at the outer boundary of the plastic zone.
Author
Flow Distribution; Friction Welding; Mathematical Models; Trajectories

20020043470 Tracer Technologies, Inc., San Diego, CA USA
A Portable Sorption Tester for Nondestructive Testing of Chemical Protective Garments ***Final Report, Aug. 1986-Jan. 1988***
Kerrin, Stephen; Klemperer, Elizabeth; Aug. 1992; 36p; In English
Contract(s)/Grant(s): DAAK60-85-C-0076; DAAK60-89-C-1019
Report No.(s): AD-A400228; NATICK-TR-92/042; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
A prototype portable instrument was developed to measure, nondestructively, sorptive capacity of chemical protective garments in the field. The instrument contains four major subsystems: flow control, detection, microprocessor controller, and sample cell. A low-boiling halocarbon mimics carbon tetrachloride, the standard test vapor. A very low flow mass flow controller mixes challenge from a pressurized cylinder with a controlled flow of air from a diaphragm pump. A double sample cell is used in order to make detection by thermal conductivity specific for the challenge gas. Measurement, control, and operator interface are under the control of a microprocessor. A keypad is used for operator input. A thermal printer-plotter prints default and operator input conditions and plots the breakthrough curve. Total challenge at break time is printed. Leak-tight seal of intact, double-layer Battledress Cvergarment material in the cell was achieved using tapered stainless steel cups with inset gaskets. Natick found the portable tester to display excellent repeatability. Correlation with carbon tetrachloride acceptance tests was carried out on stockpiled overgarments.
DTIC
Nondestructive Tests; Protective Clothing; Halocarbons

20020043964 Naval Observatory, Washington, DC USA
Cesium Fountain Development at USNO
Burt, E.; Swanso, T.; Ekstrom, C.; Jan. 1999; 5p; In English
Report No.(s): AD-A400432; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche
In this paper we discuss progress made at the U.S. Naval Observatory (USNO) towards building a cesium fountain atomic clock. In particular we will address the efficacy of a 4-beam optical lattice as an atom collection and launch mechanism. to date we have measured temperatures in a 4-beam lattice of 1.4(0.3) micro-K and have launched atoms from this lattice to a height of just under a meter with a temperature of 1.7(0.1) micro-K. We are able to collect 2.4 x 10(exp 6) atoms using only the lattice beams and no magnetic fields. We have completed the design for and are in the process of fabricating all aspects of the fountain device including the collection region, the drift region, the microwave cavity and the magnetic shields. We will present our progress to date including a discussion of our launch results and the design and testing of our magnetic shields.
DTIC
Cesium; Observatories; Defense Program; Navy; Fabrication

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.

20020043252 Langston Univ., Dept. of Mathematics, Langston, OK USA
Effective Communication for the Present and Into the Millenium ***Final Report***
Heard, Pamala D., Langston Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-26; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
This research is related to educational technology, in the Education Programs Department. I will be exploring the NASA/Marshall Alumni Web Page (ALEX) and NASA/MSFC Education Programs Department Home Page. My research will focus on established goals and objectives. I will investigate ways in which the Education Programs Department can better utilize

their products, for its internal and external customers. The strengths and weakness of each project will be examined. The customers needs are examined in an attempt to determine the most effective approach needed to utilize these educational products.
Author
Communication; Education

20020043264 Newcomb Communications, Inc., Manchester, NH USA
Advanced Communications Project: Operational Evaluation of a DGPS/SATCOM VTS ***Final Report***
Pietraszewski, D.; Sep. 1996; 34p; In English; Original contains color illustrations
Report No.(s): PB2002-104523; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Marine transportation is vital to the economic well-being of the United States. The capability of periodic automatic communications of precise vessel position and course over ground information in controlled waters such as harbors and high density shipping corridors provides a key ingredient to improved safety of the public and the protection of the environment. This capability provides for real-time management of the waterways, to provide timely alerts that can be used to prevent catastrophic incidents (such as the Exxon Valdez grounding), as well as, to provide quick and effective responses to control and mitigate those incidents that do occur.
NTIS
Communication Satellites; Electrical Grounding; Marine Transportation

20020043670 Naval Sea Systems Command, Washington, DC USA
JCC(X) Concept Exploration
Doerry, Norbert H.; Austin, William H., III; Strasel, Erik; Feb. 26, 2002; 15p; In English; Original contains color images; Presented at the Engineering the Total Ship (ETS) Symposium held in Gaithersburg, MD, 26-27 Feb. 2002
Report No.(s): AD-A399985; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This paper describes how the Naval Sea Systems Command (NAVSEA), Space and Naval Warfare Systems Command (SPAWAR) and the Center for Naval Analysis (CNA) assessed basic program requirements and explored a range of alternatives for fielding a new Joint Maritime Command and Control Capability (JCC(X)). It focuses attention on the early stages of the Concept Exploration Phase of Ship Acquisition, specifically the Analysis of Alternatives (AoA). Specific areas studied include staff size, mission space, topside arrangement, survivability, speed, habitability and manning. Additionally, this paper describes the development of an Operational Architecture (OA) used to define the command functions, associated Information Exchange Requirements (IER), and associated command and control spaces and potential equipments for different JCC(X) alternatives.
DTIC
Command and Control; Architecture (Computers); Systems Engineering

20020043890 NASA Kennedy Space Center, Cocoa Beach, FL USA
Attenuation of Weather Radar Signals Due to Wetting of the Radome by Rainwater or Incomplete Filling of the Beam Volume ***Final Report***
Merceret, Francis J., NASA Kennedy Space Center, USA; Ward, Jennifer G., NASA Kennedy Space Center, USA; Apr. 09, 2000; 20p; In English
Report No.(s): NASA/TM-2002-211171; NAS 1.15:211171; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
A search of scientific literature, both printed and electronic, was undertaken to provide quantitative estimates of attenuation effects of rainfall on weather radar radomes. The emphasis was on C-band (5 cm) and S-Band (10 cm) wavelengths. An empirical model was developed to estimate two-way wet radome losses as a function of frequency and rainfall rate for both standard and hydrophobic radomes. The model fits most of the published data within +/- 1 dB at both target wavelengths for rain rates from less than ten to more than 200 mm/hr. Rainfall attenuation effects remain under 1 dB at both frequencies regardless of radome type for rainfall rates up to 10 mm/hr. S-Band losses with a hydrophobic radome such as that on the WSR-88D remain under 1 dB up to 100 mm/hr. C-Band losses on standard radomes such as that on the Patrick AFB (Air Force Base) WSR-74C can reach as much as 5 dB at 50 mm/hr. In addition, calculations were performed to determine the reduction in effective reflectivity, Z, when a radar target is smaller than the sampling volume of the radar. Results are presented for both the Patrick Air Force Base WSR-74C and the WSR-88D as a function of target size and range.
Author
Meteorological Radar; Radomes; Rain; Weather

20020043926 Booz-Allen and Hamilton, Inc., McLean, VA USA

Department of Defense Mail Guard for High Robustness Environments

Gilmore, Linda M.; Mayer, Barbara; Montequin, Rita; Rogers, Kristina; Weiss, Howard; Sep. 30, 2001; 77p; In English

Report No.(s): AD-A400053; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This Protection Profile (PP) specifies the information security requirements for DoD Mail Guards for High Robustness Environments. The Mail Guard specified in this PP sits between two protected network enclaves at different classification levels, controlling the flow of electronic messages sent between the two networks. The protection approach employs various processing, filtering, and data-blocking techniques in an attempt to provide data sanitization (e.g., downgrade) or separation between enclaves. Besides enforcing an information flow policy and providing services for confidentiality and integrity of mail messages, the Mail Guard provides identification and authentication, trusted path and audit capabilities and has been designed with a high degree of assurance. The specific functional and assurance requirements are contained in Section 5 of this document.

DTIC

Defense Program; Electronic Mail; Computer Information Security; Robustness (Mathematics)

20020043951 Army Communications-Electronics Command, Research, Development and and Engineering Center, Fort Monmouth, NJ USA

The US Army of 2010 Command, Control, Communications, Computers and Intelligence Surveillance and Reconnaissance (C4ISR): An Integrated Approach

Perricelli, Robert F.; Corea, Patricia; Jun. 21, 2000; 7p; In English

Report No.(s): AD-A400142; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

In an effort to focus limited Department of Defense (DoD) resources, the US Army has chosen to utilize commercially available systems and equipment to meet its military requirements for the future. Radically increased lethality and mobility, wide disparities in the size and nature of conflicts, expansive urbanization and a global information environment will characterize the future military environment. The US Army s vision for the future is that everyone in the battlespace can interact at anytime using all the tools necessary to convey thoughts, orders, or plans to any system, mounted or dismounted; on the battlespace in real time. The day of separate land, sea and air operations is gone forever. Operations will be joint service and certainly include multinational components.

DTIC

Command and Control; Data Processing; Decision Making; Military Technology

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.

20020043249 Tennessee Technological Univ., Cookeville, TN USA

Developing a Fundamental Model for an Integrated GPS/INS State Estimation System with Kalman Filtering *Final Report*

Canfield, Stephen, Tennessee Technological Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-11; In English

Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

This work will demonstrate the integration of sensor and system dynamic data and their appropriate models using an optimal filter to create a robust, adaptable, easily reconfigurable state (motion) estimation system. This state estimation system will clearly show the application of fundamental modeling and filtering techniques. These techniques are presented at a general, first principles level, that can easily be adapted to specific applications. An example of such an application is demonstrated through the development of an integrated GPS/INS navigation system. This system acquires both global position data and inertial body data, to provide optimal estimates of current position and attitude states. The optimal states are estimated using a Kalman filter. The state estimation system will include appropriate error models for the measurement hardware. The results of this work will lead to the development of a ”black-box” state estimation system that supplies current motion information (position and attitude states) that can be used to carry out guidance and control strategies. This black-box state estimation system is developed independent of the vehicle dynamics and therefore is directly applicable to a variety of vehicles. Issues in system modeling and application of Kalman filtering techniques are investigated and presented. These issues include linearized models of equations

of state, models of the measurement sensors, and appropriate application and parameter setting (tuning) of the Kalman filter. The general model and subsequent algorithm is developed in Matlab for numerical testing. The results of this system are demonstrated through application to data from the X-33 Michael's 9A8 mission and are presented in plots and simple animations.
Author
Global Positioning System; Kalman Filters; Mathematical Models; Electronic Equipment; Systems Integration; State Estimation

20020043399 Academy of Sciences (Russia), Saint Petersburg, Russia
Nanostructures: Physics and Technology ***Final Report, 18-22 Jun. 2001***
Jun. 2001; ISBN 5-93634-005-8; 634p; In English; Presented at International Symposium (9th) on Nanostructures: Physics and Technology, St. Petersburg, Russia, 18-22 Jun. 2001
Report No.(s): AD-A400352; No Copyright; Avail: CASI; A99, Hardcopy; A06, Microfiche
The Proceedings of the 9th International Symposium on Nanostructures: Physics and Technology (NANO200l) held in St. Petersburg, Russia on June 18-22 2001 contains papers on the following topics: Nanostructure technology, Silicon based nanostructures, Infrared phenomena in nanostructures, Wide band gap nanostructures, Microgravity and photonic crystal, Nanostructure characterization and novel atomic-scale probing techniques, Quantum wells and superlattices, Quantum wires and quantum dots, Tunneling phenomena, General properties of low dimensional structures, Spin related phenomena, Quantum computing, Ordered arrays and nanoparticles, Nanostructure devices, Transport in nanostructures, Lasers and optoelectronic devices, Excitons, 2D electron gas.
DTIC
Semiconductor Junctions; Quantum Wells; Electro-Optics; Nanostructures (Devices); Electron Gas

20020043400 National Inst. of Materials Physics, Bucharest, Romania
Proceedings of International Workshop on Amorphous and Nanostructured Chalcogenides - Fundamentals and Applications - (1st) Held in Bucharest, Romania on June 25-28, 2001. Part 2
Popescu, Mihai A.; Sep. 2001; 196p; In English
Report No.(s): AD-A400350; No Copyright; Avail: CASI; A09, Hardcopy; A03, Microfiche
This is Part II of the Proceedings papers presented at the First International Workshop on Amorphous and Nanostructured Chalcogenides Fundamentals and Applications held in Bucharest, Romania June 25-28, 2001
DTIC
Electro-Optics; Amorphous Materials; Glass Fibers; Chalcogenides

20020043474 Boeing Phantom Works, Seattle, WA USA
Manufacturing and Applications of Multisensor Systems ***Final Report, Apr. 1997-Feb. 2001***
Tanielian, Minas H.; Feb. 2002; 162p; In English; Original contains color images
Contract(s)/Grant(s): F30602-97-2-0099; AF Proj. E117
Report No.(s): AD-A400254; AFRL-IF-RS-TR-2002-19; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche
Current Flight Loads Testing technology of a new airplane wing includes a plastic tube system with remotely located pressure sensors, discrete electronics, and pneumatic system control. This approach is cumbersome to install, expensive to operate, and lacks the desired accuracy. This effort developed a MEMS-based, pressure sensor tape, which provides a multitude of 'smart' pressure sensors at the point-of-use, through integration of the sensors and their corresponding electronics on a MCM. to accomplish this goal, research was focused on the development of the following: (a) a standard network interface protocol capable of handling large numbers of sensors, (b) a low-profile, high accuracy MEMS pressure sensor, (c) innovative packaging techniques, including tape design and packaging of the MEMS sensor with its associated electronics on a high density multichip module substrate, and (d) thin protective coatings which will be used to protect the various devices and components from adverse environmental conditions and provide an aerodynamically smooth surface. Validation of these developments and the objective of attaining an accuracy within 0.1 % of the full scale pressure reading (roughly lox better than the state-of-the-art), was realized both in the laboratory and flight tests on both military and commercial airplanes.
DTIC
Microelectromechanical Systems; Pressure Sensors; Chips (Electronics)

20020043695 Helsinki Univ. of Technology, Lab. of Physics, Espoo, Finland

Development of Instrumentation and Methods for Positron Spectroscopy of Defects in Semiconductors

Nissilae, J.; 2001; 102p; In English

Report No.(s): PB2002-103046; DISSERTATION-113(2001); Copyright; Avail: National Technical Information Service (NTIS), Microfiche

In this thesis, positron annihilation spectroscopies have further been developed for defect studies in semiconductors. In semiconductors, the annihilation characteristics in different defects are often rather similar. To improve the chances of successfully resolving the experimental data, good statistics is of utmost importance. Therefore, efficient spectrometers with good stability are desired. Publications 1 and II of this thesis are devoted to the enhancement of the stability of the lifetime spectrometers. Two aspects of instability were treated. Firstly, it was found that the aging of the photomultiplier tubes (PMT) in the detectors can be slowed down by lowering the supply voltage over the tubes and by compensating the reduced gain with fast preamplifiers. With this action, the average anode current in the PMTs causing the degradation of the gain can be lowered by a factor of 20 without impairment of the time resolution.

NTIS

Nondestructive Tests; Technology Assessment; Defects; Semiconductors (Materials)

20020043696 Technische Univ., Lab. of Electromagnetic Research, Delft, Netherlands

Areas for Exploration in Electromagnetic Modeling and Inversion

deHoop, A. T.; Feb. 15, 2000; 26p; In English

Report No.(s): PB2002-102881; ITS/EM-2000-10; Copyright; Avail: National Technical Information Service (NTIS), Microfiche

In this contribution some 'areas for exploration in electromagnetic modeling and inversion' are discussed, the focus being on applications in the evaluation and monitoring of subsurface fossil-energy reservoirs in the Earth. Three topics receive attention: (1) the modeling of electro-magnetic wavefields in strongly heterogeneous media (such as rock), for which the domain-integrated field equations method is presented as a tool, (2) the feasibility of carrying out inversion in the time Laplace-transformed domain at a set of real, positive values of the transform parameter to which Lerch's uniqueness theorem of the one-sided, causal Laplace transformation applies, and (3) a general operator formalism that is based on the iterative decrease in the norm of the mismatch in data equation and object equation as they occur in the contrast-source formulation of the inversion problem.

NTIS

Inversions; Models; Electromagnetic Radiation

20020043697 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA USA

Non-Volatile Memory Technology Symposium 2000: Proceedings

Aranki, Nazeeh, Editor, Jet Propulsion Lab., California Inst. of Tech., USA; November 2000; 143p; In English; Non-Volatile Memory Technology Symposium 2000, 15-16 Nov. 2000, Arlington, VA, USA; Sponsored by NASA, USA; Also announced as 20020043698 through 20020043721

Contract(s)/Grant(s): NAS7-1407

Report No.(s): JPL-Publ-00-15; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This publication contains the proceedings for the Non-Volatile Memory Technology Symposium 2000 that was held on November 15-16, 2000 in Arlington, Virginia. The proceedings contains a wide range of papers that cover the presentations of myriad advances in the nonvolatile memory technology during the recent past including memory cell design, simulations, radiation environment, and emerging memory technologies. The papers presented in the proceedings address the design challenges and applications and deals with newer, emerging memory technologies as well as related issues of radiation environment and die packaging.

Author

Memory (Computers); Computer Storage Devices; Conferences

20020043698 United Microelectronic Corp., Specialty Technology Div., Hsinchu, Taiwan, Province of China

Implementation of Self-Align Local Poly Interconnection on 0.25 Micron Flash Memory

Lee, C. H., United Microelectronic Corp., Taiwan, Province of China; Lin, C. H., United Microelectronic Corp., Taiwan, Province of China; Chen, H. H., United Microelectronic Corp., Taiwan, Province of China; Sheu, Y. K., United Microelectronic Corp., Taiwan, Province of China; Ting, Wen-Chi, United Microelectronic Corp., Taiwan, Province of China; Hong, Gary, United Microelectronic Corp., Taiwan, Province of China; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 2-4; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche

For ETOX Flash technology. the self-aligned source module plays a critical role in minimizing cell size. For advanced Flash technology using the shallow-trench isolation (STI) scheme, however, it is difficult to form a stable source line. The Flash process in this experiment features an ETOX structure and with SIN spacer. Poly-Si (implanted poly) is used as the local interconnection material connecting the source line and was successfully implemented in the ETOX flash array in this paper.
Author
Connectors; Memory (Computers); Oxides

20020043699 United Microelectronic Corp., Specialty Technnology Div., Hsinchu, Taiwan, Province of China
A 0.25 Micron Embedded Flash Technology with Shallow Trench Isolation Using Channel FN Operation
Huang, C. J., United Microelectronic Corp., Taiwan, Province of China; Liu, Y. C., United Microelectronic Corp., Taiwan, Province of China; Lin, P. C., United Microelectronic Corp., Taiwan, Province of China; Wu, A., United Microelectronic Corp., Taiwan, Province of China; Chen, H. H., United Microelectronic Corp., Taiwan, Province of China; Ting, W. C., United Microelectronic Corp., Taiwan, Province of China; Hong, Gray, United Microelectronic Corp., Taiwan, Province of China; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 5-8; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche

A new 0.25 micron flash EEPROM developed for embedded applications will be reported. Flash memory is achieved by utilizing a single transistor NOR type cell that employs Fowler-Nordheim tunneling for both program and erase operations. Channel FN tunneling is a high efficiency and low power consumption approach for flash cell operation. The flash EEPROM is integrated into a standard quarter micron logic process with dual gate oxide for high performance and high voltage transistors. Program and erase could be achieved within 5 ms to target. The high performance logic devices didn't be degraded by incorporated with flash process was demonstrated.
Author
Read-Only Memory Devices; Embedded Computer Systems; Electron Tunneling

20020043700 Lehigh Univ., Sherman Fairchild Lab., Bethlehem, PA USA
Design Considerations in Scaled SONOS Nonvolatile Memory Devices
Bu, Jian-Kang, Lehigh Univ., USA; White, Marvin H., Lehigh Univ., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 9-15; In English; Also announced as 20020043697
Contract(s)/Grant(s): NSF ECS-98-10923; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche

Scaling the programming voltage, while still maintaining 10-year data retention time, has been always a big challenge for Poly-Oxide-Nitride-Oxide-Silicon (SONOS) researchers. We describe our progress in the design and scaling of SONOS nonvolatile memory devices. -9 V +10 V (1 ms) programmable SONOS devices ensuring 10 years retention time after 10(exp 7) Erase/Write cycles at 85 C have been developed successfully. Deuterium anneal, applied in SONOS device fabrication for the first time, improves the endurance characteristics better than traditional hydrogen or forming gas anneal. In this paper, we describe scaling considerations and process optimization along with experiments and characterization results.
Author
Computer Storage Devices; Oxides; Nitrides; Silicon

20020043704 Silicon Storage Technology, Inc., Sunnyvale, CA USA
Opportunities and Challenges for Embedded Flash Memory
Kianian, Sohrab, Silicon Storage Technology, Inc., USA; Sweetman, David, Sweetman (David), USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 32-38; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche

With advances in deep submicron CMOS technology, faster timing and more feature-rich integrated silicon devices are being used in consumer electronics advanced communication and networking systems, computers, servers, and virtually all other electronic systems. The demand for performance and functionality is ever increasing and a key component of that demand is the in-system nonvolatile alterability of both code and data. Larger operating and application codes as well as configuration and personalization codes are stored in various IC components, which require field upgrade capability. Various types of data require nonvolatility. With systems becoming increasing portable and smaller in size, various bulky mechanical elements, such as magnetic storage disks, are designed out and silicon programmable elements are being substituted for them. The silicon elements must continue to provide better reliability and an ability to operate in harsher environments than media that have mechanical

movement. These trends have presented an opportunity for flash and embedded flash as never seen before. The question is whether embedded flash is ready to serve these demands and keep up with the projected increasing demands well into the future.
Author
CMOS; Computer Storage Devices; Technology Transfer; Silicon

20020043705 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA USA
Radiation Issues and Applications of Floating Gate Memories
Scheick, L. Z., Jet Propulsion Lab., California Inst. of Tech., USA; Nguyen, D. N., Jet Propulsion Lab., California Inst. of Tech., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 39-44; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche

The radiation effects that affect various systems that comprise floating gate memories are presented. The wear-out degradation results of unirradiated flash memories are compared to irradiated flash memories. The procedure analyzes the failure to write and erase caused by wear-out and degradation of internal charge pump circuits. A method is described for characterizing the radiation effects of the floating gate itself. The rate dependence, stopping power dependence, SEU susceptibility and applications of floating gate in radiation environment are presented. The ramifications for dosimetry and cell failure are discussed as well as for the long term use aspects of non-volatile memories.
Author
Radiation Effects; Irradiation; Memory (Computers)

20020043706 Raytheon Co., Sudbury, MA USA
Total Dose Radiation Response and High Temperature Imprint Characteristics of Chalcogenide Memory Elements
Bernacki, Steve, Raytheon Co., USA; Hunt, Ken, Air Force Research Lab., USA; Tyson, Scott, Air Force Research Lab., USA; Hudgens, Steve, Ovonyx, USA; Pashmakov, Boil, Ovonyx, USA; Czubatly, Wally, Ovonyx, USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 45-52; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche

This videograph presents the applicable aspects of C-RAM memory element radiation testing. These aspects include: (1) Motivation; (2) Chalcogenide Technology Primer; (3) Temperature and Total Dose Testing Methodology; (4) Test Results and Discussion; and (5) Conclusions.
CASI
Random Access Memory; Chalcogenides; Radiation Effects

20020043707 Northrop Grumman Corp., Baltimore, MD USA
SONOS Nonvolatile Semiconductor Memories for Space and Military Applications
Adams, Dennis A., Northrop Grumman Corp., USA; Mavis, David, Mission Research Corp., USA; Murray, James R., Sandia National Labs., USA; White, Marvin H., Lehigh Univ., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 53-56; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche

Silicon-Oxide-Nitride-Oxide-Silicon (SONOS) based nonvolatile memory has emerged as the most mature nonvolatile semiconductor memory (NVSM) currently in use for space applications. SONOS 64k EEPROMs have been flying in numerous satellite applications since 1992 with a 256k EEPROM version of this part qualified for space applications in 2000. This paper will summarize the production and development status of a family of SONOS-based devices (EEPROMs. FPGAs, Controller ASICs) currently being manufactured at the Northrop Grumman Corporation (NGC) Advanced Technology Laboratories in Baltimore, Maryland.
Author
Silicon Oxides; Nitrides; Computer Storage Devices; Technology Utilization; Semiconductors (Materials); Military Technology

20020043708 Celis Semiconductor Corp., Colorado Springs, CO USA
Implementation of Ferroelectric Memories for Space Applications
Philpy, Stephen C., Celis Semiconductor Corp., USA; Derbenwick, Gary F., Celis Semiconductor Corp., USA; Kamp, David A., Celis Semiconductor Corp., USA; Isaacson, Alan F., Celis Semiconductor Corp., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 60-63; In English; Also announced as 20020043697
Contract(s)/Grant(s): JPL-1206463; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche

Ferroelectric random access semiconductor memories (FeRAMs) are an ideal nonvolatile solution for space applications. These memories have low power performance, high endurance and fast write times. by combining commercial ferroelectric

memory technology with radiation hardened CMOS technology, nonvolatile semiconductor memories for space applications can be attained. Of the few radiation hardened semiconductor manufacturers, none have embraced the development of radiation hardened FeRAMs, due a limited commercial space market and funding limitations. Government funding may be necessary to assure the development of radiation hardened ferroelectric memories for space applications.
Author
CMOS; Ferroelectricity; Random Access Memory

20020043709 Peregrine Semiconductor Corp., San Diego, CA USA
Characterization of a New EEPROM/Flash Memory Cell
Reedy, Ron, Peregrine Semiconductor Corp., USA; Cable, Jim, Peregrine Semiconductor Corp., USA; Wright, Frank, Peregrine Semiconductor Corp., USA; Anthony, Hal, Peregrine Semiconductor Corp., USA; Tabbert, Chuck, Peregrine Semiconductor Corp., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 65-69; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche
This paper discusses on-going work sponsored through the Defense Threat Reduction Agency (DTRA) SBIR program at Peregrine Semiconductor Corp to characterize the radiation and endurance performance characteristics of Peregrine's patented PlusCell(TM) - a new non-volatile memory cell which utilizes a standard CMOS process on a silicon on insulator technology. This work begins with basic cell characterization of write voltages & read currents on sample cells across multiple wafer lots, progresses through cell retention and endurance testing across temperature and radiation environment, extracting necessary activation energy for cell charge leakage and completes with total dose characterization of the basic cell through 100 K write/erase cycles with radiation testing performed after 0, 10 K & 100 K write/erase cycles. The PlusCell(TM) is very compact and operates at write voltages as low as 6 V and read voltages below 1 V. Charge injection of both polarities is accomplished through a 100 A thick gate oxide by means of hot carrier injection. The cell relies on isolation provided by an insulating substrate. In the case of Peregrine's UTSi technology, the base technology is fully depleted silicon on sapphire CMOS and the cell is manufactured without any additional processing or masking steps. Measured cell performance of charge retention, radiation sensitivity and endurance is presented. Traditional EEPROM or flash cells require specialized regions of thin tunneling oxide, which increase complexity and cost while reducing density and yield. Additionally, the normal injection mechanism is based only on electrons, which means writing and erasing must be carefully balanced, or over-erasing can occur. The PlusCell(TM) using both hole and electron injection, has several key advantages including elimination of any over-erase mechanism, an extremely dense cell, availability of bi-directional read, and efficient block erase.
Author
Memory (Computers); Computer Storage Devices; CMOS; Wafers

20020043710 Naval Research Lab., Washington, DC USA
SOI Non-volatile Memory
McMarr, P. J., Naval Research Lab., USA; Lawrence, R. K., Naval Research Lab., USA; Hughes, H. L., Naval Research Lab., USA; Jenkins, W. C., Naval Research Lab., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 70-74; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche
SIMOX silicon-on-insulator (SOI) substrates were implanted with silicon ions at doses of 5 x 10(exp 15) and 1 x 10(exp 16) ions/square cm at 130 keV. At this energy, the majority of the silicon ions were implanted into the buried oxide of the SIMOX substrate. Silicon-oxide-silicon test structures were fabricated on these implanted substrates. Point-contact transistor (PCT) measurements were performed on the test structures and initial threshold voltages determined. A stress voltage was then applied to the test structure for times ranging from 10 millisec to 100 sec. After removal of the stress voltage, PCT measurements were again performed. The threshold voltages shifted by significant and reproducible values. This stress-voltage-induced device switching response forms the basis for a new type of non-volatile SOI memory. The temperature stability of this switching was studied from -50 deg C to +200 C. In addition, the field and time dependence of the switching is also presented.
Author
SOI (Semiconductors); Threshold Voltage; Thermal Stability; Transistors; Electric Contacts

20020043712 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA USA
Functional Nanostructured Particle Arrays for Nanocrystal Nonvolatile Memories
Atwater, Harry, California Inst. of Tech., USA; Ostraat, Michele, California Inst. of Tech., USA; Brongersma, Mark, California Inst. of Tech., USA; Boer, Elizabeth, California Inst. of Tech., USA; Casperson, Julie, California Inst. of Tech., USA; Maier, Stefan, California Inst. of Tech., USA; Flagan, Richard C., California Inst. of Tech., USA; deBlauwe, Jan, Lucent Technologies, USA; Green, Martin, Lucent Technologies, USA; Bell, L. Douglas, Jet Propulsion Lab., California Inst. of Tech., USA;

Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 80-86; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche

This presentation outlines the performance characteristics of state-of-the-art nonvolatile memory devices and identifies charge storage mechanisms in nanocrystal floating gate materials.

Derived from text

Computer Storage Devices; Nanocrystals; Memory (Computers)

20020043716 Ovonyx, Inc., Manassas, VA USA

Chalcogenide-Based Non-Volatile Memory Technology

Maimon, J., Ovonyx, Inc., USA; Spall, E., Ovonyx, Inc., USA; Quinn, R., Lockheed Martin Federal Systems, USA; Schnur, S., Lockheed Martin Federal Systems, USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 113-118; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche

Chalcogenide is a proven phase change material used in re-writeable CDs and DVDs. This material changes phases, reversibly and quickly, between an amorphous state that is dull in appearance and electrically high in resistance, and a polycrystalline state that is highly reflective and low in resistance. The application of this commercially proven technology to create dense, high-speed, non-volatile semiconductor memories is discussed.

Author

Chalcogenides; Memory (Computers); Magnetic Disks; Semiconductors (Materials)

20020043717 Celis Semiconductor Corp., Colorado Springs, CO USA

Advances in FeRAM Technologies

Derbenwick, Gary F., Celis Semiconductor Corp., USA; Kamp, David A., Celis Semiconductor Corp., USA; Philpy, Stephen C., Celis Semiconductor Corp., USA; Isaacson, Alan F., Celis Semiconductor Corp., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 119-121; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche

Commercial ferroelectric random access memories (FeRAMs) are emerging into the marketplace. Reliability levels have been measured to be comparable to or better than those of other reprogrammable nonvolatile semiconductor technologies. Both SBT and PZT ferroelectric materials have been used in these memories for the memory storage elements. by combining ferroelectric memory technology with radiation hardened CMOS technology. nonvolatile semiconductor memories for space applications can be attained. These memories have high endurance. fast write times and low power performance. While significant efforts are underway at major semiconductor manufacturers worldwide to develop ferroelectric memory businesses, funding limitations must be overcome to allow the development of radiation hardened ferroelectric memories for space applications.

Author

Ferroelectric Materials; Random Access Memory; CMOS; Radiation Hardening; Technology Utilization

20020043718 Irvine Sensors Corp., Costa Mesa, CA USA

High Density Packaging of Non-Volatile Memory

Carson, John C., Irvine Sensors Corp., USA; Gann, Keith D., Irvine Sensors Corp., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 122-124; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche

We describe an innovation in three-dimensional (3D) packaging is heterogeneous stacks containing all of the components for a complete system or subsystem. The stack is constructed using known good die (KGD), and provides a high level of integration and interconnectivity. This packaging technology lends itself to mass storage, as well as complete computers and other complex systems. For non-volatile memory, very high densities can be achieved even through the individual chips themselves are relatively low capacity.

Author

Electronic Packaging; Complex Systems; Memory (Computers)

20020043827 Arizona State Univ., Tempe, AZ USA

Advanced Research Workshop on Quantum Transport in Semiconductors

Ferry, David K.; Jan. 08, 2002; 266p; In English; Presentations from Advanced Research Workshop on Quantum Transport in Semiconductors held 17-22 Jun 2001, Maratea, Italy. Primarily contains viewgraphs

Contract(s)/Grant(s): N00014-01-1-0115

Report No.(s): AD-A400380; No Copyright; Avail: CASI; A12, Hardcopy; A03, Microfiche

A workshop was held on the topic of quantum transport in semiconductor devices. This workshop brought together 17 lecturers and 35 other attendees for this purpose.
DTIC
Quantum Theory; Semiconductor Devices

20020043831 Lockheed Martin Infrared and Imaging Systems, Lexington, MA USA
432X432 SW/MW FPAs with Extended Dynamic Range
Zimmermann, P. H.; Hairston, A.; Parodos, T.; Norton, P.; Hines, R.; Jan. 1998; 11p; In English; Original contains color images
Report No.(s): AD-A400018; No Copyright; Avail: CASI; A03, Hardcopy

This is the first report on results for Lockheed Martin's radiation hardened 432x432 MW HgCdTe Focal Plane Arrays (FPAs) with extended dynamic range. The extended dynamic range concept has also been successfully implemented in a 768 x 6 TDI scanning FPA. These large format FPAs are designed for space surveillance applications. The instantaneous dynamic range of the staring FPAs is up to 118dB. Excellent operability and uniformity has been measured. Near BLIP NEI has been demonstrated for SW (3.6 micrometers cutoff) detectors operating at 120K at 1.8E12 ph/cm2-s background irradiance and MW (4.8 mm cutoff) detectors operating at 120K at 8.0E12 ph/cm2-s background irradiance. These FPAs utilize the Lockheed Martin Federal Systems (LMFS) 0.8 mm radiation hardened CMOS process with two layer polysilicon and depletion mode capacitor options for total dose radiation hardness. In this paper we describe the results achieved with our new 432x432 FPAs and also our new 768 x 6 scanning FPAs. The detectors were fabricated using our production LPE material growth process and a multilayer anti-reflection coating to give high and uniform quantum efficiency of 90% over the large active areas. The responsivity standard deviation is only 2.4% of the average responsivity. The ROICs have a dual-gain feature that gives a very high maximum instantaneous dynamic range of 118dB. These FPAs have demonstrated a 80% of-BLIP NEI of 3.0E9 ph/cm2-s at a background of 1.8E12 ph/ cm2-s, an integration time of 18 ms and a cutoff of 3.6 mm at 120K. NEI and response operability have been measured at over 99%. Differential responsivity linearity is typically 0.5%. Data for MW 432x432 also show near BLIP limited performance. The FPA is low power, drawing only 85 mW, even though it has a CTIA amplifier input for each detector to give good performance at low backgrounds.
DTIC
Focal Plane Devices; Liquid Phase Epitaxy; Standard Deviation; Silicon Polymers; Radar Echoes; Coating

20020043858 Rockwell International Corp., Science Center, Thousand Oaks, CA USA
2048X2048 HgCdTe FPA
Lozlowski, L. J.; Vural, K.; Hodapp, K.; Kleinhans, W. E.; Aug. 1998; 9p; In English; Original contains color images
Report No.(s): AD-A400006; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Rockwell has begun developing infrared FPAs in the 2048(2) format. The first is the HAWAII-2, an infrared 2048(2) focal plane array (FPA) for next-generation infrared astronomy. It will supplant our HAWAII 1024(2) as the largest high-performance infrared imager available. As with our prior infrared FPAs, the flip-chip hybrid will consist of a low dark current, low-capacitance HgCdTe detector array mated to a low-noise CMOS silicon multiplexer via indium interconnects. The FPA's 18 micrometers pixel pitch accommodates both reasonable telescope optics and fabrication of the large, low-noise readout (approximately equal 40 x 40 mm(2)) using world-class submicron CMOS.
DTIC
Infrared Detectors; Pixels; Multiplexing; Infrared Astronomy; Focal Plane Devices

20020043860 Naval Research Lab., Washington, DC USA
Performance Characteristic of Two Color Midwave HgCdTe Detectors Above 80K
Mason, Whitney; Waterman, J. R.; Aug. 1998; 10p; In English
Report No.(s): AD-A400025; No Copyright; Avail: CASI; A02, Hardcopy

Two color mid-wave triple layer heterojunction HgCdTe detectors were studied using temperature-dependent current-voltage (I-V) measurements, temperature-dependent spectral response measurements, and temperature-dependent noise measurements. The reverse biased dark current shows diffusion-limited behavior for T is greater than 125 K. The same data shows evidence for generation-recombination type behavior at temperatures between 100K and 125K. For temperatures less than 100K, the measurements are limited background by photon flux, even though these measurements are performed at nominal zero background. The upper junction shows reverse breakdown voltages on the order of about 400mV, while the bottom junction shows no breakdown for V is less than 500 mV. At 80K, the RoA product is in excess of 1 x 10(exp 6) Ohms sq cm. In forward bias, the current-voltage characteristics of the lower junction are diffusion limited for all temperatures, while at lower temperatures, the upper junction showed generation-recombination behavior. Optical measurements found a cutoff wavelength of about 4

micrometers the lower junction and about 4.5 micrometers for the upper junction. The temperature dependence of the cutoff wavelength agrees with theory. The spectral crosstalk was less than 5%. At 80K, the noise of the shorter wavelength junction could not be distinguished from the instrument noise, regardless of bias. For the longer wavelength junction, the noise at lower frequencies increases with bias. There is no difference in the noise characteristics when either the photon flux or the temperature is increased.
DTIC
Infrared Detectors; Mercury Cadmium Tellurides; Focal Plane Devices; Electric Potential; Heterojunctions; Spectrum Analysis

20020043924 Naval Research Lab., Washington, DC USA
Real-Time Fused Color Imagery from Two-Color Midwave HgCdTe IRFPAS
Waterman, James R.; Scribner, Dean; Aug. 1998; 11p; In English; Original contains color images
Report No.(s): AD-A400026; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Real time display of color imagery has been demonstrated using a two-color midwave HgCdTe IRFPA built by Raytheon SBRC. A variety of algorithms were implemented using a real time image processor (TI C80) on a PC based frame grabber board. Statistically based scaling, de-correlation, spectral band differencing, and histogram equalization have been applied using the red-cyan color space representation of the imagery.
DTIC
Infrared Detectors; Mercury Cadmium Tellurides; Focal Plane Devices

20020043925 Raytheon Co., Infrared Center of Excellence, Goleta, CA USA
Staring 256 x 256 LWIR Focal Plane Array Performance of the Raytheon Exoatmospheric Kill Vehicle
Herring, J.; Bollengier, L.; Madajian, D.; Magoun, C.; Pham, L.; Jan. 1998; 22p; In English; Original contains color images
Contract(s)/Grant(s): DASG60-90-C-0166
Report No.(s): AD-A400061; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
As part of the Exoatmospheric Kill Vehicle (EKV) Exoatmospheric Flight Test (EFT), the Raytheon Infrared Center of Excellence (RIR CoE) has produced many high performance LWIR focal plane arrays (FPAs) for use in interceptor flight tests scheduled 1999. Each of the two LWIR FPAs per EKV consists of a single 256 x 256 S-117 readout multiplexer hybridized to a LWIR or VLWIR detector and mounted to a ceramic / beryllium module assembly. Flexible kapton cables with fine line constantan conductors provide electrical interconnections to the near-FPA Sensor Electronics. to date the RIR COE has delivered a sufficient quantity of Detector Module Assemblies to support the successful Seeker Flight Test conducted on 16 January 1998, and Exoatmospheric Flight Tests scheduled in 1999. The LWIR detectors are 30 um x 30 um in size and arranged in a 256 x 256 array format. The liquid phase epitaxy (LPE) double layer heterojunction (DLHJ) detectors are designed to provide optimized cutoff wavelengths and performance characteristics for each of the two IR spectral bands that are utilized for target detection and discrimination. Both IR FPAs provide near theoretical performance characteristics and are cooled using LN2 to facilitate a rapid, in-flight cool down to the operating temperature of 70K. The cryo-CMOS multiplexer utilizes a high charge capacity, direct injection (DI) unit cell with on-FPA background subtraction for ultra-high radiometric performance. The 256 x 256 unit cells are multiplexed onto two outputs, each operating at a 2.0 MHz data rate. These FPAs have excellent responsivity and response uniformity, near-theoretical noise equivalent irradiance (NEI) and outstanding operability. In addition, these FPAs have been produced in sufficient quantities to support the demanding schedule requirements of multiple, near-term launches throughout 1999.
DTIC
Infrared Detectors; Focal Plane Devices

20020043955 Occupational Safety and Health Administration, Washington, DC USA
Controlling Electrical Hazards
Jan. 1997; 37p; In English; Original contains color images
Report No.(s): AD-A400134; OSHA-3075; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This booklet provides an overview of basic electrical safety for individuals with little or limited training or familiarity with electrical hazards. The concepts and principles presented will help further an understanding of OSHA's electrical safety standards for general industry, Title 29 Code of Federal Regulations (CFR), Part 1910.302, Subpart S Design Safety Standards for Electrical Systems, and 1910. 331 Electrical Safety-Related Work Practices Standard. In general, OSHA's electrical standards are based on the National Fire Protection Associations Standard NFPA 70E, Electrical Safety Requirements for Employee Workplaces, and in turn, from the National Electrical Code (NEC). OSHA also has electrical standards for construction and maritime, but recommends that employers in these industries follow the general industry electrical standards whenever possible for hazards that

are not addressed by their industry specific standards. OSHA's electrical standards address concerns that electricity has long been recognized as a serious workplace hazard, exposing employees to such dangers as electric shock, electrocution, burns, fires, and explosions. In 1992, for example, the Bureau of Labor Statistics reported that 6,210 work-related deaths occurred in private sector workplaces employing 11 workers or more. Six percent of the fatalities, or around 347 deaths, were the direct result of electrocutions at work. What makes these statistics more tragic is that, for the most part, these fatalities could have been easily avoided.
DTIC
Hazards; Regulations; Industrial Safety; Electric Equipment

20020043959 National Taras Shevchenko Univ. of Kiev, Radiophysics Faculty, Kiev, Ukraine
The Study of the Phase Characteristics of Bragg Cells for Acousto-Optic Signal Processing ***Final Report***
Yurchenko, Alexander V.; Jan. 01, 1998; 35p; In English; Original contains color images
Contract(s)/Grant(s): F617089-7-W-0095
Report No.(s): AD-A400178; EOARD-SPC-97-4025; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This report results from a contract tasking Kiev Taras Shevchenko National University as follows: The contractor will determine the relationship of phase characteristics between TeO2 and GaAs cells with their constructive and technical parameters. Design a Braggcell TeO2 with minimal phase distortions operating near 100 MHz. Experimentally investigate the phase characteristics for a Bragg cell on TeO2. Thus, the basic results of the work are as follows: (1) A Bragg cell in a heterodyne (coherent) signal processing system does not insert any appreciable phase distortions into an output signal unless a photodetector size is less than a light spot one; (2) Otherwise, such distortions can offer and be appreciable causing an unavoidable frequency dependent phase noise and a dynamic range reduction; and (3) In testing optical systems a Bragg cell wave-front distortions can cause a deterioration of system parameters. From the aforesaid follows that further experimental investigations using a photodiode array are useful and necessary to learn vividly real limitations of considered opto-electronic system application.
DTIC
Bragg Cells; Distortion; Signal Processing; Acousto-Optics

20020044006 National Research Council, Rome, Italy
International Conference on Defects - Recognition, Imaging and Physics in Semiconductors (9th) (DRIP IX) ***Final Report***
Sep. 2001; 247p; In English, 24-28 Sep. 2001, Rimini, Italy
Report No.(s): AD-A400330; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche
Conference topics included: Photoluminescence, Other optical methods, Nanoscanning techniques, Defects in silicon, contactless techniques, Electron beam methods, Electrical methods, Defects in wide-gap semiconductors, cathodoluminescence, X-ray techniques, Miscellaneous techniques and Defects in devices.
DTIC
Semiconductors (Materials); Conferences; Crystal Defects; Nanostructure (Characteristics)

20020044009 Air Force Research Lab., Information Directorate, Rome, NY USA
An Analysis of an Ultra-High Speed Content-Addressable Database Retrieval System ***Final Report, 25 Jul. 2000-25 Jun. 2001***
Costianes, Peter J.; Dec. 2001; 21p; In English; Original contains color images
Contract(s)/Grant(s): AF Proj. 459E
Report No.(s): AD-A400296; AFRL-IF-RS-TR-2001-285; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This work presents a model for assessing the performance of a paradigm and its implementation first proposed by Chou, Detofsky, and Louri entitled Multiwavelength Optical Content-Addressable Parallel Processor (MW-OCAPP) and its implementation as a high speed optical chip. The paradigm uses polarization states to represent binary very words and EO modulators to represent database words to perform what is essentially XOR operations. The model was created using Matlab M-files consisting of custom and built-in functions. Polarization is represented by the Jones Vectors. All polarizations are considered to be linear. Since the model only addresses the temporal characteristics of the EO modulators, transmission losses due to possible waveguide losses and insertion losses between interfacing subsystems are not considered. The grating subsystem is assumed to have a constant loss across all wavelengths which is arbitrarily set at 90% loss. The final photodetector array has a linear response.
DTIC
Information Retrieval; Performance Prediction; Optical Computers; Transmission Loss; Data Bases

20020044031 HRL Labs., LLC, Malibu, CA USA

Real-Time Monitoring and Control of HgCdTe MBE Using an Integrated Multi-Sensor System

Olson, G. L.; Roth, J. A.; Brewer, P. D.; Rajavel, R. D.; Jensen, J. E.; Aug. 1998; 13p; In English

Report No.(s): AD-A400110; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We present recent progress on the use of an integrated real-time sensing and control system for monitoring and controlling substrate temperature, layer composition, and effusion cell flux during MBE growth of HgCdTe epilayers for advanced IR detectors. Substrate temperature is measured and controlled in real-time using absorption-edge spectroscopy (ABES). This allows the substrate temperature to be maintained at +/-1.5 deg C from the desired setpoint, even during actuation of effusion cell shutters which under conventional thermocouple-based control would produce a substantial (10-15 deg C) temperature change. In situ spectroscopic ellipsometry (SE) is used for monitoring HgCdTe layer composition in real-time. We describe the development of a comprehensive temperature- and composition-dependent SE dielectric function database which can be used for accurate and precise monitoring of Hg(1-x)Cd(x)Te layer composition over a wide range of x-values, from 0.2 to 0.42. The composition changes inferred from the real-time SE measurements obtained during growth of a two-layer structure are in excellent agreement with actual composition vs. depth profiles obtained using post-growth SIMS analysis. Likewise, the accuracy and precision of SE measurements conducted over multiple growth runs are shown to be suitable for robust SE-based composition control. Changes in gas-phase concentration of Cd atoms produced by a CdTe effusion cell are detected using an atomic absorption method (optical-absorption flux monitoring OFM). The OFM method allows changes in HgCdTe layer composition to be correlated directly with variations in Cd flux. The in situ optical sensors are linked using a custom software framework to provide the foundation for integrated, real-time monitoring and control of HgCdTe MBE growth of high performance IR detector structures over a wide range of compositions, layer thickness and substrate temperature.

DTIC

Mercury Cadmium Tellurides; Real Time Operation; Infrared Detectors; Molecular Beam Epitaxy; Focal Plane Devices

20020044043 SRI International Corp., Menlo Park, CA USA

Interdiffusion of HgTe/CdTe Hetero-Interfaces

Robinson, H. G.; Gleixner, S. L.; Hamilton, W. J.; Johnson, J. L.; Kosai, K.; Aug. 1998; 9p; In English; Prepared in cooperation with Raytheon IR Center of Excellence, Goleta, CA

Report No.(s): AD-A400077; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

In this paper results are presented from a study of interdiffusion in HgTe/ CdTe heterostructures. The samples were grown by MBE at HRL Laboratories and had Cd x values ranging from 0.2 to 0.35. The samples were annealed at temperatures ranging from 250 deg C to 425 deg C in both Hg vapor and vacuum ambients. The samples annealed under vacuum were coated with a layer of CdTe prior to annealing. The data were simulated using Darken's equation, and results show strong agreement between the simulated and experimental profiles. Significantly more diffusion was observed for anneals under Hg-rich ambients than under vacuum. For Hg-rich anneals, the activation energy was 1.50 eV at temperatures less than 350 deg C and 1.33 eV at higher temperatures. This is the first time that two activation energies for the interdiffusion coefficient have been reported. The mechanisms responsible for this behavior are discussed.

DTIC

Semiconductors (Materials); Thermal Diffusion

34
FLUID MECHANICS AND THERMODYNAMICS

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

20020043256 NASA Ames Research Center, Moffett Field, CA USA

Large Eddy Simulation of a Turbulent Jet

Webb, A. T., Australian Defence Force Academy, Australia; Mansour, Nagi N., NASA Ames Research Center, USA; [2001]; 4p; In English; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Here we present the results of a Large Eddy Simulation of a non-buoyant jet issuing from a circular orifice in a wall, and developing in neutral surroundings. The effects of the subgrid scales on the large eddies have been modeled with the dynamic large eddy simulation model applied to the fully 3D domain in spherical coordinates. The simulation captures the unsteady motions of the large-scales within the jet as well as the laminar motions in the entrainment region surrounding the jet. The computed time-averaged statistics (mean velocity, concentration, and turbulence parameters) compare well with laboratory data without

invoking an empirical entrainment coefficient as employed by line integral models. The use of the large eddy simulation technique allows examination of unsteady and inhomogeneous features such as the evolution of eddies and the details of the entrainment process.
Author
Large Eddy Simulation; Turbulent Jets; Simulation; Dynamic Models; Entrainment

20020043287 NASA Ames Research Center, Moffett Field, CA USA
High-Performance Java Codes for Computational Fluid Dynamics
Riley, Christopher, North Carolina Univ., USA; Chatterjee, Siddhartha, North Carolina Univ., USA; Biswas, Rupak, NASA Ames Research Center, USA; [2001]; 5p; In English; Java Grande ISCOPE Conference, 2-4 Jun. 2001, Stanford, CA, USA
Contract(s)/Grant(s): NSF CCR-97-11438; RTOP 725-10-31
Report No.(s): ACM-0-89791-88-6/97/05; Copyright Waived; Avail: CASI; A01, Hardcopy; A01, Microfiche
The computational science community is reluctant to write large-scale computationally -intensive applications in Java due to concerns over Java's poor performance, despite the claimed software engineering advantages of its object-oriented features. Naive Java implementations of numerical algorithms can perform poorly compared to corresponding FORTRAN or C implementations. To achieve high performance, Java applications must be designed with good performance as a primary goal. This paper presents the object-oriented design and implementation of two real-world applications from the field of Computational Fluid Dynamics (CFD): a finite-volume fluid flow solver (LAURA, from NASA Langley Research Center), and an unstructured mesh adaptation algorithm (2D_TAG, from NASA Ames Research Center). This work builds on our previous experience with the design of high-performance numerical libraries in Java. We examine the performance of the applications using the currently available Java infrastructure and show that the Java version of the flow solver LAURA performs almost within a factor of 2 of the original procedural version. Our Java version of the mesh adaptation algorithm 2D_TAG performs within a factor of 1.5 of its original procedural version on certain platforms. Our results demonstrate that object-oriented software design principles are not necessarily inimical to high performance.
Author
Computational Fluid Dynamics; Applications Programs (Computers); Java (Programming Language); FORTRAN; Unstructured Grids (Mathematics); Computer Programming; Object-Oriented Programming

20020043315 Institute for Computer Applications in Science and Engineering, Hampton, VA USA
Influence of 2D Finite Element Modeling Assumptions on Debonding Prediction for Composite Skin-stiffener Specimens Subjected to Tension and Bending ***Final Report***
Krueger, Ronald, Institute for Computer Applications in Science and Engineering, USA; Minguet, Pierre J., Boeing Co., USA; March 2002; 34p; In English
Contract(s)/Grant(s): NAS1-97046; RTOP 505-90-52-01
Report No.(s): NASA/CR-2002-211452; NAS 1.26:211452; ICASE-2002-4; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The influence of two-dimensional finite element modeling assumptions on the debonding prediction for skin-stiffener specimens was investigated. Geometrically nonlinear finite element analyses using two-dimensional plane-stress and plane strain elements as well as three different generalized plane strain type approaches were performed. The computed deflections, skin and flange strains, transverse tensile stresses and energy release rates were compared to results obtained from three-dimensional simulations. The study showed that for strains and energy release rate computations the generalized plane strain assumptions yielded results closest to the full three-dimensional analysis. For computed transverse tensile stresses the plane stress assumption gave the best agreement. Based on this study it is recommended that results from plane stress and plane strain models be used as upper and lower bounds. The results from generalized plane strain models fall between the results obtained from plane stress and plane strain models. Two-dimensional models may also be used to qualitatively evaluate the stress distribution in a ply and the variation of energy release rates and mixed mode ratios with lamination length. For more accurate predictions, however, a three-dimensional analysis is required.
Author
Finite Element Method; Two Dimensional Models; Tensile Stress; Composite Materials; Debonding (Materials); Bending; Skin (Structural Member)

20020043680 London Univ., UK

Measurements of Local Heat Transfer Coefficient and Film Cooling Effectiveness in Turbine Blade Tip Geometries ***Final Report, 18 Aug. 1999-18 Feb. 2000***

Yoon, Jae H.; Martinez-Botas, Ricardo F.; Sep. 2001; 57p; In English

Report No.(s): AD-A400381; SPC-99-4095; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report results from a contract tasking Imperial College of Science. Technology and Medicine as follows: The project will involve the quantification of the flow and surface characteristics of turbine blade tip cooling geometry with velocity and turbulence distributions relevant to the gas turbine designer. The experimental program will provide measurements of the film cooling adiabatic effectiveness and heat transfer coefficient in a simulated blade tip. with injection from the pressure surface side near the tip. The program will be progressive and interactive. starting with a single row of film cooling holes with injection from the pressure surface side near the tip. moving towards other representative injection configurations: slot injection on the tip surface and groove-tip geometry. The project will supply validation data for the 3D Navier-Stokes solver Glenn-HT. currently used by NASA. and it will also provide insight into the performance of advanced cooling geometry configurations. The experiments will make use of liquid crystal thermography to obtain the heat transfer data. The data acquisition method corresponds to the steady-state technique with the use of wide band liquid crystals. It requires a reduced number of experiments when compared with narrow band crystals and thermocouples, and provides a high degree of spatial resolution and reduced uncertainty level. It will be accompanied by data from small-diameter thermocouples. hot wires and pressure transducers.

DTIC

Heat Transfer; Film Cooling; Turbine Blades

20020044030 Moscow State Univ., Dept. of Physics, Russia

Development of Methods for Diagnostics of Discharges in Supersonic Flows ***Final Report, 1 Aug. 2000-1 Aug 2001***

Ershov, Alexey P.; Sep. 2001; 224p; In English; Original contains color images

Report No.(s): AD-A400105; EOARD-ISTC-1867P; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

The application of three independent methods of plasma diagnostics probe, spectroscopic and microwave - for diagnostics of discharges in supersonic gas flows has been investigated.

DTIC

Gas Discharges; Supersonic Flow; Plasma Diagnostics

35
INSTRUMENTATION AND PHOTOGRAPHY

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

20020043243 Virginia Polytechnic Inst. and State Univ., Bradley Dept. of Electrical and Computer Engineering, Blacksburg, VA USA

Optical Fiber Strain Instrumentation for High Temperature Aerospace Structural Monitoring ***Final Report, 1 Jan. - 31 Dec. 2002***

Wang, A., Virginia Polytechnic Inst. and State Univ., USA; March 2002; 24p; In English; Original contains color illustrations

Contract(s)/Grant(s): NAG1-01018; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The objective of the program is the development and laboratory demonstration of sensors based on silica optical fibers for measurement of high temperature strain for aerospace materials evaluations. A complete fiber strain sensor system based on white-light interferometry was designed and implemented. An experiment set-up was constructed to permit testing of strain measurement up to 850 C. The strain is created by bending an alumina cantilever beam to which is the fiber sensor is attached. The strain calibration is provided by the application of known beam deflections. to ensure the high temperature operation capability of the sensor, gold-coated single-mode fiber is used. Moreover, a new method of sensor surface attachment which permits accurate sensor gage length determination is also developed. Excellent results were obtained at temperatures up to 800-850 C.

Author

Fiber Optics; Strain Measurement; Aircraft Construction Materials; Spacecraft Construction Materials; Silicon Dioxide; Optical Fibers

20020043297 Alabama Univ., Materials Science Program, Huntsville, AL USA
Advanced Microscopic Integrated Thermocouple Arrays ***Final Report***
Pettigrew, Penny J., Alabama Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-14; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
The purpose of this research is to develop and refine a technique for making microscopic thermocouple arrays for use in measuring the temperature gradient across a solid-liquid interface during the solidification process. Current thermocouple technology does not allow for real-time measurements across the interface due to the prohibitive size of available thermocouples. Microscopic thermocouple arrays will offer a much greater accuracy and resolution of temperature measurements across the solid-liquid interface which will lead to a better characterization of the solidification process and interface reaction which affect the properties of the resulting material.
Author
Temperature Gradients; Thermocouples; Microscopy

20020043675 Goettingen Univ., Germany
Infrared Sensory Systems in Insects ***Final Report, 15 Jul. 1998-14 Jul 2001***
Schmitz, Helmut; Feb. 25, 2002; 13p; In English
Contract(s)/Grant(s): F49620-98-1-0489
Report No.(s): AD-A400282; AFRL-SR-BL-TR-02-0126; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Aim and scope of the project was the investigation of infrared (IR) sensory systems in insects. It was intended to learn more about the principles and mechanisms of uncooled biological IR receptors. Investigations were performed on: (1) two species of 'pyrophilous' jewel beetles (Buprestidae), which show the behaviour to fly to forest fires. (2) Certain bloodsucking bugs (so called Chagas bugs, Reduviidae), which approach their warm blooded hosts at night. The IR sensilla in the metathoracic IR-pit organs of Melanophila-beetles were investigated physiologically and with respect to their ultrastructure and material properties. Results corroborated the so called 'photomechanic model' of IR reception which was suggested in the literature. In the Australian 'fire-beetle' Merumna atrata abdominal IR receptors were discovered which are different from the Melanophila-receptors and function according to a bolometer system. Thermal cues play an important role in host finding behaviour of bloodsucking bugs. However, there was only weak evidence that bugs can perceive IR radiation. In behavioural experiments it was found that Chagas bugs use IR radiation to approach a thermal source and that possible IR receptors most probably are located under the abdominal cuticle. In a biomimetical approach results were utilized to build a prototype of a technical photomechanic IR detector.
DTIC
Infrared Detectors; Insects; Receptors (Physiology); Sensory Perception

20020043679 National Central Univ., Chung-Li, Taiwan, Province of China
Proceedings of the Asian Conference (21st) on Remote Sensing. Volume 1 Held in Taipei, Taiwan on December 4-8, 2000
Liu, Chao-Han; Murai, Shunji; Chen, A. J.; Dec. 2000; 644p; In English; Conference held: Dec 4-8, 2000, Taipei International Convention Center Taipei, Taiwan. Organized by: Chinese Taipei Society of Photogrammetry and Remote Sensing, Center for Space and Remote Sensing Research, National Central Univ., Asian Associatio
Contract(s)/Grant(s): F62562-01-M-9011
Report No.(s): AD-A400363; AOARD-CSP-001014; No Copyright; Avail: CASI; A99, Hardcopy; A06, Microfiche
The 21st Asian Conference on Remote Sensing (ACRS 2000) was held 4-8 December 2000 in Taipei, Taiwan. 210 Papers are included in the proceedings, Vol. 1 and 2. Technical sessions included: Agriculture and Soil, Water Resources, Coastal Zone Monitoring, Digital Photogrammetry, Environment, Forest Resources, GIS and Data Integration, Hazard Mitigation, Image Processing, Education and Profession, Global Change, Land use, Mapping from Space and OPS, SAR/InSAR, Oceanography, Hyperspectral and Data Acquisition Systems, and AirSAR/ MASTER.
DTIC
Remote Sensing; Synthetic Aperture Radar; Photogrammetry; Image Processing; Education

20020043702 SEAKR Engineering, Inc., Englewood, CO USA
Challenges in Implementing Commercial Non-Volatile Memory in Spacecraft Solid State Recorders
Adams, Lynn, SEAKR Engineering, Inc., USA; Chao, Kedong, SEAKR Engineering, Inc., USA; Fehringer, Matt, SEAKR Engineering, Inc., USA; Miller, Chris, SEAKR Engineering, Inc., USA; Murray, Paul, SEAKR Engineering, Inc., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 23-25; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche

SEAKR Engineering produces a variety of Solid State Data Storage and Processing Systems for use in applications from avionics to deep space. Power requirements for deep space missions require the use of non-volatile storage system. For the JPL X2000 program, SEAKR selected FLASH memory for use in the PCI NonVolatile Memory Slice (NVMS). While FLASH Memory offers a significant power advantage for interplanetary missions, there are several constraints intrinsic to FLASH memory devices that must be resolved by the system design. These features include; radiation sensitivity, slow read/write speed, bad memory blocks, limited write cycles, and electro-magnetic noise. This paper describes how these features were resolved and the tradeoffs that were made to accommodate the use of FLASH memory in an interplanetary environment.
Author
Computer Storage Devices; Solid State; Space Missions; Interplanetary Space; Systems Engineering

20020043714 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA USA
Advanced Compact Holographic Data Storage System
Chao, Tien-Hsin, Jet Propulsion Lab., California Inst. of Tech., USA; Zhou, Hanying, Jet Propulsion Lab., California Inst. of Tech., USA; Reyes, George, Jet Propulsion Lab., California Inst. of Tech., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 100-105; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche
JPL, under current sponsorship from NASA Space Science and Earth Science Programs, is developing a high-density, nonvolatile and rad-hard Advanced Holographic Memory (AHM) system to enable large-capacity, high-speed, low power consumption, and read/write of data in a space environment. The entire read/write operation will be controlled with electro-optic mechanism without any moving parts. This CHDS will consist of laser diodes, photorefractive crystal, spatial light modulator, photodetector array, and I/O electronic interface. In operation, pages of information would be recorded and retrieved with random access and highspeed. The nonvolatile, rad-hard characteristics of the holographic memory will provide a revolutionary memory technology to enhance mission capabilities for all NASA's Earth Science Mission. In this paper, recent technology progress in developing this CHDS at JPL will be presented.
Author
Data Storage; Holography; Optical Memory (Data Storage); Aerospace Environments; Electro-Optics

20020043715 MetroLaser, Irvine, CA USA
Ultra-High Density Holographic Memory Module with Solid-State Architecture
Markov, Vladimir B., MetroLaser, USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 106-111; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche
NASA's terrestrial. space, and deep-space missions require technology that allows storing. retrieving, and processing a large volume of information. Holographic memory offers high-density data storage with parallel access and high throughput. Several methods exist for data multiplexing based on the fundamental principles of volume hologram selectivity. We recently demonstrated that a spatial (amplitude-phase) encoding of the reference wave (SERW) looks promising as a way to increase the storage density. The SERW hologram offers a method other than traditional methods of selectivity, such as spatial de-correlation between recorded and reconstruction fields, In this report we present the experimental results of the SERW-hologram memory module with solid-state architecture, which is of particular interest for space operations.
Author
Holography; Optical Memory (Data Storage); Architecture (Computers); Solid State

20020043825 National Central Univ., Chung-Li, Taiwan, Province of China
Proceedings of the 21st Asian Conference on Remote Sensing. Volume 2
Dec. 2000; 618p; In English; Presented at Asian Conference (21st) on Remote Sensing, Taipei, Taiwan, 4-8 Dec. 2000
Contract(s)/Grant(s): F62562-01-M-9011
Report No.(s): AD-A400351; AOARD-CSP-001014-VOL-2; No Copyright; Avail: CASI; A99, Hardcopy; A06, Microfiche
The 21st Asian Conference on Remote Sensing (ACRS 2000) was held 4-8 December 2000 in Taipei, Taiwan. 210 Papers are included in the proceedings, Vol. I & II. Technical sessions included: Agriculture & Soil, Water Resources, Coastal Zone Monitoring, Digital Photogrammetry, Environment, Forest Resources, (115 & Data Integration, Hazard Mitigation, Image Processing, Education & Profession, Global Change, Landuse, Mapping from Space & GPS, SAR/InSAR, Oceanography, Hyperspectral & Data Acquisition Systems, and AirSAR/MASTER.
DTIC
Image Processing; Synthetic Aperture Radar; Remote Sensing

20020043854 Army Research Lab., Adelphi, MD USA

Comparison of Single Well and Double and Triple Coupled Well Quantum-Well Infrared Photodetector Designs

Kennerly, S. W.; Beekman, D. W.; Little, J. W.; Goldberg, A. C.; Leavitt, R. P.; Jan. 1998; 9p; In English; Original contains color images; Prepared in collaboration with Univ. of Maryland, College Park, MD. --Original contains color plates: All DTIC reproductions will be in black and white

Report No.(s): AD-A399973; No Copyright; Avail: CASI; A02, Hardcopy

A comparison is presented between three GaAs/AlGaAs quantum well infrared photodetector (QWIP) designs: the conventional single well and two coupled well designs, one containing two wells per period and the other three. Three QWIP detector test arrays have the same quantum well width, barrier thickness, doping density in each well, and a peak wavelength of 8.7 m. The detector array test structures used edge coupling to remove the grating or optical coupling structure effects from the detector response characteristics. Extensive temperature, bias and spectral dependent blackbody response and specific detectivity data are presented. The data show that coupled well designs offer both higher quantum efficiency and lower dark current than the more conventional single well QWIP.

DTIC

Quantum Wells; Infrared Radiation; Quantum Efficiency; Gallium Arsenides; Photometers

20020043953 Massachusetts Inst. of Tech., Lincoln Lab., Lexington, MA USA

Fusion Experiments of HSI and High Resolution Panchromatic Imagery

Hsu, Su May; Burke, Hsiao Hua; Jan. 01, 2001; 11p; In English; Original contains color images

Contract(s)/Grant(s): F19628-95-C-0002

Report No.(s): AD-A400136; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In this paper, the fusion of hyperspectral imaging (HSI) sensor data and high-resolution panchromatic imagery (HPI) is explored. Spatial/spectral sharpening techniques have been proposed to increase the spatial resolution of spectral imagery with HPI. The intent of the process is to reconstruct high spatial resolution imagery with high spectral fidelity. Target detection and identification of such imagery can be achieved with spectral and spatial processing techniques. Three sharpening approaches are reviewed here. The first one uses pseudo-inverse techniques, the second and third are component replacement methods in spatial and frequency domains, respectively. The performance of these approaches are assessed and shown with examples. In addition, a spatial-spectral analysis with fusion of HSI and HPI is also demonstrated for enhanced target detection and identification.

DTIC

Imagery; Imaging Techniques; Image Processing; Transformations (Mathematics)

20020043980 Army Research Lab., Sensors Directorate, Adelphi, MD USA

Mid-Wavelength Quantum-Well Infrared Photodetectors

Tidrow, M. Z.; Little, J. W.; Leavitt, R. P.; Goldberg, A. C.; Kennerly, S. W.; Aug. 1998; 14p; In English; Prepared in collaboration with the Univ. of Maryland, College Park, MD and Sanders, Lockheed Martin, Nashua, NH

Report No.(s): AD-A400089; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Quantum-well infrared photodetectors (QWIPs) have developed rapidly over the past ten years. Most of the efforts have been concentrated on the long-wavelength and the very-long-wavelength regions of the thermal emission spectrum. Due to the success of InSb, HgCdTe, and PtSi detectors in the midwavelength infrared region, less emphasis has been placed on the development of QWIP focal-plane arrays operating in this wavelength band. However, recent interest in establishing pixel-registered, multispectral imaging capabilities has emphasized the need for high-quality mid-wavelength detectors that can be integrated with long-wavelength devices. In this presentation, the design and characterization of QWIPs using InGaAs/AlGaAs grown on GaAs substrates and InGaAs/InAlAs grown on InP substrates will be discussed. Both of these material systems can be used as single-wavelength, mid-wave devices and are compatible with vertical integration to give multispectral operation. Fundamental detector parameters, such as optical absorption strength, photoconductive gain, and temperature-dependent dark current, have been determined for various midwavelength QWIP designs and will be presented along with the results of single-pixel radiometric tests.

DTIC

Infrared Radiation; Photometers; Quantum Wells

20020044016 Syracuse Univ., NY USA

Resilient Remote Sensing

Taylor, Stephen; Achalakul, Tiranee; Lee, Joohan; Lhee, Kyung-suk; Robila, Stefan; Jan. 01, 2001; 8p; In English; Original contains color images

Contract(s)/Grant(s): N66001-99-1-8922; N00014-99-1-0525
Report No.(s): AD-A400243; No Copyright; Avail: CASI; A02, Hardcopy

This invited paper briefly describes our progress in developing a resilient multi-spectral image analysis capability for remote sensing applications. This capability is intended to allow image streams from a collection of distributed sensors to be disseminated and interpreted by a group of analysts, while under information warfare attack. There are five component technologies that we are developing: real-time multiband hyper-spectral camera systems, concurrent algorithms for image analysis, high performance networking and computer architectures, algorithms for achieving computational resiliency, and general mathematical tools for integrating these technologies.
DTIC
Real Time Operation; Architecture (Computers); Image Analysis; Multisensor Fusion

20020044020 Raytheon Systems Co., Plano, TX USA
Integrated Sight Boresighting
Gilstrap, Jeff; Antesberger, Wayne; Mar. 1998; 11p; In English; Original contains color images
Report No.(s): AD-A400238; No Copyright; Avail: CASI; A03, Hardcopy

Development of soldier systems for the 21st century Land Warrior is exemplified by the techniques used on the Integrated Sight (IS) Program to integrate a thermal imager, a CCD camera, a miniature laser rangefinder (LRF), an electronic compass, and an infrared (IR) pointer into an advanced weapon sight and surveillance system. The Integrated Sight is being developed as a technology demonstrator and potential future upgrade to the Land Warrior and Thermal Weapon Sight Programs. A key integration challenge involves initial mechanical boresight alignment of the subsystems as well as boresighting of the thermal sight, CCD camera, LRF, compass, and IR pointer to each other in the IS system, and to the various weapons in the inventory. One aiming procedure requires the soldier to place a reticle on a target and fire the LRF. The IS then computes the ballistic trajectory based on the target range and the selected round, and displaces the reticle to a new aiming point to compensate for the calculated ballistic drop. For this concept to meet requirements, boresight tolerances must be carefully selected and the design of the weapon sight must be robust enough to withstand the rigors of use and the hostile shock and vibration of weapon firing.
DTIC
Boresights; Visual Perception; Infrared Radiation

36
LASERS AND MASERS

Includes lasing theory, laser pumping techniques, maser amplifiers, laser materials, and the assessment of laser and maser outputs. For cases where the application of the laser or maser is emphasized see also the specific category where the application is treated. For related information see also 76 Solid-State Physics.

20020043254 Alabama Univ., Dept. of Mechanical and Aerospace Engineering, Huntsville, AL USA
Analysis of the Laser Lightcraft Vehicle *Final Report*
Feikema, Douglas A., Alabama Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-19; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

Advanced propulsion research and technology concepts require launch and space flight technologies, which can drastically reduce mission costs. Laser propulsion is a concept in which energy of a thrust producing reaction mass is supplied via beamed energy from an off-board power source. A variety of laser beamed energy concepts were theoretically and experimentally investigated since the early 1970's. During the 1980's the Strategic Defense Initiative (SDIO) research lead to the invention of the Laser Lightcraft concept. Based upon the Laser Lightcraft concept, the propulsion research center, TD 40, within the Space Transportation Directorate of NASA MSFC has set out to develop technologies required for launching small payloads into Earth Orbit for a cost of $1.0M or $1000/lb to $100/lb. The near term objectives are to demonstrate technologies and capabilities essential for a future earth to orbit launch capability. Laser propulsion offers the advantages of both high thrust and good specific impulse, I(sp) in excess of 1000 s(exp -1). Other advantages are the simplicity and reliability of the engine because of few moving parts; simplistic propellant feed system, and low specific fuel consumption as a result of high specific impulse. Major limitations of this approach are the laser power available, absorption and distortion of the pulsed laser beam through the atmosphere, and

coupling laser power into thrust throughout the flight envelope. This summer's effort focused on performance of the laser engine, which included 1) optical ray tracing and 2), a time dependent calculation of the optically induced blast wave.
Author
Laser Propulsion; Space Transportation; Technology Utilization

20020043293 Alabama Univ., Dept. of Mechanical and Aerospace Engineering, Huntsville, AL USA
Laser Lightcraft Vehicle Design ***Final Report***
Buch, Kevin, Alabama Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-5; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Current space deployment vehicle research is investigating ways to lower the cost to place payloads into orbit. Beamed energy propulsion is one of the areas that are being studied. The Laser lightcraft concept, which uses a ground based laser as part of its propulsion system, falls into this category. This concept has been developed by previous Strategic Defense Initiative Office (SDIO) research. In this concept, the laser energy is reflected off of a mirror on the craft and is focused inside the cowl to created optical breakdown of the propellant. There are several concerns about the design that must be further studied. These include: 1) Thermodynamic analysis of the cryogenic fuel storage and feed systems, 2) Analysis of the regenerative cooling system for the primary optic, and 3) Analysis of focal blurring of the laser due to off-axis flight.
Author
Thermodynamics; Aerospace Vehicles; Laser Propulsion; Propulsion System Configurations

20020043407 NASA Ames Research Center, Moffett Field, CA USA
Far-Infrared Generation in Sb-Based Quantum Wells Pumped by Near-Infrared Diode Lasers
Liu, A., NASA Ames Research Center, USA; Li, J., NASA Ames Research Center, USA; Ning, Cun-Zheng, NASA Ames Research Center, USA; Larrabee, D. C., Rice Univ., USA; Tang, J., Rice Univ., USA; Khodaparast, G., Rice Univ., USA; Kono, J., Rice Univ., USA; Sasa, S., Osaka Inst. of Tech., Japan; Inoue, M., Osaka Inst. of Tech., Japan; [2001]; 4p; In English; DARPA Workshop on 6.1 A Semiconductors, 30 Jul. - 2 Aug. 2001, Snowbird, UT, USA; Sponsored by Defense Advanced Research Projects Agency, USA
Contract(s)/Grant(s): RTOP 519-40-12; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche
This paper presents viewgraphs on Far-infrared Antimony based quantum well systems pumped by near infrared diode lasers.
CASI
Quantum Wells; Antimony; Semiconductor Lasers; Far Infrared Radiation; Near Infrared Radiation

20020044026 Boeing North America, Inc., Rocketdyne Propulsion and Power, Albuquerque, NM USA
Modeling and Theory Support for Mid-IR ***Final Report, 22 Mar. 2000-22 Mar 2001***
Gallant, David J.; Jul. 2001; 12p; In English
Contract(s)/Grant(s): F29601-00-D-0169; AF Proj. 3151
Report No.(s): AD-A400119; AFRL-DE-TR-2001-1064; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The SLIDERS contract encompassed several research efforts within the Semiconductor Laser Branch of the Laser Division, Directed Energy Directorate of the Air Force Research Laboratory. The scope of this contract included development, design, fabrication, procurement, management, operations and maintenance of optical, electronic, and mechanical systems, subsystems, and components. Principal efforts included theory and concept development, design analysis, laboratory operations, and semiconductor laser and diode-pumped laser development, operation and maintenance. Efforts also included the development, procurement, and operation of instrumentation to evaluate and characterize laser systems. The objective of task order 3 was to provide modeling and theoretical analysis with the objective of increasing the power, brightness and operating temperature of mid-IR semiconductor lasers and laser arrays.
DTIC
Semiconductor Lasers; Laser Arrays

20020044027 Academy of Sciences (USSR), General Physics Inst., Moscow, USSR
Solid State Raman Materials Characterization and Raman Shifting of 1.3 Micron Laser Radiation ***Final Report***
Jun. 2000; 88p; In English; Original contains color images
Contract(s)/Grant(s): F61775-99-WE024
Report No.(s): AD-A400129; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This report results from a contract tasking General Physics Institute of the Russian Academy of Sciences as follows: The contractor will investigate experimentally the advantages and disadvantages of different solid state Raman materials with respect to their use for high average power lasers, especially the iodine laser at 1.3 microns.
DTIC
High Power Lasers; Iodine Lasers; Laser Beams

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.

20020043213 Tennessee Technological Univ., Cookeville, TN USA
Initial Study of Friction Pull Plug Welding ***Final Report***
Rich, Brian S., Tennessee Technological Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-15; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

Pull plug friction welding is a new process being developed to conveniently eliminate defects from welded plate tank structures. The general idea is to drill a hole of precise, optimized dimensions and weld a plug into it, filling the hole perfectly. A conically-shaped plug is rotated at high angular velocity as it is brought into contact with the plate material in the hole. As the plug is pulled into the hole, friction rapidly raises the temperature to the point at which the plate material flows plastically. After a brief heating phase, the plug rotation is terminated. The plug is then pulled upon with a forging force, solidly welding the plug into the hole in the plate. Three aspects of this process were addressed in this study. The transient temperature distribution was analyzed based on slightly idealized boundary conditions for different plug geometries. Variations in hole geometry and ram speed were considered, and a program was created to calculate volumes of displaced material and empty space, as well as many other relevant dimensions. The relation between the axially applied forging force and the actual forging pressure between the plate and plug surfaces was determined for various configurations.
Author
Friction Welding; Plugging

20020043221 Texas Univ., San Antonio, TX USA
Friction Stir Welding of Curved Plates ***Final Report***
Sanchez, Nestor, Texas Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-41; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

Friction stir welding (FSW) is a remarkable technology for making butt and lap joints in aluminum alloys. The process operates by passing a rotating tool between two closely butted plates. This process generates heat and the heated material is stirred from both sides of the plates to generate a high quality weld. Application of this technique has a very broad field for NASA. In particular, NASA is interested in using this welding process to manufacture tanks and curved elements. Therefore, this research has been oriented to the study the FSW of curved plates. The study has covered a number of topics that are important in the model development and to uncover the physical process involve in the welding itself. The materials used for the experimental welds were as close to each other as we could possibly find, aluminum 5454-0 and 5456-0 with properties listed at http://matweb.com. The application of FSW to curved plates needs to consider the behavior that we observed in this study. There is going to be larger force in the normal direction (Fz) as the curvature of the plate increases. A particular model needs to be derived for each material and thickness. A more complete study should also include parameters such as spin rate, tool velocity, and power used. The force in the direction of motion (Fx) needs to be reconsidered to make sure of its variability with respect to other parameters such as velocity, thickness, etc. It seems like the curvature does not play a role in this case. Variations in temperature were found with respect to the curvature. However, these changes seem to be smaller than the effect on Fz. The temperatures were all below the melting point. We understand now that the process of FSW produces a three dimensional flow of material that takes place during the weld. This flow needs to be study in a more detailed way to see in which directions the flow of material is stronger. It could be possible to model the flow using a 2-dimensional model in the particular directions where the flow moves faster. More experimental information is required to enrich the knowledge about FSW, and from this point, derive useful mathematical

formulas to optimize the process and the design of the machines that will perform it. More experiments and experimental equipment are required to uncover the mathematics of the process.
Author
Aluminum Alloys; Curvature; Friction Welding; Metal Plates; Welded Joints

20020043261 Austin Peay State Univ., Dept. of Physics, Clarksville, TN USA
Seal Materials Compatible with the Electroplating Solvent Used in Constellation-X Mirrors ***Final Report***
Pei, Xiong-Skiba, Austin Peay State Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-52; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
The existing gasket seals used in electroplating of the Constellation-X mirrors are difficult to assemble, and the current seal material is hydrophobic and too thick. The combination of the above problems result in: 1) non-uniform plating; 2) defect sites such as pits on the mirror edges; 3) ”bear claws” on the edges of the mandrels and mirrors causing difficulties in shell-mirror separations; and 4) leakage of the plating solution past the seals into the mandrel causing chemical etching of the mandrel interior. This paper reports the results of this summer study in searching for alternate seal materials chemically compatible with the electroplating solvent. Fifteen common elastomeric rubber seal materials made-by Parker Seals were investigated including butyl, ethylene propylene, fluorosilicone, nitrile, Viton fluorocarbon, and silicone. Test results showed that Viton fluorocarbon compounds as a group were superior to the other tested compounds for chemical compatibility with the plating bath.
Author
Constellations; Electroplating; Gaskets; Mirrors; Solvents; Chemical Compatibility

20020043272 Mississippi State Univ., Mechanical Engineering Dept., Mississippi State, MS USA
Development of a Revolutionary High Speed Spindle ***Final Report***
Agba, Emmanuel I., Mississippi State Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-3; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
This report presents the development of a hydraulic motor driven spindle system to be employed for high speed machining of composite materials and metals. The spindle system is conceived to be easily retrofitted into conventional milling machines. The need for the hydraulic spindle arises because of the limitations placed on conventional electric motor driven spindles by the low cutting power and the presence of vibrational phenomena associated with voltage frequency at high rotational speeds. Also, the electric motors are usually large and expensive when power requirements are moderately high. In contrast, hydraulic motor driven spindles promise a distinct increase in spindle life over the conventional electric motor driven spindles. In this report, existing technologies applicable to spindle holder for severe operating conditions were reviewed, conceptual designs of spindle holder system were developed and evaluated, and a detailed design of an acceptable concept was conducted. Finally, a rapid prototype of the design was produced for design evaluation.
Author
High Speed; Hydraulic Equipment; Spindles; Electric Motors; Holders

20020043275 Tennessee Technological Univ., Cookeville, TN USA
Preliminary Study of a Pull Plug Friction Weld ***Final Report***
Buchanan, George R., Tennessee Technological Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-9; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
A pull plug friction weld, simply defined, comprises inserting a rotating cone-shaped cylinder into a somewhat cone-shaped hole in a plate. The rotating plug makes contact with the edge of the plate and the resulting friction generates heat. The temperature of the plate material eventually reaches a magnitude that will cause the plate material at the edge of the hole to flow. This can be termed a temperature dependent plastic flow. The rotation of the plug is terminated, additional pressure is applied and the metal at the interface of the two materials cools and welding occurs. This preliminary study addresses only three aspects of a complete analysis that is multi-faceted. The transient temperature distribution for different pull plug configurations has been studied in some detail even though the initial conditions and boundary conditions may still be deemed tentative. The stress distribution within the pull plug caused by the heating pressure was studied along with a preliminary analysis of the thermoelastic stress distribution caused by friction heating. There are no definitive results for the stress analysis. Additional study will be required.
Author
Friction Welding; Holes (Mechanics); Rotating Cylinders; Thermoelasticity

20020043298 Alabama Agricultural and Mechanical Univ., Dept. of Mechanical Engineering, Normal, AL USA
Friction-Stir Welding and Mathematical Modeling ***Final Report***
Rostant, Victor D., Alabama Agricultural and Mechanical Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-16; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
The friction-stir welding process is a remarkable way for making butt and lap joints in aluminum alloys. This process operates by passing a rotating tool between two closely butted plates. Through this process it generates a lot of heat and heated material is stirred from both sides of the plates in which the outcome will one high quality weld. My research has been done to study the FSW through mathematical modeling, and using modeling to better understand what take place during the friction-stir weld.
Author
Friction Welding; Mathematical Models; Mechanical Engineering

20020043398 Texas Univ., Austin, TX USA
Solid Freeform Fabrication Proceedings
Bourell, D. L.; Beaman, J. J., Jr; Aug. 2001; 696p; In English; Proceedings of Solid Freeform Fabrication Symposium (12th) held 6-8 Aug 2001, Austin, TX
Contract(s)/Grant(s): N00014-01-1-0637
Report No.(s): AD-A400355; No Copyright; Avail: CASI; A99, Hardcopy; A06, Microfiche
The Twelfth Solid Freeform Fabrication Symposium, held at The University of Texas in Austin on August 6-8, 2001, was attended by over 125 national and international researchers. Papers addressed SFF issues in computer software, machine design, materials synthesis and processing, and integrated manufacturing. A total of 78 presentations were made, 61 oral presentations and 17 poster presentations. of these, 69 are included in the proceedings volume. The diverse domestic and foreign attendees represented industrial users, SFF machine manufacturers, universities, and government. The attendance was up this year from previous years.
DTIC
Fabrication; Manufacturing; Computer Programs

39
STRUCTURAL MECHANICS

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

20020043292 Tennessee Technological Univ., Dept. of Mechanical Engineering, Cookeville, TN USA
ANSYS Modeling of Hydrostatic Stress Effects ***Final Report***
Allen, Phillip A., Tennessee Technological Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-3; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Classical metal plasticity theory assumes that hydrostatic pressure has no effect on the yield and postyield behavior of metals. Plasticity textbooks, from the earliest to the most modem, infer that there is no hydrostatic effect on the yielding of metals, and even modem finite element programs direct the user to assume the same. The object of this study is to use the von Mises and Drucker-Prager failure theory constitutive models in the finite element program ANSYS to see how well they model conditions of varying hydrostatic pressure. Data is presented for notched round bar (NRB) and ”L” shaped tensile specimens. Similar results from finite element models in ABAQUS are shown for comparison. It is shown that when dealing with geometries having a high hydrostatic stress influence, constitutive models that have a functional dependence on hydrostatic stress are more accurate in predicting material behavior than those that are independent of hydrostatic stress.
Author
Mathematical Models; Hydrostatic Pressure; Plastic Properties; Stress Analysis; Metals

42
GEOSCIENCES (GENERAL)

Includes general research topics related to the Earth sciences, and the specific areas of petrology, mineralogy, and general geology. For other specific topics in geosciences see categories 41 through 48.

20020043240 Geological Survey, Water Resources Div., Vancouver, WA USA
Lahar Hazards at Mombacho Volcano, Nicaragua
Vallance, J. W.; Schilling, S. P.; Devoli, G.; 2001; 18p; In English
Report No.(s): PB2002-105344; USGS/OFR-01-455; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Contents include the following: Introduction; Debris Avalanches, Landslides, and Lahars; Future Landslides and Lahars at Mombacho Volcano; Lahar-Hazard-Zonation Map; Hazard Forecasts and Warnings; Protecting Communities and Citizens from Lahar Hazards; References; Additional Suggested Reading; and End Notes.
NTIS
Volcanoes; Nicaragua; Debris; Avalanches; Landslides

20020043268 Environmental Protection Agency, Office of Water, Washington, DC USA
Methods for Evaluating Wetland Condition: Number 4. Study Design for Monitoring Wetlands
Parker, A. K.; Dec. 2001; 26p; In English
Report No.(s): PB2002-105166; EPA/822/R-01/007D; No Copyright; Avail: National Technical Information Service (NTIS)
In 1999, the U.S. Environmental Protection Agency (EPA) began work on this series of reports entitled Methods for Evaluating Wetland Condition. The purpose of these reports is to help States and Tribes develop methods to evaluate (1) the overall ecological condition of wetlands using biological assessments and (2) nutrient enrichment of wetlands, which is one of the primary stressors damaging wetlands in many parts of the country. This information is intended to serve as a starting point for States and Tribes to eventually establish biological and nutrient water quality criteria specifically refined for wetlands.
NTIS
Wetlands; Environmental Monitoring; Evaluation; Environment Protection

20020043652 Technische Univ., Delft, Netherlands
Mathematical Aspects of Salt Transport in Porous Media
Schotting, R. J.; Feb. 09, 1998; 196p; In English
Report No.(s): PB2002-104459; Copyright; Avail: National Technical Information Service (NTIS), Microfiche
Groundwater is the water that occurs below the surface of the earth, where it occupies all or part of the void spaces in a geological formation. Its availability in large quantities plays a crucial role in the development of densely populated and industrialized regions. Worldwide there is a growing concern about the quality of groundwater, which is affected by natural factors and human activities. Examples of the latter are disposed of industrial waste to natural waters, irrigation return flows containing salt and fertilizers, and silting of man-made reservoirs. Groundwater pollution control has been recognized as an important environmental issue. The chemical composition of groundwater, in particular near drinking water reservoirs, is continuously and intensively being monitored and in the past decades many advanced and dedicated techniques have been developed to avoid or reduce contamination of soil-groundwater systems. Needless to say that mathematical modeling and computer simulations play an essential role in the prediction of the extent of contamination events and in the design of clean-up strategies.
NTIS
Mathematical Models; Brines; Transport Properties; Porous Materials; Environmental Chemistry; Sodium Chlorides

43
EARTH RESOURCES AND REMOTE SENSING

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

20020043291 East Central Univ., Dept. of Cartography and Geography, Ada, OK USA
Converting Topographic Maps into Digital Form to Aid in Archeological Research in the Peten, Guatemala ***Final Report***
Aldrich, Serena R., East Central Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-2; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

The purpose of my project was to convert a topographical map into digital form so that the data can be manipulated and easily accessed in the field. With the data in this particular format, Dr. Sever and his colleagues can highlight the specific features of the landscape that they require for their research of the ancient Mayan civilization. Digital elevation models (DEMs) can also be created from the digitized contour features adding another dimension to their research.
Author
Archaeology; Guatemala; Topography; Relief Maps

20020043305 East Central Univ., Dept. of Cartography and Geography, Ada, OK USA
Remote Sensing in Archaeology: Visible Temporal Change of Archaeological Features of the Peten, Guatemala *Final Report*
Lowry, James D., Jr., East Central Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-28; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
The purpose of this archaeological research was two-fold; the location of Mayan sites and features in order to learn more of this cultural group, and the (cultural) preservation of these sites and features for the future using LANDSAT Thematic Mapper (TM) images. Because the rainy season, traditionally at least, lasts about six months (about June to December), the time of year the image is acquired plays an important role in spectral reflectance. Images from 1986, 1995, and 1997 were selected because it was felt they would provide the best opportunity for success in layering different bands from different years together to attempt to see features not completely visible in any one year. False-color composites were created including bands 3, 4, and 5 using a mixture of years and bands. One particular combination that yielded tremendously interesting results included band 5 from 1997, band 4 from 1995, and band 3 from 1986. A number of straight linear features (probably Mayan causeways) run through the bajos that Dr. Sever believes are features previously undiscovered. At this point, early indications are that this will be a successful method for locating ”new” Mayan archaeological features in the Peten.
Author
Archaeology; Guatemala; Remote Sensing; Temporal Distribution

20020044018 Occupational Safety and Health Administration, Washington, DC USA
Asbestos Standard for the Construction Industry
Jan. 1995; 48p; In English
Report No.(s): AD-A400234; OSHA-3096-Rev; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Asbestos is the generic term for a group of naturally occurring, fibrous minerals with high tensile strength, flexibility, and resistance to thermal, chemical, and electrical conditions. In the construction industry, asbestos is found in installed products such as shingles, floor tiles, cement pipe and sheet, roofing felts, insulation, ceiling tiles, fire-resistant drywall, and acoustical products. Very few asbestos-containing products are currently being installed. Consequently, most worker exposures occur during the removal of asbestos and the renovation and maintenance of buildings and structures containing asbestos. Asbestos fibers enter the body by the inhalation or ingestion of airborne particles that become embedded in the tissues of the respiratory or digestive systems. Exposure to asbestos can cause disabling or fatal diseases, such as asbestosis, an emphysemalike condition; lung cancer; mesothelioma, a cancerous tumor that spreads rapidly in the cells of membranes covering the lungs and body organs; and gastrointestinal cancer. The symptoms of these diseases generally do not appear for 20 or more years after initial exposure.
DTIC
Asbestos; Exposure; Toxic Hazards; Respiratory System

20020044024 Occupational Safety and Health Administration, Washington, DC USA
Asbestos Standard for General Industry
Jan. 1995; 31p; In English
Report No.(s): AD-A400231; OSHA-3095-Rev; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Asbestos is a widely used, mineral-based material that is resistant to heat and corrosive chemicals. Depending on the chemical composition, fibers may range in texture from coarse to silky. The properties that make asbestos fibers so valuable to industry are its high-tensile strength, flexibility, heat and chemical resistance, and good frictional properties. Asbestos fibers enter the body by inhalation of airborne particles or by ingestion and can become embedded in the tissues of the respiratory or digestive systems. Years of exposure to asbestos can cause numerous disabling or fatal diseases. Among these diseases are asbestosis, an emphysemalike condition; lung cancer; mesothelioma, a cancerous tumor that spreads rapidly in the cells of membranes covering the lungs and body organs; and gastrointestinal cancer. Since 1972, however, OSHA has regulated asbestos exposure in general industry thereby causing a significant decline in the use of asbestos-containing materials. The revised standard continues to protect

workers, in general, who are exposed to asbestos-containing materials but now includes provisions that apply to workers performing brake and clutch repair and to those doing housekeeping in buildings and facilities where asbestos-containing materials exist.
DTIC
Asbestos; Respiratory System; Toxic Hazards

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.

20020043282 Texas A&M Univ., Texas Engineering Experiment Station Center for Space Power, College Station, TX USA
Space Solar Power: Satellite Concepts *Final Report*
Little, Frank E., Texas A&M Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-27; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

Space Solar Power (SSP) applies broadly to the use of solar power for space related applications. The thrust of the NASA SSP initiative is to develop concepts and demonstrate technology for applying space solar power to NASA missions. Providing power from satellites in space via wireless transmission to a receiving station either on earth, another celestial body or a second satellite is one goal of the SSP initiative. The sandwich design is a satellite design in which the microwave transmitting array is the front face of a thin disk and the back of the disk is populated with solar cells, with the microwave electronics in between. The transmitter remains aimed at the earth in geostationary orbit while a system of mirrors directs sunlight to the photovoltaic cells, regardless of the satellite's orientation to the sun. The primary advantage of the sandwich design is it eliminates the need for a massive and complex electric power management and distribution system for the satellite. However, it requires a complex system for focusing sunlight onto the photovoltaic cells. In addition, positioning the photovoltaic array directly behind the transmitting array power conversion electronics will create a thermal management challenge. This project focused on developing designs and finding emerging technology to meet the challenges of solar tracking, a concentrating mirror system including materials and coatings, improved photovoltaic materials and thermal management.
Author
Solar Generators; Satellite Design; Systems Engineering; NASA Space Programs

20020043395 NASA Goddard Space Flight Center, Greenbelt, MD USA
Performance of Li-Ion Cells Under Battery Voltage Charge Control
Rao, Gopalakrishna M., NASA Goddard Space Flight Center, USA; Vaidyanathan, Hari, Vaidyanathan (Hari), USA; [2001]; 18p; In English; 2001 NASA Aerospace Battery Workshop, 27-29 Nov. 2001, Huntsville, AL, USA; Sponsored by NASA, USA; Original contains color illustrations; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A study consisting of electrochemical characterization and Low-Earth-Orbit (LEO) cycling of Li-Ion cells from three vendors was initiated in 1999 to determine the cycling performance and to infuse the new technology in the future NASA missions. The 8-cell batteries included in this evaluation are prismatic cells manufactured by Mine Safety Appliances Company (MSA), cylindrical cells manufactured by SAFT and prismatic cells manufactured by Yardney Technical Products, Inc. (YTP). The three batteries were cycle tested in the LEO regime at 40% depth of discharge, and under a charge control technique that consists of battery voltage clamp with a current taper. The initial testing was conducted at 20 C; however, the batteries were cycled also intermittently at low temperatures. YTP 20 Ah cells consisted of mixed-oxide (Co and Ni) positive, graphitic carbon negative, LIPF6 salt mixed with organic carbonate solvents. The battery voltage clamp was 32 V. The low temperature cycling tests started after 4575 cycles at 20 C. The cells were not capable of cycling. at low temperature since the charge acceptance at battery level was poor. There was a cell in the battery that showed too high an end-of-charge (EOC) voltage thereby limiting the ability to charge the rest of the cells in the battery. The battery has completed 6714 cycles. SAFT 12 Ah cells consisted of mixed-oxide (Co and NO positive, graphitic carbon negative, LiPF6 salt mixed with organic carbonate solvents. The battery voltage clamp was for 30.8 V. The low temperature cycling tests started after 4594 cycles at 20 C. A cell that showed low end of discharge (EOD) and EOC voltages and three other cells that showed higher EOC voltages limited the charge acceptance at the selected voltage limit during charge. The cells were capable of cycling at 10 C and 0 C but the charge voltage limit had to be increased to 34.3 V (4.3 V per cell). The low temperature cycling may have induced poor chargeability since the voltage had to be increased to achieve the

required charge input. The battery has completed 6226 cycles. MSA 10 Ah cells consisted of Co oxide positive, graphitic carbon negative, LiPF6 salt mixed with organic carbonate solvents. The battery voltage clamp was 30.8 V. The low temperature cycling tests were started after 2182 cycles at 20 C. The cells were capable of cycling at 10 C and 0 C. Like SAFT, the voltage limit on charge had to be increased to 36 V (4.5 V per cell). There was a cell (cell S/N 13) in the battery that showed poor performance features such as low EOD voltage and high EOC voltage. The battery has completed 3441 cycles. A reconditioning procedure that consisted of C15 charge to a taper current of C/100 and C/20 discharge improved the voltage behavior of SAFT and MSA cells with no significant effect on YTP cells. We have demonstrated that the charge operation with VT clamp at battery rather than at cell level is feasible for onboard Li-Ion battery operation.
Author
Lithium Batteries; Electric Potential; Low Temperature Tests; Cycles

20020043653 Technical Research Centre of Finland, Jyvaskyla, Finland
New Concepts for Biofuels in Transportation: Biomass-Based Methanol Production and Reduced Emissions in Advanced Vehicles
Ohlstroem, M.; Maekinen, T.; Laurikko, J.; Pipatti, R.; 2001; 172p; In English
Report No.(s): PB2002-103510; VTT-RN-2074; Copyright; Avail: National Technical Information Service (NTIS), Microfiche
In this study, new concepts for methanol and hydrogen production from wood-based biomass were evaluated and the climate benefits that could be achieved from the use of these fuels in advanced vehicles were estimated. In the process concepts chosen for the techno-economic assessment, methanol or hydrogen production is integrated to CHP production of an existing pulp mill. The production of methanol from biomass requires a fairly advanced gasification and gas cleaning process in order to meet the requirements of the synthesis process. The hydrogen production process is somewhat simpler. However, the evaluation of the hydrogen production processes was, due to priorities set in the project, based on a more shallow evaluation. Two methanol production concepts were selected for evaluation: methanol production integrated to an existing pulp mill in Finland and in the Far East. Performance and costs of corresponding hydrogen production were also estimated roughly for the Finnish case.
NTIS
Biomass; Fuel Consumption; Automobile Fuels; Methyl Alcohol; Substitutes

20020044022 General Accounting Office, Washington, DC USA
AIR QUALITY: TVA Plans to Reduce Air Emissions Further, but Could Do More to Reduce Power Demand
Mar. 2002; 31p; In English; Report to the Chairman, Subcommittee on Legislative, Committee on Appropriations, House of Representatives
Report No.(s): AD-A400240; GAO-02-301; No Copyright; Avail: CASI; A03, Hardcopy
Even though TVA intends to increase its capacity to generate electricity through 2005,it also expects to reduce its SO2 and NOx emissions during the same time period,primarily by (1)burning lower-sulfur coal, (2)installing devices to control emissions at its existing plants,and (3)relying on fuels other than coal for new capacity.TVA expects to expand its capacity by more than 10 percent through 2005,with 79 percent of the increase slated to come from upgrading existing facilities and constructing new noncoal-burning facilities,such as turbines that run on natural gas or oil.TVA projects that its SO2 emissions will decline to 525,000 tons (a 28-percent decrease from the 2000 level)and its NOx emissions will decline to 216,000 tons (a 25-percent decrease from the 2000 level).
DTIC
Air Quality; Sulfur Dioxides; Combustion; Electricity

45
ENVIRONMENT POLLUTION

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

20020043233 Environmental Protection Agency, Office of Water, Washington, DC USA
Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual
Oct. 2001; 210p; In English; Original contains color illustrations
Report No.(s): PB2002-105181; EPA/823/B-01/002; No Copyright; Avail: National Technical Information Service (NTIS)
Sediments provide essential habitat for many freshwater, estuarine, and marine organisms. In aquatic systems, most anthropogenic chemicals and waste materials, particularly persistent organic and inorganic chemicals, may accumulate in

sediments. These sediments become repositories for many of the more toxic chemicals that are introduced into surface waters. USA Environmental Protection Agency's National Sediment Inventory (NSI) (USEPA 1998), a biennial report to Congress on sediment quality in the USA, demonstrates that sediment contamination exists in every state of the country. Contaminated sediments represent a hazard to aquatic life through direct toxicity as well as to aquatic life, wildlife and human health through bioaccumulation in the food chain. Assessments of sediment quality commonly include analyses of anthropogenic contaminants, benthic community structure, physicochemical characteristics, and direct measures of whole sediment and pore water toxicity. Accurate assessment of environmental hazards posed by sediment contamination depends in large part on the accuracy and representativeness of these analyses. The methods described in this manual are intended to provide the user with sediment collection, storage, and manipulation methods that are most likely to yield accurate, representative sediment quality data (e.g., toxicity, chemical) based on the experience of many monitoring programs and researchers.
NTIS
Toxicology; Sediments; Marine Chemistry; Contaminants; Preserving

20020043234 Environmental Protection Agency, Office of Water, Washington, DC USA
Methods for Evaluating Wetland Condition: Number 17. Land-Use Characterization for Nutrient and Sediment Risk Assessment
Dec. 2001; 20p; In English
Report No.(s): PB2002-105176; EPA/822/R-01/007Q; No Copyright; Avail: National Technical Information Service (NTIS)
The condition of and potential threats to a given wetland are often largely determined by surrounding land use. Land use, especially the percent of the watershed that has been cleared of natural vegetation, can affect the amount of water, sediment, pesticide, and nutrients entering a wetland as well as the composition of its plant and animal communities. A rapid and inexpensive assessment of the land use around a wetland and its implications for nutrient and sediment inputs can be made using readily available maps and aerial photographs, including county soil maps, USGS quadrangle maps, land-use maps, and aerial photographs. These are used to delimit the watershed or drainage basin around a wetland and to classify land use within this watershed. These land use data are used to calculate an index of potential nutrient loading to the wetland and a sediment risk index. Their intended use is to identify quickly, easily, and cheaply those wetlands that are at greatest risk from nutrient and/or sediment inputs.
NTIS
Wetlands; Evaluation; Nutritional Requirements; Geological Surveys; Soil Mapping

20020043269 Environmental Protection Agency, Office of Water, Washington, DC USA
Methods for Evaluating Wetland Condition: Number 1. Introduction to Wetland Biological Assessment
Dec. 2001; 46p; In English
Report No.(s): PB2002-105165; EPA/822/R-01/007A; No Copyright; Avail: National Technical Information Service (NTIS)
Biological assessments (bioassessments) evaluate the health of a waterbody by directly measuring the condition of one or more of its taxonomic assemblages (e.g., macroinvertebrates, plants) and supporting chemical and physical attributes. A major premise of bioassessments is that the community of plants and animals will reflect the underlying health of the waterbody in which they live. When a waterbody is damaged by human activities, biological attributes such as taxonomic richness, community structure, trophic structure, and health of individual organisms will change. For example, in disturbed systems the number of intolerant taxa typically decreases and the proportion of tolerant individuals typically increases. The biological community will reflect the cumulative effect of multiple stressors, whether they be chemical (e.g., toxic chemical), physical (e.g., sedimentation), or biological (e.g., non-native species). In recent years, a growing number of State and Federal organizations have started to develop bioassessment methods and Indexes of Biological Integrity (IBI) for wetlands. An IBI is an index that integrates several biological metrics to indicate a site's condition. A common approach among these organizations is to first sample attributes of a taxonomic assemblage in wetlands ranging from good condition to poor condition. The data are reviewed to identify metrics, which are attributes of the assemblage that show a predictable and empirical response to increasing human disturbance. After the metrics are tested and validated, they are combined into an IBI, which provides a summary score that is easily communicated to managers and the public. Once wetland bioassessment methods are developed, wetland managers can use them for a variety of applications. Wetland managers can use bioassessments to evaluate the performance of wetland restoration activities or best management practices, such as buffer strips, in restoring and protecting wetland health. Wetland managers can also use bioassessments to more effectively target resources for restoring, protecting, and acquiring wetlands.
NTIS
Wetlands; Environmental Monitoring; Evaluation; Bioassay

20020043270 Environmental Protection Agency, Office of Water, Washington, DC USA
UCMR (1999) List 1 and List 2 Chemical Analytical Methods and Quality Control Manual
Dec. 2001; 108p; In English
Report No.(s): PB2002-105164; EPA/815/R-01/028; No Copyright; Avail: National Technical Information Service (NTIS)

This document provides guidance regarding sampling, analytical methods, and related quality control issues for the States, EPA offices, water systems, and analytical laboratories participating in the Unregulated Contaminant Monitoring Rule (UCMR) Program. It replaces the previously issued UCMR Analytical Methods and Quality Control Manual (EPA 815-R-00-006, March 2000) and the Supplement A to the UCMR Analytical Methods and QC Manual (EPA 815-R-00- 002, March 2000). This document is written for the personnel at a water system, laboratory, or agency who will be responsible for UCMR Program planning, implementation, and oversight.
NTIS
Water Quality; Quality Control; Chemical Analysis; Drinking

20020043307 NASA Goddard Space Flight Center, Greenbelt, MD USA
Advection from the North Atlantic as the Forcing of Winter Greenhouse Effect Over Europe
Otterman, J., NASA Goddard Space Flight Center, USA; Angell, J., National Oceanic and Atmospheric Administration, USA; Atlas, R., NASA Goddard Space Flight Center, USA; Bungato, D., Science Applications International Corp., USA; Shubert, S., NASA Goddard Space Flight Center, USA; Starr, David OC., NASA Goddard Space Flight Center, USA; Susskind, J., NASA Goddard Space Flight Center, USA; Wu, M.-L. C., NASA Goddard Space Flight Center, USA; Jan. 04, 2002; 20p; In English; Original contains color illustrations; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In winter, large interannual fluctuations in the surface temperature are observed over central Europe. Comparing warm February 1990 with cold February 1996, a satellite-retrieved surface (skin) temperature difference of 9.8 K is observed for the region 50-60 degrees N; 5-35 degrees E. Previous studies show that advection from the North Atlantic constitutes the forcing to such fluctuations. The advection is quantified by Index I(sub na), the average of the ocean-surface wind speed over the eastern North Atlantic when the direction is from the southwest (when the wind is from another direction, it counts as a zero speed to the average). Average I(sub na) for February 1990 was 10.6 m/s, but for February 1996 I(sub na) was only 2.4 m/s. A large value of I(sub na) means a strong southwesterly flow which brings warm and moist air into central Europe at low level, producing a steeper tropospheric lapse rate. Strong ascending motions at 700 mb are observed in association with the occurrence of enhanced warm, moist advection from the ocean in February 1990 producing clouds and precipitation. Total precipitable water and cloud-cover fraction have larger values in February 1990 than in 1996. The difference in the greenhouse effect between these two scenarios, this reduction in heat loss to space, can be translated into a virtual radiative heating of 2.6 W/square m above the February 1990 surface/atmosphere system, which contributes to a warming of the surface on the order of 2.6 K. Accepting this estimate as quantitatively meaningful, we evaluate the direct effect, the rise in the surface temperature in Europe as a result of maritime-air inflow, as 7.2 K (9.8 K-2.6 K). Thus, fractional reinforcement by the greenhouse effect is 2.6/7.2, or 36%, a substantial positive feedback.
Author
Advection; Atlantic Ocean; Greenhouse Effect; Central Europe; Skin Temperature (Non-Biological); Air Currents

20020043308 NASA Goddard Space Flight Center, Greenbelt, MD USA
Theoretical Basis for the Surface Spectral Reflectance Relationships Used in the MODIS Aerosol Algorithm
Kaufman, Yoram J., NASA Goddard Space Flight Center, USA; Gobron, Nadine, Joint Research Centre of the European Communities, Italy; Pinty, Bernard, Joint Research Centre of the European Communities, Italy; Widlowski, Jean-Luc, Joint Research Centre of the European Communities, Italy; Verstraete, Michel M., Joint Research Centre of the European Communities, Italy; [2001]; 5p; In English; Original contains color illustrations; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The analysis of data from the MODIS instrument on the Terra platform to derive global distribution of aerosols assumes a set of relationships between the blue, rho (sub blue), the red, rho (sub red), and 2.1 micrometers, rho (sub 2.1), spectral channels. These relations have been established from a series of measurements indicating that rho (sub blue) approximately 0.5 rho (sub red) approximately 0.25 rho (sub 2.1). Here we use a model to describe the transfer of radiation through a vegetation canopy composed of randomly oriented leaves to assess the theoretical foundations for these relationships. The influence of varying fractional vegetation coverage is simulated simply as a linear combination of pure soil and pure vegetation conditions, also known as Independent Pixel Approximation (IPA). Calculations for a wide range of leaf area indices and vegetation fractions show that rho (sub blue) is consistently about 1/4 of rho (sub 2.1) as used by MODIS for the whole range of analyzed cases, except for very dark soils, such as those found in burn scars. For its part, the ratio rho (sub red)/rho (sub 2.1) varies from less than the empirically derived value of 1/2 for dense and dark vegetation (rho (sub 2.1) less than 0.1), to more than 1/2 for bright mixture of soil and

vegetation. This is in agreement with measurements over uniform dense vegetation, but not with measurements over mixed dark scenes. In the later case, the discrepancy is probably mitigated by shadows due to uneven canopy and terrain on a large scale. It is concluded that the value of this ratio should ideally be made dependent on the land cover type in the operational processing of MODIS data, especially over dense forests.
Author
Aerosols; Algorithms; Imaging Spectrometers; Spectral Reflectance; Mathematical Models; Canopies (Vegetation)

20020043316 Utah Univ., Dept. of Civil and Environmental Engineering, Salt Lake City, UT USA
Analysis and Application of Airborne Thermal Data at the Local Level Salt Lake City, Utah ***Final Report***
Dudley-Murphy, Elizabeth A., Utah Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-17; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Expanding cities are transforming periurban environments such as agricultural land, natural grasslands, forests, wetlands, and and land, into urban surfaces, such as asphalt and concrete. This transformation is part of a process defined as ”urban heat island”. The urban surfaces get much hotter during the daylight hours in the summer than the natural or vegetated environment. The heat builds up creating a dome effect over the city making it many degrees hotter than it’s surrounding area. The impacts from this, which include higher usage of air conditioners, water, etc., are numerous and costly. As cities expand, this problem is exacerbated. It is necessary to incorporate better quality data into urban analysis and for establishing methods that systematically and objectively monitor growth and change due to increased urbanization. NASA initiated Project Atlanta in 1997 ”as an interdisciplinary remote sensing study to observe and measure the growth and development of the urban heat island effect over Atlanta, and its associated impacts”. This project has recently included Salt Lake City, among others, in the study of the development and effects of ”urban heat islands”. NASA has made available to Salt Lake City, high resolution, 10 meter, multispectral thermal data collected in June 1998. The data collection was part of a special NASA over-flight, a mission supported by the U.S. EPA in conjunction with their Urban Heat Island (UHI) Mitigation Initiative. Salt Lake City is one of three pilot cities selected to participate in this unique initiative. Hence, this project constitutes a rare opportunity to capitalize upon state-of-the-art NASA technology and link it to an urban community very concerned about rapid growth and development. This data will enhance existing data and be used for improving technical tools used to plan for Utah’s future.
Author
Remote Sensing; Utah; Data Processing; Heat Islands

20020043988 Scripps Institution of Oceanography, La Jolla, CA USA
The Change in Oceanic O2 Inventory Associated with Recent Global Warming
Keeling, Ralph, Scripps Institution of Oceanography, USA; Garcia, Hernan, Scripps Institution of Oceanography, USA; [2002]; 27p; In English
Contract(s)/Grant(s): NAG5-6668; NOAA-NA-77RJ0453A; NSF ATM-00-00923; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Oceans general circulation models predict that global warming may cause a decrease in the oceanic O2 inventory and an associated O2 outgassing. An independent argument is presented here in support of this prediction based on observational evidence of the ocean’s biogeochemical response to natural warming. On time scales from seasonal to centennial, natural O2 flux/heat flux ratios are shown to occur in a range of 2 to 10 nmol O2 per Joule of warming, with larger ratios typically occurring at higher latitudes and over longer time scales. The ratios are several times larger than would be expected solely from the effect of heating on the O2 solubility, indicating that most of the O2 exchange is biologically mediated through links between heating and stratification. The change in oceanic O2 inventory through the 1990’s is estimated to be 0.3 - 0.4 x 10(exp 14) mol O2 per year based on scaling the observed anomalous long-term ocean warming by natural O2 flux/heating ratios and allowing for uncertainty due to decadal variability. Implications are discussed for carbon budgets based on observed changes in atmospheric O2/N2 ratio and based on observed changes in ocean dissolved inorganic carbon.
Author
Global Warming; Oxygen; Outgassing; Biogeochemistry; Heat Flux; Oceans

20020044010 Medical Univ. of South Carolina, Dept. of Microbiology and Immunology, Charleston, SC USA
Collaborative Research: Microbial Reductive Dechlorination of Polychlorinated Biphenyls (PCBs) in Estuarine and Marine Coastal Sediments ***Final Report, 1 Oct. 1998-30 Sep. 2001***
Sowers, Kevin R.; May, Harold D.; Mar. 29, 2002; 4p; In English
Contract(s)/Grant(s): N00014-99-1-0101; N00014-99-1-0078

Report No.(s): AD-A400300; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

For many years researchers have tried to identify and monitor PCB (Polychlorinated Biphenyl) dechlorinating bacteria. Strains o-17 and DF-1 are the first PCB dechlorinating bacteria to be identified. These organisms have proven to be very difficult to grow in pure culture thus far. However, for the first time molecular approaches (165 rDNA analysis) has ben combined with enrichment culture technique to identify these organisms. This is a significant breakthrough that will advance the application of bioremediation and it proves that such an approach can be used to identify difficult to culture environmental microorganisms, which is to say most microorganisms. Now for the first time these organisms can be monitored in order to better understand their physiology and to track the organisms in situ, before, during and after active and passive remediation attempts.

DTIC

Microorganisms; Polychlorinated Biphenyls

20020044056 Scripps Institution of Oceanography, La Jolla, CA USA

Southern Ocean Seasonal Net Production from Satellite, Atmosphere, and Ocean Data Sets ***Final Report, 1 Jan. 1998 - 30 Jun. 2001***

Keeling, Ralph F., Scripps Institution of Oceanography, USA; May 01, 2002; 3p; In English

Contract(s)/Grant(s): NAG5-6668

Report No.(s): Rept-97-1503; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

A new climatology of monthly air-sea O2 flux was developed using the net air-sea heat flux as a template for spatial and temporal interpolation of sparse hydrographic data. The climatology improves upon the previous climatology of Najjar and Keeling in the Southern Hemisphere, where the heat-based approach helps to overcome limitations due to sparse data coverage. The climatology is used to make comparisons with productivity derived from CZCS images. The climatology is also used in support of an investigation of the plausible impact of recent global warming an oceanic O2 inventories.

Author

Climatology; Air Water Interactions; Oxygen; Annual Variations; Southern Hemisphere

46
GEOPHYSICS

Includes earth structure and dynamics, aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism. For related information see 47 Meteorology and Climatology; and 93 Space Radiation.

20020043463 Norwegian Seismic Array, Kjeller, Norway

Advanced Regional Array Studies

Kvaerna, Tormod; Sep. 2001; 97p; In English; Original contains color images

Contract(s)/Grant(s): DSWA01-97-C-0128

Report No.(s): AD-A400396; DTRA-TR-00-6; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

We have addressed the problem of optimizing the site-specific seismic threshold monitoring method in order to achieve the highest possible automatic monitoring capability of particularly interesting areas, such as the Novaya Zemlya testing area, and the Indian and Pakistani test sites. For the Novaya Zemlya test site, where a regional monitoring network is available, we obtain a monitoring capability varying between m(sub b) 2.0 and 2.5 during normal noise conditions. Based on data from the teleseismic network observing the Indian and Pakistani tests of 1998, we obtain a monitoring capability in the range m(sub b) 2.8-3.0 for these test sites. In order to fully automate the site-specific threshold monitoring method, we have developed an automatic explanation facility for analysis of the threshold traces. In this way threshold peaks caused by events located outside the target region can be discarded from further analysis. We have also extended the site-specific threshold monitoring method to process surface waves. An important results of this study is the demonstration of the significant benefits of using a shorter period band (8.12 seconds) instead of the traditional processing band (17-24 seconds) for processing surface waves at regional disturbances during an aftershock sequence.

DTIC

Seismology; Earthquakes; Seismic Waves

20020043475 Aerospace Corp., El Segundo, CA USA

Underground Structures and Gravity Gradiometry

Maier, M. W.; Jan. 15, 2002; 67p; In English; Original contains color images

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

Report No.(s): AD-A400252; TR-2001(3000)-1; SMC-TR-02-14; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report evaluates the use of gravity gradiometry as a tool to characterize underground facilities. The gradient of the Earth's gravitational field can be used to make inferences about the Earth's mass density field. Mass deficits, such as those produced when an underground region is excavated, produce a characteristic change in the Earth's gravitational field. In principle, gradiometric measurements can make inferences about mass deficits that are covered by hundreds of meters of rock. In practice, the technique is much more limited. The report studies the potential for characterizing underground facilities from gravity data using matched filters and a variety of inversion techniques. All of the techniques indicate that the fundamental spatial resolution is directly related to the distance from the point of interest to the gradient sensor. Thus, resolution of feature sizes of man-made facilities requires quite close access by the gradient sensors. Detection applications are also limited by the unknown size of spatial gravity 'clutter' due to the inhomogeneous Earth. Useful applications may be possible where high-sensitivity instruments can be used in proximity to the area of interest. Measurements from high-altitude aircraft or space may be strongly synergistic with short-distance measurements.

DTIC

Gravity Gradiometers; Underground Structures; Gradients; Gravitational Fields

20020043604 Woods Hole Oceanographic Inst., MA USA

Morphology of Hudson Canyon and Hudson Apron ***Final Report, 1 Jul.-31 Dec. 2001***

Tucholke, Brian E.; Apr. 09, 2002; 5p; In English

Contract(s)/Grant(s): N00014-01-1-0965

Report No.(s): AD-A400413; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Hudson Canyon is the most prominent submarine canyon on the US east coast, and it lies just north of Hudson Apron, an extensive depositional region on the continental slope that is unusually unstructured (stable) compared to the slope along the remainder of the margin. With funding from this grant, we processed bathymetric and backscatter data from an existing SeaBeam 2112 multibeam survey of these two provinces and made a preliminary analysis of the results. Hudson Canyon exhibits a wide range of morphological features which, to first order, can be related to lithology of the seafloor, the behavior of turbid down-canyon flows in response to regional seafloor gradient, and possibly the presence of gas hydrates beneath the continental rise. Hudson Apron, while regionally stable, shows small-scale indications of incipient slope failure.

DTIC

Continental Drift; Sediment Transport; Continental Shelves; Slopes

20020043605 Woods Hole Oceanographic Inst., MA USA

Fluid Mechanical Measurements within the Bottom Boundary Layer During Coastal Mixing and Optics

Fredericks, J. J.; Trowbridge, John H.; Williams, A. J., III; Voulgaris, George; Shaw, William; Aug. 2001; 190p; In English

Contract(s)/Grant(s): N00014-95-1-0373

Report No.(s): AD-A400411; WHOI-2001-08; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

To quantify and understand the role of vertical mixing processes in determining mid-shelf vertical structure of hydrographic and optical properties and particulate matter, the Office of Naval Research (ONR) funded a program called Coastal Mixing and Optics (CMO), which was conducted at a mid-shelf location in the Mid-Atlantic Bight, south of Martha's Vineyard, Massachusetts. As part of the CMO program, a tall tripod, called SuperBASS, was equipped to collect a year-long, near-bottom time-series analysis of velocity, temperature, salinity and pressure. The BASS sensors were modified to measure absolute as well as differential acoustic travel time, to provide sound speed (a surrogate for temperature) and velocity in a single sample volume. Seven BASS velocity and travel time sensors were placed between 0.4 and 7 meters above bottom (mab). Three acoustic Doppler velocity (ADV) meters were mounted near the bottom-most BASS sensor at 0.3 meters above bottom. The sensors were used to obtain high-quality time-series measurements of velocity and temperature throughout a large fraction of the bottom boundary layer on the New England shelf. The measurements provide vertical structure of the Reynolds-averaged velocity and temperature fields, direct covariance estimates of turbulent Reynolds stress and turbulent heat flux, and indirect inertial range estimates of dissipation rate for turbulent kinetic energy and temperature variance. The purpose of this report is to describe the SuperBASS

instrumentation and deployments, to provide summaries of the data collected, and to document the processing, preliminary analysis and archival of the data collected for this component of the program.
DTIC
Boundary Layers; Sediment Transport; Ocean Bottom; Fluid Mechanics; Oceanography; Time Series Analysis

20020043766 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0220
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(07)-325-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043767 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0221
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(08)-352-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user

interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043768 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0223
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-363-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043769 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0224
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-367-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user

interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043770 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0233
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(07)-305-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043771 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0235
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(07)-307-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043781 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0257
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-361-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043782 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0256
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-360-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043789 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0246

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(07)-328-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043790 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0244

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(07)-326-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043791 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0243

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(07)-321-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043792 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0242

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(07)-320-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043793 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0241

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(07)-319-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043794 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0240

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(07)-318-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043795 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0271

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(10)-382-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043796 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0269

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(10)-380-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043836 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0251

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(08)-351-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043837 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0248

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(07)-330-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043838 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0245

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space

Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(07)-327-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043839 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0237

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(07)-315-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043840 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0234

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(07)-306-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043847 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0225

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(09)-369-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043848 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0222

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(08)-353-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043849 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0270

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(10)-381-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043850 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0267

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker,

D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(10)-378-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043851 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0264
Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; Ocuna, M. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-373-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043852 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0261
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent,

and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-370-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043853 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0254

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(08)-348-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043862 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0219

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(07)-314-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043863 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_IM_KP_0218
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2001(07)-313-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043864 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0255
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-369-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043865 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0253
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(08)-349-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043866 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0252
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(08)-350-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043867 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0250
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(08)-347-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043868 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0249
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(08)-346-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
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interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043869 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0247
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(07)-329-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043870 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0268
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(10)-379-GSFC; No Copyright; Avail: CASI; C01, CD-ROM
The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043871 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0266
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(10)-377-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043872 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0265
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-374-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

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Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043873 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0263

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(09)-372-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043874 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0262

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(09)-371-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043875 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0260

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space

Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-366-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043876 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0259

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(09)-365-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043877 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0258

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(09)-362-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043887 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0236

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)

Report No.(s): NP-2000(07)-309-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.

Derived from text

Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043888 NASA Goddard Space Flight Center, Greenbelt, MD USA

International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0238

Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space

Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(07)-316-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020043889 NASA Goddard Space Flight Center, Greenbelt, MD USA
International Solar-Terrestrial Program Key Parameter Visualization Tool Data: USA_NASA_DDF_ISTP_KP_0239
Ocuna, M. H., NASA Goddard Space Flight Center, USA; Ogilvie, K. W., NASA Goddard Space Flight Center, USA; Baker, D. N., Colorado Univ., USA; Curtis, S. A., NASA Goddard Space Flight Center, USA; Fairfield, D. H., NASA Goddard Space Flight Center, USA; Mish, W. H., NASA Goddard Space Flight Center, USA; 2001; In English; CD-ROM contains the product data files in minor subdirectories which are specific to the mission, instrument, and data type being distributed on this disk; The CD-ROM conforms to the ISO 9660 format and as such is constrained to the 8.3 file naming convention. It is platform independent, and will not contain any specific platform information (e.g. RMS data specifics)
Report No.(s): NP-2000(07)-317-GSFC; No Copyright; Avail: CASI; C01, CD-ROM

The Global Geospace Science Program (GGS) is designed to improve greatly the understanding of the flow of energy, mass and momentum in the solar-terrestrial environment with particular emphasis on ”Geospace”. The Global Geospace Science Program is the US contribution to the International Solar-Terrestrial Physics (ISTP) Science Initiative. This CD-ROM issue describes the WIND and POLAR spacecraft, the scientific experiments carried onboard, the Theoretical and Ground Based investigations which constitute the US Global Geospace Science Program and the ISTP Data Systems which support the data acquisition and analysis effort. The International Solar-Terrestrial Physics Program (ISTP) Key Parameter Visualization Tool (KPVT), provided on the CD-ROM, was developed at the ISTP Science Planning and Operations Facility (SPOF). The KPVT is a generic software package for visualizing the key parameter data produced from all ISTP missions, interactively and simultaneously. The tool is designed to facilitate correlative displays of ISTP data from multiple spacecraft and instruments, and thus the selection of candidate events and data quality control. The software, written in IDL, includes a graphical/widget user interface, and runs on many platforms, including various UNIX workstations, Alpha/Open VMS, Macintosh (680x0 and PowerPC), and PC/Windows NT, Windows 3.1, and Windows 95.
Derived from text
Solar Terrestrial Interactions; Earth Ionosphere; Earth Magnetosphere; Solar Wind; Heliosphere; Solar Activity Effects; Data; Polar/Ggs Spacecraft; Wind/Ggs Spacecraft

20020044044 California Univ., Inst. of Geophysics and Planetary Physics, Los Angeles, CA USA
Progress on the Cluster Mission ***Final Report, 15 Feb. 2001 - 31 Mar. 2002***
Kivelson, Margaret, California Univ., USA; Khurana, Krishan, California Univ., USA; [2002]; 17p; In English; Original contains color illustrations
Contract(s)/Grant(s): NAG5-10354; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Prof M. G. Kivelson and Dr. K. K. Khurana (UCLA (University of California, Los Angeles)) are co-investigators on the Cluster Magnetometer Consortium (CMC) that provided the fluxgate magnetometers and associated mission support for the Cluster Mission. The CMC designated UCLA as the site with primary responsibility for the inter-calibration of data from the four

spacecraft and the production of fully corrected data critical to achieving the mission objectives. UCLA will also participate in the analysis and interpretation of the data. The UCLA group here reports its excellent progress in developing fully intra-calibrated data for large portions of the mission and an excellent start in developing inter-calibrated data for selected time intervals, especially extended intervals in August, 2001 on which a workshop held at ESTEC in March, 2002 focused. In addition, some scientific investigations were initiated and results were reported at meetings.
Derived from text
Cluster Mission; Magnetometers

47
METEOROLOGY AND CLIMATOLOGY

Includes weather observation forecasting and modification

20020043223 Chicago State Univ., Dept. of Mathematics and Computer Science, Chicago, IL USA
Time-of-Arrival Lightning Location Retrieval Using an Oblate Spheroidal Earth Model ***Final Report***
Solakiewicz, Richard, Chicago State Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-46; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
The problem of retrieving lightning ground strike location on an oblate spheroidal Earth using a network of 4 or more time-of-arrival sensors is considered. A recently developed analytic method for obtaining such retrievals on a spherical Earth surface is perturbed resulting in an iterative procedure to get correction terms. The perturbation procedure consists of applying a vector Newton's method to eqs. relating the distances from the lightning location to each sensor along a geodesic and the times of arrival of the wave produced by the lightning source at each sensor.
Author
Earth Surface; Lightning; Position (Location); Oblate Spheroids

20020043300 Wisconsin Univ., Physics Dept., Stoughton, WI USA
Brazil ALDF System Error Analysis ***Final Report***
Rompala, John T., Wisconsin Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-38; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
In a cooperative effort among: the Global Hydrology Climate Center (GHCC) of NASA's Marshal Space Flight Center (MSFC), the Atmospheric Electric Group of the Brazilian National Institute of Space Research, the University of San Paulo (USP), and the Brazilian National Institute of Meteorology (INME), a network of four lightning detectors has been established in Brazil's Rhondonian region. This paper surveys the efforts of GHCC researchers to develop algorithms and field procedures which reliable determine lightning strike locations based on site data comprised of the signal time of arrival, and radiated electromagnetic field.
Author
Brazil; Climatology; Hydrology; Error Analysis

20020043928 Lockheed Martin Infrared and Imaging Systems, Lexington, MA USA
4482 Element Multispectral Hybrid PV/PC HgCdTe IRFPA for High Resolution Coverage of 3.7 - 15.4 Micrometers for the AIRS Instrument
Rutter, James; Libonate, Scott; Denley, Brian; Gurnee, Mark N.; Robillard, Gene; Jan. 1996; 11p; In English; Original contains color images
Contract(s)/Grant(s): NAS9-58970
Report No.(s): AD-A400043; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The Atmospheric Infrared Sounder (AIRS) is a key facility instrument in the NASA Earth Observing System (EOS) program, being implemented to obtain comprehensive long-term measurements of earth processes affecting global change. The instrument performs passive IR remote sensing using a high resolution grating spectrometer with a wide spectral coverage (3.7 - 15.4 m) directing radiation onto a hybrid HgCdTe IRFPA operating at 58K in a vacuum package cooled to 155K. The hybrid HgCdTe FPA consists of twelve modules, 10 with multiplexed photovoltaic detectors and two with individually leaded out photoconductive detectors. The complex FPA has a large optical footprint, 53 mm x 66 mm, and receives energy dispersed from the grating through a precision filter assembly containing 17 narrow band filters. The backside illuminated PV detector arrays are fabricated from

P-on-n double layer LPE grown heterojunction detectors in a bilinear format of 50 m x 100 m detectors, with from 232 to 420 detectors per module. For the MWIR bands four PV modules cover the 3.7 m to 8.22 m region. Low detector capacitance and low noise preamplifiers in the ROIC are key to achieving high sensitivities in these bands. Uniform quantum efficiencies and detectivities exceeding 3E13 cm-rtHz/W have been achieved. The LWIR region is covered by six PV modules spanning 8.8 m to 13.75 m. High detector resistance and very low ROIC preamplifier input noise are key to achieving high sensitivity. A detectivity exceeding 2E11 cm-rtHz/W has been achieved at the longest wavelength. Two additional PC modules cover the longest spectral bands out to 15.4 m. This high performance multispectral focal plane has been built and integrated with the dewar assembly, and is currently being integrated with the complete AIRS sensor.
DTIC
Infrared Instruments; Photovoltaic Effect; Mercury Cadmium Tellurides; Focal Plane Devices

20020043942 Analytic Sciences Corp., Reading, MA USA
Weather Impact Decision Aids (WIDA)
Gouveia, Melanie J.; Bensinger, Richard B.; Morrison, Jeffrey S.; Sep. 27, 1999; 56p; In English
Contract(s)/Grant(s): F19628-97-C-0087; AF Proj. 2688
Report No.(s): AD-A400418; AFRL-VS-TR-2000-1509; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche
Weather Impact Decision Aids (WIDAs) predict the effects of weather and other environmental factors on the performance of electro-optical (EO) (infrared, visible, and laser) weapons systems. WIDAs will be used to support mission planning and execution . This report summarizes development progress from August 1998 through August 1998. The WIDA program is broken down into two software development programs. The Weather Automated Mission Planning Software (WAMPS) will be a demonstratable system showing how weather decision aids can benefit mission planning. The Target Acquisition Weather Software (TAWS) will be fielded to replace the aging DOS-based Electro-Optical Tactical Decision Aid (EOTDA) software. TAWS takes advantage of the latest hardware and software technology improvements and will integrate advances in environmental effects modeling. TAWS will also leverage developments already underway at the Air Force Research Laboratory (AFRL) in its Infrared Target Scene Simulation (IRTSS) and Night Vision Goggles Operations Weather Software (NOWS) programs. Together, these programs will significantly enhance support to the warfighter. When hundreds to thousands of sorties may be flown over a very short period of time using precision guided munitions, automation and inclusion of weather effects is essential.
DTIC
Decision Support Systems; Weather; Electro-Optics; Computer Programming

20020044057 Meteorological Satellite Center, Kiyose, Japan
Monthly Report of the Meteorological Satellite Center: December 2001
December 2001; In English; CD-ROM conforms to the ISO 9660 standard for volume and file structure; Copyright; Avail: Issuing Activity
The CD-ROM concerning the December 2001 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 Image; Cloud Image of Japan and its vicinity; Cloud Amount; Sea Surface Temperature; Cloud Motion Wind; Water Vapor Motion Wind; Equivalent Blackbody Temperature; OLR (Out-going Longwave Radiation), Solar Radiation; 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.
Derived from text
Satellite Observation; Satellite Sounding; Atmospheric Sounding; Meteorological Parameters; Satellite Imagery; Japan

48
OCEANOGRAPHY

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

20020043235 Environmental Protection Agency, Office of Water, Washington, DC USA
Methods for Evaluating Wetland Condition: Number 9. Developing an Invertebrate Index of Biological Integrity for Wetlands

Dec. 2001; 60p; In English
Report No.(s): PB2002-105170; EPA/822/R-01/007I; No Copyright; Avail: National Technical Information Service (NTIS)

The invertebrate module gives guidance for developing an aquatic invertebrate Index of Biological Integrity (IBI) for assessing the condition of wetlands. In the module, details on each phase of developing the IBI are given. First, in the planning stage, invertebrate attributes are selected, the wetland study sites are chosen, and decisions are made about which stratum of the wetland to sample and what is the optimal sampling period or periods. Then, field sampling methods are chosen. The module describes field methods used in several States, and gives recommendations. Laboratory sampling procedures are reviewed and discussed, such as whether and how to subsample, and what taxonomic level to choose for identifications of the invertebrates. Specific categories of attributes, such as taxa richness, tolerance, feeding function, and individual health are discussed, with examples. Appendices to the invertebrate module give details about the advantages and disadvantages of using invertebrates, of the different attributes, of various field sampling methods, and of lab processing procedures as used by several State and Federal agencies. The module and appendices give a detailed example of one State's process for developing an invertebrate IBI, with a table of metrics with scoring ranges, and a table of scores of individual metrics for 27 wetlands. A glossary of terms is provided.
NTIS
Wetlands; Evaluation; Rhythm (Biology)

20020044013 Army Engineer Research and Development Center, Coastal and Hydraulics Lab., Vicksburg, MS USA
BOUSS-2D: A Boussinesq Wave Model for Coastal Regions and Harbors
Nwogu, Okey G.; Demirbilek, Zeki; Sep. 2001; 92p; In English; Original contains color images
Report No.(s): AD-A400294; ERDC/CHL-TR-01-25; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

BOUSS-2D is a comprehensive numerical model for simulating the propagation and transformation of ocean waves in coastal regions and harbors. The model is based on depth-integrated Boussinesq-type mass and momentum equations for nonlinear-dispersive waves. The equations describe most of the wave transformation phenomena of interest in coastal regions and harbors including shoaling, refraction, diffraction, reflection, nonlinear wave-wave interactions, and wave breaking. This manual describes the theoretical background behind the model and the steps involved in setting up and running the model.
DTIC
Mathematical Models; Water Waves; Boussinesq Approximation; Nonlinear Equations

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.

20020043253 Dartmouth Coll., Hanover, NH USA
Buffer Effects in the Solubility, Nucleation and Growth of Chicken Egg White Lysozyme *Final Report*
Gibson, Ursula J., Dartmouth Coll., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-21; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

The growth of protein crystals is important for determination of their three-dimensional structure, which relates to their biochemical functions and to the practical goal of designing pharmaceuticals to modify that function. While many proteins have been successfully crystallized by a variety of methods, there is still limited understanding of the process of nucleation and growth of even the simplest proteins. Chicken egg-white lysozyme (CEWL) is readily crystallized under a variety of conditions, and studies underway at MSFC are designed to elucidate the mechanisms by which the crystals nucleate and grow. We have investigated the effect of buffer choice on the solubility, nucleation and growth of CEWL. CEWL was purified by dialysis against a .05M phosphate buffer and chromatographic separation from contaminants in a sepharose column. Solubility studies were made as a function of buffer concentration for phosphate and formate buffers, and the nucleation and growth of crystals at 10 C was studied as a function of pH for oxalate, succinate, formate, butyrate, carbonate, phosphate and acetate buffer solutions. The solubility data support the conclusion that there is a solubility minimum as a function of buffer concentration for amphiphilic molecules, while no minimum is observed for a phosphate buffer. Nucleation is suppressed at pH greater than pKa for all buffers except phosphate. The aspect ratio of the (110) faces is shown to be a function of crystal size, rather than pH.
Author
Biochemistry; Lysozyme; Nucleation; Solubility; Proteins; Buffers (Chemistry)

20020043286 NASA Ames Research Center, Moffett Field, CA USA

Artificial Cells: Prospects for Biotechnology

Pohorille, Andrew, NASA Ames Research Center, USA; Deamer, David, California Univ., USA; Aug. 09, 2001; 16p; In English
Contract(s)/Grant(s): RTOP 344-38-22-06; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A variety of techniques can now be used to alter the genome of a cell. Although these techniques are very powerful, they also have limitations related to cost and efficiency of scale. Artificial cells designed for specific applications combine properties of biological systems such as nano-scale efficiency, self-organization and adaptability at relatively low cost. Individual components needed for such structures have already been developed, and now the main challenge is to integrate them in functional microscopic compartments. It will then become possible to design and construct communities of artificial cells that can perform different tasks related to therapeutic and diagnostic applications.

Author

Biotechnology; Genetic Engineering; Bioinstrumentation; Cells (Biology)

20020043401 Scripps Research Inst., La Jolla, CA USA

Chronic Stress and Neuronal Pathology: Neurochemical, Molecular and Genetic Factors ***Annual Report, 15 Jun. 2000-14 Jun 2001***

Koob, George F.; Jul. 2001; 10p; In English
Contract(s)/Grant(s): DAMD17-99-1-9501
Report No.(s): AD-A400462; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The purpose of this project is to explore the effects of chronic activation of the brain corticotropin releasing factor (CRF) stress system and to investigate individual susceptiblity to this pathological cascade. It is our hypothesis that sustained central CRF activation results in damage to the brain dopamine system through oxidative mechanisms and that certain populations may be uniquely susceptible. In Specific Aim I, the goal is to selectively breed rats for high and low response to stressors on the basis of their hypothalamic pituitary adrenal axis response to footshock. Two independent lines (replications) are being bred (the fifth generation of Line 1 is currently in utero and the third generation of Line 2 is nearing weaning). The lines appear to be separating at a steady, although moderate, rate, possibly reflecting a locking in of the original selection. In Specific Aim 2, the goal is to explore the effects of chronic hyperactivity of the brain CRF stress system on dysregulation of brain monoamine systems with a focus on dopamine. Chronic hyperactivity of the CRF system by repeated central administration of CRF produced a temporary dysfunction of the mesocortical and nigrostriatal dopaminergic systems possibly mediated by oxidative damage.

DTIC

Brain; Stress (Physiology); Dopamine; Neurophysiology; Genetics

20020043402 California Univ., San Diego, La Jolla, CA USA

Combinatorial Strategies and Hypothesis-Based Drug Design in Drug Discovery Targeted to the Protease and Channel Activities of Botulinum Toxin A ***Final Report, 1 Jul. 1998-31 Dec. 2001***

Montal, Mauricio; Jan. 2002; 83p; In English
Contract(s)/Grant(s): DAMD17-98-C-8040
Report No.(s): AD-A400463; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The ultimate goal of this program is to understand in detail the mechanisms by which botulinum neurotoxins (BoNT) abrogate neurotransmitter release. One facet is focused on the channel-forming domain of the heavy chain (HC). The aim is to identify open channel blockers as a single class of drugs that would be effective against all BoNT isoforms. A major objective is to seek direct demonstration that the HC acts as the molecular conduit for the light chain (LC) thereby allowing the protease activity to reach the cytosol where it acts. Accordingly, purified HC is first reconstituted in lipid bilayers and the direct translocation of isolated LC through the HC channel is measured by single channel recordings and also by direct analytical determination of the LC protease activity. A second facet of the program involves the concept that the peptide products of substrate proteolysis by BoNTs uncouple excitation from secretion pointing to new means of intervention. This notion, discovered for BoNT A, appears to be valid for other BoNT isoforms thereby yielding a diverse repertoire of peptide sequences that may provide insights into the molecular interactions between partner proteins involved in membrane fusion. It is anticipated that this concerted and focused approach will uncover lead compounds that may be developed into selective drugs targeted to prevent or relieve the neurotoxic actions of BoNT.

DTIC

Clostridium Botulinum; Toxins and Antitoxins; Protease; Molecular Interactions

20020043404 Jackson Lab., Bar Harbor, ME USA

Genetic and Dynamic Analyses of Murine Peak Bone Density ***Final Report, 27 Sep. 1996-26 Sep 2001***

Beamer, Wesley G.; Oct. 2001; 185p; In English

Contract(s)/Grant(s): DAMD17-96-1-6306

Report No.(s): AD-A400443; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

A comprehensive genetic assessment was undertaken for Quantitative Trait Loci (QTLs) that regulate acquisition of peak bone density using the low density C57BL/6J (B6) and the high density CAST/EiJ (CAST) and C3H/HeJ (C3H) inbred strains. Genome wide analyses of (B6 x CAST)F2 and (B6 x C3H)F2 progeny yielded 8 QTLs in the B6CAST-F2 F2 and 10 QTLs in the B6C3H-F2 progenies, respectively. Heritability of BMD ranged from 57 to 87%, demonstrating the strong genetic basis for this trait. Locations of the QTLs (LOD scores greater than 2.9) were established, major effects and modes of inheritance were established, and B6 background congenic strains were established to pursue biological and fine mapping/cloning of genes. Genes common to femurs and to vertebrae were found, in addition to genes unique to each bone site. Biological studies of the progenitor B6, C3H, and CAST inbred strains reveal that there are both formation and resorption processes actively in place that contribute to the differences in bone mineral density, microstructure and strength differences in these strains. Studies of QTL gene locations, structure, biomechanical, microarchitectural, and process of bone turn-over are currently being pursued as well as being planned for the future.

DTIC

Bones; Osteoporosis; Genetics; Bone Mineral Content

20020043405 California Univ., Irvine, CA USA

Physiological Stress Reactivity and Breast Cancer ***Annual Report, 1 Oct. 2000-30 Sep. 2001***

Wadhwa, Pathik; Oct. 2001; 5p; In English

Contract(s)/Grant(s): DAMD17-99-1-9248

Report No.(s): AD-A400459; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The objective of the present program of research is to study physiological processes that may mediate the links between psychological states and cancer. Specifically, the present study is designed to conduct an investigation of the cross-sectional associations between indices of stress reactivity and psychological coping styles in women with breast cancer and matched healthy controls. The aims of the project are: (1) to quantify parameters of biological reactivity to a behavioral stress paradigm in women with and without breast cancer; (2) to examine effects of menopause and familial risk on biological stress reactivity and emotional expression; and (3) To develop the methodology and obtain preliminary data which could justify subsequent, prospective research with high-risk populations. This report outlines the steps that have been taken to resume this research study at University of California-Irvine ever since the author left the previous site, University of Kentucky. These steps include setting up a behavioral medicine research laboratory, obtaining IRB approval for the project from UCI, obtaining approval from the University's General Clinical Research Center to conduct the study, setting up a collaboration with an oncologist and biochemist, and recruit other necessary staff.

DTIC

Stress (Physiology); Mammary Glands; Cancer; Emotional Factors

20020043465 Louisville Univ., KY USA

Procathepsin D Stimulation of Human Breast Cancer Cell Growth ***Annual Report, 15 Jun. 2000-14 Jun 2001***

Vetvicka, Vaclav; Jul. 2001; 39p; In English

Contract(s)/Grant(s): DAMD17-99-1-9257

Report No.(s): AD-A400390; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Nine different clones transfected with human pCD cDNA and eight clones transfected with cDNA with deleted APpCD have been established and tested. Our results showed that the individual clones differ in secretion of pCD. These clones not only secrete pCD into the medium, but can also react to the estradiol stimulus by proliferation. Similar results have been obtained when the tumor growth has been evaluated in vivo and in vitro. Matrigel assay demonstrated that the transfection with pCD with deleted activation peptide did not influence the invasiveness of the clone. These data demonstrate that the proliferation and invasiveness of breast cancer cells closely correlates with production and secretion of pCD and the presence of the APpCD. After establishing that the fragment 27-44 is the part responsible for the pCD binding to cells, we focused our attention on this particular fragment. We found that the biological activity can be located into the fragment AA 36-44. The cancer cells reacted to the addition of AA 36-44 fragments with the same level of proliferation as to the addition of pCD. When this fragment was used for inhibition of the

pCD-FITC binding to the cancer cells, this fragment was comparable to the unlabeled pCD. We prepared a library of synthetic peptides with a single amino acid substitution based on the results mentioned above.
DTIC
Cancer; Mammary Glands; Cell Division

20020043471 Research Triangle Inst., Research Triangle Park, NC USA
Health Status of Military Women in the Total Force ***Final Report, 1 Oct. 1996-31 Aug. 2001***
Bray, Robert; Sep. 2001; 493p; In English
Contract(s)/Grant(s): DAMD17-96-2-6021
Report No.(s): AD-A400236; No Copyright; Avail: CASI; A21, Hardcopy; A04, Microfiche
The current study sought to investigate health issues and behaviors among all military women and men, including both active duty and reserve personnel. The effort resulted in administration of a major survey, with a total of 24,881 respondents. This dataset represents the single largest and most comprehensive information base regarding military health and health behavior to date. Furthermore, it serves as valuable baseline data for future monitoring and tracking of health events in the military.
DTIC
Females; Personnel; Health Physics

20020043676 Naval Health Research Center, San Diego, CA USA
Documentation Patient Encounters During a Humanitarian Assistance Mission to Guatemala ***Interim Report, 3 Jan. 2000-3 Jan 2001***
Gauker, E. D.; Konoske, P. J.; Apr. 18, 2001; 21p; In English
Report No.(s): AD-A400269; NHRC-01-13; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Researchers from the Naval Health Research Center (NHRC) collected patient encounter data from Naval Medical Center San Diego (NMCSD) physicians who traveled with a non-government organization, HELPS, International, on a humanitarian assistance mission to Guatemala. The purpose was for NHRC to expand its database of operations other than war patient information and to test a revised patient encounter form. The purpose of the NMCSD staff was to train to provide medical care under austere conditions. Data were collected for 857 patient encounters during which 1476 diagnoses were made. Women comprised 57% of the sample, and children aged 1-10 formed the largest age group (20.9%). The NMCSD staff included several eye specialists; therefore, the diagnoses were most frequently ophthalmologic conditions. Other frequent diagnoses included worms, musculoskeletal pain, headaches, and diarrhea. The revised, forced-choice patient encounter form alleviated problems of illegibility and nonstandard language often found in free-text forms. Future research will continue to improve data collection methods and to expand the NHRC medical information database.
DTIC
Guatemala; Health; Patients; Signs and Symptoms

20020043677 Toledo Univ., OH USA
Expression of Inappropriate Cadherins in Human Breast Carcinomas ***Final Report, 15 Jul. 1998-14 Jul 2001***
Wheelock, Margaret J.; Aug. 2001; 52p; In English
Contract(s)/Grant(s): DAMD17-98-1-8252
Report No.(s): AD-A400268; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche
E-cadherin is a transmembrane protein that mediates calcium-dependent cell-cell adhesion and plays a role in maintaining the normal phenotype of epithelial cells. Decreased expression of E-cadherin is correlated with increased invasiveness of breast cancer. Inappropriate expression of a non-epithelial cadherin, such as N-cadherin, by an epithelial cell has been shown to down-regulate E-cadherin expression and contribute to cell motility. In this study we explored the possibility that expression of non-epithelial cadherins may be correlated with increased cellular motility and invasion in breast cancer cells. We showed that 1) N-cadherin promotes motility and invasion in breast cancer cells; 2) decreased expression of E-cadherin does not correlate with invasion in breast cancer cells; 3) N-cadherin expression correlates with invasion and motility in breast cancer cells and plays a direct role in promoting motility; 4) forced expression of E-cadherin in invasive, N-cadherin positive cells does not reduce their invasive capacity; 5) forced expression of N-cadherin in non-invasive, E-cadherin-positive cells produces an invasive cell even though these cells continue to express E-cadherin; 6) N-cadherin-dependent motility may be mediated by fibroblast growth factor receptor signaling; and 7) the domain on N-cadherin that is responsible for increased invason resides in the 4th extracellular repeat domain.
DTIC
Cancer; Mammary Glands; Proteins; Epithelium; Gene Expression

20020043834 Army Medical Research Inst. of Infectious Diseases, Fort Detrick, MD USA

Collective Behaviors: Mass Panic and Outbreaks of Multiple Unexplained Symptoms

Pastel, Ross H.; Feb. 20, 2002; 4p; In English

Report No.(s): AD-A400319; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The general public, the mass media, and many government officials believe that the use of weapons of mass destruction (WMD) will inevitably lead to mass panic and/or mass hysteria. However, studies of disasters and wars show that disorganized flight in the presence of a real or perceived danger (i.e., mass panic) is rare. On the other hand, in a real or perceived WMD scenario, outbreaks of multiple unexplained symptoms (i.e., mass psychogenic illness, mass sociogenic illness, mass hysteria, or epidemic hysteria) may be prevalent. Many of the symptoms (fatigue, nausea, vomiting, headache, dizziness/lightheadedness, and anorexia) are common in combat and after toxic chemical exposure, chemical weapon exposure, prodromal infectious illness, and acute radiation sickness.

DTIC

Signs and Symptoms; Fear; Physiological Effects; Hazards; Panic; Radiation Sickness

20020043945 MacCallum (Peter) Cancer Inst., Melbourne, Australia

Mechanisms of Bone Metastasis from Breast Cancer Using a Clinically Relevant Model ***Final Report, 1 Jul. 1998-30 Jun. 2001***

Anderson, Robin L.; Jul. 2001; 62p; In English; Original contains color images

Contract(s)/Grant(s): DAMD17-98-1-8144

Report No.(s): AD-A400441; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Bone metastases develop in 70% of breast cancer patients who are left untreated or for whom treatment fails. Once the tumor has metastasised, the disease is hard to control and treatment options are limited. A lack of knowledge of the metastasis process and the genes that control it precludes the use of rational drug design. Breast cancer metastasis to bone is poorly understood largely due to a dearth of model systems available to study this process. We have developed a murine model of breast cancer that actively mimics the human disease. After implantation of tumor cells into the mammary gland, a primary tumour develops and subsequently metastasises to the lymph nodes, lung and bone. The resulting bone lysis, paralysis, hypercalcaemia and elevated plasma parathyroid hormone-related protein (PTHrP) are all hallmarks of the human disease. We have used the 3 years of DOD funding to develop and characterize the model and to seek the genes that regulate metastasis to bone. By differential gene expression analysis using two clones that are both metastatic but differ in their ability to metastasise to bone, we have identified candidate genes for bone tumor homing and growth. We have also determined the expression patterns and function of genes already proposed by others to play a role in breast cancer metastasis.

DTIC

Bones; Cancer; Gene Expression; Lymphatic System; Metastasis; Parathyroid Gland

20020044012 General Hospital Corp., Boston, MA USA

Center for the Integration of Medicine and Innovative Technology ***Annual Report, 15 Oct. 2000-15 Oct 2001***

Perrish, John A.; Nov. 2001; 177p; In English; Original contains color images

Contract(s)/Grant(s): DAM17-99-2-9001

Report No.(s): AD-A400289; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

The Center for Integration of Medicine and Innovative Technology (CIMIT), is a consortium of nonprofit Massachusetts-based institutions led by Massachusetts General Hospital and includes Brigham and Women's Hospital, Massachusetts Institute of Technology and Draper Laboratory. The primary aim of the Center is to develop technologies that will advance the capability of modern medicine to diagnose and treat patients using minimally invasive and less costly approaches. CIMIT will coordinate and implement research programs in cardiovascular disease, cancer, stroke, trauma and critical care, that are supported by basic science and engineering development in biomaterials, endoscopic tools, energy delivery, intelligent decision systems, medical imaging, microsensors, outcomes, robotics and simulation. A unique military/ civilian partnership fostered by CIMIT will allow DOD (Department of Defense) technologies to be evaluated by CIMIT investigators and facilitate the transfer to the military of successful minimally invasive approaches developed at CIMIT. An educational program, which includes coursework, seminars, and on-site training opportunities, will serve the shared needs of academic and military physicians and scientists. The overall goal of CIMIT is to create a national program that combines clinical and technological excellence in order to generate, develop, and reduce-to-practice innovative and high-impact concepts in minimally invasive therapy.

DTIC

Medical Science; Technology Utilization; Product Development

20020044034 Advanced Technology Inst., North Charleston, SC USA
DHIAP Phase I Technology Demonstration Report: Prototype for Remote Authentication Dial-In User Service (RADIUS)
Crane, Lynn S.; Melton, Lane H.; Stinson, Jack, Jr.; Andrews, Archie D.; Schwengels, Forrest V., II; Apr. 01, 2000; 38p; In English; Original contains color images
Contract(s)/Grant(s): DAMD17-99-C-9001
Report No.(s): AD-A400078; 00-04; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Defense Healthcare Information Assurance Program (DHIAP) involved demonstration of prototype information assurance technology to assess the impact on military Medical Treatment Facility (MTF) operations and ability to improve security of sensitive information. The prototype, developed and tested in a distributed laboratory and demonstrated at two MTFs within a region, is a system that meets the Remote Authentication Dial-In User Service (RADIUS) standard. This report describes the development and trials of the technology and provides an analysis of alternative
DTIC
Medical Services; Defense Program; Computer Information Security

52
AEROSPACE MEDICINE

Includes the biological and physiological effects of atmospheric and space flight (weightlessness, space radiation, acceleration, and altitude stress) on the human being; and the prevention of adverse effects on those environments. For psychological and behavioral effects of aerospace environments see 53 Behavioral Science. For the effects of space on animals and plants see 51 Life Sciences.

20020043824 Army Aeromedical Research Lab., Fort Rucker, AL USA
U.S. Army Aeromedical Research Laboratory Annual Progress Report, Calendar Year 2001 ***Annual Report, Jan.-Dec. 2001***
Mar. 2002; 50p; In English
Report No.(s): AD-A400340; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Annual Progress Report gives the calendar year 2001 personnel and funding strength of the U.S. Army Aeromedical Research Laboratory. This report includes an overview of the Laboratory activities, current areas of research, and a brief description of the research being conducted.
DTIC
Stress (Physiology); Laboratories; Aerospace Medicine

53
BEHAVIORAL SCIENCES

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

20020043219 College of New Jersey, Dept. of Mathematics and Statistics, Pomona, NJ USA
Human Reliability Analysis: An Overview ***Final Report***
Navard, Sharon E., College of New Jersey, USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-32; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

Human/process error is potentially a large contributor to failures of aerospace systems. For some systems, such as the space shuttle main engine, large amounts of data are available, and accurate failure rates can be determined empirically. For such systems, the human error is implicit in the empirical failure rate and does not need to be quantified separately. However, for other systems, such as the solid rocket boosters, large amounts of data are not available and the failure rates must be determined by more theoretical means. When empirical data is lacking, structural models and engineering judgment must be employed. In this case, the human/process error must be modeled explicitly. An extensive literature review was performed to determine what methods already exist for modeling human error for aerospace systems. No methods that apply directly were found, although there are a number of methods that have been developed specifically for the nuclear power industry that could probably be modified for space applications. The results of the literature review are presented, as well as recommendations for future research.
Author
Aerospace Systems; Space Shuttle Main Engine; Technology Utilization; Reliability Analysis; Human Performance

20020043941 Air Force Systems Command, Human Systems Information Analysis Center, Wright-Patterson AFB, OH USA
Gateway, Volume 12
Heinle, Todd; Chelette, Tamara L.; Cheung, Bob; Ercoline, Bill; Jan. 2001; 17p; In English
Contract(s)/Grant(s): SP0700-98-D-4001
Report No.(s): AD-A400430; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This issue contains articles on the following subjects: (1) Spatial Disorientation Research. (2) Glossary of spatial Disorientation Terms and Spatial Disorientation Acronyms. (3) Measuring the head Title Illusion During Sustaining Acceleration. (4) Canadian Approach to Spatial Disorientation Training. (5) A calendar of human system events. (6) Products. (7) Spatial Disorientation, Geographic Disorientation, Loss of Situation Awareness, and Controlled Flight into Terrain. (8) Advanced Display Technologies: What have We Lost? (9) Desdemona: Advanced Disorientation Trainer.
DTIC
Spatial Distribution; Human Factors Engineering; Flight Control

54
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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

20020043227 Clark-Atlanta Univ., Dept. of Engineering, GA USA
ISS Propulsion Module Crew Systems Interface Analysis in the Intelligent Synthesis Environment ***Final Report***
Chen, Di-Wen, Clark-Atlanta Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-15; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

ERGO, a human modeling software for ergonomic assessment and task analysis, was used for the crew systems interface analysis of the International Space Station (ISS) Propulsion Module (PM). The objective of analysis was to alleviate passageway size concerns. Three basic passageway configuration concepts: (1) 45” clear passageway without centerline offset (2) 50” clear passageway, 12” centerline offset, (3) 50” clear passageway, no centerline offset, and were reviewed. 95 percentile male and female models which were provided by the software performed crew system analysis from an anthropometric point of view. Four scenarios in which the crew floats in microgravity through a 50” no-offset passageway as they carry a 16” x 20” x 30” avionics box were simulated in the 10-weeks of intensive study. From the results of the analysis, concept (3) was the preferred option. A full scale, three-dimensional virtual model of the ISS Propulsion Module was created to experience the sense of the Intelligent Synthesis Environment and to evaluate the usability and applicability of the software.
Author
Avionics; International Space Station; Spacecraft Propulsion; Human Factors Engineering; Artificial Intelligence

20020043236 Battelle Seattle Research Center, Seattle, WA USA
Development of Human Factors Guidelines for Advanced Traveler Information Systems and Commercial Vehicle Operations: Investigation of ATIS Function Transition and the Effects of an In-Vehicle ATIS on Driver Performance ***Final Report, Apr. 1995 - 1997***
Campbell, J. L.; Kantowitz, B. H.; Simsek, O.; Carney, C.; Hanowski, R.; Dec. 1999; 159p; In English
Report No.(s): PB2002-105195; FHWD-RD-96-146; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

The objective of the first experiment reported below was to measure the cognitive demands associated with transitioning across Advanced Traveler Information System (ATIS) functions. This required the development of both objective and subjective indices of driver behavior and cognition. to accomplish this, a small number of pre-drive trip scenarios that invoke appropriate transitions across ATIS functions were developed. Driving performance under more representative conditions was investigated in experiment 2 using a driving simulator. This study investigated several issues on the influence of an ATIS on driving behavior. The questions asked were: how does a moving map display of the current vehicle location influence driving performance; how do ATIS control inputs influence driving performance; should they be allocated to pre-drive; is it too much to expect the driver to do while in transit; do ATIS messages affect drivers reactions to roadway events; and does message potency affect drivers reactions to roadway events. Overall, the two experiments reported here suggest that in-vehicle ATIS devices can be learned, understood, and successfully used by drivers for both pre-drive trip planning tasks and on-road driving conditions. ATIS devices have the potential to improve driver compliance to regulatory information, as compared with standard roadside signs. While concurrent visual and auditory ATIS alert messages may be beneficial, the visual ATIS messages alone are significantly better

than roadside sign-age alone. While cognitive demands associated with ATIS transitions and ATIS complexity should continue to be a concern, these demands can be addressed by selecting ATIS functions with clear benefits to the driving task.
NTIS
Human Factors Engineering; Safety; Human Performance

20020043472 Massachusetts Inst. of Tech., Cambridge, MA USA
Interactive Planning and Monitoring for the Anchor Desk Associate ***Final Report, Jun. 1994-Feb. 1999***
Borchardt, Gary; Katz, Boris; Winston, Patrick; Jan. 2002; 30p; In English
Contract(s)/Grant(s): F30602-94-C-0199; AF Proj. B165
Report No.(s): AD-A400248; AFRL-IF-RS-TR-2001-273; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This report describes a technique for collaborative, human-computer accomplishment of planning and monitoring activity in a range of domains. The technique, called split-confirmation, provides for a partitioning of duties between the two participants, such that each vouches for the likelihood of occurrence for a distinct temporal portion of particular events or sets of events describing past, present or future activity. Assignment of duties is controlled by the human participant and can be altered at will in response to changes in the overall context for planning and monitoring activity.
DTIC
Human-Computer Interface; Planning

20020043958 Occupational Safety and Health Administration, Washington, DC USA
Ergonomics Program Management Guidelines for Meatpacking Plants
Jan. 1993; 40p; In English
Report No.(s): AD-A400145; OSHA-3123; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
In recent years, there has been a significant increase in the reporting of cumulative trauma disorders (CTDs) and other work-related disorders due to ergonomic hazards. CTDs account for an increasingly large percentage of workers' compensation costs each year, and they represent nearly half of the occupational illnesses reported in the annual Bureau of Labor Statistics (BLS) survey.
DTIC
Human Factors Engineering; Hazards

20020044017 Department of Labor, Washington, DC USA
Permit-Required Confined Spaces
Jan. 1998; 33p; In English
Report No.(s): AD-A400246; OSHA-3138; No Copyright; Avail: CASI; A03, Hardcopy
Many workplaces contain spaces that are considered to be confined because their configurations hinder the activities of any employees who must enter into, work in, and exit from them. In many instances, employees who work in confined spaces also face increased risk of exposure to serious physical injury from hazards such as entrapment, engulfment, and hazardous atmospheric conditions. Confinement itself may pose entrapment hazards, and work in confined spaces may keep employees closer to hazards, such as machinery components, than they would be otherwise. For example, confinement, limited access, and restricted airflow can result in hazardous conditions that would not normally arise in an open workplace. The term permit-required confined space (i.e., permit space)refers to those spaces that meet the definition of a confined space and contain health or safety hazards, thereby requiring a permit for entry.
DTIC
Work; Confinement; Injuries; Personnel

20020044023 Department of Labor, Washington, DC USA
Assessing the Need for Personal Protective Equipment: A Guide for Small Business Employers
Jan. 2000; 58p; In English; Original contains color images
Report No.(s): AD-A400241; OSHA-3151; No Copyright; Avail: CASI; A04, Hardcopy
The Occupational Safety and Health Administration (OSHA) requires employers to protect their employees from workplace hazards such as machines, work procedures, and hazardous substances that can cause injury. The preferred way to do this is through engineering controls or work practice and administrative controls, but when these controls are not feasible or do not

provide sufficient protection, an alternative or supplementary method of protection is to provide workers with personal protective equipment (PPE) and the know-how to use it properly.
DTIC
Commerce; Personnel; Protection

20020044025 Occupational Safety and Health Administration, Washington, DC USA
Ergonomics: The Study of Work
Jan. 2000; 15p; In English; Original contains color images
Report No.(s): AD-A400232; OSHA-3125-Rev; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Ergonomics can be defined simply as the study of work. More specifically, ergonomics is the science of designing the job to fit the worker, rather than physically forcing the worker's body to fit the job. Adapting tasks, work stations, tools, and equipment to fit the worker can help reduce physical stress on a worker's body and eliminate many potentially serious, disabling work-related musculoskeletal disorders (MSDs). Ergonomics draws on a number of scientific disciplines, including physiology, biomechanics, psychology, anthropometry, industrial hygiene, and kinesiology
DTIC
Human Factors Engineering; Industrial Safety; Work Functions; Human Performance

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.

20020043603 Stanford Univ., Computer Systems Lab., Stanford, CA USA
Reducing Manual Abstraction in Formal Verification of Out-of-Order Execution
Jones, Robert B.; Skakkebaek, Jens U.; Dill, David L.; Jan. 2002; 16p; In English
Contract(s)/Grant(s): DABT63-96-C-0097-P00002
Report No.(s): AD-A400402; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Several methods have recently been proposed for verifying processors with out-of-order execution. These methods use intermediate abstractions to decompose the verification process into smaller steps. Unfortunately, the process of manually creating intermediate abstractions is very laborious. We present an approach that dramatically reduces the need for an intermediate abstraction, so that only the scheduling logic of the implementation is abstracted. After the abstraction, we apply an enhanced incremental-flushing approach to verify the remaining circuitry by comparing the processor description against itself in a slightly simpler configuration. by induction, we demonstrate that any reachable configuration is equivalent to the simplest possible configuration. Finally, we prove correctness on the simplest configuration. The approach is illustrated with a simple example of an out-of-order execution core.
DTIC
Scheduling; Computers; Microprocessors

20020043703 Philips Research Labs., Eindhoven, Netherlands
Expectations of MRAM in Comparison with Other Non-Volatile Memory Technologies
Lenssen, K.-M. H., Philips Research Labs., Netherlands; Dormans, G. J. M., Philips Semiconductors, Netherlands; Cuppens, R., Philips Research Labs., Netherlands; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 26-31; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche
Magnetic Random Access Memory (MRAM) is often presented as the ideal, all-purpose solid-state memory of the future. Indeed, it is expected that MRAM may provide a combination of properties that at present are only found distributed over different types of memories (SRAM, EEPROM, Flash, DRAM, etc.). This is certainly a very attractive perspective; if two (or more) different memory technologies could be replaced by a single memory technology (c.q. MRAM), the development costs for a next generation of a product comprising embedded memory could decrease dramatically. However, for this to come true, it is important that the specifications of MRAM will not merely be a compromise, only suitable for certain niche markets, but that they will really be able to compete with the (future) state-of-the-art "conventional memories". In order to obtain a better insight in this matter, we have looked at (expected) properties of different non-volatile memories for one and the same technology node (0.18 microns).

From this, the weaknesses and strengths of MRAM have been identified. Special attention was paid to a comparison with ferro-electric RAM (FERAM), which seems to be the most competitive alternative memory technology.
Author
Random Access Memory; Solid State; Magnetic Storage

20020043719 IME Corp., Berkeley, CA USA
All-Metal Magnetic RAM
Torok, E. J.; Spitzer, R.; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 125-127; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche

The factors that enter into the development of an all-metal, nonvolatile magnetic RAM, in which multilayer giant magnetoresistive films are used for all functions - storage, readout, and support electronics - are described. Four significant characteristics are expected to favor all-metal over hybrid magnetic RAM. First, silicon-technology fabrication requires a large number of masking steps, including complex ones such as ion implantation. Conversely, all-metal technology is inherently simple: fewer masking steps, no doping, scaling to lithographic limits, very little operating power. Second, the all-metal footprint is significantly smaller than the hybrid one. Third, an all-metal RAM is expected to be able to be miniaturized to lithographic limits; miniaturization of hybrid magnetic RAMs is likely to be limited by the semiconductor circuitry. Finally, semiconductor processing and magnetic processing in MRAM are done separately because the former requires high temperatures, whereas magnetic fabrication is a low-temperature process. By contrast, because both GMR electronics and the memory elements are made of the same materials, the two major components are deposited and patterned concurrently on the same substrate.
Author
Random Access Memory; Magnetic Storage; Metals; Magnetoresistivity

20020043720 Nonvolatile Electronics, Inc., Eden Prairie, MN USA
Advanced MRAM Concepts
Daughton, James M., Nonvolatile Electronics, Inc., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 128-132; In English; Also announced as 20020043697
Contract(s)/Grant(s): F29601-00-C-0194; N00014-00-C-0236; N00014-97-C-2027; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche

Two important goals of Magnetoresistive Random Access Memory (MRAM) development are to improve MRAM manufacturability and to extend MRAM density to 100 nm dimensions. One potential barrier to MRAM manufacturability is associated with the method of write selection in which two orthogonal currents in coincidence must write data. whereas each of the orthogonal currents alone cannot disturb the data. This ”2D” selection method places constraints on uniformity of MRAM memory cells. Using a transistor per cell for write select greatly improves operating margins and lowers write currents. Attaining reasonable memory densities for this scheme depends on limiting the required write current in order to minimize the area of the select transistor. A second goal is to extend MRAM density to 100 nm dimensions. Use of a vertical GMR multilayer ring structure. where the data is stored in circumferencially oriented magnetizations, can extend the density of MRAM. Stability is projected for cells with inside diameters of less than 50nm. A second approach is to use Joule heating, in combination with magnetic field from a current, to write by exceeding the Neel point of an anti-ferromagnetic pinning layer in a pseudo-spin valve cell. Feature sizes smaller than 100 nm are projected along with decreases in required switching currents.
Author
Magnetoresistivity; Random Access Memory; Magnetic Storage

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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.

20020043229 Oklahoma State Univ., Computer Science Dept., Stillwater, OK USA
Modeling and Simulation Reliable Spacecraft On-Board Computing *Final Report*
Park, Nohpill, Oklahoma State Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-34; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

The proposed project will investigate modeling and simulation-driven testing and fault tolerance schemes for Spacecraft On-Board Computing, thereby achieving reliable spacecraft telecommunication. A spacecraft communication system has inherent capabilities of providing multipoint and broadcast transmission, connectivity between any two distant nodes within a wide-area coverage, quick network configuration /reconfiguration, rapid allocation of space segment capacity, and distance-insensitive cost. to realize the capabilities above mentioned, both the size and cost of the ground-station terminals have to be reduced by using reliable, high-throughput, fast and cost-effective on-board computing system which has been known to be a critical contributor to the overall performance of space mission deployment. Controlled vulnerability of mission data (measured in sensitivity), improved performance (measured in throughput and delay) and fault tolerance (measured in reliability) are some of the most important features of these systems. The system should be thoroughly tested and diagnosed before employing a fault tolerance into the system. Testing and fault tolerance strategies should be driven by accurate performance models (i.e. throughput, delay, reliability and sensitivity) to find an optimal solution in terms of reliability and cost. The modeling and simulation tools will be integrated with a system architecture module, a testing module and a module for fault tolerance all of which interacting through a centered graphical user interface.
Author
Computerized Simulation; Fault Tolerance; Spacecraft Reliability; Mathematical Models; Airborne/Spaceborne Computers

20020043241 NASA Ames Research Center, Moffett Field, CA USA
HPF Implementation of NPB2.3
Frumkin, Michael, NASA Ames Research Center, USA; Jin, Hao-Qiang, NASA Ames Research Center, USA; Yan, Jerry, MRJ Technology Solutions, Inc., USA; [1998]; 30p; In English; Frontiers 1999, 21-25 Feb. 1999, Annapolis, MD, USA
Contract(s)/Grant(s): NAS2-14303; RTOP 519-40-12; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
We present the HPF implementation of BT, SP, LU, FT, and MG of NPB2.3-serial benchmark set, The implementation is based on HPF performance model of the benchmark specific operations with distributed arrays. We present profiling and performance data on SGI origin 2000 and compare the results with NPB2.3. We discuss advantages and limitations of HPF and pghpf compiler.
Author
Atmospheric Physics; Decomposition; FORTRAN; Selection; Compilers; Performance Prediction

20020043247 General Accounting Office, Washington, DC USA
Report to the Chairman, Committee on Governmental Affairs, US Senate. Electronic Government: Challenges to Effective Adoption of the Extensible Markup Language
Apr. 2002; 78p; In English
Report No.(s): PB2002-104158; GAO-02-327; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
This report responds to your request that we review the status of Extensible Markup Language (XML) technology and the challenges the federal government faces in implementing it. XML is a flexible, nonproprietary set of standards designed to facilitate the exchange of information among disparate computer systems, using the Internets protocols. Specifically, we agreed to assess (1) the overall development status of XML standards to determine whether they are ready for governmentwide use and (2) challenges faced by the federal government in optimizing its adoption of XML technology to promote broad information sharing and systems interoperability. The report recommends that the director of the Office of Management and Budget (OMB) take steps to improve the federal government's planning for adoption of XML.
NTIS
Document Markup Languages; Computer Programs; Electronic Mail; Governments

20020043288 Alabama Univ., Dept. of Computer and Information Sciences, Birmingham, AL USA
Java RMI Software Technology for the Payload Planning System of the International Space Station *Final Report*
Bryant, Barrett R., Alabama Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-8; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
The Payload Planning System is for experiment planning on the International Space Station. The planning process has a number of different aspects which need to be stored in a database which is then used to generate reports on the planning process in a variety of formats. This process is currently structured as a 3-tier client/server software architecture comprised of a Java applet at the front end, a Java server in the middle, and an Oracle database in the third tier. This system presently uses CGI, the Common Gateway Interface, to communicate between the user-interface and server tiers and Active Data Objects (ADO) to communicate between the server and database tiers. This project investigated other methods and tools for performing the communications

between the three tiers of the current system so that both the system performance and software development time could be improved. We specifically found that for the hardware and software platforms that PPS is required to run on, the best solution is to use Java Remote Method Invocation (RMI) for communication between the client and server and SQLJ (Structured Query Language for Java) for server interaction with the database. Prototype implementations showed that RMI combined with SQLJ significantly improved performance and also greatly facilitated construction of the communication software.
Author
International Space Station; Java (Programming Language); Payloads; Software Engineering; Applications Programs (Computers)

20020043295 NASA Ames Research Center, Moffett Field, CA USA
A Simple XML Producer-Consumer Protocol
Smith, Warren, NASA Ames Research Center, USA; Gunter, Dan, California Univ., Lawrence Berkeley National Lab., USA; Quesnel, Darcy, Argonne National Lab., USA; [2001]; 20p; In English; Global Grid Forum 2, Unknown
Contract(s)/Grant(s): DTTS59-99-00437; NASA Order A-61812-D; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

There are many different projects from government, academia, and industry that provide services for delivering events in distributed environments. The problem with these event services is that they are not general enough to support all uses and they speak different protocols so that they cannot interoperate. We require such interoperability when we, for example, wish to analyze the performance of an application in a distributed environment. Such an analysis might require performance information from the application, computer systems, networks, and scientific instruments. In this work we propose and evaluate a standard XML-based protocol for the transmission of events in distributed systems. One recent trend in government and academic research is the development and deployment of computational grids. Computational grids are large-scale distributed systems that typically consist of high-performance compute, storage, and networking resources. Examples of such computational grids are the DOE Science Grid, the NASA Information Power Grid (IPG), and the NSF Partnerships for Advanced Computing Infrastructure (PACIs). The major effort to deploy these grids is in the area of developing the software services to allow users to execute applications on these large and diverse sets of resources. These services include security, execution of remote applications, managing remote data, access to information about resources and services, and so on. There are several toolkits for providing these services such as Globus, Legion, and Condor. As part of these efforts to develop computational grids, the Global Grid Forum is working to standardize the protocols and APIs used by various grid services. This standardization will allow interoperability between the client and server software of the toolkits that are providing the grid services. The goal of the Performance Working Group of the Grid Forum is to standardize protocols and representations related to the storage and distribution of performance data. These standard protocols and representations must support tasks such as profiling parallel applications, monitoring the status of computers and networks, and monitoring the performance of services provided by a computational grid. This paper describes a proposed protocol and data representation for the exchange of events in a distributed system. The protocol exchanges messages formatted in XML and it can be layered atop any low-level communication protocol such as TCP or UDP Further, we describe Java and C++ implementations of this protocol and discuss their performance. The next section will provide some further background information. Section 3 describes the main communication patterns of our protocol. Section 4 describes how we represent events and related information using XML. Section 5 describes our protocol and Section 6 discusses the performance of two implementations of the protocol. Finally, an appendix provides the XML Schema definition of our protocol and event information.
Derived from text
Protocol (Computers); Software Development Tools; Computational Grids; Computer Networks; C++ (Programming Language)

20020043296 Computer Sciences Corp., Moffett Field, CA USA
Charon Message-Passing Toolkit for Scientific Computations
VanderWijngaart, Rob F., Computer Sciences Corp., USA; [2000]; 24p; In English; HIPC2000 Conference, 17-20 Dec. 2000, Bangalore, India
Contract(s)/Grant(s): DTTS59-99-D-00437; NASA Order A-61812-D; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Charon is a library, callable from C and FORTRAN, that aids the conversion of structured-grid legacy codes-such as those used in the numerical computation of fluid flows-into parallel, high- performance codes. Key are functions that define distributed arrays, that map between distributed and non-distributed arrays, and that allow easy specification of common communications

on structured grids. The library is based on the widely accepted MPI message passing standard. We present an overview of the functionality of Charon, and some representative results.
Author
Structured Grids (Mathematics); FORTRAN; Messages; Libraries

20020043466 Stanford Univ., Computer Systems Lab., Stanford, CA USA
Formal Verification of Out-of-Order Execution Using Incremental Flushing
Skakkebaek, Jens U.; Jones, Robert B.; Dill, David L.; Jun. 1998; 12p; In English
Report No.(s): AD-A400401; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
We present a two-part approach for verifying out-of-order execution. First, the complexity of out-of-order issue and scheduling is handled by creating an in-order abstraction of the out-of-order execution core. Second, incremental flushing addresses the complexity difficulties encountered by automated abstraction functions on very deep pipelines. We illustrate the techniques on a model of a simple out-of-order processor core.
DTIC
Microprocessors; Scheduling

20020043598 Stanford Univ., Computer Systems Lab., Stanford, CA USA
A Decision Procedure for Bit-Vector Arithmetic
Barrett, Clark W.; Dill, David L.; Levitt, Jeremy R.; Jun. 1998; 6p; In English
Report No.(s): AD-A400400; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
Bit-vector theories with concatenation and extraction have been shown to be useful and important for hardware verification. We have implemented an extended theory which includes arithmetic. Although deciding equality in such a theory is NP-hard, our implementation is efficient for many practical examples. We believe this to be the first such implementation which is efficient, automatic, and complete.
DTIC
Computer Programs; Binary Data

20020043599 Stanford Univ., Dept. of Computer Science, Stanford, CA USA
Checking Properties of Safety Critical Specifications Using Efficient Decision Procedures
Park, David Y.; Skakkebaek, Jens U.; Heimdahl, Mats P.; Czerny, Barbara J.; Dill, David L.; Jan. 1997; 10p; In English
Contract(s)/Grant(s): DARPA-E276; NSF-CCR-9624324
Report No.(s): AD-A400399; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
The increasing use of software in safety critical systems entails increasing complexity, challenging the safety of these systems. Although formal specifications of real-life systems are orders of magnitude simpler than the system implementations, they are still quite complex. It is easy to overlook problems in a specification, ultimately compromising the safety of the implementation. Since it is error-prone and time consuming to check large specifications manually, mechanical support is needed. The challenge is to find the right combination of deductive power (i.e., how rich a logic and what theories are decided) and efficiency to complete the verification in reasonable time. In addition, it must be possible to explain why a proof fails. As an initial approach to solving this problem, we have adapted the Stanford Validity Checker (SVC), a highly efficient, general-purpose decision procedure for quantifier-free first-order logic with linear arithmetic, to check the consistency of specifications written in Requirements State Machine Language (RSML). We have concentrated on a small but complex part of version 6.04a of the specification of the (air) Traffic Alert and Collision Avoidance System (TCAS II). SVC was extended to produce a counter-example in terms of the original specification. The efforts discovered an undesired inconsistency in the specification, which the maintainers of the specification independently discovered and subsequently fixed in the most recent version. The case study demonstrates the practicality of uncovering problems in real-life specifications with a modest effort, by selective application of state-of-the-art formal methods and tools. The logic of SVC was sufficiently expressive for the properties that we checked, but more work is needed to extend the class of formulae that SVC decides to cover the properties found in other parts of the TCAS II specification.
DTIC
Computer Programs; Software Engineering; Decision Making; Warning Systems; Program Verification (Computers); Systems Analysis

20020043600 Stanford Univ., Dept. of Computer Science, Stanford, CA USA
Static Analysis to Identify Invariants in RSML Specifications
Park, David Y.; Skakkebaek, Jens U.; Dill, David L.; Jan. 1997; 10p; In English

Contract(s)/Grant(s): DABT63-96-C-0097-P00002
Report No.(s): AD-A400398; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Static analysis of formal, high-level specifications of safety critical software can discover flaws in the specification that would escape conventional syntactic and semantic analysis. As an example, specifications written in the Requirements State Machine Language (RSML) should be checked for consistency: two transitions out of the same state that are triggered by the same event should have mutually exclusive guarding conditions. The check uses only behavioral information that is local to a small set of states and transitions. However, since only local behavior is analyzed, information about the behavior of the surrounding system is missing. The check may consequently produce counterexamples for state combinations that are not possible when the behavior of the whole system is taken into account. A solution is to identify invariants of the global system that can be used to exclude the impossible state combinations. Manually deriving invariants from designs of realistic size is laborious and error-prone. Finding them by mechanically enumerating the state space is computationally infeasible. The challenge is to find approximate methods that can find fewer but adequate invariants from abstracted models of specifications. We present an algorithm for deriving invariants that are used to exclude impossible counterexamples resulting from checking consistency of transitions in RSML. The algorithm has been implemented in an RSML prototype tool and has been applied successfully to the static checking of version 6.04a of the (air) Traffic Alert and Collision Avoidance System (TCAS II) specification.
DTIC
Computer Programs; Software Engineering; Machine Oriented Languages

20020043602 Stanford Univ., Computer Systems Lab., Stanford, CA USA
Approximate Reachability With BDDs Using Overlapping Projections
Govindaraju, Shankar G.; Dill, David L.; Hu, Alan J.; Horowitz, Mark A.; Jan. 1996; 6p; In English
Contract(s)/Grant(s): DABT63-94-C-0054; DABT63-96-C-0097
Report No.(s): AD-A400403; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Approximate reachability techniques trade off accuracy with the capacity to deal with bigger designs. Cho et al proposed approximate FSM (finite state machine) traversal algorithms over a partition of the set of state bits. In this paper we generalize it by allowing projections onto a collection of nondisjoint subsets of the state variables. We establish the advantage of having overlapping projections and present a new multiple constrain function for BDDs (Binary Decision Diagrams), to compute efficiently the approximate image during symbolic forward propagation using overlapping projections. We demonstrate the effectiveness of this new algorithm by applying it to several control modules from the I/O unit in the Stanford FLASH Multiprocessor. We also present our results on the larger ISCAS 89 benchmarks.
DTIC
Computer Programs; Binary Data; Program Verification (Computers)

20020043671 Coast Guard, Integrated Deepwater System Program, Washington, DC USA
The Integrated Deepwater System (IDS) Ensuring Interoperability in the Acquisition of a Total System of Systems
Roden, Paul J.; Henke, Douglas J.; Feb. 26, 2002; 20p; In English; Original contains color images
Report No.(s): AD-A400091; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The U.S. Coast Guard is in the process of recapitalizing its entire fleet of resources for offshore missions in one integrated long-term acquisition. The Integrated Deepwater System (IDS) Program will upgrade or replace the capabilities of existing assets in order to maximize operational effectiveness and minimize total ownership costs associated with the performance of all 'Deepwater' missions. This system of systems acquisition is unique in its breadth among all government acquisitions in that it includes surface assets, aircraft, C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance) and logistics capabilities. Interoperability between all system assets will be a critical success factor of the Integrated Deepwater System performance. Success will be measured by the performance of the entire Deepwater System and total costs of operation and support. This paper will discuss how the program has focused on developing a framework for successfully ensuring interoperability as it applies to intra-Coast Guard and inter-agency operations. Among the methods discussed are: use of specifications, Government/Contractor relationships, design development, contracting vehicles, software tools and inter-agency agreements.
DTIC
Systems Integration; Interoperability; System Effectiveness

20020043721 Celis Semiconductor Corp., Colorado Springs, CO USA
SONOS Nonvolatile Shadow RAMs for Space Applications
Derbenwick, Gary F., Celis Semiconductor Corp., USA; Kamp, David A., Celis Semiconductor Corp., USA; Isaacson, Alan F.,

Celis Semiconductor Corp., USA; Gill, J. Roger, Simtek Corp., USA; Linn, Stephen, Simtek Corp., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 57-59; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche

Several versions of shadow random access memories have been commercialized. These memories consist of an SRAM shadowed by a nonvolatile memory on a single chip of silicon. Both floating gate and silicon nitride devices have been used for the nonvolatile shadow memory storage elements. Because radiation hardened SRAMs have been proven for space applications and silicon nitride devices have a high tolerance to radiation exposure, shadow RAMs based on the silicon nitride technology can be combined with radiation hardened CMOS to provide rugged nonvolatile semiconductor memories for space applications. These memories have high endurance, fast write times and low power performance because these parameters are determined by the SRAM portion of the memory. The nonvolatile shadow memory is automatically written only on power down. Therefore the endurance limitation of silicon nitride to approximately 10(exp 6) cycles applies only to the number of power down cycles. Nonvolatile retention times of greater than ten years can be obtained at 140 deg C.

Author

Random Access Memory; Silicon Nitrides; Radiation Hardening; CMOS; Technology Utilization

20020043923 Pennsylvania State Univ., Applied Research Lab., University Park, PA USA

Dynamo: A Tool for Modeling Integrated Air Defense Systems

Hall, David L.; Sexton, Pamela; Warren, Mike; Zmyslo, James; Jan. 01, 2001; 14p; In English; Original contains color images; Prepared in collaboration with Joint Warfare Analysis Center, Dahlgren, VA

Report No.(s): AD-A400029; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A continuing challenge for multisensor data fusion systems is the problem of estimating the accuracy or performance of the system. This is especially difficult for dynamic adaptable systems such as modern integrated air defense systems (IADS). These systems utilize multiple sensors (e.g., radar, identification-friend-foe (IFF) systems) to observe airborne targets to develop accurate tracks and to identify the observed targets. Modern IADS have the capability to dynamically reconfigure themselves to account for fault conditions such as the failure of individual sensors or communications links. As a result it is difficult to compute the accuracy of the IADS in situations in which there is dynamic reconfiguration. This paper describes a software system implemented to model IADS. The system, called Dynamo, accurately models the communications links and routing for integrated air defense systems. Dynamo accounts for sensor performance, effects of terrain, and dynamic reconfiguration of the IADS to fault conditions. Near term efforts will focus on modeling the target tracking and identification processes. Planned future capabilities include the ability to account communications delays, data formats, and associated data processing.

DTIC

Air Defense; Computerized Simulation; Multisensor Fusion; Communication Networks

20020043939 BBNT Solutions, LLC, Columbia, MD USA

Human Interaction With Software Agents (HISA) ***Final Report, Feb. 1999-Nov. 2000***

Mulvehill, Alice M.; Whitaker, Randall; Nov. 2000; 70p; In English; Prepared in collaboration with Logicon Technical Services, Inc., Dayton, OH

Contract(s)/Grant(s): F33615-99-D-6001; AF Proj. 2745

Report No.(s): AD-A400412; BBN-8291; AFRL-HE-WP-TR-2002-0007; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Agent based systems are rapidly emerging to support users as the knowledge and complexity of computer-based information systems increases. Software agents are currently being used to monitor data sources, bringing back only the information that is of relevance to a particular user. The primary object of the Human Interaction with Software Agents (HISA) project was to develop a graphical user interface (GUI) that allows users to task and manage software agents. Software agents were modeled and implemented using BBNs Distributed Operator Model Architecture (D-OMAR). D-OMAR was chosen since the D-OMAR environment supports discrete-event simulations of agents driven by goals and procedures. In addition, D-OMAR supports parallel activities, its agents can respond to asynchronous signals of events, and it supports semantic level communications between agents. The focus of the effort was placed on how Channel Plans are developed at the Tanker Airlift Control Center (TACC), specifically the early detection and communication of Maximum on the Ground (MOG) restrictions, and messages from Notice to Airmen (NOTAM) files regarding airfield restrictions. This report covers the development of a GUI where D-OMAR software agents monitoring NOTAMs could post notices to human planners. The intent was to alert the planner of problems as

they occur so that the Channel Planner has more time to research problems caused by the change and to make the required mission adjustment.
DTIC
Computer Techniques; Human-Computer Interface; Software Engineering; Parallel Processing (Computers)

20020043948 Air Force Research Lab., Rome, NY USA
Information Assurance Intrusion Detection Sensor Database Design: Lessons Learned
Spink, Brian T.; Blake, Thomas M.; Salerno, Vincent; Jan. 01, 2001; 8p; In English; Original contains color images; Prepared in collaboration with LittonPRC, Inc., Rome, NY
Report No.(s): AD-A400127; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
Current architectural trends in information assurance for the Department of Defense focuses on the fusion and correlation of large volumes of data collected across several intrusion detection systems and boundary devices. to be optimally effective this data must support near-real time analysis for immediate situational awareness, and long term trending, to identify subtle anomalies and suspicious events that could lead to compromise or denial-of-service. The obvious benefits of using a relational data model and SQL to help solve this problem continue to be observed at Air Force Research Laboratory (AFRL). Prototype integration environments for information assurance, using Oracle, have now been used in operational demonstrations. This paper explores the design implications and some operational pitfalls encountered integrating the Relational Database Management System (RDBMS) concepts into these prototype environments.
DTIC
Data Base Management Systems; Detection; Computer Information Security; Relational Data Bases

20020043952 Defense Advanced Research Projects Agency, Arlington, VA USA
Dynamic Database: Efficiently Convert Massive Quantities of Sensor Data into Actionable Information for Tactical Commanders
Kessler, Otto; Jun. 01, 2000; 26p; In English; Original contains color images
Report No.(s): AD-A400140; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
As the number of sensors, platforms, exploitation sites, and command and control nodes continues to grow in response to Joint Vision 2010 information dominance requirements, commanders and analysts will have an ever increasing need to collect and process vast amounts of data over wide areas using a large number of disparate sensors and information gathering sources.
DTIC
Data Processing; Data Bases; Change Detection

20020043961 Carnegie-Mellon Univ., Software Engineering Inst., Pittsburgh, PA USA
Measures for Software Product Lines: A White Paper for the Office of the Undersecretary of Defense, Science and Technology, Software Engineering
Zubrow, Dave; Apr. 2001; 22p; In English; Original contains color images
Report No.(s): AD-A400174; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This paper is one of a series commissioned by the Department of the Undersecretary of Defense, Science and Technology (DUSD) (S&T) that characterizes the status of measurement associated with a particular aspect of software engineering. The specific focus of this paper is measures for software product lines.
DTIC
Computer Programming; Software Engineering; Technologies; Software Development Tools

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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.

20020043242 MRJ Technology Solutions, Inc., Moffett Field, CA USA
The P-Mesh: A Commodity-based Scalable Network Architecture for Clusters
Nitzberg, Bill, MRJ Technology Solutions, Inc., USA; Kuszmaul, Chris, MRJ Technology Solutions, Inc., USA; Stockdale, Ian, MRJ Technology Solutions, Inc., USA; Becker, Jeff, MRJ Technology Solutions, Inc., USA; Jiang, John, MRJ Technology Solutions, Inc., USA; Wong, Parkson, MRJ Technology Solutions, Inc., USA; [1998]; 10p; In English; 32nd Hawaii International

Conference on System Sciences, 1999, HI, USA
Contract(s)/Grant(s): NAS2-14303; RTOP 509-10-24; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We designed a new network architecture, the P-Mesh which combines the scalability and fault resilience of a torus with the performance of a switch. We compare the scalability, performance, and cost of the hub, switch, torus, tree, and P-Mesh architectures. The latter three are capable of scaling to thousands of nodes, however, the torus has severe performance limitations with that many processors. The tree and P-Mesh have similar latency, bandwidth, and bisection bandwidth, but the P-Mesh outperforms the switch architecture (a lower bound for tree performance) on 16-node NAB Parallel Benchmark tests by up to 23%, and costs 40% less. Further, the P-Mesh has better fault resilience characteristics. The P-Mesh architecture trades increased management overhead for lower cost, and is a good bridging technology while the price of tree uplinks is expensive.
Author
Architecture (Computers); Toruses; Resilience; Bandwidth

20020043668 Space and Naval Warfare Systems Command, San Diego, CA USA
IT-21: SPAWAR Delivers the Navy's Horizontally Integrated C4ISR System
Harris, James; Underwood, Thomas; Suggs, Charles; Jordan, Martin; Pace, Howard; Feb. 26, 2002; 13p; In English; Presented at Engineering the Total Ship (STS) Symposium held in Gaithersburg, MD, 26-27 Feb. 2002
Report No.(s): AD-A399979; SPAWAR-SR-2002-014; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This paper describes the process improvements that comprise the Space and Naval Warfare Systems Command's Horizontal Integration Initiative. The paper will specify how these process improvements are leading to improved capability, sustainability, and cost effectiveness, as the System Command fields successive Blocks of its horizontally integrated product line: 'IT-21'. In the past two decades the IT Revolution has offered Navy Warfighters the promise of Information Dominance'. Implementing that promise has, however, imposed significant change management challenges for the Navy's C4ISR directorate, SPAWARSYSCOM. Most importantly, proliferating data interfaces and protocols compromised Fleet interoperability within the Navy Battlegroup, and every succeeding level beyond. IT-21 is COMSPAWAR's strategy to implement process improvements intended to improve every feature of Fleet C4ISR performance. The paper briefly describes iterative improvements leading up to the current IT-21 re-engineering initiative, and discusses development and fielding plans for SPAWAR's initial - fully integrated product line: IT-21 Block 1. An organizational overview of this IT-21 Block 1 architecture within its functional enclaves (Genser, SCI, UNCLAS, Networks, Transport) lists the key features of the end to end' design package. Finally, the paper charts the intended future path of IT-21, as plans for successive IT-21 Builds focus on future mission requirements, and the incorporation of next generation C4ISR technologies. Methods of incorporating future IT-21 builds within both the Navy's new ship construction schedules and Battlegroup upgrades are explored.
DTIC
Systems Integration; Command and Control; Mission Planning; Data Systems; Navy

20020043832 Marine Corps Schools, Command and Staff Coll., Quantico, VA USA
Information Warfare...From the Sea. Integrating Information Operations and the Marine Corps Planning Process
Feiring, Douglas I.; Mar. 30, 2001; 12p; In English
Report No.(s): AD-A400017; No Copyright; Avail: CASI; A03, Hardcopy

Although the Marine Corps's current method of planning and employing Information Operations (IO) seeks to integrate its various elements, improvements must be made for this emerging concept to be a truly effective force multiplier.
DTIC
Information Systems; Io; Seas

20020043856 Marine Corps Schools, Operational Test and Evaluation Activity, Quantico, VA USA
USMC Information Assurance Operational Testing and Training Strategy
Garvin, John R.; Christensen, Peter H.; Aug. 16, 2001; 27p; In English; Original contains color images
Report No.(s): AD-A399993; No Copyright; Avail: CASI; A03, Hardcopy

This briefing discusses MCOTEA's mission and scope, the USMC's high interest programs, cyber threat and network centric warfare, information assurance and joint interoperability.
DTIC
Interoperability; Computer Networks; Education

20020043857 National Inst. of Standards and Technology, Gaithersburg, MD USA
Recommendation for Block Cipher Modes of Operation. Methods and Techniques
Dworkin, Morris; Dec. 2001; 67p; In English
Report No.(s): AD-A400014; NIST-SP-800-38A; No Copyright; Avail: CASI; A04, Hardcopy
This recommendation defines five confidentiality modes of operation for use with an underlying symmetric key block cipher algorithm: Electronic Codebook (ECB), Cipher Block Chaining (CBC), Cipher Feedback (CFB), Output Feedback (OFB) , and Counter (CTR). Used with an underlying block cipher algorithm that is approved in a Federal Information Processing Standard (FIPS), these modes can provide cryptographic protection for sensitive, but unclassified, computer data.
DTIC
Cryptography; Algorithms; Feedback

20020043859 California Univ., San Diego, Dept. of Computer Science and Engineering, La Jolla, CA USA
Inferring Internet Denial-of-Service Activity
Moore, David; Voelker, Geoffrey M.; Savage, Stefan; Jan. 01, 2001; 15p; In English; Original contains color images
Contract(s)/Grant(s): N66001-98-2-8922
Report No.(s): AD-A400003; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
In this paper, we seek to answer a simple question: ”How prevalent are denial-of-service attacks in the Internet today?”. Our motivation is to understand quantitatively the nature of the current threat as well as to enable longer-term analyses of trends and recurring patterns of attacks. We present a new technique, called ”backscatter analysis”, that provides an estimate of worldwide denial-of-service activity. We use this approach on three week-long datasets to assess the number, duration and focus of attacks, and to characterize their behavior. During this period, we observe more than 2,000 attacks against more than 5,000 distinct targets, ranging from well known e-commerce companies such as Amazon and Hotmail to small foreign ISPs and dial-up connections. We believe that our work is the only publicly available data quantifying denial-of-service activity in the Internet.
DTIC
Security; Internets; Motivation; Electronic Commerce

20020043949 Department of Defense, Washington, DC USA
DOD Common Access Card Information Brief
Dixon, Mary; Jul. 12, 2001; 8p; In English; Original contains color images
Report No.(s): AD-A400124; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
Applications and statistics of the Department of Defense’s Common Access Card.
DTIC
Cards; Utilization

20020043960 Carnegie-Mellon Univ., Software Engineering Inst., Pittsburgh, PA USA
Measuring Systems Interoperability: Challenges and Opportunities
Kasunic, Mark; Jan. 2001; 40p; In English; Original contains color images
Report No.(s): AD-A400176; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This paper is one of a series commissioned by the Department of Defense that characterizes the status of measurement associated with a particular aspect of software engineering. The specific focus of this paper is on measures for interoperability. Interoperability is the ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together. The intent of this paper is to identify current practices related to measuring systems interoperability and to recommend a set of measures that will assist military planners in the acquisition, development and implementation of C4I systems that are interoperable.
DTIC
Interoperability; Software Engineering; Systems Management

20020043962 Booz-Allen and Hamilton, Inc., McLean, VA USA
Information Assurance and Critical Infrastructure Protection. A Federal Perspective
Jan. 2001; 8p; In English
Report No.(s): AD-A400170; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
The Internet and associated electronic communications have become an indispensable tool for both business and government. This technology allows organizations to conduct electronic commerce, provide better customer service, collaborate with remote partners, reduce communications costs, improve internal communication and access needed information rapidly. However, our

reliance on a networked electronic society is not risk free. Security breaches, theft of proprietary information, privacy risk, financial fraud, and sabotage of data or networks are emerging threats in our new information age.
DTIC
Computer Information Security; Internets; Risk

20020044028 Army Electronic Proving Ground, Fort Huachuca, AZ USA
Information Assurance Testing: Jamming Is No Longer Enough
Apr. 26, 2001; 15p; In English; Original contains color images
Report No.(s): AD-A400086; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
A briefing relating to Information Assurance testing for U.S. Army information operations.
DTIC
Military Operations; Computer Information Security

20020044032 National Security Agency, Central Security Service, Fort Meade, MD USA
The 60 Minute Network Security Guide (First Steps Towards a Secure Network Environment), 1.0
Oct. 16, 2001; 36p; In English
Report No.(s): AD-A400112; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
During the last four years the National Security Agency s Systems and Network Attack Center (C4) has released Security Guides for operating systems, applications and systems that operate in the larger IT network. These security guides can be found at our web site www.nsa.gov/ Security Recommendation Guides. Many organizations across the Department of Defense have used these documents to develop new networks and to secure existing IT infrastructures. This latest Security Guide addresses security a bit differently. Our goal is to make system owners and operators aware of fixes that become force multipliers in the effort to secure their IT network.
DTIC
Computer Information Security; Operating Systems (Computers)

20020044035 National Inst. of Standards and Technology, Information Technology Lab., Gaithersburg, MD USA
Common Criteria Evaluation and Validation Scheme for Information Technology Security: Guidance to Validators of IT Security Evaluations, 1.0
Feb. 2002; 112p; In English
Report No.(s): AD-A400085; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche
The purpose of this document, Guidance to Validators of IT Security Evaluations, is to provide guidance and assistance to Validators in performing their assigned duties under the Validation Body. Additionally, the document provides information to the CCTLs and sponsors of evaluations about the activities and responsibilities of assigned Validators.
DTIC
Information Systems; Computer Information Security

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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.

20020042044 NASA Ames Research Center, Moffett Field, CA USA
A Generative Control Capability for a Model-based Executive
Williams, Brian C., NASA Ames Research Center, USA; Nayak, P. Pandurang, NASA Ames Research Center, USA; [1997]; 8p; In English; Fifteenth International Joint Conference on Artificial Intelligence, 23-29 Aug. 1997, Nagoya, Japan; Sponsored by International Joint Conference on Artificial Intelligence, Inc., Japan
Contract(s)/Grant(s): NASA Order H-6198; No Copyright; Avail: Issuing Activity; Abstract Only
This paper describes Burton, a core element of a new generation of goal-directed model-based autonomous executives. This executive makes extensive use of component-based declarative models to analyze novel situations and generate novel control actions both at the goal and hardware levels. It uses an extremely efficient online propositional inference engine to efficiently determine likely states consistent with current observations and optimal target states that achieve high level goals. It incorporates a flexible generative control sequencing algorithm within the reactive loop to bridge the gap between current and target states.

The system is able to detect and avoid damaging and irreversible situations, After every control action it uses its model and sensors to detect anomalous situations and immediately take corrective action. Efficiency is achieved through a series of model compilation and online policy construction methods, and by exploiting general conventions of hardware design that permit a divide and conquer approach to planning. The paper presents a formal characterization of Burton's capability, develops efficient algorithms, and reports on experience with the implementation in the domain of spacecraft autonomy. Burton is being incorporated as one of the key elements of the Remote Agent core autonomy architecture for Deep Space One, the first spacecraft for NASA's New Millenium program.
Author
Artificial Intelligence; Conferences; Damage; Autonomy; Algorithms

20020043828 Stanford Univ., Computer Systems Lab., Stanford, CA USA
Formally Verifying Data and Control With Weak Reachability Invariants
Su, Jeffrey; Dill, David L.; Skakkebaek, Jens U.; Jan. 2002; 17p; In English
Contract(s)/Grant(s): DABT63-95-C-0049; DABT63-96-C-0097
Report No.(s): AD-A400377; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Existing formal verification methods do not handle systems that combine state machines and data paths very well. Model checking deals with finite-state machines efficiently, but model checking full designs is infeasible because of the large amount of state in the data path. Theorem-proving methods may be effective for verifying data path operations, but verifying the control requires finding and proving inductive invariants that characterize the reachable states of the system. We present a new approach to verification of systems that combine control FSMs and data path operations. Invariants are specified only for a small set of control states, called clean states, where the invariants are especially simple. We avoid the need to specify the invariants for the unclean states by symbolically simulating over all paths to find the possible next clean states. The set of all paths from one clean state to the next is represented by a regular expression, which is extracted from the control FSMs. The number of paths is infinite only if the regular expression contains stars. The method uses a heuristic to generalize the symbolic state to cover all of the paths of the starred expression. We have implemented a prototype tool for guiding an existing symbolic simulator and verification tool and used it successfully to prove properties of the Instruction Fetch Unit of TORCH, a superscalar microprocessor designed at Stanford. With much less effort, we were able to find all the bugs in the unit that were found earlier by manually strengthening the invariants.
DTIC
Pattern Recognition; Program Verification (Computers); Computer Programs; Data Processing

20020043929 State Univ. of New York, Center of Multisource Information Fusion, Buffalo, NY USA
Intentional Systems, Intentional Stance, and Explanations of Intentional Behavior
Deutsch, Robert D.; Llinas, James; Jun. 2000; 17p; In English; Original contains color images; Prepared in collaboration with DDB worldwide, Inc., New York, NY
Report No.(s): AD-A400073; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This paper is a limited overview of a preliminary research task carried out for the National Security Agency (NSA) having to do with developing a basic understanding of the notions and concepts of intent, intentionality, and intentional behavior. These notions clearly have significant implications for intelligence analysis and especially predictive intelligence; modern-day asymmetric threats and operations other than war make the understanding and exploitation of these notions yet more urgent. The projects eventual goal is to develop and conduct research-oriented experiments with a prototype automated intent-estimating aid based on fused SIGINT-type data, as a path toward developing deeper knowledge about these concepts. This research effort is in support of NSA's WARGODDESS program which is developing a SIGINT-Fusion capability for operational use. As will be seen from the paper, this first study effort started with a review of the quite-basic research literature in the philosophical, cognitive, and legal arenas, with the purpose of evolving possibly new but minimally consistent and synthesized understanding of these basic concepts. It will also be seen that such understanding will not come easily and will require a serious continuing research program if optimal progress is to be made.
DTIC
Predictions; Behavior

20020043940 Pisa Univ., Italy

Electroactive Polymers and Biosystems: New Directions in Electroactive Polymer Materials for Biomimetic and Interactive Processes ***Final Report***

Aug. 03, 2001; 212p; In English

Report No.(s): AD-A400410; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

The workshop, held in Lucca, Italy, 30 July - 3 August 2001, was sponsored by ONR-IFO and DARPA and was organized by the University of Pisa, Italy. Its aim was to evaluate the progress in research and assessment of new frontiers in the field of electroactive polymers and their potential applications in biomimetics and various other interactive processes. Presentations and topics were organized into six topical areas: (1) Biomimetics, (2) Molecular Actuators, (3) Neural Communications, (4) Biostructure and Tissue Engineering, (5) Artificial Sensors and Biosensors, and (6) Robotics and Biomechantronics.

DTIC

Bioinstrumentation; Biomimetics; Electroactive Polymers; Tissue Engineering; Robotics

20020044021 Teknowledge Federal Systems, Inc., Palo Alto, CA USA

High-Performance Integration Transition and Exploitation of Knowledge (HITEK) ***Final Report, Jun. 1997-Sep. 2001***

Pease, Adam; Feb. 2002; 38p; In English; Original contains color images

Contract(s)/Grant(s): F30602-97-C-0145; DARPA ORDER-F107; Proj-IIST

Report No.(s): AD-A400239; AFRL-IF-RS-TR-2002-15; No Copyright; Avail: CASI; A03, Hardcopy

This effort focused on the development and integration of large knowledge bases and knowledge based tools. The project significantly advanced the state of the art in ontology and knowledge base development. of particular scientific interest was a set of formal experiments that were conducted and described in technical reports and academic publications that quantified the value of knowledge base technology. The project also laid the groundwork for further efforts in ontology development and standardization. The Teknowledge integration approach was integration of components using a single large ontology based on Cyc. A significant result was the development of a version of Cyc for government distribution, which contained an Integrated Knowledge Base (IKB) and Integrated Development Environment (IDE). This software built on Cyc and included the ontology content developed during the HPKB project by our team. The HPKB project was structured to have several Challenge Problems that motivated and evaluate research progress. The Crisis Management Challenge Problem was focused on knowledge-based inference and the domain was reasoning about international crisis situations. The Battlespace Challenge Problem went through several iterations but wound up focusing on planning for battlefield workarounds and critiquing Army Courses of Action (COAs). The latter technology focus was on an integration of knowledge based sketching, restricted English to logic translation, problem solving, and knowledge-based inference.

DTIC

Knowledge Based Systems; Inference; Problem Solving; Standardization

64
NUMERICAL ANALYSIS

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

20020043251 NASA Ames Research Center, Moffett Field, CA USA

Central Schemes for Multi-Dimensional Hamilton-Jacobi Equations

Bryson, Steve, NASA Ames Research Center, USA; Levy, Doron, Stanford Univ., USA; Aug. 23, 2002; 28p; In English

Contract(s)/Grant(s): RTOP 704-40-42; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We present new, efficient central schemes for multi-dimensional Hamilton-Jacobi equations. These non-oscillatory, non-staggered schemes are first- and second-order accurate and are designed to scale well with an increasing dimension. Efficiency is obtained by carefully choosing the location of the evolution points and by using a one-dimensional projection step. First-and second-order accuracy is verified for a variety of multi-dimensional, convex and non-convex problems.

Author

Hamilton-Jacobi Equation; Mathematical Models; Oscillations; Singularity (Mathematics)

20020043259 Belmont Univ., Dept. of Mathematics and Computer Science, Nashville, TN USA
Wrong Signs in Regression Coefficients ***Final Report***
McGee, Holly, Belmont Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-12; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
When using parametric cost estimation, it is important to note the possibility of the regression coefficients having the wrong sign. A wrong sign is defined as a sign on the regression coefficient opposite to the researcher's intuition and experience. Some possible causes for the wrong sign discussed in this paper are a small range of x's, leverage points, missing variables, multicollinearity, and computational error. Additionally, techniques for determining the cause of the wrong sign are given.
Author
Regression Coefficients; Parameterization

20020043950 Air Force Research Lab., Sensors Directorate, Wright-Patterson AFB, OH USA
Investigating Multiple Model Techniques for Target Tracking
Weaver, Scott; Layne, Jeff; Jun. 20, 2000; 8p; In English; Original contains color images
Report No.(s): AD-A400143; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
In this paper, we investigate the fundamental assumptions of popular target tracking algorithms. These assumptions rarely hold in the real world and can have significant effects on current tracking systems. These analyses provide motivation for new algorithms that overcome the difficulties in current algorithms, providing better target tracking systems.
DTIC
Algorithms; Multiple Target Tracking; Target Acquisition

65
STATISTICS AND PROBABILITY

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

20020043861 Information Extraction and Transport, Inc., Arlington, VA USA
Measuring Performance for Situation Assessment
Mahoney, Suzanne M.; Laskey, Kathryn B.; Wright, Ed; Ng, Keung C.; Jun. 01, 2001; 21p; In English; Original contains color images
Report No.(s): AD-A400023; No Copyright; Avail: CASI; A03, Hardcopy
We define a situation estimate as a probability distribution over hypothesized groups, units, sites and activities of interest in a military situation. to be useful to decision makers, there must be a way to evaluate the quality of situation assessments. This paper presents and illustrates an approach to meeting this difficult challenge. A situation assessment integrates low-level sensor reports to produce hypotheses at a level of aggregation of direct interest to a military commander. The elements of a situation assessment include 1) hypotheses about entities of interest and their attributes, 2) association of reports and/or lower level elements with entities of interest, and 3) inferences about the activities of a set of entities of interest. In estimating the quality of a situation assessment, these elements may be scored at any level of granularity from a single vehicle to the entire situation estimate.
DTIC
Decision Making; Probability Distribution Functions; Probability Theory; Estimating

20020043947 SRI International Corp., Menlo Park, CA USA
Multiple-Target Tracking and Data Fusion via Probabilistic Mapping
Tao, K. M.; Abileah, Ronald; Lawrence, John D.; Jun. 2000; 16p; In English; Original contains color images
Report No.(s): AD-A400131; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
A new approach is taken to address the various aspects of the multi-sensor, multi-target tracking (MTT) problem in dense and noisy environments. Instead of fixing the trackers on the potential targets as the conventional tracking algorithms do, this new approach is fundamentally different in that an array of parallel-distributed trackers is laid in the search space. The difficult data-track association problem that has challenged the conventional trackers becomes a nonissue with this new approach. By partitioning the search space into cells, this new approach, called PMAP (probabilistic mapping), dynamically calculates the spatial probability distribution of targets in the search space via Bayesian updates. The distribution is spread at each time step, following a fairly general Markov-chain target motion model, to become the prior probabilities of the next scan. This framework can effectively handle data from multiple sensors and incorporate contextual information, such as terrain and weather, by

performing a form of evidential reasoning. Used as a pre-filtering device, the PMAP is shown to remove noise-like false alarms effectively, while keeping the target dropout rate very low. This gives the downstream track linker a much easier job to perform. A related benefit is that with PMAP it is now possible to lower the detection threshold and to enjoy high probability of detection and low probability of false alarm at the same time, thereby improving overall tracking performance. The feasibility of using PMAP to track specific targets in an end-game scenario is also demonstrated. Both real and simulated data are used to illustrate the PMAP performance. The PMAP algorithm is parallel distributed in nature; for serial computer implementation, fast algorithms have been developed. Some related applications based on the PMAP approach, including a spatial-temporal sensor data fusion application and a gray-scale video sequence stacking application, are also discussed.
DTIC
Algorithms; Multiple Target Tracking; Multisensor Fusion; Probability Theory; Targets

20020043954 Lockheed Martin Corp., Eagan, MN USA
A Theoretical Foundation for the Stein-Winter "Probability Hypothesis Density (PHD)" Multitarget Tracking Approach
Mahler, Ronald P.; Jun. 20, 2000; 21p; In English
Contract(s)/Grant(s): DAAH04-94-C-0011; DAAG55-98-C-0039
Report No.(s): AD-A400161; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
In several unpublished manuscripts written from 1993 to 1995, Michael Stein, C.L. Winter, and Robert Tenney introduced a multitarget tracking and evidential-accumulation concept called a 'Probability Hypothesis Surface' (PHS). A PHS is the graph of a probability distribution - the Probability Hypothesis Density (PHD) - that, when integrated over a region in target state space, gives the expected number of targets in that region. The PHD is uniquely defined by this property: Any other density function that satisfies it must be the PHD.
DTIC
Probability Theory; Targets; Tracking (Position)

20020043979 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Robust Sensitivity Analysis for Multi-Attribute Deterministic Hierarchical Value Models
Kahraman, Yucel R.; Mar. 2002; 84p; In English
Report No.(s): AD-A400032; AFIT/GOR/ENS/02-10; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
There is a wide array of multi-attribute decision analysis methods and associated sensitivity analysis procedures in the literature. However, there is no detailed discussion of sensitivity analysis methods solely relating to additive hierarchical value models. The currently available methodology in the literature is unsophisticated and can be hard to implement into complex models. The methodology proposed in this research builds mathematical foundations for a robust sensitivity analysis approach and extends the current methodology to a more powerful form. The new methodology is easy to implement into complex hierarchical value models and gives flexible and dynamic capabilities to decision makers during sensitivity analysis. The mathematical notation is provided in this study along with applied examples to demonstrate this methodology. Global and local sensitivity analysis are considered and implemented using the proposed robust technique. This research provides consistency and a common standard for the decision analysis community for sensitivity analysis of multi-attribute deterministic hierarchical value models.
DTIC
Hierarchies; Statistical Decision Theory; Sensitivity Analysis

66
SYSTEMS ANALYSIS AND OPERATIONS RESEARCH

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

20020043835 Aerospace Corp., Engineering and Technology Group, El Segundo, CA USA
Advanced Electro-Optical Space-Based Systems for Missile Surveillance
Lawrie, David G.; Lomheim, Terrence S.; Sep. 2001; 32p; In English; Original contains color images
Contract(s)/Grant(s): F04701-00-C-0009
Report No.(s): AD-A400345; TR-2001(8556)-1; SMC-TR-02-15; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This report describes an analysis/simulation methodology used to assess a nominal space-based infrared surveillance architect against a Theater Missile Warning (TMW) mission for two potential theatres of operation. System performance is derived for three generic infrared scanning sensor designs (which were analyzed in parallel for sensitivity, subsystem definition, mass,

and power) and parameterized against the potential variations and uncertainties in scene background structure which produce clutter. The results provide insight into the cost, in terms of sensor mass, that is paid for background phenomenology uncertainty.
DTIC
Mathematical Models; Infrared Detectors; Architecture (Computers); Infrared Radiation; Infrared Scanners

20020043855 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
An Optimization of the Hub-and-Spoke Distribution Network in USA European Command
Skipper, Joseph B.; Mar. 2002; 74p; In English; Original contains color images
Report No.(s): AD-A399997; AFIT/GLM/ENS/02-17; No Copyright; Avail: CASI; A04, Hardcopy
The current hub-and-spoke network in the European Theater is made up of locations built and organized around a Cold War threat. The threat of large-scale attrition warfare seems to have passed, and the threat of multiple, smaller scale contingencies has placed greater demands on the US military's ability to transport equipment and personnel to multiple locations simultaneously. This research effort utilizes a Multiple Objective Linear Programming (MOLP) model to analyze optimal hub locations in USEUCOM. The model used to analyze the network was developed in Microsoft Excel and followed MOLP techniques to determine the trade-offs between the two constructs of importance time and cost. The results of the multiple model runs show that the Aviano hub alternative provides the least expensive and least time consuming option of the four alternatives considered. This came as no surprise. The use of a hub location that coincides with one of the demand locations eliminates the need for forward movement from the hub to the demand location. The reduction of cost and time in the optimal network should result in an overall savings to the entire network cost.
DTIC
Heuristic Methods; Logistics; Linear Programming

20020043930 Sandia National Labs., Albuquerque, NM USA
Information Systems Vulnerability: A Systems Analysis Perspective
Wyss, Gregory D.; Daniel, Sharon L.; Schriner, Heather K.; Gaylor, Timothy R.; Jun. 1996; 15p; In English
Contract(s)/Grant(s): DE-AC04-94AL85000
Report No.(s): AD-A400069; SAND96-1541C; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Vulnerability analyses for information systems are complicated because the systems are often geographically distributed. Sandia National Laboratories has assembled an interdisciplinary team to explore the applicability of probabilistic logic modeling (PLM) techniques (including vulnerability and vital area analysis) to examine the risks associated with networked information systems. We have found that the reliability and failure modes of many network technologies can be effectively assessed using fault trees and other PLM methods. The results of these models are compatible with an expanded set of vital area analysis techniques that can model both physical locations and virtual (logical) locations to identify both categories of vital areas simultaneously. These results can also be used with optimization techniques to direct the analyst toward the most cost-effective security solution.
DTIC
Information Systems; Fault Trees; Systems Analysis; Risk

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.

20020043826 Delaware Univ., Newark, DE USA
Magnets for High Temperature Applications ***Final Report, 1 Sep. 1996-31 Aug. 2001***
Hadjipanayis, George; Unruh, Karl; Xiao, John; Feb. 20, 2002; 14p; In English
Contract(s)/Grant(s): F49620-96-1-0434; Proj-3484; Proj-2305
Report No.(s): AD-A400383; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The aim of this work was to develop high temperature magnets to be used in an electromagnetic system for the "More Electric Plane" applications. The desired operating temperature T(op) was 45O0 C for permanent magnets and 65O0 C for soft magnets.
DTIC
High Temperature; Permanent Magnets; Fabrication

20020043956 Florida Inst. of Tech., Melbourne, FL USA
Micropatch Antenna Phase Shifting ***Final Report, 1 Sep. 1997-31 Aug. 2000***
Thursby, Michael; Aug. 31, 2000; 16p; In English
Contract(s)/Grant(s): F49620-97-1-0422
Report No.(s): AD-A400157; AFRL-SR-BL-TR-02-0110; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Micropatch antenna is a ubiquitous entity which is more and more being used in arrays to form beams for communication from one point to another. To accomplish this one needs to be able to make the patch as flexible as possible. and at the same time be able to reliably form the beam of the antenna array. We have been looking at the ability of embedded element to adjust the phase shift seen by the element with the goal of being able to remove the phase shifting devices from the antenna and replace it with a phase shifting antenna element. This would reduce the number of components and connections associated with the array, and hopefully reduce loss associated with these extra devices. As part of this research we have discovered that the addition of controlling elements into the microstript patch has been able to shift the phase of the field in the far field to some extent. We have also discovered that there is not a consistent phase pattern in the far field from the element with respect to the azimuthal direction. This discovery was unsettling as this could be due to a movement of the phase center during the phase adjustment. to investigate this effect we set out in this final phase of this research activity to determine by modeling if there might be a change in phase center position with the change in bias of the controlling device that was embedded in the microstrip patch.
DTIC
Radio Communication; Antenna Arrays

71
ACOUSTICS

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

20020043403 Boston Univ., Boston, MA USA
New Techniques in Photo-Acoustic Spectroscopy ***Final Report, 1 Sep. 1999-1 Oct. 2001***
Morse, T. F.; Apr. 05, 2002; 14p; In English
Contract(s)/Grant(s): N00014-99-1-1087
Report No.(s): AD-A400455; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Erbium fiber lasers may be tuned continuously from 1.527 microns to 1.6 microns. Thulium fiber lasers may be tuned from 1.7 microns to 2.0 microns. If large pulses of these two wavelengths can be appropriately mixed in a non-linear crystal, continuous pulses of radiation can be obtained between 7 and 19 microns. We have demonstrated the continuous tuning of these fiber lasers, and preliminary experiments were carried out to Q switch them. We also initiated work to develop double clad lasers to obtain high peak powers with relatively short pulse periods. The final goal of our effort was not achieved; however, we believe that preliminary results indicate that the amplification of pulsed fiber lasers with double clad lasers can lead to new, compact sources in the far infrared region of the spectrum.
DTIC
Photoacoustic Spectroscopy; Fiber Lasers; Erbium; Thulium

20020043799 Virginia Polytechnic Inst. and State Univ., Dept. of Mechanical Engineering, Blacksburg, VA USA
Experimental Investigation of the Herschel-Quincke Tube Concept on the Honeywell TFE731-60
Smith, Jerome P., Virginia Polytechnic Inst. and State Univ., USA; Burdisso, Ricardo A., Virginia Polytechnic Inst. and State Univ., USA; March 2002; 40p; In English; Original contains color illustrations
Contract(s)/Grant(s): NAG1-2137; RTOP 706-81-12-01
Report No.(s): NASA/CR-2002-211431; NAS 1.26:211431; VPI-ENGR-4-26483; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report summarizes the key results obtained by the Vibration and Acoustics Laboratories at Virginia Tech over the period from January 1999 to December 2000 on the project 'Investigation of an Adaptive Herschel-Quincke Tube Concept for the Reduction of Tonal and Broadband Noise from Turbofan Engines', funded by NASA Langley Research Center. The Herschel-Quincke (HQ) tube concept is a developing technique that consists of circumferential arrays of tubes around the duct. A fixed array of tubes is installed on the inlet duct of the Honeywell TFE731-60 engine. Two array designs are incorporated into the inlet treatment, each designed for a different circumferential mode order which is expected to be cut on in the duct. Far field

and in-duct noise measurement data are presented which demonstrate the effectiveness of the HQ concept for array 1, array 2, and both operating simultaneously.
Author
Turbofan Engines; Noise Reduction; Intake Systems

20020043801 NASA Langley Research Center, Hampton, VA USA
Aeroacoustic Experiments in the NASA Langley Low-Turbulence Pressure Tunnel
Choudhari, Meelan M., NASA Langley Research Center, USA; Lockard, David P., NASA Langley Research Center, USA; Macaraeg, Michele G., NASA Langley Research Center, USA; Singer, Bart A., NASA Langley Research Center, USA; Streett, Craig L., NASA Langley Research Center, USA; Neubert, Guy R., Boeing Commercial Airplane Co., USA; Stoker, Robert W., Boeing Commercial Airplane Co., USA; Underbrink, James R., Boeing Commercial Airplane Co., USA; Berkman, Mert E., High Technology Corp., USA; Khorrami, Mehdi R., High Technology Corp., USA; February 2002; 46p; In English; Original contains color illustrations
Contract(s)/Grant(s): RTOP 706-81-13-02
Report No.(s): NASA/TM-2001-211432; NAS 1.15:211432; L-18131; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
A phased microphone array was used in the NASA Langley Low-Turbulence Pressure Tunnel to obtain acoustic data radiating from high-lift wing configurations. The data included noise localization plots and acoustic spectra. The tests were performed at Reynolds numbers based on the cruise-wing chord, ranging from 3.6 x 10(exp 6) to 19.2 x 10(exp 6). The effects of Reynolds number were small and monotonic for Reynolds numbers above 7.2 x 10(exp 6).
Author
Aeroacoustics; Low Turbulence; Wind Tunnel Tests; Acoustic Properties; Pressure Gradients

20020043965 Pennsylvania State Univ., Dept. of Aerospace Engineering, University Park, PA USA
Numerical Simulations for Landing Gear Noise Generation and Radiation ***Final Report***
Morris, Philip J., Boeing Co., USA; Long, Lyle N., Pennsylvania State Univ., USA; April 2002; 88p; In English
Contract(s)/Grant(s): NRA-98-LaRC-5; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
Aerodynamic noise from a landing gear in a uniform flow is computed using the Ffowcs Williams -Hawkings (FW-H) equation. The time accurate flow data on the surface is obtained using a finite volume flow solver on an unstructured and. The Ffowcs Williams-Hawkings equation is solved using surface integrals over the landing gear surface and over a permeable surface away from the landing gear. Two geometric configurations are tested in order to assess the impact of two lateral struts on the sound level and directivity in the far-field. Predictions from the Ffowcs Williams-Hawkings code are compared with direct calculations by the flow solver at several observer locations inside the computational domain. The permeable Ffowcs Williams-Hawkings surface predictions match those of the flow solver in the near-field. Far-field noise calculations coincide for both integration surfaces. The increase in drag observed between the two landing gear configurations is reflected in the sound pressure level and directivity mainly in the streamwise direction.
Author
Aerodynamic Noise; Uniform Flow; Landing Gear; Directivity; Sound Pressure; Computational Fluid Dynamics

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.

20020043313 Tennessee Technological Univ., Dept. of Mechanical Engineering, Cookeville, TN USA
Atomic-Based-Combined-Cycle Analysis ***Final Report***
Han, Samuel S., Tennessee Technological Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-25; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Atomic-based-combined-cycle (ABCC) engine combines an air-breathing ramjet engine with an atomic reactor to increase the mission-averaged specific impulse and thereby increasing the dry-mass ratio. ABCC engine is similar to RBCC engine except that energy needed for the propulsive power is derived from nuclear reaction rather than chemical combustion used in the RBCC engine. The potential performance improvement of an ABCC engine over a RBCC engine comes from two factors. Firstly, the

energy density of nuclear reaction is several order of magnitudes higher than the chemical combustion. Secondly, hydrogen can produce much higher nozzle exit velocity because of its small molecular weight. A one-dimensional, transient numerical model was used to analyze a generic RBCC engine and it is used as a baseline to evaluate an imaginary ABCC engine performance. A nuclear reactor is treated as a black box energy source that replaces the role of the primary rocket and the chemical combustion chamber in a RBCC engine. The performance of a generic ABCC engine along a flight path (q0 =10 (exp 3) lbf per square ft) shows that the mission averaged-specific impulse is about twice larger than RBCC engine and the dry mass-ratio is about 50% larger. Results of the present ABCC engine performance are based on the assumptions that the flow passage of working fluids is identical to that of RBCC engine and that a nuclear reactor is treated as an energy black box. Preliminary heat transfer calculation shows that the rate of heat transfer to the working fluids is within the limit of turbulent convective heat transfer regimes. The flow passage of realistic ABCC engine must be known for a better prediction of ABCC engine performance. Also, critical heat transfer calculations must be performed for the ejector mode and ramjet mode operations. This is possible only when the details of a reactor configuration are available.
Author
Air Breathing Engines; Rocket-Based Combined-Cycle Engines; Atomic Theory; Mathematical Models

74
OPTICS

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

20020043214 Mercer Univ., School of Engineering, Macon, GA USA
Fuzzy Control Hardware for Segmented Mirror Phasing Algorithm ***Final Report***
Roth, Elizabeth, Mercer Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-17; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
This paper presents a possible implementation of a control model developed to phase a system of segmented mirrors, with a PAMELA configuration, using analog fuzzy hardware. Presently, the model is designed for piston control only, but with the foresight that the parameters of tip and tilt will be integrated eventually. The proposed controller uses analog circuits to exhibit a voltage-mode singleton fuzzifier, a mixed-mode inference engine, and a current-mode defuzzifier. The inference engine exhibits multiplication circuits that perform the algebraic product composition through the use of operational transconductance amplifiers rather than the typical min-max circuits. Additionally, the knowledge base, containing exemplar data gained a priori through simulation, interacts via a digital interface.
Author
Algorithms; Segmented Mirrors; Fuzzy Systems

20020043230 Mercer Univ., Electrical and Computer Engineering Dept., Macon, GA USA
Neuro-Fuzzy Phasing of Segmented Mirrors ***Final Report***
Olivier, Philip D., Mercer Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-33; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
A new phasing algorithm for segmented mirrors based on neuro-fuzzy techniques is described. A unique feature of this algorithm is the introduction of an observer bank. Its effectiveness is tested in a very simple model with remarkable success. The new algorithm requires much less computational effort than existing algorithms and therefore promises to be quite useful when implemented on more complex models.
Author
Algorithms; Segmented Mirrors; Fuzzy Systems

20020043245 National Inst. of Standards and Technology, Electricity Div., Gaithersburg, MD USA
NIST Stray Light Elimination Tube Prototype
Boynton, P. A.; Kelley, E. F.; Mar. 2002; 16p; In English
Report No.(s): PB2002-103650; NISTIR-6861; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Electronic projection displays involve the projection of an image, usually through a lens system, onto a viewing screen. Metrics such as light output, contrast, non-uniformity, and color gamut are used to describe the resultant image quality. Although standards exist that difine the methodology for these measurements, the accuracy of measuring the light output of projection

display systems can be compromised by the condition of the viewing room. Room lights directly illuminate the screen and these light sources reflect off of walls, floors, furniture and other objects. Additionally, back-reflections from the light form the projection screen off of objects in the room and back onto the screen must be considered. The stray-light components can contribute to the measured result, providing erroneous results.
NTIS
Light Scattering; Prototypes; Lenses; Image Resolution; Display Devices

20020043273 Alabama Univ., Dept. of Electrical and Computer Engineering, Huntsville, AL USA
Silica Integrated Optical Circuits Based on Glass Photosensitivity ***Final Report***
Abushagur, Mustafa A. G., Alabama Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-2; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Integrated optical circuits play a major rule in the new photonics technology both in communication and sensing due to their small size and compatibility with integrated circuits. Currently integrated optical circuits (IOCs) are fabricated using similar manufacturing to those used in the semiconductor industry. In this study we are considering a new technique to fabricate IOCs which does not require layers of photolithography, depositing and etching. This method is based on the photosensitivity of germanosilicate glasses. Waveguides and other IOC devises can be patterned in these glasses by exposing them using UV lasers. This exposure by UV light changes the index of refraction of the germanosilicate glass. This technique enjoys both the simplicity and flexibility of design and fabrication with also the potential of being fast and low cost.
Author
Fabrication; Glass; Integrated Circuits; Photonics; Photosensitivity; Silicon Dioxide; Optical Materials

20020043277 Alabama Univ., Dept. of Electrical and Computer Engineering, Huntsville, AL USA
Application of Novel Nonlinear Optical Materials to Optical Processing ***Final Report***
Banerjee, Partha P., Alabama Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-5; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
We describe wave mixing and interactions in nonlinear photorefractive polymers and disodium flourescein. Higher diffracted orders yielding forward phase conjugation can be generated in a two-wave mixing geometry in photorefractive polymers, and this higher order can be used for image edge enhancement and correlation. Four-wave mixing and phase conjugation is studied using nonlinear disodium floureschein, and the nature and properties of gratings written in this material are investigated.
Author
Nonlinearity; Optical Materials; Polymers; Four-Wave Mixing; Photorefractivity

20020043278 Alabama Univ., Physics Dept., Huntsville, AL USA
Aberrations in Fresnel Lenses and Mirrors ***Final Report***
Gregory, Don, Alabama Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-23; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
The NASA/MSFC Shooting Star program revealed a number of technical problems that must be solved before solar thermal propulsion can become a reality. The fundamental problem of interest here is the collection of solar energy. This is the first step in the propulsion process and indeed the most important. Everything else depends on the efficiency and focusing ability of the collection lens or mirror. An initial model of Fresnel lens behavior using a wave optics approach has been completed and the results were encouraging enough to warrant an experimental investigation. This experimental investigation confirmed some of the effects predicted and produced invaluable photographic evidence of coherence based diffraction and aberration.
Author
Aberration; Fresnel Lenses; Mirrors; Meteoroids

20020043302 Texas A&M Univ., Physics Dept., Kingsville, TX USA
Segmented Mirror Image Degradation Due to Surface Dust, Alignment and Figure ***Final Report***
Schreur, Julian J., Texas A&M Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-43; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

In 1996 an algorithm was developed to include the effects of surface roughness in the calculation of the point spread function of a telescope mirror. This algorithm has been extended to include the effects of alignment errors and figure errors for the individual elements, and an overall contamination by surface dust. The final algorithm builds an array for a guard-banded pupil function of a mirror that may or may not have a central hole, a central reflecting segment, or an outer ring of segments. The central hole, central reflecting segment, and outer ring may be circular or polygonal, and the outer segments may have trimmed comers. The modeled point spread functions show that x-tilt and y-tilt, or the corresponding R-tilt and theta-tilt for a segment in an outer ring, is readily apparent for maximum wavefront errors of 0.1 lambda. A similar sized piston error is also apparent, but integral wavelength piston errors are not. Severe piston error introduces a focus error of the opposite sign, so piston could be adjusted to compensate for segments with varying focal lengths. Dust affects the image principally by decreasing the Strehl ratio, or peak intensity of the image. For an eight-meter telescope a 25% coverage by dust produced a scattered light intensity of 10(exp -9) of the peak intensity, a level well below detectability.
Author
Alignment; Degradation; Dust; Segmented Mirrors; Image Processing

20020043312 Texas A&M Univ., Physics Dept., Kingsville, TX USA
Design and Evaluation of a Telecompressor for a Cassegrain ***Final Report***
Carden, Russell, Texas A&M Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-6; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
In order to make better use of their telescope's available field for imaging, avid telescope users make use of an optical device known as a telecompressor also known as a Shapley lens or a focal reducer. Rather than widening the field like a Barlow lens by increasing the telescope's focal length a telecompressor does the opposite compressing the field by shortening the telescope's focal length. This allows for shorter exposure times for film and the potential to fit a telescope's entire field onto a CCD camera. A simple telecompressor would consist of a single positive lens. Such a system would be in adequate for astrophotography, which is why telecompressors like many other refractive optical systems are corrected for certain wavelengths of light. Sometimes a telescope can benefit from having the telecompressor designed just for that particular telescope. The director of the observatory at Texas A&M University Kingsville has been contemplating whether or not a custom made telecompressor would hold any benefits. The report discusses the preliminary design and evaluation of an astronomical achromat according to the third order aberration theory. The achromat is then optimized by finite ray-tracing. The achromat's performance as a telecompressor is compared to the performance of a telecompressor designed just for the telescope at TAMUK. The results indicate that the achromat performs about as well as the custom telecompressor. Analysis also presented that the custom telecompressor was optimized for the wrong system could potentially perform much better if it were optimized on the correct system. However in the meantime an ordinary achromat should suit the system well enough for CCD astroimaging.
Author
Imaging Techniques; Telescopes; Cassegrain Optics; Design Analysis; Optical Equipment; Compressing

20020043833 Woods Hole Oceanographic Inst., MA USA
Characterization and Modeling of Inherent Optical Properties in the Gulf of Maine ***Progress Report, 1 Jan.-31 Dec. 2001***
Sosik, Heidi M.; McGillicuddy, Dennis J.; Jan. 2002; 6p; In English; Original contains color images
Contract(s)/Grant(s): N00014-01-1-0256
Report No.(s): AD-A400321; WHOI-13125600; WHOI-13125601; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
Our longterm goal is to contribute to a fundamental understanding of the sources of biological, physical and optical variability in coastal ocean systems. Particular focus is on applications useful for studying important ecological processes and the links between phytoplankton properties and physical processes in coastal regions. The overall objective of this project is to improve understanding of the Gulf of Maine and Georges Bank system through characterization and modeling of optical properties in the context of physical and biological processes. We wish to describe the processes controlling space/ time variability in the various constituents (CDOM, phytoplankton, sediment, detrital particles) that determine the optical properties of this region. As planned, our effort to date has been concentrated on processing and quality control for optical and hydrographic data collected during 5 cruises during 1997-1999. We have also made progress towards compiling an accessible database that includes our observations plus those collected by several other investigators working in the Gulf of Maine region. The compiled database is now being used to generate empirically driven parameterizations of optical variability for the Gulf of Maine region, which will in turn be used to construct an optical submodel (to later be coupled with biological and physical models). Our preliminary efforts to characterize optical variability present in the Gulf of Maine at different times of year have documented that some properties must be considered

seasonally variable, while others seem more temporally stable. These observations will be quantitatively incorporated into the optical model we are constructing. Ultimately, we expect that integrating models of optical properties into our physically realistic ecosystem simulations will contribute to better understanding of the processes contributing to optical variability in coastal waters. DTIC

Optical Properties; Models; Activity (Biology); Bionics; Coastal Water

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PLASMA PHYSICS

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

20020043225 Alabama Univ., Dept. of Mathematical Sciences, Huntsville, AL USA

Analysis of Kelvin Helmholtz Instabilities of Plasma Jets ***Final Report***

Friedman, Mark J., Alabama Univ., USA; Hollingsworth, Blane J., Alabama Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-20; In English

Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

Ulysses data indicates density fluctuations which are theorized to be the result of shear between a solar jet and its ambient. The MHD Kelvin-Helmholtz (”KH”) instability causes such fluctuations as observed by Ulysses. A new dispersion relationship which accounts for this KH instability is derived via the linearization of the MHD equations. This generalizes an earlier result by Hardee. This dispersion relationship has the form of eight non-linear equations with nine unknowns.

Author

Plasma Jets; Kelvin-Helmholtz Instability; Magnetohydrodynamics

20020043285 Purdue Univ., Dept. of Nuclear Engineering, IN USA

Inertial Electrostatic Confinement Fusion: Set-Up and Operation ***Final Report***

Hurst, Chantelle M., Purdue Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-9; In English

Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

During the research period focus was placed upon set-up, installment, and operation of the IEC. While procurement of specific components was difficult, the IEC was on several occasions demonstrated to be practical and safe during operation. Over the course of the summer several different grids were tested and various modes were obtained. While hard data was not produced, the IEC did something more important, which was to become established here at Marshall and pave the way for future IEC systems to be built.

Author

Electrostatics; Inertial Confinement Fusion; Systems Engineering

20020043311 Alabama Univ., Dept. of Mathematical Sciences, Huntsville, AL USA

Analysis of Kelvin Helmholtz Instabilities of Plasma Jets ***Final Report***

Friedman, Mark J., Alabama Univ., USA; Hollingsworth, Blane J., Alabama Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-8; In English

Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

Ulysses data indicates density fluctuations which axe theorized to be the result of shear between a solar jet and its ambient. The MHD Kelvin-Helmholtz (”KH”) instability causes such fluctuations as observed by Ulysses. A new dispersion relationship which accounts for this KH instability is derived via the linearization of the MHD equations. This generalizes an earlier result by Hardee. This dispersion relationship has the form of eight non-linear equations with nine unknowns.

Author

Plasma Jets; Kelvin-Helmholtz Instability; Magnetohydrodynamics; Solar Physics

20020043674 Alabama Univ., Huntsville, AL USA

Investigation of Non-Equilibrium Plasmas ***Final Report, 15 Nov. 1997-6 Mar. 2002***

Hawk, Clark W.; Mar. 06, 2002; 416p; In English

Report No.(s): AD-A400283; AFRL-SR-BL-TR-02-0115; No Copyright; Avail: CASI; A18, Hardcopy; A04, Microfiche

The research program investigated non-equilibrium plasmas with a variety of simple gases for the purpose of obtaining experimental data that can be used to anchor analytical models of flowing plasmas suitable for various electric propulsion devices. A microwave plasma generator (MPG) operating at 2.45GHz and 3kW was the initial source of the plasmas. The working fluids included: argon, helium, nitrogen, carbon dioxide, and water vapor. The research also included investigation of several MHD devices placed at the outlet of the MPG to accelerate the plasmas to velocities of interest for propulsion so that the plasma plume data could be obtained in representative environments. Diagnostic methods included Langmuir probes and a Rayleigh scattering technique. The latter experienced poor signal to noise ratios that are believed to be a result of the small vacuum bell jar in which the experiments were conducted. Electron densities and other key parameters are presented for the range of working fluids and acceleration devices.
DTIC
Mathematical Models; Plasmas (Physics); Magnetohydrodynamics; Nonequilibrium Plasmas

20020043943 North Carolina State Univ., Dept. of Nuclear Engineering, Raleigh, NC USA
Initiation of Chemical Reactions in Energetic Materials Using Plasmas and Arc Channels ***Final Report, 1 Aug. 2000-31 Dec. 2001***
Bourham, Mohamed A.; Mar. 29, 2002; 35p; In English
Contract(s)/Grant(s): N00014-00-1-0901
Report No.(s): AD-A400416; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Experiments were conducted to determine the spatial and temporal distribution of the plasma temperature, pressure, number density, and velocity in the plasma-flow-field of an electrothermal source. The experiments revealed a decreasing plasma pressure, plasma temperature and plasma number density as plasma is leaving the capillary source and expands in air. The plasma jet velocity 2 inches from the source exit was found to be about 1300 m/s. Following plasma flow-field characterization, a set of experiment were conducted on the plasma-propellant interaction with increased propellant bed temperature. Experiments were conducted on JA-2 solid propellant with controlled bed temperature. Obtained results were used to develop a semi-empirical model that includes the bed temperature. Increased burn rates were observed with increased bed temperature, which appears to follow a power BR = A P(sup a) (T/T ambient) (sup b). Further investigation on plasma parameters, through optical emission spectroscopy measurements, allowed modifying the model to include plasma radiative heat flux and plasma number density in the proposed model. Arc channels were initiated in the central perforation of the propellant sample using two arc energy regimes, low and medium energies. The low energy, milli-joule range, has shown weight change of plus or minus 0.03 mg. Medium energy range between 260 and 1050 joules has shown an increased weight loss (increased burn rate) with increased arc energy. Experimental data has a linear fit Am = 2 x 10(exp -4) (E + 282), where delta m is the mass loss in mg and E is the arc energy in joules. The linear fit has R(sup 2) (sup) 0.91. Arc modeling using approximated modified Coulomb logarithm has shown over-prediction of arc plasma parameters, as seen from arc temperature calculated by the model when compared to spectral results.
DTIC
Chemical Reactions; Magnetohydrodynamic Flow; Plasmas (Physics); Spectroscopy; Solid Propellants

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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.

20020043258 Auburn Univ., AL USA
Characterization of Optical Lenses to be Considered for the Imaging of Crystal Dendrite Growth ***Final Report***
Wing, Frank M., Auburn Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-18; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Dynamic fracture is a phenomenon that is extremely sensitive to small perturbations in system parameters. This phenomenon is, in some ways, similar to that of dendritic crystal growth, although it is governed by different physical principles. Crystal dendrite growth patterns are affected by parameters such as temperature, pressure, and gravity. by studying the behavior of crystal dendrites in a controlled, microgravity environment, a greater understanding of dynamic fracture could be revealed. A sealed cubical container contains four stingers, which facilitate the growth of crystal dendrites. The container has five windows and is emersed in a liquid, for thermal isolation. The tip of a dendrite can advance in any direction, therefore three-dimensional images of the process are desired. Furthermore, because of the rapid growth rate, a fast image frame rate is required for accurate tracking

of dendrite tip velocity. In addition, optical parameters such as field of view, depth of focus, and resolution are examined, as well as the working distance between a lens and the target of observation.
Author
Crystal Growth; Dendritic Crystals; Imaging Techniques; Lenses

20020043276 Washington Univ., Dept. of Materials Science and Engineering, Seattle, WA USA
Modeling the Freezing of SN in High Temperature Furnaces ***Final Report***
Brush, Lucien, Washington Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-7; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Presently, crystal growth furnaces are being designed that will be used to monitor the crystal melt interface shape and the solutal and thermal fields in its vicinity during the directional freezing of dilute binary alloys, To monitor the thermal field within the solidifying materials, thermocouple arrays (AMITA) are inserted into the sample. Intrusive thermocouple monitoring devices can affect the experimental data being measured. Therefore, one objective of this work is to minimize the effect of the thermocouples on the data generated. To aid in accomplishing this objective, two models of solidification have been developed. Model A is a fully transient, one dimensional model for the freezing of a dilute binary alloy that is used to compute temperature profiles for comparison with measurements taken from the thermocouples. Model B is a fully transient two dimensional model of the solidification of a pure metal. It will be used to uncover the manner in which thermocouple placement and orientation within the ampoule breaks the longitudinal axis of symmetry of the thermal field and the crystal-melt interface. Results and conclusions are based on the comparison of the models with experimental results taken during the freezing of pure Sn.
Author
Furnaces; High Temperature; Mathematical Models; Freezing; Tin

20020043447 Helsinki Univ. of Technology, Lab. of Physics, Espoo, Finland
Laboratory of Physics and COMP Activity Report, ***1999***
2000; 42p; In English
Report No.(s): PB2002-103508; Copyright; Avail: National Technical Information Service (NTIS), Microfiche
Areas of current activity include semiconductor materials and structures, surface science, nanomaterials and quantum structures, magnetism, statistical physics and complex systems, and biophysics. The Laboratory is host to COMP, the research unit in computational condensed matter and complex materials.
NTIS
Semiconductors (Materials); Nanocomposites; Magnetic Properties; Theoretical Physics; Complex Systems

20020043462 Japan Society of Applied Physics, Tokyo, Japan
International Conference on Silicon and Carbide and Related Materials 2001 (9th) (ICSCRM2001) Held in Tsukuba, Japan on October 28 - November 2, 2001. Technical Digest ***Final Report, 28 Oct.-2 Nov. 2001***
Yoshida, Sadafumi; Nov. 2001; 799p; In English
Report No.(s): AD-A400386; No Copyright; Avail: CASI; A99, Hardcopy; A10, Microfiche
The Technical Digest contains the abstracts of 506 papers presented at the International Conference on Silicon Carbide and Related Materials 2001 held on October 28-November 2 in Tsukuba, Japan. Topics include crystal growth, characterization, device process, and device modeling of wide bandgap materials such as silicon carbide, III-V nitrides and carbon nanotube.
DTIC
Composite Materials; Silicon Carbides

20020043701 Illinois Univ., Beckman Inst. for Advanced Science and Technology, Urbana, IL USA
3-D Computer Simulation of Nano-crystal Floating-Gate Flash Memory Devices
Thean, Aaron, Illinois Univ., USA; Leburton, Jean-Pierre, Illinois Univ., USA; Sadd, Michael, Motorola, Inc., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 16-21; In English; Also announced as 20020043697
Contract(s)/Grant(s): NSF ECS-98-02730; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche
We present a detailed investigation of single-electron charging effects in silicon nanocrystal quantum-dots, taking into account the quantum-mechanical properties of the silicon bandstructure. We show that the retention and erase times resulting from

differences in the quantum coupling between the channel states and the nanocrystal states of different geometries can differ by orders of magnitude.
Author
Computerized Simulation; Nanocrystals; Computer Storage Devices; Band Structure of Solids; Silicon

20020043711 Naval Research Lab., Washington, DC USA
Mechanisms of Protonic Nonvolatile Memory Device
Macfarlane, P. J., Naval Research Lab., USA; Stahlbush, R. E., Naval Research Lab., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 75-79; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A01, Hardcopy; A02, Microfiche

A nonvolatile memory device based on protonic transport in oxides has been proposed. The mobile H+ ions are introduced into the SiO2 layer by annealing Si/SiO2/Si structures in H2 at temperatures greater than 500 deg C. This effect has only been observed for confined oxides that have been annealed at greater than or equal to 1100 C prior to the hydrogenation anneal. This includes buried oxides such as Unibond and SIMOX as well as thermal oxides annealed with a polysilicon cap. An applied field moves the charge within the oxide and the charge stops moving when the field is removed. In a memory device, the hydrogen-annealed oxide is the gate oxide and the position of the mobile charge is sensed by the shift of the I-V curve. Much is still not understood about the motion of the charge across the buried oxide. Previous work has assumed that H+ transport and the time it takes to traverse the oxide is governed by interactions within the bulk of the oxide. Based on parameters that affect the transport time, we conclude that H+ trapping and detrapping at the Si/SiO2 interface are more important than H+ interactions within the oxide bulk. These parameters include the applied field, the H+ concentration and the oxide thickness. One consequence is that projections of device write-time based on the previous assumptions of H+ transport mechanisms may be overly optimistic.
Author
Computer Storage Devices; Memory (Computers); Protons; Oxides; Charge Transfer

20020043713 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA USA
Quantitative Analysis of Charge Injection and Discharging of Si Nanocrystals and Arrays by Electrostatic Force Microscopy
Bell, L. D., Jet Propulsion Lab., California Inst. of Tech., USA; Boer, E., California Inst. of Tech., USA; Ostraat, M., California Inst. of Tech., USA; Brongersma, M. L., California Inst. of Tech., USA; Flagan, R. C., California Inst. of Tech., USA; Atwater, H. A., California Inst. of Tech., USA; Non-Volatile Memory Technology Symposium 2000: Proceedings; November 2000, pp. 87-99; In English; Also announced as 20020043697; No Copyright; Avail: CASI; A03, Hardcopy; A02, Microfiche

NASA requirements for computing and memory for microspacecraft emphasize high density, low power, small size, and radiation hardness. The distributed nature of storage elements in nanocrystal floating-gate memories leads to intrinsic fault tolerance and radiation hardness. Conventional floating-gate non-volatile memories are more susceptible to radiation damage. Nanocrystal-based memories also offer the possibility of faster, lower power operation. In the pursuit of filling these requirements, the following tasks have been accomplished: (1) Si nanocrystal charging has been accomplished with conducting-tip AFM; (2) Both individual nanocrystals on an oxide surface and nanocrystals formed by implantation have been charged; (3) Discharging is consistent with tunneling through a field-lowered oxide barrier; (4) Modeling of the response of the AFM to trapped charge has allowed estimation of the quantity of trapped charge; and (5) Initial attempts to fabricate competitive nanocrystal non-volatile memories have been extremely successful.
Derived from text
Charge Transfer; Injection; Silicon; Nanocrystals; Computer Storage Devices; Radiation Hardening

20020044008 Virginia Univ., Dept. of Mechanical and Aerospace Engineering, Charlottesville, VA USA
Probing Thin Film Thermophysical Properties Using the Femtosecond Transient ThermoReflectance Technique
Norris, Pamela M.; May 30, 2001; 38p; In English; Original contains color images; See Also ADM001348. Thermal Materials Workshop 2001, held in Cambridge, UK on May 30-June 1, 2001. Additional papers can be downloaded from: http://www-mech.eng.cam.ac.uk/onr/. --Original contains color plates: All DTIC reproductions will be in bla
Report No.(s): AD-A400310; No Copyright; Avail: CASI; A03, Hardcopy

The objectives are as follows: Discuss Femtosecond Transient ThermoReflectance (FTTR) technique as a method for measuring the thermophysical properties of thin film materials. Demonstrate the measurement of the thermal diffusivity, electron-phonon coupling factor, and thermal boundary resistance of thin metallic films using the FTTR technique. Discuss the

importance of considering the nonlinear relationship between reflectance and temperature. Present experimental results for Femtosecond Transient ThermoTransmittance (FTTT) studies performed on amorphous silicon solar cells.
DTIC
Thin Films; Thermophysical Properties; Thermal Diffusivity; Reflectance; Solar Cells

80
SOCIAL AND INFORMATION SCIENCES (GENERAL)

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

20020043216 Alabama Univ., Dept. of Education, Huntsville, AL USA
Technology Needs for Teachers Web Development and Curriculum Adaptations ***Final Report***
Carroll, Christy J., Alabama Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-13; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Computer-based mathematics and science curricula focusing on NASA inventions and technologies will enhance current teacher knowledge and skills. Materials and interactive software developed by educators will allow students to integrate their various courses, to work cooperatively, and to collaborate with both NASA scientists and students at other locations by using computer networks, email and the World Wide Web.
Author
Instructors; World Wide Web; Computer Networks; Mathematics

20020043255 Embry-Riddle Aeronautical Univ., Physical Sciences Dept., USA
NASA Educational Product Development and Post-Secondary Program Assessment Planning ***Final Report***
Salmons, Phyllis A., Embry-Riddle Aeronautical Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-40; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Producing ”value-added students” involves proactively addressing how successfully students develop their skills, knowledge, and personal, social, and ethical growth due to their association with a program. NASA programs for higher education can certainly be responsive in aiding the academic community strive for quality in terms of ”valueadded” students. by identifying essential characteristics of exemplary assessment practices, the standards developed by accrediting agencies serve as guides for developing quality practices and policies. Such a process is an effective tool for communicating the expectations of the educational components of a program to all concerned with the program and its expected results. When standards are connected to student performance, they provide a very compelling argument for refocusing the definition of quality in higher education. by linking standards and performance, student learning and development becomes the starting point for examining program quality. If the multiple stakeholders - faculty, peers, the professional community, addressed assessment issues, then accreditation can be a link among various constituencies, the parties can better understand the needs of each other and develop the necessary trust needed for understanding and support.
Author
Education; NASA Programs; Product Development; Technology Assessment

20020043265 National Coalition for Aviation Education, Washington, DC USA
Guide to Aviation Education Resources
2002; 54p; In English
Report No.(s): PB2002-104559; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche
The report contains the National Coalition Aviation Education (NCAE) Member Organization educational resources list.
NTIS
Education; Aerospace Engineering

81
ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

20020043650 Research and Technology Organization, Neuilly-sur-Seine, France
North Atlantic Treaty Organization Research and Technology Organization Highlights, *2000*
May 2001; 64p; In English
Report No.(s): PB2002-103502; Copyright; Avail: National Technical Information Service (NTIS), Microfiche
RTO is the single focus in NATO for Defense Research and Technology activities. Its mission is to conduct and promote cooperative research and information exchange. The objective is to support the development and effective use of national defense research and technology and to meet the military needs of the Alliance, to maintain a technological lead, and to provide advice to NATO and national decision makers. The RTO performs its mission with the support of an extensive network of national experts. It also ensures effective coordination with other NATO bodies involved in R&T activities.
NTIS
North Atlantic Treaty Organization (NATO); Defense Program; Military Technology; Research

82
DOCUMENTATION AND INFORMATION SCIENCE

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

20020043271 North Carolina Univ., Dept. of Mathematics and Computer Science, Pembroke, NC USA
Wing Classification in the Virtual Research Center *Final Report*
Campbell, William H., North Carolina Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-10; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
The Virtual Research Center (VRC) is a Web site that hosts a database of documents organized to allow teams of scientists and engineers to store and maintain documents. A number of other workgroup-related capabilities are provided. My tasks as a NASA/ASEE Summer Faculty Fellow included developing a scheme for classifying the workgroups using the VRC using the various Divisions within NASA Enterprises. to this end I developed a plan to use several CGI Perl scripts to gather classification information from the leaders of the workgroups, and to display all the workgroups within a specified classification. I designed, implemented, and partially tested scripts which can be used to do the classification. I was also asked to consider directions for future development of the VRC. I think that the VRC can use XML to advantage. XML is a markup language with designer tags that can be used to build meaning into documents. An investigation as to how CORBA, an object-oriented object request broker included with JDK 1.2, might be used also seems justified.
Author
Object-Oriented Programming; Classifications; Virtual Reality; Wings

20020043476 Freiburg Univ., Germany
Building Standardized 3D Face Data Base for Face Recognition Applications *Final Report*
Vetter, Thomas; Blanz, Volker; May 2001; 15p; In English
Contract(s)/Grant(s): N68171-00M-5590
Report No.(s): AD-A400264; R/D-9845-EN-01; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
During the past 9 months we concentrated our work on three main issues: First, we developed of methods and software for processing three-dimensional face data and started a collaboration with the University of Florida to obtain and process a large set of high quality laser scans of human heads that might be valuable for future research on automated face recognition. Second, we derived a morphable face model from a selected subset of the face data collected so far using a method we developed earlier. Third, we now also performed a series of first experiments on using a three-dimensional morphable face model for pose and illumination invariant face recognition. The results of these experiments demonstrated that the morphable model is a promising approach for compensating pose variations up to 90 deg.
DTIC
Data Bases; Three Dimensional Models; Pattern Recognition; Face (Anatomy)

20020043823 Army Research Lab., Sensors Directorate, Adelphi, MD USA
Building a Prototype Army Web Site for Scientific Research: Micrometeorology ***Final Report, Sep. 2000-Mar. 2001***
Tunick, Arnold; Mar. 2002; 15p; In English
Contract(s)/Grant(s): Proj-B53A
Report No.(s): AD-A400344; ARL-TN-187; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
A prototype Army web site for scientific research is developed to facilitate scientific exchange necessary for efficient research productivity in the modern laboratory. The web site reported here focuses on computational and experimental field studies in micrometeorology and offers a practical format for the fast and effective communication of current research ideas with other Army Research Laboratory scientists. The new web site is located at http://w3.arl. army.mil/atunick/, although it is limited to user accounts within the ARL system.
DTIC
Micrometeorology; Internets; Scientific Visualization; Prototypes

20020043829 Texas Univ., Applied Research Labs., Austin, TX USA
ONR Basic Research Program: Summary and Bibliographies ***Final Report, 1 Jan. 1996-31 Dec. 1999***
Wilson, Gary R.; Frazer, Elaine C.; Jan. 15, 2002; 36p; In English
Contract(s)/Grant(s): N00014-96-1-0298
Report No.(s): AD-A400389; ARL-TR-02-01; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The Office of Naval Research (ONR) sponsored the Basic Research Program, a discretionary grant program for the purpose of giving university laboratory directors freedom to develop and apply their resources to basic research problems of naval relevance, which might not be known or appreciated by others in the community. Program guidelines included (1) involvement of students and faculty and (2) initiation of research in areas that could transition into either core or special research initiative (SRI) programs at ONR.
DTIC
Bibliographies; Research; Students

20020043844 NASA Ames Research Center, Moffett Field, CA USA
Science Desk: General Overview
Keller, Richard M., NASA Ames Research Center, USA; [2001]; 32p; In English; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This viewgraph presentation discusses information sharing and other management procedures between related groups of scientists. ScienceOrganizer is an information repository and digital library for use by distributed scientific project teams which enables the storage and retrieval of heterogeneous project information in multiple formats. Over time, usage by persons results in the development of an increasingly information-rich knowledge base and network. Some of the engineering details include the determination of useful navigation hubs by which users can most easily navigate the information management system.
CASI
Information Systems; Information Resources Management

20020043927 Army Science Board, Washington, DC USA
The Objective Force Soldier/Soldier Team, Volume 2, The Science and Technology Challenges ***Final Report***
Douglas, Robert; Downing, Wayne; Steele, Marty; Nov. 2001; 153p; In English; Original contains color images
Report No.(s): AD-A400052; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche
The Army Science Board was tasked to: (1) Characterize the level and nature of lethality, survivability, logistical and information systems for command, control, communications and computer improvements that must be achieved to yield a more effective Objective Force Soldier across the operational spectrum. Evaluate connectivity/interface between Future Combat System variants and the Objective Force Soldier. (2) Map the technology from present to future that would obtain the improvements as described above. (3) Include in the technology roadmap an assessment of current and projected Research Development and Acquisition efforts. Highlight those areas where modest investments now may yield significant capabilities in soldier effectiveness, weight reduction, power efficiency and affordability of soldier systems. (4) Recommend alternative science and technology strategies that can provide the level of improvements outlined above. Stratify the level of cost, technical and schedule risk associated with each alternative. Address emerging technologies from academia, industry and other government agencies. The ASB responded by identifying specific goals, highlighting the uncertainty in connectivity, identifying top effectiveness gains and preparing S&T investment/activity roadmaps. Each ASB subpanel provided specific recommendations corresponding to subpanel topics: Future Threats, Conceptual Framework, Analysis, FightabilityTechnologies, Weight

Considerations, Power System Technologies, Manpower and Personnel, S&T investment Strategy, Affordability and Cost Control, Senior Officer Observations.
DTIC
Information Systems; Armed Forces; Personnel

83
ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

20020044002 Air Force Inst. of Tech., School of Systems and Logistics, Wright-Patterson AFB, OH USA
Estimating the Operating and Support Cost Difference Among TUAF C-130, C-130B and USAF C-130J Aircraft
Kosucu, Kubilay; Dec. 02, 2002; 128p; In English; Original contains color images
Report No.(s): AD-A400444; AFIT/GLM/ENS/02-10; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This study addresses the operation and support cost differences between the TUAF C-130E and C-130B, and the USAF C-130J aircraft. The TUAF C-130s have been being used for more than 30 years and changing world situations give armed forces different roles, and Turkey participates in all peacekeeping missions that are assigned by NATO (North Atlantic Treaty Organization) and the United Nations. While performing these roles, the importance of air mobility and the importance of reliability became widely appreciated. Moreover, the coming retiring age of the existing C-130s in the TUAF forced the TUAF to look for ways to improve its air mobility. Under these conditions the TUAF is trying to find a way to decrease these interruptions in the missions and to increase the capability of carrying more personnel and materials so as to increase the effectiveness of Air Lift missions. There are two ways to accomplish this target: (1) Refurbish the existing C-130s and increasing its reliability; and (2) Buy the newest version of C-130 Hercules, the C-130J. This study investigates the O&S cost difference among the aircraft by establishing a model to assess the O&S cost that can be used to evaluate the competing alternatives as well as the replacement decision for the existing systems. Cost Oriented Resource Estimation (CORE) model utilized in establishing the model. Sensitivity Analysis, and Breakeven Analysis are applied to the cost figures over 40 years. The analysis showed that C-130J armortizes itself in the lifetime of the cargo aircraft. In addition to that improved avionic, and propulsion systems increase the efficiency and effectiveness of the air mobility.
DTIC
Cost Analysis; Cost Estimates; C-130 Aircraft

85
TECHNOLOGY UTILIZATION AND SURFACE TRANSPORTATION

Includes aerospace technology transfer; urban technology; surface and mass transportation. For related information see 03 Air Transportation and Safety, 16 Space Transportation and Safety, and 44 Energy Production and Conversion. For specific technology transfer applications see also the category where the subject is treated.

20020044011 Seoul National Univ., Korea, Republic of
7th GNSS Workshop: International Symposium on GPS/GNSS
Dec. 02, 2000; 399p; In Korean; Proceedings of GNSS Workshop (7th) held at Intl. Symposium on GPS/GNSS in Seoul, Korea, 30 Nov 30-2 Dec 2000. Abstracts in English; text in Korean
Contract(s)/Grant(s): F62562-00-M-9185
Report No.(s): AD-A400303; No Copyright; Avail: CASI; A17, Hardcopy; A04, Microfiche

International Symposium on GPS (Global Positioning System)/GNSS (Global Navigation Satellite System) was held November 30 - December 2, 2000 in Seoul, Korea. Forty-six papers are included in the proceedings. Topical sessions included: Navigation Technology, DGPS (Differential Global Positioning System), Timing and IT (Information Technology) Applications, GIS (Global Information System) and Surveying, and Carrier Phase Technique.
DTIC
Global Positioning System; Satellite Networks

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ASTRONOMY

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

20020043681 Naval Observatory, Washington, DC USA
Advances in Astrometry and Geophysics Made Possible by Radio Interferometry
Johnston, Kenneth J.; Jan. 1998; 10p; In English
Report No.(s): AD-A400378; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Radio Interferometry has had a tremendous impact on the development of astrometry and geodesy. Barry Clark has played a leading role in developing the technology of radio interferometry through his work on connected-element interferometry, i.e., the Green Bank Interferometer and Very Large Array; and VLBI, i.e., the Mark I and II VLBI systems and the Very Long Baseline Array (VLBA). These efforts resulted in an increase in astrometric accuracy of four orders of magnitude. Stellar positions at radio wavelengths now can be measured with a precision of 0.1 milliarcseconds (mas). Earth orientation parameters such as UT1 and polar motion are now measured with precisions of 10 microarcseconds (micronas). The precession constants and models for nutation need revision to precisions at the microarcsecond level. Tectonic plate motion was directly measured in the 1980s. These were and are exciting times for research in these fields and Barry's scientific career parallels them especially in astrometry.
DTIC
Astrometry; Geophysics; Very Long Base Interferometry; Very Long Baseline Array (VLBA); Interferometry

20020044000 Smithsonian Astrophysical Observatory, Cambridge, MA USA
Identification of M Supergiant and B Star Binaries in the Magellanic Clouds ADP ***Final Report, 1 Nov. 1999 - 31 Jan. 2002***
Evans, Nancy, Smithsonian Astrophysical Observatory, USA; April 2002; 14p; In English
Contract(s)/Grant(s): NAG5-8872; Copyright; Avail: Issuing Activity

Polaris has presented us with the rare phenomenon of a Cepheid with a pulsation amplitude that has decreased over the last 50 yr. In this study we have used this property to see whether the amplitude decrease during the last 15 yr has had any effect on upper atmosphere heating. We obtained IUE high and low-resolution spectra but found no change in either the Mg II chromospheric emission or the flux at 1800 A between 1978 and 1993 when the pulsation amplitude dropped by 50% (from 2.8 to 1.6 km/s). The energy distribution from 1700 A through V, Be, R(KC), and I(KC) is like that of a nonvariable supergiant of the same color rather than a full amplitude Cepheid in that it has more flux at 1800 A than the full amplitude Cepheid delta Cap. Polaris also has a rapidly changing period (3.2 s/yr), in common with other overtone pulsators. We argue that this is a natural consequence of the different envelope locations that dominate pulsation growth rates in fundamental and overtone pulsation. In fundamental mode pulsators, the deeper envelope is more important in determining growth rates than for overtone pulsators. For fundamental mode pulsators, evolutionary changes in the radius produce approximately linear changes in period. In overtone pulsators, pulsation reacts to small evolutionary changes in a more unstable way because the modes are more sensitive to high envelope features such as opacity bumps, and the growth rates for the many closely spaced overtone modes change easily. Finally, the upper limit to the X-ray flux from an Einstein observation implies that the companion in the astrometric orbit is earlier than FAA V. The combination of upper and lower limits on the companion from IUE and Einstein respectively catch the companion mass between 1.7 and 1.4 solar mass. The X-ray limit is consistent with the more distant companion alpha UMi B being a physical companion in a hierarchal triple system. However the X-ray limits require that the even more distant companions alpha UMi C and D are too old to be physically associated with Polaris.
Author
Magellanic Clouds; Binary Stars; Cepheid Variables; Stellar Oscillations; Stellar Atmospheres

20020044040 Smithsonian Astrophysical Observatory, Cambridge, MA USA
Origins of Solar Systems: Removing Activity-Related Radial Velocity Noise to Improve Extrasolar Planet Searches ***Progress Report, 1 Apr. 2001 - 31 Mar. 2002***
Saar, Steven, Smithsonian Astrophysical Observatory, USA; April 2002; 4p; In English
Contract(s)/Grant(s): NAG5-10630; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

We have continued the super high resolution (R is approximately 200,000), high S/N ((greater than) 300) echelle study of joint line bisector and radial velocity variations using the McDonald 2-D (two dimensional) coude. Observing runs in October 2000 and March 2001 were plagued by poor weather, but runs in June and October 2001 were good. We have made a preliminary analysis of the limited data in hand, and find some tantalizing evidence for correlations between median line bisector displacement

and radial velocity v (sub r). The correlation appears to be specific to the particular star being considered, probably since it is a function of both spectral type and rotation rate.
Derived from text
Extrasolar Planets; Radial Velocity

20020044055 Arizona Univ., Lunar and Planetary Lab., Tucson, AZ USA
Long-term Doppler Shift and Line Profile Studies of Planetary Search Target Stars ***Final Report, 1 Mar. 1997 - 2 May 2002***
McMillan, Robert S., Arizona Univ., USA; [2002]; 13p; In English
Contract(s)/Grant(s): NAG5-4598
Report No.(s): UA-FRS-347140; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This grant supported attempts to develop a method for measuring the Doppler shifts of solar-type stars more accurately. The expense of future space borne telescopes to search for solar systems like our own makes it worth trying to improve the relatively inexpensive pre-flight reconnaissance by ground-based telescopes. The concepts developed under this grant contributed to the groundwork for such improvements. They were focused on how to distinguish between extrasolar planets and stellar activity (convection) cycles. to measure the Doppler shift (radial velocity; RV) of the center of mass of a star in the presence of changing convection in the star's photosphere, one can either measure the effect of convection separately from that of the star's motion and subtract its contribution to the apparent RV, or measure the RV in a way that is insensitive to convection. This grant supported investigations into both of these approaches. We explored the use of a Fabry-Perot Etalon HE interferometer and a multichannel Fourier Transform Spectrometer (mFTS), and finished making a 1.8-m telescope operational and potentially available for this work.
Author
Doppler Effect; Main Sequence Stars; Stellar Activity; Extrasolar Planets; Photosphere

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ASTROPHYSICS

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

20020043257 NASA Ames Research Center, Moffett Field, CA USA
Sugar-Related Organic Compounds in Carbonaceous Meteorites
Cooper, G., NASA Ames Research Center, USA; Kimmich, N., NASA Ames Research Center, USA; Belisle, W., NASA Ames Research Center, USA; Sarinana, J., NASA Ames Research Center, USA; Brabham, K., NASA Ames Research Center, USA; Garrel, L., NASA Ames Research Center, USA; [2001]; 26p; In English
Contract(s)/Grant(s): RTOP 344-38-12-15; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Sugars and related polyols are critical components of all organisms and may have been necessary for the origin of life. to date, this class of organic compounds had not been definitively identified in meteorites. This study was undertaken to determine if polyols were present in the early Solar System as constituents of carbonaceous meteorites. Results of analyses of the Murchison and Murray meteorites indicate that formaldehyde and sugar chemistry may be responsible for the presence of a variety of polyols. We conclude that polyols were present on the early Earth through delivery by asteroids and possibly comets.
Author
Asteroids; Biological Evolution; Carbonaceous Meteorites; Organic Compounds; Organisms; Sugars; Meteorites

20020043280 NASA Goddard Space Flight Center, Greenbelt, MD USA
An Overview of Observations by the Cassini Radio and Plasma Wave Investigation at Earth
Kurth, W. S., Iowa Univ., USA; Hospodarsky, G. B., Iowa Univ., USA; Gurnett, D. A., Iowa Univ., USA; Kaiser, M. L., NASA Goddard Space Flight Center, USA; Wahlund, J.-E., Swedish Inst. of Space Physics, Sweden; Roux, A., Centre d'Etudes des Environnements et Planetaires, France; Canu, P., Centre d'Etudes des Environnements et Planetaires, France; Zarka, P., Observatoire de Paris-Meudon, France; Tokarev, Y., Radiophysical Research Inst., Russia; Journal of Geophysical Research; Dec. 01, 2001; ISSN 0148-0227; Volume 106, No. A12, pp. 30,239-30,252; In English; Original contains color illustrations
Contract(s)/Grant(s): JPL-961152; CRDF-RP1-2107
Report No.(s): Paper-2001JA900033; Copyright; Avail: Issuing Activity
On August 18, 1999, the Cassini spacecraft flew by Earth at an altitude of 1186 km on its way to Saturn. Although the flyby was performed exclusively to provide the spacecraft with sufficient velocity to get to Saturn, the radio and plasma wave science (RPWS) instrument, along with several others, was operated to gain valuable calibration data and to validate the operation of a

number of capabilities. In addition, an opportunity to study the terrestrial radio and plasma wave environment with a highly capable instrument on a swift fly-through of the magnetosphere was afforded by the encounter. This paper provides an overview of the RPWS observations, at Earth, including the identification of a number of magnetospheric plasma wave modes, an accurate measurement of the plasma density over a significant portion of the trajectory using the natural wave spectrum in addition to a relaxation sounder and Langmuir probe, the detection of natural and human-produced radio emissions, and the validation of the capability to measure the wave normal angle and Poynting flux of whistler-mode chorus emissions. The results include the observation of a double-banded structure at closest' approach including a band of Cerenkov emission bounded by electron plasma and upper hybrid frequencies and an electron cyclotron harmonic band just above the second harmonic of the electron cyclotron frequency. In the near-Earth plasma sheet, evidence for electron phase space holes is observed, similar to those first reported by Geotail in the magnetotail. The wave normal analysis confirms the Polar result that chorus is generated very close to the magnetic equator and propagates to higher latitudes. The integrated power flux of auroral kilometric radiation is also used to identify a series of substorms observed during the outbound passage through the magnetotail.
Author
Radio Waves; Plasma Waves; Earth Magnetosphere; Whistlers; Dawn Chorus; Plasma Density; Radio Astronomy

20020043294 New York City Technical Coll., Dept. of Physical and Biological Science, Brooklyn, NY USA
Interstellar Initiative Web Page Design ***Final Report***
Mehta, Alkesh, New York City Technical Coll., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-13; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
This summer at NASA/MSFC, I have contributed to two projects: Interstellar Initiative Web Page Design and Lenz's Law Relative Motion Demonstration. In the Web Design Project, I worked on an Outline. The Web Design Outline was developed to provide a foundation for a Hierarchy Tree Structure. The Outline would help design a Website information base for future and near-term missions. The Website would give in-depth information on Propulsion Systems and Interstellar Travel. The Lenz's Law Relative Motion Demonstrator is discussed in this volume by Russell Lee.
Author
Interstellar Travel; Information Systems; Websites

20020043314 Raytheon Technical Services Co., Lanham, MD USA
The Winds of B Supergiants ***Final Report***
Massa, Derck, Raytheon Technical Services Co., USA; [2002]; 26p; In English
Contract(s)/Grant(s): NASA Order S-57790-Z; RITSS-3400; NAG5-7372; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
We present the most suitable data sets available in the International Ultraviolet Explorer (IUE) archive for the study of time-dependent stellar winds in early B supergiants. The UV line profile variability in 11 B0 to B3 stars is analyzed, compared and discussed, based on 16 separate data sets comprising over 600 homogeneously reduced high-resolution spectrograms. The targets include 'normal' stars with moderate rotation rates and examples of rapid rotators. A gallery of grey-scale images (dynamic spectra) is presented, which demonstrates the richness and range of wind variability and highlights different structures in the winds of these stars. This work emphasizes the suitability of B supergiants for wind studies, under-pinned by the fact that they exhibit unsaturated wind lines for a wide range of ionization. The wind activity of B supergiants is substantial and has highly varied characteristics. The variability evident in individual stars is classified and described in terms of discrete absorption components, spontaneous absorption, bowed structures, recurrence, and ionization variability and stratification. Similar structures can occur in stars of different fundamental parameters but also different structures may occur in the same star at a given epoch. We discuss the physical phenomena that may be associated with the spectral signatures, and highlight the challenges that these phenomena present to theoretical studies of time-dependent outflows in massive stars. In addition, SEI line-synthesis modelling of the UV wind lines is used to provide further information about the state of the winds in our program stars. Typically the range, implied by the line profile variability, in the product of mass-loss rate and ion fraction (M qi) is a factor of approximately 1.5, when integrated between 0.2 and 0.9 v infinity; it it can however be several times larger over localized velocity regions. At a given effective temperature the mean relative ion ratios can differ by a factor of 5. The general excess in predicted (forward-scattered) emission in the low velocity regime is discussed in turns of structured outflows. Mean ion fractions are estimated over the B0 to B1 spectral classes, and trends in the ionic ratios as a function of wind velocity are described. The low values obtained for the ion fractions of UV resonance lines may reflect the role of clumping in the wind.
Author
Supergiant Stars; Stellar Winds; B Stars; Ultraviolet Astronomy; IUE

20020043373 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA USA

Electron Densities Near Io from Galileo Plasma Wave Observations

Gurnett, D. A., Iowa Univ., USA; Persoon, A. M., Iowa Univ., USA; Kurth, W. S., Iowa Univ., USA; Roux, A., Universite de Versailles Saint Quentin, France; Bolton, S. J., Jet Propulsion Lab., California Inst. of Tech., USA; Journal of Geophysical Research; Nov. 01, 2001; ISSN 0148-0227; Volume 106, No. A11, pp. 26,225-26,232; In English; Original contains color illustrations

Contract(s)/Grant(s): JPL-958779

Report No.(s): Paper-2000JA002509; Copyright; Avail: Issuing Activity

This paper presents an overview of electron densities obtained near Io from the Galileo plasma wave instrument during the first four flybys of Io. These flybys were Io, which was a downstream wake pass that occurred on December 7, 1995; I24, which was an upstream pass that occurred on October 11, 1999; I25, which was a south polar pass that occurred on November 26, 1999; and I27, which was an upstream pass that occurred on February 22, 2000. Two methods were used to measure the electron density. The first was based on the frequency of upper hybrid resonance emissions, and the second was based on the low-frequency cutoff of electromagnetic radiation at the electron plasma frequency. For three of the flybys, Io, I25, and I27, large density enhancements were observed near the closest approach to Io. The peak electron densities ranged from 2.1 to 6.8 x 10(exp 4) per cubic centimeters. These densities are consistent with previous radio occultation measurements of Io's ionosphere. No density enhancement was observed during the I24 flyby, most likely because the spacecraft trajectory passed too far upstream to penetrate Io's ionosphere. During two of the flybys, I25 and I27, abrupt step-like changes were observed at the outer boundaries of the region of enhanced electron density. Comparisons with magnetic field models and energetic particle measurements show that the abrupt density steps occur as the spacecraft penetrated the boundary of the Io flux tube, with the region of high plasma density on the inside of the flux tube. Most likely the enhanced electron density within the Io flux tube is associated with magnetic field lines that are frozen to Io by the high conductivity of Io's atmosphere, thereby enhancing the escape of plasma along the magnetic field lines that pass through Io's ionosphere.

Author

Electron Density (Concentration); Galileo Spacecraft; Io; Plasma Waves; Flyby Missions; Observation

20020043397 Smithsonian Astrophysical Observatory, Cambridge, MA USA

A Multi-Wavelength Study of the Hot Component of the Interstellar Medium ***Annual Report, 1 Apr. 2001 - 31 Mar. 2002***

Nichols, Joy, Smithsonian Astrophysical Observatory, USA; March 2002; 69p; In English; Original contains color illustrations

Contract(s)/Grant(s): NAG5-8483; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The goals of this research are as follows: (1) Using the large number of lines of sight available in the ME database, identify the lines of sight with high-velocity components in interstellar lines, from neutral species through Si VI, C IV, and N V; (2) Compare the column density of the main components (i.e. low velocity components) of the interstellar lines with distance, galactic longitude and latitude, and galactic radial position. Derive statistics on the distribution of components in space (e.g. mean free path, mean column density of a component). Compare with model predictions for the column densities in the walls of old SNR bubbles and superbubbles, in evaporating cloud boundaries and in turbulent mixing layers; (3) For the lines of sight associated with multiple high velocity, high ionization components, model the shock parameters for the associated superbubble and SNR to provide more accurate energy input information for hot phase models and galactic halo models. Thus far 49 lines of sight with at least one high velocity component to the C IV lines have been identified; and (4) Obtain higher resolution data for the lines of sight with high velocity components (and a few without) to further refine these models.

Derived from text

Interstellar Matter; Supernova Remnants; Line Spectra; Ultraviolet Spectra

20020043797 Smithsonian Astrophysical Observatory, Cambridge, MA USA

Evolution of Pre-Main Sequence Accretion Disks ***Annual Report, 1 Jul. 2001 - 30 Jun. 2002***

Hartmann, Lee W., Smithsonian Astrophysical Observatory, USA; April 2002; 8p; In English

Contract(s)/Grant(s): NAG5-9670; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The aim of this project is to develop a comprehensive global picture of the physical conditions in, and evolutionary timescales of, pre-main sequence accretion disks. The results of this work will help constrain the initial conditions for planet formation. to this end we plan to: (1) Develop much larger samples of 3-10 Myr-old stars to provide better empirical constraints on protoplanetary disk evolution; (2) Study the dusty emission and accretion rates in these systems, with ages closer to the expected

epoch of (giant) planet formation at 3-10 Myr; and (3) Develop detailed model disk structures consistent with observations to infer physical conditions in protoplanetary disks and to constrain possible grain growth as the first stage of planetesimal formation.
Derived from text
Accretion Disks; Planetary Evolution; Protoplanetary Disks

20020043822 Smithsonian Astrophysical Observatory, Cambridge, MA USA
Shocks in Dense Clouds in the Vela Supernova Remnant: FUSE ***Final Report, 1 Mar. 2000 - 28 Feb. 2002***
Nichols, Joy, Smithsonian Astrophysical Observatory, USA; March 2002; 32p; In English; Original contains color illustrations
Contract(s)/Grant(s): NAG5-9002; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We have obtained 8 LWRS FUSE spectra to study a recently identified interaction of the Vela supernova remnant with a dense cloud region along its western edge. The goal is to quantify the temperature, ionization, density, and abundance characteristics associated with this shock/dense cloud interface by means of UV absorption line studies. Our detection of high-velocity absorption line C I at +90 to +130 km/s with IUE toward a narrow region interior to the Vela SNR strongly suggests the Vela supernova remnant is interacting with a dense ISM or molecular cloud. The shock/dense cloud interface is suggested by (1) the rarity of detection of high-velocity C I seen in IUE spectra, (2) its very limited spatial distribution in the remnant, and (3) a marked decrease in X-ray emission in the region immediately west of the position of these stars where one also finds a 100 micron emission ridge in IRAS images. We have investigated the shock physics and general properties of this interaction region through a focussed UV absorption line study using FUSE spectra. We have FUSE data on OVI absorption lines observed toward 8 stars behind the Vela supernova remnant (SNR). We compare the OVI observations with IUE observations of CIV absorption toward the same stars. Most of the stars, which are all B stars, have complex continua making the extraction of absorption lines difficult. Three of the stars, HD 72088, HD 72089 and HD 72350, however, are rapid rotators (v sin i less than 100 km/s) making the derivation of absorption column densities much easier. We have measured OVI and CIV column densities for the ”main component” (i.e. the low velocity component) for these stars. In addition, by removing the H2 line at 1032.35A (121.6 km/s relative to OVI), we find high velocity components of OVI at approximately 150 km/s that we attribute to the shock in the Vela SNR. The column density ratios and magnitudes are compared to both steady shock models and results of hydrodynamical SNR modeling. We find that the models require the shock to be relatively slow (approximately 100 - 170 km/s) to match the FUSE data. We discuss the implications of our results for models of the evolution of the Vela SNR.
Author
Far UV Spectroscopic Explorer; Supernova Remnants; Ultraviolet Absorption; Line Spectra

20020043978 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA USA
The Plasma Wave Environment of Europa
Kurth, W. S., Iowa Univ., USA; Gurnett, D. A., Iowa Univ., USA; Persoon, A. M., Iowa Univ., USA; Roux, A., Universite de Versailles Saint Quentin, France; Bolton, S. J., Jet Propulsion Lab., California Inst. of Tech., USA; Alexander, C. J., Jet Propulsion Lab., California Inst. of Tech., USA; Planetary and Space Science; 2001; ISSN 0032-0633; Volume 49, pp. 345-363; In English; Original contains color illustrations
Contract(s)/Grant(s): JPL-958779; Copyright; Avail: Issuing Activity

The Galileo spacecraft has executed nine close flybys of Jupiter’s moon Europa for which plasma wave observations were obtained. This paper presents an analysis of the observations from these flybys taking into consideration the variable geometry of the trajectories in an attempt to characterize the general plasma-wave environment associated with the interaction of the Jovian magnetosphere with the moon. A wide variety of plasma-wave phenomena are found to be associated with this interaction. While there are apparently temporal variations which complicate the analysis, a crude model of the distribution of these phenomena around Europa is derived. Primarily on the upstream side of Europa, and working inward to the moon, electron-cyclotron harmonics are first observed, followed by a region within about two Europa radii of the moon with whistler-mode hiss or chorus, and culminating in a region closest to the moon where a band at the upper hybrid resonance frequency is sometimes enhanced over its ambient intensity. The wake region is approximately two Europa radii across and comprises a broadband, highly variable, and bursty electrostatic phenomenon. Upon closer inspection, these bursty emissions appear as solitary structures similar to those in Earth’s auroral zone and plasma sheet boundary layer. In addition to the survey of wave phenomena in the vicinity of Europa, we provide density profiles derived primarily from the upper hybrid resonance frequency which is readily apparent throughout most of each of the flybys. Finally, we suggest that the whistler mode, electron cyclotron harmonic, and upper hybrid resonance emissions are driven by some combination of factors including variations in the magnetic field near Europa and the loss and production of plasma at Europa as a result of the interaction of the Jovian magnetosphere with the moon. by analogy with studies

of the ion and electron holes and broadband electrostatic noise at Earth and Jupiter, we argue that the electrostatic solitary structures in the wake are associated with currents and beams coupling Europa to Jupiter's ionosphere.
Author
Europa; Plasma Waves; Planetary Environments; Planetary Magnetic Fields; Jupiter Atmosphere

20020043999 Smithsonian Astrophysical Observatory, Cambridge, MA USA
Gravitational Lenses and the Structure and Evolution of Galaxies ***Final Report, 1 Jun. 2001 - 31 May 2002***
Kockanek, Christopher, Smithsonian Astrophysical Observatory, USA; April 2002; 2p; In English
Contract(s)/Grant(s): NAG5-9265; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche
This grant has supported papers which present a new direction in the theory and interpretation of gravitational lenses. During the second year we have focused more closely on the relationship of baryons and dark matter.
Derived from text
Galactic Structure; Gravitational Lenses

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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.

20020043284 New York City Technical Coll., Dept. of Physical and Biological Science, Brooklyn, NY USA
Jupiter, Tether, and Lenz's Law ***Final Report***
Lee, Russell, New York City Technical Coll., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. E-11; In English
Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only
Jupiter has a large, complex, and intense magnetic field that is thought to arise from electrical currents in the rapidly spinning metallic hydrogen interior. The strong magnetic field can induce currents when the conductive tether is directed toward or away from Jupiter. The currents can be stored and used for both propulsion and power generation. Therefore, our spacecraft might be able to visit several Jovian moons or maintain in the orbit around Jupiter. In our future space traveling, we also can use this technical skill to travel to other planets without any fuel. First-year physics textbooks describe Lenz's Law in which current is induced in a conductor moving through a stationary magnetic field. A demonstration of induced current in a stationary conductor and moving magnetic field is described, which may have space-tether application.
Author
Jupiter (Planet); Tethering; Electric Current

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SOLAR PHYSICS

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

20020043798 Smithsonian Astrophysical Observatory, Cambridge, MA USA
The Development of a New Model of Solar EUV Irradiance Variability ***Annual Report, 1 May 2001 - 30 Apr. 2002***
Warren, Harry, Smithsonian Astrophysical Observatory, USA; April 2002; 4p; In English
Contract(s)/Grant(s): NAG5-10786; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche
The goal of this research project is the development of a new model of solar EUV (Extreme Ultraviolet) irradiance variability. The model is based on combining differential emission measure distributions derived from spatially and spectrally resolved observations of active regions, coronal holes, and the quiet Sun with full-disk solar images. An initial version of this model was developed with earlier funding from NASA. The new version of the model developed with this research grant will incorporate observations from SoHO as well as updated compilations of atomic data. These improvements will make the model calculations much more accurate.
Derived from text
Extreme Ultraviolet Radiation; Solar Radiation; Variability; Models

20020044001 Smithsonian Astrophysical Observatory, Cambridge, MA USA

Properties of Minor Ions In the Solar Wind and Implications for the Background Solar Wind Plasma ***Annual Report, 1 Jun. 2001 - 31 May 2002***

Esser, Ruth, Smithsonian Astrophysical Observatory, USA; April 2002; 5p; In English; Original contains color illustrations

Contract(s)/Grant(s): NAG5-10996; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Ion charge states measured in situ in interplanetary space carry information on the properties of the solar wind plasma in the inner corona. The goal of the proposal is to determine coronal plasma conditions that produce the in situ observed charge states. This study is carried out using solar wind models, coronal observations, ion fraction calculations and in situ observations. Derived from text

Ions; Solar Wind; Interplanetary Space

93
SPACE RADIATION

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

20020043281 Minnesota State Univ., Mankato, MN USA

Gamma-Ray Burst Subclasses: Separating Instrumental Biases from Potential Source Populations ***Final Report***

Hakkila, Jon, Minnesota State Univ., USA; 1999 NASA/ASEE Summer Faculty Fellowship Program; October 1999, pp. D-24; In English

Contract(s)/Grant(s): NGT8-52874; No Copyright; Avail: Issuing Activity; Abstract Only

Instrumental effects mar gamma-ray burst observations. These effects can alter whether or not bursts trigger, as well as changing measured burst properties. The Burst and Transient Source Experiment (BATSE) on NASA's Compton Gamma-Ray Observatory (CGRO) has provided the largest database of gamma-ray bursts observed to date. It also provides an excellent laboratory for studying instrumental biases. We examine trigger biases and burst property biases as they pertain to previously identified gamma-ray burst classes. We also study some burst class properties in the new age of burst afterglow studies. Author

Gamma Ray Bursts; Gamma Ray Observatory; Populations; Gamma Ray Astronomy

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