Scientific and Technical Aerospace Reports

STAR

Volume 38
December 15, 2000

National Aeronautics and
Space Administration
Langley Research Center

**Scientific and Technical
Information Program Office**

The NASA STI Program Office . . . in Profile

Since its founding, NASA has been dedicated to the advancement of aeronautics and space science. The NASA Scientific and Technical Information (STI) Program Office plays a key part in helping NASA maintain this important role.

The NASA STI Program Office is operated by Langley Research Center, the lead center for NASA's scientific and technical information. The NASA STI Program Office provides access to the NASA STI Database, the largest collection of aeronautical and space science STI in the world. The Program Office is also NASA's institutional mechanism for disseminating the results of its research and development activities. These results are published by NASA in the NASA STI Report Series, which includes the following report types:

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

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

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

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

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

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

Specialized services that complement the STI Program Office's diverse offerings include creating custom thesauri, building customized databases, organizing and publishing research results . . . even providing videos.

For more information about the NASA STI Program Office, see the following:

- Access the NASA STI Program Home Page at ***http://www.sti.nasa.gov***

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

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

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

- Write to:
  NASA STI Help Desk
  NASA Center for AeroSpace Information
  7121 Standard Drive
  Hanover, MD 21076-1320

Introduction

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:

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

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

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

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

SCAN Goes Electronic!

If you have electronic mail or if you can access the Internet, you can view biweekly issues of *SCAN* from your desktop absolutely free!

Electronic SCAN takes advantage of computer technology to inform you of the latest worldwide, aerospace-related, scientific and technical information that has been published.

No more waiting while the paper copy is printed and mailed to you. You can view *Electronic SCAN* the same day it is released—up to 191 topics to browse at your leisure. When you locate a publication of interest, you can print the announcement. You can also go back to the *Electronic SCAN* home page and follow the ordering instructions to quickly receive the full document.

Start your access to *Electronic SCAN* today. Over 1,000 announcements of new reports, books, conference proceedings, journal articles...and more—available to your computer every two weeks.

Timely Flexible Complete FREE!

For Internet access to *E-SCAN*, use any of the following addresses:

http://www.sti.nasa.gov
ftp.sti.nasa.gov
gopher.sti.nasa.gov

To receive a free subscription, send e-mail for complete information about the service first. Enter **scan@sti.nasa.gov** on the address line. Leave the subject and message areas blank and send. You will receive a reply in minutes.

Then simply determine the SCAN topics you wish to receive and send a second e-mail to **listserv@sti.nasa.gov**. Leave the subject line blank and enter a subscribe command, denoting which topic you want and your name in the message area, formatted as follows:

Subscribe SCAN–02–01 Jane Doe

For additional information, e-mail a message to **help@sti.nasa.gov**.

Phone: (301) 621-0390

Fax: (301) 621-0134

Write: NASA STI Help Desk
NASA Center for AeroSpace Information
7121 Standard Drive
Hanover, MD 21076-1320

Looking just for *Aerospace Medicine and Biology* reports?

Although hard copy distribution has been discontinued, you can still receive these vital announcements through your *E-SCAN* subscription. Just **Subscribe SCAN-AEROMED Jane Doe** in the message area of your e-mail to **listserv@sti.nasa.gov**.

New Feature!
subscribe SCAN-AEROMED

Table of Contents

Subject Divisions

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

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

Indexes

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

Subject Term Index
Personal Author Index

Document Availability

Select **Availability Info** for important information about NASA Scientific and Technical Information (STI) Program Office products and services, including registration with the NASA Center for AeroSpace Information (CASI) for access to the NASA CASI TRS (Technical Report Server), and availability and pricing information for cited documents.

Subject Categories of the Division A. Aeronautics

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

01 Aeronautics (General) 1

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

02 Aerodynamics 2

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

03 Air Transportation and Safety 5

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 7

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 8

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

07 Aircraft Propulsion and Power 12

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 13

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) 13

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

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

13 Astrodynamics 14

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

15 Launch Vehicles and Launch Operations 14

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 15

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 17

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.*

19 Spacecraft Instrumentation and Astrionics 18

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

20 Spacecraft Propulsion and Power 18

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

Subject Categories of the Division C. Chemistry and Materials

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

23 Chemistry and Materials (General) 19

Includes general research topics related to the composition, properties, structure, and use of chemical compounds and materials as they relate to aircraft, launch vehicles, and spacecraft. For specific topics in chemistry and materials see *categories 24 through 29*. For astrochemistry see category *90 Astrophysics*.

24 Composite Materials 22

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

25 Inorganic, Organic, and Physical Chemistry 23

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 28

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

27 Nonmetallic Materials 31

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 32

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 41

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) 42

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 44

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 48

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 52

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.*

36 Lasers and Masers 54

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 55

Includes mechanical devices and equipment; machine elements and processes. For cases where the application of a device or the host vehicle is emphasized see also the specific category where the application or vehicle is treated. For robotics see *63 Cybernetics, Artificial Intelligence, and Robotics*; and *54 Man/System Technology and Life Support*.

38 Quality Assurance and Reliability 57

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

39 Structural Mechanics 57

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) 59

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 60

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 82

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 82

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

46 Geophysics 91

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 96

Includes weather observation forecasting and modification.

48 Oceanography 97

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) 102

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 105

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 120

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

54 Man/System Technology and Life Support 121

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*..

55 Exobiology 122

Includes astrobiology; planetary biology; and extraterrestrial life. For the biological effects of aerospace environments on humans see *52 Aerospace medicine*; on animals and plants see *51 Life Sciences*. For psychological and behavioral effects of aerospace environments see *53 Behavioral Science*.

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 123

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 124

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 133

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 135

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 139

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

65 Statistics and Probability 141

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

66 Systems Analysis and Operations Research 141

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

67 Theoretical Mathematics 142

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

Subject Categories of the Division H. Physics

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

70 Physics (General) 144

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 145

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 148

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

73 Nuclear Physics 150

Includes nuclear particles; and reactor theory. For space radiation see *93 Space Radiation*. For atomic and molecular physics see *72 Atomic and Molecular Physics*. For elementary particle physics see *77 Physics of Elementary Particles and Fields*. For nuclear astrophysics see *90 Astrophysics*.

74 Optics 153

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

75 Plasma Physics 154

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

76 Solid-State Physics 162

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

77 Physics of Elementary Particles and Fields 165

Includes quantum mechanics; theoretical physics; and statistical mechanics. For related information see also *72 Atomic and Molecular Physics, 73 Nuclear Physics, and 25 Inorganic, Organic and Physical Chemistry.*

Subject Categories of the Division I. Social and Information Sciences

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

80 Social and Information Sciences (General) 165

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

81 Administration and Management 166

Includes management planning and research.

82 Documentation and Information Science 170

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

84 Law, Political Science and Space Policy 175

Includes aviation law; space law and policy; international law; international cooperation; and patent policy.

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 176

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

90 Astrophysics 177

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

91 Lunar and Planetary Science and Exploration 178

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 179

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

Subject Categories of the Division K. General

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

99 General 180

Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs such as Apollo, Gemini, and Mercury spacecraft, Earth Resources Technology Satellite (ERTS), and Skylab; NASA appropriations hearings.

Document Availability Information

The mission of the NASA Scientific and Technical (STI) Program Office is to quickly, efficiently, and cost-effectively provide the NASA community with desktop access to STI produced by NASA and the world's aerospace industry and academia. In addition, we will provide the aerospace industry, academia, and the taxpayer access to the intellectual scientific and technical output and achievements of NASA.

Eligibility and Registration for NASA STI Products and Services

The NASA STI Program offers a wide variety of products and services to achieve its mission. Your affiliation with NASA determines the level and type of services provided by the NASA STI Program. To assure that appropriate level of services are provided, NASA STI users are requested to register at the NASA Center for AeroSpace Information (CASI). Please contact NASA CASI in one of the following ways:

E-mail:	help@sti.nasa.gov
Fax:	301-621-0134
Phone:	301-621-0390
Mail:	ATTN: Registration Services NASA Center for AeroSpace Information 7121 Standard Drive Hanover, MD 21076-1320

Limited Reproducibility

In the database citations, a note of limited reproducibility appears if there are factors affecting the reproducibility of more than 20 percent of the document. These factors include faint or broken type, color photographs, black and white photographs, foldouts, dot matrix print, or some other factor that limits the reproducibility of the document. This notation also appears on the microfiche header.

NASA Patents and Patent Applications

Patents owned by NASA are announced in the STI Database. Printed copies of patents (which are not microfiched) are available for purchase from the U.S. Patent and Trademark Office.

When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, by money order or check payable to the Commissioner of Patents and Trademarks. Prepaid purchase coupons for ordering are also available from the U.S. Patent and Trademark Office.

Patents and patent applications owned by NASA are available for licensing. Requests for licensing terms and further information should be addressed to:

National Aeronautics and Space Administration
Associate General Counsel for Intellectual Property
Code GP
Washington, DC 20546-0001

Sources for Documents

One or more sources from which a document announced in the STI Database is available to the public is ordinarily given on the last line of the citation. The most commonly indicated sources and their acronyms or abbreviations are listed below, with an Addresses of Organizations list near the back of this section. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source.

Avail: NASA CASI. Sold by the NASA Center for AeroSpace Information. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code following the letters HC or MF in the citation. Current values are given in the NASA CASI Price Code Table near the end of this section.

Note on Ordering Documents: When ordering publications from NASA CASI, use the document ID number or other report number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in Energy Research Abstracts. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center—Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: ESDU. Pricing information on specific data, computer programs, and details on ESDU International topic categories can be obtained from ESDU International.

Avail: Fachinformationszentrum Karlsruhe. Gesellschaft für wissenschaftlich-technische Information mbH 76344 Eggenstein-Leopoldshafen, Germany.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, CA. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration (JBD-4), Public Documents Room (Room 1H23), Washington, DC 20546-0001, or public document rooms located at NASA installations, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: NTIS. Sold by the National Technical Information Service. Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) are available. For information concerning this service, consult the NTIS Subscription Section, Springfield, VA 22161.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from Dissertation Abstracts and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.

Avail: US Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of $1.50 each, postage free.

Avail: (US Sales Only). These foreign documents are available to users within the United States from the National Technical Information Service (NTIS). They are available to users outside the United States through the International Nuclear Information Service (INlS) representative in their country, or by applying directly to the issuing organization.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed on the Addresses of Organizations page. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

Addresses of Organizations

British Library Lending Division
Boston Spa, Wetherby, Yorkshire
England

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, DC 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, TN 37830

European Space Agency–
Information Retrieval Service ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

ESDU International
27 Corsham Street
London
N1 6UA
England

Fachinformationszentrum Karlsruhe
Gesellschaft für wissenschaftlich–technische
Information mbH
76344 Eggenstein–Leopoldshafen, Germany

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Center for AeroSpace Information
7121 Standard Drive
Hanover, MD 21076-1320

(NASA STI Lead Center)
National Aeronautics and Space Administration
Scientific and Technical Information Program Office
Langley Research Center – MS157
Hampton, VA 23681

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, CA 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, MI 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey Library National Center
MS 950
12201 Sunrise Valley Drive
Reston, VA 22092

U.S. Geological Survey Library
2255 North Gemini Drive
Flagstaff, AZ 86001

U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025

U.S. Geological Survey Library
Box 25046
Denver Federal Center, MS914
Denver, CO 80225

NASA CASI Price Tables — Effective January 1, 2000

Hardcopy & Microfiche Prices

Code	NASA	U.S.*	International*
A01	$ 9.50	$ 9.50	$ 19.00
A02	$ 13.50	$ 14.50	$ 29.00
A03	$ 24.50	$ 27.50	$ 55.00
A04	$ 27.00	$ 30.50	$ 61.00
A05	$ 28.50	$ 32.50	$ 65.00
A06	$ 31.00	$ 35.50	$ 71.00
A07	$ 34.50	$ 39.50	$ 79.00
A08	$ 37.50	$ 43.00	$ 86.00
A09	$ 42.50	$ 49.00	$ 98.00
A10	$ 45.50	$ 53.00	$ 106.00
A11	$ 48.50	$ 56.50	$ 113.00
A12	$ 52.50	$ 61.00	$ 122.00
A13	$ 55.50	$ 65.00	$ 130.00
A14	$ 57.50	$ 67.00	$ 134.00
A15	$ 59.50	$ 69.50	$ 139.00
A16	$ 61.50	$ 72.00	$ 144.00
A17	$ 63.50	$ 74.50	$ 149.00
A18	$ 67.00	$ 78.50	$ 157.00
A19	$ 69.00	$ 81.00	$ 162.00
A20	$ 71.00	$ 83.50	$ 167.00
A21	$ 73.00	$ 86.00	$ 172.00
A22	$ 78.50	$ 92.50	$ 185.00
A23	$ 80.50	$ 95.00	$ 190.00
A24	$ 82.50	$ 97.00	$ 194.00
A25	$ 84.50	$ 99.50	$ 199.00
A99	Contact NASA CASI		

Exception Prices

Code	NASA	U.S.*	International*
E01	$ 102.50	$ 121.00	$ 242.00
E02	$ 111.00	$ 131.50	$ 263.00
E03	$ 120.50	$ 143.00	$ 286.00
E04	$ 130.00	$ 154.00	$ 308.00
E05	$ 139.50	$ 165.50	$ 331.00
E06	$ 148.00	$ 176.00	$ 352.00
E07	$ 157.50	$ 187.00	$ 374.00
E08	$ 167.00	$ 198.50	$ 397.00
E09	$ 175.50	$ 209.00	$ 418.00
E10	$ 185.00	$ 220.00	$ 440.00
E11	$ 194.50	$ 231.50	$ 463.00
E12	$ 202.50	$ 241.00	$ 482.00
E13	$ 212.00	$ 252.50	$ 505.00
E14	$ 221.50	$ 264.00	$ 528.00
E15	$ 231.00	$ 275.50	$ 551.00
E16	$ 239.50	$ 285.50	$ 571.00
E17	$ 249.00	$ 297.00	$ 594.00
E18	$ 258.50	$ 308.50	$ 617.00
E19	$ 267.00	$ 318.50	$ 637.00
E20	$ 276.50	$ 330.00	$ 660.00
E21	$ 286.00	$ 341.50	$ 683.00
E22	$ 294.50	$ 351.50	$ 703.00
E23	$ 304.00	$ 363.00	$ 726.00
E24	$ 313.50	$ 374.50	$ 749.00
E99	Free	Free	Free

NASA Prices:

For NASA employees and contractors registered at NASA CASI.

*U.S. Prices: *Shipping fees extra*

For users located within the U.S.

*International Prices: *Shipping fees extra*

For users outside the U.S. and international within the U.S. embassies

Service Fees

Shipping Fees: per item

$1.50 U.S.
$9.00 International

Video Shipping Fees: per title

$3.50 U.S.
$11.00 International

Express Service Surcharge: per item

One day CASI processing & shipped FedEX or Airmail.
*This charge is in addition to the shipping fee.

$15.00 U.S.
$30.00 International

Fax Service Fees: per item up to 30 pages

$16.50 U.S.
$24.00 International

Federal Depository Library Program

In order to provide the general public with greater access to U.S. Government publications, Congress established the Federal Depository Library Program under the Government Printing Office (GPO), with 53 regional depositories responsible for permanent retention of material, inter-library loan, and reference services. At least one copy of nearly every NASA and NASA-sponsored publication, either in printed or microfiche format, is received and retained by the 53 regional depositories. A list of the Federal Regional Depository Libraries, arranged alphabetically by state, appears at the very end of this section. These libraries are not sales outlets. A local library can contact a regional depository to help locate specific reports, or direct contact may be made by an individual.

Public Collection of NASA Documents

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England for public access. The British Library Lending Division also has available many of the non-NASA publications cited in the STI Database. European requesters may purchase facsimile copy or microfiche of NASA and NASA-sponsored documents FIZ–Fachinformation Karlsruhe–Bibliographic Service, D-76344 Eggenstein-Leopoldshafen, Germany and TIB–Technische Informationsbibliothek, P.O. Box 60 80, D-30080 Hannover, Germany.

Submitting Documents

All users of this abstract service are urged to forward reports to be considered for announcement in the STI Database. This will aid NASA in its efforts to provide the fullest possible coverage of all scientific and technical publications that might support aeronautics and space research and development. If you have prepared relevant reports (other than those you will transmit to NASA, DOD, or DOE through the usual contract- or grant-reporting channels), please send them for consideration to:

ATTN: Acquisitions Specialist
NASA Center for AeroSpace Information
7121 Standard Drive
Hanover, MD 21076-1320.

Reprints of journal articles, book chapters, and conference papers are also welcome.

You may specify a particular source to be included in a report announcement if you wish; otherwise the report will be placed on a public sale at the NASA Center for AeroSpace Information. Copyrighted publications will be announced but not distributed or sold.

Federal Regional Depository Libraries

ALABAMA
AUBURN UNIV. AT MONTGOMERY LIBRARY
Documents Dept.
7300 University Dr.
Montgomery, AL 36117–3596
(205) 244–3650 Fax: (205) 244–0678

UNIV. OF ALABAMA
Amelia Gayle Gorgas Library
Govt. Documents
P.O. Box 870266
Tuscaloosa, AL 35487–0266
(205) 348–6046 Fax: (205) 348–0760

ARIZONA
DEPT. OF LIBRARY, ARCHIVES, AND PUBLIC RECORDS
Research Division
Third Floor, State Capitol
1700 West Washington
Phoenix, AZ 85007
(602) 542–3701 Fax: (602) 542–4400

ARKANSAS
ARKANSAS STATE LIBRARY
State Library Service Section
Documents Service Section
One Capitol Mall
Little Rock, AR 72201–1014
(501) 682–2053 Fax: (501) 682–1529

CALIFORNIA
CALIFORNIA STATE LIBRARY
Govt. Publications Section
P.O. Box 942837 – 914 Capitol Mall
Sacramento, CA 94337–0091
(916) 654–0069 Fax: (916) 654–0241

COLORADO
UNIV. OF COLORADO – BOULDER
Libraries – Govt. Publications
Campus Box 184
Boulder, CO 80309–0184
(303) 492–8834 Fax: (303) 492–1881

DENVER PUBLIC LIBRARY
Govt. Publications Dept. BSG
1357 Broadway
Denver, CO 80203–2165
(303) 640–8846 Fax: (303) 640–8817

CONNECTICUT
CONNECTICUT STATE LIBRARY
231 Capitol Avenue
Hartford, CT 06106
(203) 566–4971 Fax: (203) 566–3322

FLORIDA
UNIV. OF FLORIDA LIBRARIES
Documents Dept.
240 Library West
Gainesville, FL 32611–2048
(904) 392–0366 Fax: (904) 392–7251

GEORGIA
UNIV. OF GEORGIA LIBRARIES
Govt. Documents Dept.
Jackson Street
Athens, GA 30602–1645
(706) 542–8949 Fax: (706) 542–4144

HAWAII
UNIV. OF HAWAII
Hamilton Library
Govt. Documents Collection
2550 The Mall
Honolulu, HI 96822
(808) 948–8230 Fax: (808) 956–5968

IDAHO
UNIV. OF IDAHO LIBRARY
Documents Section
Rayburn Street
Moscow, ID 83844–2353
(208) 885–6344 Fax: (208) 885–6817

ILLINOIS
ILLINOIS STATE LIBRARY
Federal Documents Dept.
300 South Second Street
Springfield, IL 62701–1796
(217) 782–7596 Fax: (217) 782–6437

INDIANA
INDIANA STATE LIBRARY
Serials/Documents Section
140 North Senate Avenue
Indianapolis, IN 46204–2296
(317) 232–3679 Fax: (317) 232–3728

IOWA
UNIV. OF IOWA LIBRARIES
Govt. Publications
Washington & Madison Streets
Iowa City, IA 52242–1166
(319) 335–5926 Fax: (319) 335–5900

KANSAS
UNIV. OF KANSAS
Govt. Documents & Maps Library
6001 Malott Hall
Lawrence, KS 66045–2800
(913) 864–4660 Fax: (913) 864–3855

KENTUCKY
UNIV. OF KENTUCKY
King Library South
Govt. Publications/Maps Dept.
Patterson Drive
Lexington, KY 40506–0039
(606) 257–3139 Fax: (606) 257–3139

LOUISIANA
LOUISIANA STATE UNIV.
Middleton Library
Govt. Documents Dept.
Baton Rouge, LA 70803–3312
(504) 388–2570 Fax: (504) 388–6992

LOUISIANA TECHNICAL UNIV.
Prescott Memorial Library
Govt. Documents Dept.
Ruston, LA 71272–0046
(318) 257–4962 Fax: (318) 257–2447

MAINE
UNIV. OF MAINE
Raymond H. Fogler Library
Govt. Documents Dept.
Orono, ME 04469–5729
(207) 581–1673 Fax: (207) 581–1653

MARYLAND
UNIV. OF MARYLAND – COLLEGE PARK
McKeldin Library
Govt. Documents/Maps Unit
College Park, MD 20742
(301) 405–9165 Fax: (301) 314–9416

MASSACHUSETTS
BOSTON PUBLIC LIBRARY
Govt. Documents
666 Boylston Street
Boston, MA 02117–0286
(617) 536–5400, ext. 226
Fax: (617) 536–7758

MICHIGAN
DETROIT PUBLIC LIBRARY
5201 Woodward Avenue
Detroit, MI 48202–4093
(313) 833–1025 Fax: (313) 833–0156

LIBRARY OF MICHIGAN
Govt. Documents Unit
P.O. Box 30007
717 West Allegan Street
Lansing, MI 48909
(517) 373–1300 Fax: (517) 373–3381

MINNESOTA
UNIV. OF MINNESOTA
Govt. Publications
409 Wilson Library
309 19th Avenue South
Minneapolis, MN 55455
(612) 624–5073 Fax: (612) 626–9353

MISSISSIPPI
UNIV. OF MISSISSIPPI
J.D. Williams Library
106 Old Gym Bldg.
University, MS 38677
(601) 232–5857 Fax: (601) 232–7465

MISSOURI
UNIV. OF MISSOURI – COLUMBIA
106B Ellis Library
Govt. Documents Sect.
Columbia, MO 65201–5149
(314) 882–6733 Fax: (314) 882–8044

MONTANA
UNIV. OF MONTANA
Mansfield Library
Documents Division
Missoula, MT 59812–1195
(406) 243–6700 Fax: (406) 243–2060

NEBRASKA
UNIV. OF NEBRASKA – LINCOLN
D.L. Love Memorial Library
Lincoln, NE 68588–0410
(402) 472–2562 Fax: (402) 472–5131

NEVADA
THE UNIV. OF NEVADA LIBRARIES
Business and Govt. Information Center
Reno, NV 89557–0044
(702) 784–6579 Fax: (702) 784–1751

NEW JERSEY
NEWARK PUBLIC LIBRARY
Science Div. – Public Access
P.O. Box 630
Five Washington Street
Newark, NJ 07101–7812
(201) 733–7782 Fax: (201) 733–5648

NEW MEXICO
UNIV. OF NEW MEXICO
General Library
Govt. Information Dept.
Albuquerque, NM 87131–1466
(505) 277–5441 Fax: (505) 277–6019

NEW MEXICO STATE LIBRARY
325 Don Gaspar Avenue
Santa Fe, NM 87503
(505) 827–3824 Fax: (505) 827–3888

NEW YORK
NEW YORK STATE LIBRARY
Cultural Education Center
Documents/Gift & Exchange Section
Empire State Plaza
Albany, NY 12230–0001
(518) 474–5355 Fax: (518) 474–5786

NORTH CAROLINA
UNIV. OF NORTH CAROLINA – CHAPEL HILL
Walter Royal Davis Library
CB 3912, Reference Dept.
Chapel Hill, NC 27514–8890
(919) 962–1151 Fax: (919) 962–4451

NORTH DAKOTA
NORTH DAKOTA STATE UNIV. LIB.
Documents
P.O. Box 5599
Fargo, ND 58105–5599
(701) 237–8886 Fax: (701) 237–7138

UNIV. OF NORTH DAKOTA
Chester Fritz Library
University Station
P.O. Box 9000 – Centennial and University Avenue
Grand Forks, ND 58202–9000
(701) 777–4632 Fax: (701) 777–3319

OHIO
STATE LIBRARY OF OHIO
Documents Dept.
65 South Front Street
Columbus, OH 43215–4163
(614) 644–7051 Fax: (614) 752–9178

OKLAHOMA
OKLAHOMA DEPT. OF LIBRARIES
U.S. Govt. Information Division
200 Northeast 18th Street
Oklahoma City, OK 73105–3298
(405) 521–2502, ext. 253
Fax: (405) 525–7804

OKLAHOMA STATE UNIV.
Edmon Low Library
Stillwater, OK 74078–0375
(405) 744–6546 Fax: (405) 744–5183

OREGON
PORTLAND STATE UNIV.
Branford P. Millar Library
934 Southwest Harrison
Portland, OR 97207–1151
(503) 725–4123 Fax: (503) 725–4524

PENNSYLVANIA
STATE LIBRARY OF PENN.
Govt. Publications Section
116 Walnut & Commonwealth Ave.
Harrisburg, PA 17105–1601
(717) 787–3752 Fax: (717) 783–2070

SOUTH CAROLINA
CLEMSON UNIV.
Robert Muldrow Cooper Library
Public Documents Unit
P.O. Box 343001
Clemson, SC 29634–3001
(803) 656–5174 Fax: (803) 656–3025

UNIV. OF SOUTH CAROLINA
Thomas Cooper Library
Green and Sumter Streets
Columbia, SC 29208
(803) 777–4841 Fax: (803) 777–9503

TENNESSEE
UNIV. OF MEMPHIS LIBRARIES
Govt. Publications Dept.
Memphis, TN 38152–0001
(901) 678–2206 Fax: (901) 678–2511

TEXAS
TEXAS STATE LIBRARY
United States Documents
P.O. Box 12927 – 1201 Brazos
Austin, TX 78701–0001
(512) 463–5455 Fax: (512) 463–5436

TEXAS TECH. UNIV. LIBRARIES
Documents Dept.
Lubbock, TX 79409–0002
(806) 742–2282 Fax: (806) 742–1920

UTAH
UTAH STATE UNIV.
Merrill Library Documents Dept.
Logan, UT 84322–3000
(801) 797–2678 Fax: (801) 797–2677

VIRGINIA
UNIV. OF VIRGINIA
Alderman Library
Govt. Documents
University Ave. & McCormick Rd.
Charlottesville, VA 22903–2498
(804) 824–3133 Fax: (804) 924–4337

WASHINGTON
WASHINGTON STATE LIBRARY
Govt. Publications
P.O. Box 42478
16th and Water Streets
Olympia, WA 98504–2478
(206) 753–4027 Fax: (206) 586–7575

WEST VIRGINIA
WEST VIRGINIA UNIV. LIBRARY
Govt. Documents Section
P.O. Box 6069 – 1549 University Ave.
Morgantown, WV 26506–6069
(304) 293–3051 Fax: (304) 293–6638

WISCONSIN
ST. HIST. SOC. OF WISCONSIN LIBRARY
Govt. Publication Section
816 State Street
Madison, WI 53706
(608) 264–6525 Fax: (608) 264–6520

MILWAUKEE PUBLIC LIBRARY
Documents Division
814 West Wisconsin Avenue
Milwaukee, WI 53233
(414) 286–3073 Fax: (414) 286–8074

Typical Report Citation and Abstract

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

Key

1. Document ID Number; Corporate Source
2. Title
3. Author(s) and Affiliation(s)
4. Publication Date
5. Contract/Grant Number(s)
6. Report Number(s); Availability and Price Codes
7. Abstract
8. Abstract Author
9. Subject Terms

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS

A Biweekly Publication of the National Aeronautics and Space Administration

VOLUME 38, DECEMBER 15, 2000

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.

20000115606 NASA Langley Research Center, Hampton, VA USA
Partners in Freedom: Contributions of the Langley Research Center to U.S. Military Aircraft of the 1990's
Chambers, Joseph R., NASA Langley Research Center, USA; October 2000; 273p; In English; Original contains color illustrations
Contract(s)/Grant(s): RTOP 522-24-11-20
Report No.(s): NASA/SP-2000-4519; NAS 1.21:4519; L-17965; No Copyright; Avail: CASI; A12, Hardcopy; A03, Microfiche

Established in 1917 as the nation#s first civil aeronautics research laboratory under the National Advisory Commit-tee for Aeronautics (NACA), Langley was a small laboratory that solved the problems of flight for military and civil aviation. Throughout history, Langley has maintained a working partnership with the Department of Defense, U.S. industry, universities, and other government agencies to support the defense of the nation with research. During World War II, Langley directed virtually all of its workforce and facilities to research for military aircraft. Following the war, a balanced program of military and civil projects was undertaken. In some instances Langley research from one aircraft program helped solve a problem in another. At the conclusion of some programs, Langley obtained the research models for additional tests to learn more about previously unknown phenomena. The data also proved useful in later developmental programs. Many of the military aircraft in the U.S. inventory as of late 1999 were over 20 years old. Langley activities that contributed to the development of some of these aircraft began over 50 years prior. This publication documents the role, from early concept stages to problem solving for fleet aircraft, that Langley played in the military aircraft fleet of the USA for the 1990's.
Author
Research Aircraft; Civil Aviation; Defense Program; Military Aircraft

20000116426 Federal Aviation Administration, Office of Aviation Policy and Plans, Washington, DC USA
Aviation Industry Overview, Fiscal Year 1999
Mar. 2000; 30p; In English
Report No.(s): PB2000-108306; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Contents include the following: Industry Overview; US Economic Outlook; Passenger Enplanements and Aircraft Departures; Traffic and Seat Capacity (57 Carriers); Financial Results (74 Carriers); Air Carrier Aircraft Orders and Deliveries; General Aviation Aircraft Shipments; FAA Workload Measures; Commercial Operations at Selected US Hubs; Traffic Demand, Seat Capacity, and Load Factors - Majors; Traffic Demand, Seat Capacity, and Load Factors - Nationals; Traffic Demand, Seat Capacity, and Load Factors - Large/Medium Regionals; Traffic Demand, Seat Capacity, and Load Factors - Selected Regionals/Commuters; Financial Results -Majors; Financial Results - Nationals; Financial Results - Large/Medium Regionals; Financial Results - Selected Regionals/Commuters; System Passenger Yields; Air Carrier Jet Fuel Prices.
NTIS
Aircraft Industry; Air Transportation

20000117687 NASA Langley Research Center, Hampton, VA USA
Aeronautical Engineering: A Continuing Bibliography, Supplement 421
November 2000; 72p; In English
Report No.(s): NASA/SP-2000-7037/SUPPL421; NAS 1.21:7037/SUPPL421; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This supplemental issue of Aeronautical Engineering, A Continuing Bibliography with Indexes (NASA/SP#2000-7037) lists reports, articles, and other documents recently announced in the NASA STI Database. The coverage includes documents on the engineering and theoretical aspects of design, construction, evaluation, testing, operation, and performance of aircraft (including aircraft engines) and associated components, equipment, and systems. It also includes research and development in aerodynamics, aeronautics, and ground support equipment for aeronautical vehicles.
Author
Aeronautical Engineering; Bibliographies; Data Bases; Indexes (Documentation)

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.

20000115622 Army Aviation and Missile Command, Army/NASA Rotorcraft Div., Moffett Field, CA USA
Evaluation of Airfoil Dynamic Stall Characteristics for Maneuverability
Bousman, William G., Army Aviation and Missile Command, USA; [2000]; 4p; In English; 26th; European Rotorcraft, 26-29 Sep. 2000, The Hague, Netherlands; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

In severe maneuvers, out of necessity for a military aircraft or inadvertently for a civil aircraft, a helicopter airfoil will stall in a dynamic manner and provide lift beyond what would be calculated based on static airfoil tests. The augmented lift that occurs in dynamic stall is related to a vortex that is shed near the leading edge of the airfoil. However, directly related to the augmented lift that results from the dynamic stall vortex are significant penalties in pitching moment and drag. An understanding of the relationship between the augmented lift in dynamic stall and the associated moment and drag penalties is the purpose of this paper. This relationship is characterized using data obtained in two-dimensional wind tunnel tests and related to the problem of helicopter maneuverability.
Derived from text
Aerodynamic Drag; Aerodynamic Stalling; Airfoils; Maneuverability; Pitching Moments

20000115874 NASA Langley Research Center, Hampton, VA USA
Numerical Simulation of Aircraft Trailing Vortices
Proctor, Fred H., NASA Langley Research Center, USA; Switzer, George F., Research Triangle Inst., USA; [2000], pp. 511-516; In English; 9th; Aviation, Range and Aerospace Meteorology, 11-15 Sep. 2000, Orlando, FL, USA; Sponsored by American Meteorological Society, USA; Original contains color illustrations; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The increase in air traffic is currently outpacing the development of new airport runways. This is leading to greater air traffic congestion, resulting in costly delays and cancellations. The National Aeronautics and Space Administration (NASA) under its Terminal Area Productivity (TAP) program is investigating new technologies that will allow increased airport capacity while maintaining the present standards for safety. As an element of this program, the Aircraft Vortex Spacing System (AVOSS) is being demonstrated in July 2000, at Dallas Ft-Worth Airport. This system allows reduced aircraft separations, thus increasing the arrival and departure rates, while insuring that wake vortices from a leading aircraft do not endanger trailing aircraft. The system uses predictions or wake vortex position and strength based on input from the current weather state. This prediction is accomplished by a semi-empirical model developed from theory, field observations, and relationships derived from numerical wake vortex simulations. Numerical experiments with a Large Eddy Simulation (LES) model are being conducted in order to provide guidance for the enhancement of these prediction algorithms. The LES Simulations of wake vortices are carried out with NASA's Terminal Area Simulation System (TASS). Previous wake vortex investigations with TASS are described. The primary objective of these numerical studies has been to quantify vortex transport and decay in relation to atmospheric variables. This paper summarizes many of the previous investigations with the TASS model and presents some new results regarding the onset of wake vortex decay.
Author
Numerical Analysis; Vortices; Algorithms; Large Eddy Simulation; Safety; Wakes

20000115876 NASA Langley Research Center, Hampton, VA USA

Recent Improvements in Aerodynamic Design Optimization on Unstructured Meshes

Nielsen, Eric J., NASA Langley Research Center, USA; Anderson, W. Kyle, NASA Langley Research Center, USA; [2000]; 12p; In English; 39th; 39th Aerospace Sciences Meeting and Exhibit, 8-11 Jan. 2001, Reno, NV, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA

Report No.(s): AIAA Paper 2001-0596; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

Recent improvements in an unstructured-grid method for large-scale aerodynamic design are presented. Previous work had shown such computations to be prohibitively long in a sequential processing environment. Also, robust adjoint solutions and mesh movement procedures were difficult to realize, particularly for viscous flows. to overcome these limiting factors, a set of design codes based on a discrete adjoint method is extended to a multiprocessor environment using a shared memory approach. A nearly linear speedup is demonstrated, and the consistency of the linearizations is shown to remain valid. The full linearization of the residual is used to precondition the adjoint system, and a significantly improved convergence rate is obtained. A new mesh movement algorithm is implemented and several advantages over an existing technique are presented. Several design cases are shown for turbulent flows in two and three dimensions.

Author

Computer Aided Design; Optimization; Computer Programs; Design Analysis; Unstructured Grids (Mathematics)

20000116077 Dynamac Corp., Cocoa Beach, FL USA

Soil, Groundwater, Surface Water, and Sediments of Kennedy Space Center, Florida: Background Chemical and Physical Characteristics

Shmalzer, Paul A., Dynamac Corp., USA; Hensley, Melissa A., Dynamac Corp., USA; Mota, Mario, Dynamac Corp., USA; Hall, Carlton R., Dynamac Corp., USA; Dunlevy, Colleen A., Dynamac Corp., USA; June 2000; 612p; In English; Original contains color illustrations

Contract(s)/Grant(s): NAS10-12180

Report No.(s): NASA/TM-2000-208583; NAS 1.15:208583; No Copyright; Avail: CASI; A99, Hardcopy; A06, Microfiche

This study documented background chemical composition of soils, groundwater, surface; water, and sediments of Kennedy Space Center. Two hundred soil samples were collected, 20 each in 10 soil classes. Fifty-one groundwater wells were installed in 4 subaquifers of the Surficial Aquifer and sampled; there were 24 shallow, 16 intermediate, and 11 deep wells. Forty surface water and sediment samples were collected in major watershed basins. All samples were away from sites of known contamination. Samples were analyzed for organochlorine pesticides, aroclors, chlorinated herbicides, polycyclic aromatic hydrocarbons (PAH), total metals, and other parameters. All aroclors (6) were below detection in all media. Some organochlorine pesticides were detected at very low frequencies in soil, sediment, and surface water. Chlorinated herbicides were detected at very low frequencies in soil and sediments. PAH occurred in low frequencies in soiL, shallow groundwater, surface water, and sediments. Concentrations of some metals differed among soil classes, with subaquifers and depths, and among watershed basins for surface water but not sediments. Most of the variation in metal concentrations was natural, but agriculture had increased Cr, Cu, Mn, and Zn.

Author

Soil Sampling; Ground Water; Chemical Composition; Aquifers; Contamination; Polycyclic Aromatic Hydrocarbons; Shallow Water; Watersheds

20000116138 Southampton Univ., Inst. of Sound and Vibration Research, UK

Structural Dynamics: Recent Advances, Volume 1

Ferguson, N. S.; Wolfe, H. F.; Ferman, M. A.; Rizzi, S. A.; Jul. 27, 2000; 753p; In English; 7th, 24-27 Jul. 2000, Southampton, UK

Contract(s)/Grant(s): F61775-00-W-F065

Report No.(s): AD-A382040; EOARD-CSP00-5065; ISBN 0-854-32721-5; Copyright; Avail: CASI; A99, Hardcopy; A06, Microfiche

The final proceedings for seventh international conference on recent advances in structural dynamics, 24 July 2000 - 27 July 2000. Aeronautics and Flutter, Analytical Developments, Numerical Methods, Finite Element Methods, Nonlinear Vibration, Experimental Techniques, Rotating Machines, Control, System Identification, Acoustic Fatigue and Thermal Effects, Power Flow Approaches and Impact Dynamics.

Derived from text

Conferences; Dynamic Structural Analysis; System Identification

20000116143 Southampton Univ., Inst. of Sound and Vibration Research, UK

Structural Dynamics: Recent Advances, Volume 2

Ferguson, N. S.; Wolfe, H. F.; Freeman, M. A.; Rizzi, S. A.; Jul. 27, 2000; 333p; In English; 7th, 24-27 Jul. 2000, Southampton, UK

Contract(s)/Grant(s): F61775-00-W-F065

Report No.(s): AD-A382041; EOARD-CSP00-5065; ISBN 0-854-32721-5; Copyright; Avail: Defense Technical Information Center (DTIC)

The Final Proceedings for Seventh International Conference on Recent Advances in Structural Dynamics, 24 July 2000 - 27 July 2000 Aeronautics and Flutter; Analytical Developments; Numerical Methods; Finite Element Methods; Nonlinear Vibration; Experimental techniques; Rotating Machines; Control; System Identification; Acoustic Fatigue and Thermal Effects; Power Flow Approaches and Impact Dynamics.

DTIC

Fluid Dynamics; Conferences; Dynamic Response; Dynamic Structural Analysis

20000116154 Pennsylvania State Univ., Applied Research Lab., University Park, PA USA

Trailing Edge Noise Prediction: Large-Eddy Simulation of Wall Bounded Shear Flow Using the Nonlinear Disturbance Equations *Final Report*

Chyczewski, Thomas S.; Morris, Philip J.; Long, Lyle N.; Sep. 26, 2000; 18p; In English

Contract(s)/Grant(s): N00014-99-0290

Report No.(s): AD-A382346; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The potential benefits of using the Nonlinear Disturbance (NLD) equations, which govern flow variable fluctuations about an estimated mean, for the large-eddy simulation (LES) of wall bounded shear flows are investigated in this paper. In addition to verifying the suitability of the NLD equations for wall bounded flows, we build upon its advantages by introducing a new wall model that is easily and efficiently implemented within the NLD equation framework. The model implementation consists of defining a near wall region in which a modified linear set of equations are solved. The linear equation set allows disturbances to pass through and interact with the wall without altering the estimated mean. The streamwise and spanwise grid resolution of this near wall region can therefore be significantly relaxed while maintaining reasonable mean quantities such as skin friction. Comparisons of predicted turbulence intensity profiles and wall pressure spectra to experimental data for a fully developed turbulent flat plate boundary layer are used to verify the suitability of the NLD equations for wall bounded flows. Preliminary results of a turbulent channel flow simulation are also presented to assess the new wall model.

DTIC

Large Eddy Simulation; Acoustic Simulation; Aeroacoustics; Trailing Edges; Aerodynamic Noise; Flat Plates; Turbulent Flow; Wall Flow; Turbulent Boundary Layer; Shear Flow

20000116408 Beam Technologies, Inc., Needham, MA USA

Application of Approximate Inertial Manifolds and Multiresolution Techniques to Parallel Computations of Sensititives and Design *Final Report, 15 Mar. 1995 - 14 Mar. 1998*

Berkooz, Gail; Mar. 14, 1998; 6p; In English

Contract(s)/Grant(s): F49620-95-C-0027

Report No.(s): AD-A381583; AFRL-SR-BL-TR-00-0415; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The objective of this work is to develop methodologies for the efficient computation of aerodynamic sensitivities using state-of-the-art CFD techniques for use in aerodynamic shape optimization and fluids-structure interaction analysis including: analysis of multiresolution schemes to compute sensitivities, analysis of parallel implementation issues in sensitivity computations, modification of a production CFD code for parallel multiresolution computation of sensitivities, integration of sensitivities into airframe optimization.

DTIC

Aerodynamic Configurations; Inertia; Parallel Processing (Computers)

20000116490 CFD Research Corp., Huntsville, AL USA

Development and Validation of Parallel Distributed Computing Environment for Aerostructural CFD Analysis *Final Report, May 1996-Oct 1999*

Harrand, Vincent J.; Parthasarathy, Viji; Sheta, Essam F.; Warren, Charles W.; Underwood, Mark L.; Feb. 2000; 73p; In English

Contract(s)/Grant(s): F33615-96-C-3002; AF Proj. 2404

Report No.(s): AD-A382632; A-9812; AFRL-VA-WP-TR-2000-3009; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Prediction and computer control of aeroelastic phenomena is a complex multi-disciplinary problem due to the interaction of aerodynamic, elastic and inertia forces on the aircraft structure. Lack of integration among computer programs that serve different disciplines, such as aerodynamics and structures, has posed a major obstacle to accurate aeroelastic analysis. The Multi-Disciplinary Computing Environment (MDICE) has been developed to help solve this problem. MDICE enables engineering analysis codes to perform coupled multi-disciplinary analysis in a distributed computing environment. A unique feature is that existing engineering analysis codes are being used with a high level of interoperability and interchangeability.
DTIC
Aircraft Structures; Computational Fluid Dynamics; Computer Programs; Parallel Processing (Computers); Distributed Processing; Architecture (Computers); Computation

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.

20000116070 National Transportation Safety Board, Washington, DC USA
Safety Recommendation
Hall, Jim, National Transportation Safety Board, USA; Jun. 16, 2000; 64p; In English
Report No.(s): AD-A380065; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

Contents include the following: Air traffic control operational procedures. Reporting investigation of ATC-related events.Near midair collision reporting. Air traffic control data retention.use of unrecorded telephone lines in ATC facilities.
CASI
Air Traffic Control; Safety; Midair Collisions; Recommendations

20000116199 NASA Langley Research Center, Hampton, VA USA
A Windshear Hazard Index
Proctor, Fred H., NASA Langley Research Center, USA; Hinton, David A., NASA Langley Research Center, USA; Bowles, Roland L., Aero Tech Research, Inc., USA; [2000], pp. 482-487; In English; 9th; Aviation, Range and Aerospace Meteorology, 11-15 Sep. 2000, Orlando, FL, USA; Sponsored by American Meteorological Society, USA; Original contains color illustrations; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

An aircraft exposed to hazardous low-level windshear may suffer a critical loss of airspeed and altitude, thus endangering its ability to remain airborne. In order to characterize this hazard, a nondimensional index was developed based oil aerodynamic principals and understanding of windshear phenomena, 'This paper reviews the development and application of the Bowles F-tactor. which is now used by onboard sensors for the detection of hazardous windshear. It was developed and tested during NASA/I:AA's airborne windshear program and is now required for FAA certification of onboard radar windshear detection systems. Reviewed in this paper are: 1) definition of windshear and description of atmospheric phenomena that may cause hazardous windshear. 2) derivation and discussion of the F-factor. 3) development of the F-factor hazard threshold, 4) its testing during field deployments, and 5) its use in accident reconstructions,
Author
Deployment; Detection; Hazards; Losses; Wind Shear

20000116302 Civil Aeromedical Inst., Oklahoma City, OK USA
A Unique Contact Lens-Related Airline Aircraft Accident *Final Report*
Nakagawara, Van B.; Veronneau, Stephen J.; May 2000; 9p; In English
Report No.(s): AD-A379287; DOT/FAA/AM-00/18; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The use of contact lenses to satisfy the distant visual acuity requirements for obtaining a civil airman medical certificate has been permitted since 1976. According to the Federal Aviation Administration's "Guide for Aviation Medical Examiners," the use of monovision contact lenses is not considered acceptable for aviation duties. An aviation accident involving the use of monovision contact lenses will be reviewed. A case report is presented utilizing information from a National Transportation Safety Board (NTSB) aircraft accident report (NTSB/AAR-97/03) of a nonfatal scheduled airline accident. Past studies that examined the use of contact lenses in the aviation environment are reviewed. On October 19, 1996, a McDonnell Douglas MD-88 aircraft, Delta

Airlines Flight 554, was substantially damaged in an undershoot approach while landing at LaGuardia Airport, Flushing, NY. Weather observations indicated a broken cloud layer at 800 feet, visibility between 1/2 and 1 mile in heavy rain and fog or mist, and easterly winds at 12 to 14 knots. The approach was over water to Runway 13 and the flight crew transitioned to visual references just above the decision height. As the airplane continued to descend, it struck an approach light structure and the end of the runway deck, shearing off the main landing gear and slid 2,700 feet down the runway. During an emergency evacuation, 3 passengers received minor injuries. The NTSB determined that the probable cause of this accident was the inability of the pilot to overcome his misperception of the airplane's position relative to the runway, due to the use of monovision contact lenses. The adverse effects of wearing contact lenses in the aviation environment are discussed. Research is recommended to better understand the effects of environmental conditions on monovision to validate the current policy on such corrections.
DTIC
Contact Lenses; Aerospace Medicine; Aircraft Accidents; Flight Crews; Safety Management

20000116365 Army Safety Center, Fort Rucker, AL USA
Index to U.S. Army Safety Publications
Jul. 1993; 24p; In English
Report No.(s): AD-A382365; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

"And there I was, smack in the middle of a good free-for-all discussion and, while I just knew I was right, I couldn't remember the reference!" How many times has that happened to you when challenged to "go to the book"? Such a situation is what led Al Cargen, then an Air Safety Specialist with Aviation Division, Headquarters, 5th U.S. Army to put together the original quick reference listing of subjects to directives. This edition is the fourth update of that original listing and, while it may not contain every possible subject you may run into, it's a good start in that direction. and now, properly armed, it's back to the "campfire" to dazzle your buddies-unless, of course, they also have a copy. Al Cargen is currently owner of the Aviation Safety Organization headquartered in San Antonio, TX. His organization compiled the basic information and provided it free of charge to the Army Safety Center. The information is intended to serve as a quick reference. Because of the changing nature of publications, only the basic reference is noted in most cases (annotations to page and paragraph numbers have been omitted unless considered critical or to avert possible confusion).
DTIC
Aircraft Safety; Indexes (Documentation); Documents; Armed Forces

20000116424 Disability Rights Education and Defense Fund, Berkeley, CA USA
Enforcing the Civil Rights of Air Travelers with Disabilities: Recommendations for the Department of Transportation and Congress
Blank, K.; Feb. 26, 1999; 176p; In English
Report No.(s): PB2000-108226; No Copyright; Avail: CASI; A02, Microfiche; A09, Hardcopy

This report is the first in a series of four that will evaluate the effectiveness of federal enforcement of disability civil rights laws. This report focuses on federal enforcement of ACAA. As the economy becomes increasingly global, the ability of employees with disabilities to travel by air is critical to their success and upward mobility.
NTIS
Civil Aviation; Air Transportation; Laws

20000116481 Massachusetts Inst. of Tech., Lincoln Laboratory, Lexington, MA USA
Comparison of Active TCAS Slant Range Measurements with Interpolated Passive Position Reports for Use in Hybrid Surveillance Applications: Measurements from the June 1999 Los Angeles Basin Flight Tests
Thompson, S. D.; October 17, 2000; 126p; In English; Original contains color illustrations
Report No.(s): PB2001-100753; ATC-294; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

Traffic Alert and Collision Avoidance System (TCAS) hybrid surveillance is a technique that makes use of both active surveillance data from the interrogation reply sequence and passive position estimates received from mode S extended squitters. This technique allows TCAS to use passive surveillance once the data have been validated by comparison with active data. The maximum allowable range difference for validation specified by the International Civil Aviation Organization (ICAO) is 200 meters. Data from twenty encounters recorded during flight tests conducted in the Los Angeles Basin in June 1999 were analyzed. The results show that the ICAO specified limits were never exceeded and serve to validate the 200 meter limit.
NTIS
Air Traffic Control; Collision Avoidance; Warning Systems; Aircraft Safety; Midair Collisions

20000116507 General Accounting Office, Washington, DC USA
Aviation Security: Additional Controls Needed to Address Weaknesses in Carriage of Weapons Regulations
September 2000; 50p; In English
Report No.(s): PB2001-100547; GAO/RCED-00-181; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Our objectives in this report were to determine the frequency with which law enforcement officers carry weapons on board commercial aircraft and to determine if the weapons carriage regulations both current and proposed are sufficient to ensure the safety of passengers and the security of aircraft. To achieve these objectives, we interviewed representatives from FAA, the 10 major airlines, and 3 law enforcement officer associations. We also reviewed FAAs current and proposed weapons carriage regulations and the comments that FAA received in response to the proposed changes to the regulation. Finally, we searched a National Aeronautics and Space Administration (NASA) database that contains voluntary reports of incidents related to aviation safety to find problems associated with weapons carried by law enforcement officers on board aircraft.
NTIS
Weapons; Police; Commercial Aircraft; Regulations; Civil Aviation

20000116603 Texas A&M Univ., Texas Transportation Inst., College Station, TX USA
Evaluation of the Role and Needs of Agricultural Airports in Texas, *Sep. 1998 - Aug. 1999*
Borowiec, J. D.; Dresser, G. B.; May 2000; 116p; In English
Report No.(s): PB2000-108072; TX-99/1951-S; No Copyright; Avail: CASI; A02, Microfiche; A06, Hardcopy

This study examines the role and needs of airports that serve the agricultural communities in Texas. The significance of agriculture to the state is addressed and agricultural airports are identified. The major crops produced in the state are categorized by region and the level of aerial application activity, the economic significance of the state's crops, and the technological trends of the agricultural aircraft industry. Specific recommendations are presented with respect to supporting agricultural airports through the planning and programming process.
NTIS
Aircraft Industry; Agricultural Aircraft; Airports

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.

20000115492 Army Command and General Staff Coll., School of Advanced Military Studies, Fort Leavenworth, KS USA
Global Positioning System Selective Availability: Legal, Economic, and Moral Considerations
McGee, Jeffrey K.; Jan. 2000; 57p; In English
Report No.(s): AD-A381904; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Since World War II the USA has yielded many of its policy decisions to the desires of the USA military. These policy decisions reach from nylon and aluminum restrictions for the war efforts of World War II through the tough military build-up policies of the 1980s amidst fiscal constraints. In the aftermath of the conflict in Vietnam, President Ronald Reagan was determined to regain America's influence in the world by rebuilding the military and strengthening the economy. In 1989, the Berlin Wall came crashing down as the prelude to the fall of the Soviet Union and the Iron Curtain of communism. Without the apparent threat of war with the Soviet Union, the USA began to focus more on maintaining an economic and political leadership role around the world. No longer did the USA military hold a firm grip on the rudder of national policy. Instead, a balance between the amount of military power required to remain relevant in the world and economic and political influence was sought. One of the tools provided by the military to the civilian community is the Global Positioning System (GPS). This system, originally designed for the USA military, was released for public use in a degraded form after the tragic downing of a Korean airliner by Soviet fighter aircraft after the airliner unknowingly strayed into Soviet airspace in 1983. The GPS system's full accuracy capability was not released to the public out of fear by the Department of Defense (DOD) that potential adversaries might use the system for inertial guidance of smart munitions against the U.S.
DTIC
Policies; Economics; Availability; Global Positioning System; Ethics; Leadership

20000116522 Naval Air Warfare Center, Aircraft Div., Patuxent River, MD USA
Display Booth Arrangement and Trifold Handout for Global Summit on International Aviation Infrastructure
Ciecka, Ronald; Jan. 2000; 13p; In English
Report No.(s): AD-A376032; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

NASA engineers are launching missiles, Navy ships wait off-shore with anti-war missile weapons, weather forecasters watch approaching thunderstorms and send warnings to air-controllers, who re-route carriers to an offshore corridor. The day passes without incident. Military units finish their training exercises. Commander jets land safely and on schedule. The link that maintains the delicate balance to maintain safe uses of the nation's limited airspace is FACTS. The Fleet Area Control and Surveillance Facility (FACSFAC) Air Control Traffic System (FACTS) is a dual-redundant, real-time, state-of-the-art, digitized air traffic control and area surveillance system that combines signals from multiple radars and other sources and presents the data to air traffic controllers in color.
Author
Air Traffic Control; Real Time Operation; Radar; Air Traffic

20000116599 Naval Postgraduate School, Monterey, CA USA
The Experimental Evaluation of a DGPS Based Navigation System for the ARIES AUV
Stinespring, Benjamin M., Naval Postgraduate School, USA; June 2000; 202p; In English
Contract(s)/Grant(s): N00014-99-AF-00002
Report No.(s): AD-A380162; No Copyright; Avail: Defense Technical Information Center (DTIC)

Autonomous Underwater Vehicles (AUV) currently use varying methods for navigation, but incorporating GPS into those methods is becoming a popular technique. This thesis experimentally evaluates the configuration and implementation of the Navigational Suite within the Naval Postgraduate School's AUV, the ARIES (Acoustic Radio Interactive Exploratory Server). Specific attention is given to the configuration of the vehicle's newly completed DGPS (Differential Global Positioning System). A brief discussion of DGPS and Extended Kalman Filter theory continues with a description of the make-up and applications of components within the Suite. Details of a series of experiments, which begins with evaluation of the DGPS setup, then qualifies the system in an open-water environment, and finally qualifies the DGPS in conjunction with newly configured ARIES Navigational Filter, provide an examination of the Suite's performance.
DTIC
Global Positioning System; Underwater Vehicles; Navigation; Autonomy

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.

20000115471 Technische Univ., Div. of Control and Simulation, Delft, Netherlands
Angle-of-Attack Vane Calibration in Non-Stationary Flight. Flight Test Results for the 1998 Cessna Citation II Angle-of-Attack Vane Calibration
Soijer, M. W.; Aug. 1998; 30p; In English
Report No.(s): PB2000-106611; TUD/TM-856; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

August 26, 1998 a flight test was conducted by the Control and Simulation Division in Delft Aerospace, in order to recalibrate the angle-of-attack vane of the Cessna Citation II laboratory aircraft. In addition, the possibility of using non-stationary maneuvers rather than a series of stationary flight conditions was investigated. The proposed non-stationary calibration procedure reduces the time that is required for a full calibration test run from approximately forty minutes to less than ten minutes. This report contains both information on the flight test and the results from the calibration. It is shown that angle-of-attack vane calibration using a vertical gyro as a reference suffers from a hysteresis-like effect, where the use of an accelerometer along the longitudinal axis as a reference does not.
NTIS
Angle of Attack; Vanes; Aerodynamic Configurations

20000115608 NASA Langley Research Center, Hampton, VA USA

Exploratory Studies in Generalized Predictive Control for Active Aeroelastic Control of Tiltrotor Aircraft

Kvaternik, Raymond G., NASA Langley Research Center, USA; Juang, Jer-Nan, NASA Langley Research Center, USA; Bennett, Richard L., Bell Helicopter Co., USA; October 2000; 37p; In English; Active Controls Technology Conference, October 4-5, 2000, Bridgeport, CT, USA; Sponsored by Bell Helicopter Co., USA

Contract(s)/Grant(s): RTOP 581-10-11-03

Report No.(s): NASA/TM2000-210552; NAS 1.15:210552; L-18031; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Aeroelasticity Branch at NASA Langley Research Center has a long and substantive history of tiltrotor aeroelastic research. That research has included a broad range of experimental investigations in the Langley Transonic Dynamics Tunnel (TDT) using a variety of scale models and the development of essential analyses. Since 1994, the tiltrotor research program has been using a 1/5-scale, semispan aeroelastic model of the V-22 designed and built by Bell Helicopter Textron Inc. (BHTI) in 1981. That model has been refurbished to form a tiltrotor research testbed called the Wing and Rotor Aeroelastic Test System (WRATS) for use in the TDT. In collaboration with BHTI, studies under the current tiltrotor research program are focused on aeroelastic technology areas having the potential for enhancing the commercial and military viability of tiltrotor aircraft. Among the areas being addressed, considerable emphasis is being directed to the evaluation of modern adaptive multi-input multi- output (MIMO) control techniques for active stability augmentation and vibration control of tiltrotor aircraft. As part of this investigation, a predictive control technique known as Generalized Predictive Control (GPC) is being studied to assess its potential for actively controlling the swashplate of tiltrotor aircraft to enhance aeroelastic stability in both helicopter and airplane modes of flight. This paper summarizes the exploratory numerical and experimental studies that were conducted as part of that investigation.

Author

Control Systems Design; Active Control; Helicopters; Aeroelasticity; Aircraft Control

20000115905 Naval Air Warfare Center, Aircraft Div., Patuxent River, MD USA

Airborne Icing Tanker Spray Array

Hane, Thomas; Oct. 26, 1999; 12p; In English

Report No.(s): AD-A376034; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Contents include following: Air supply. Drag. Weight. Maintenance.

CASI

Design Analysis; User Requirements; Maintenance; Tanker Aircraft

20000116099 Federal Aviation Agency, Washington, DC USA

Airworthiness Certification of Aircraft and Related Products

Sep. 30, 1999; 270p; In English

Report No.(s): PB2000-103115; FAA-8130.2D; No Copyright; Avail: National Technical Information Service (NTIS)

This order establishes procedures for accomplishing original and recurrent airworthiness certification of aircraft and related products. The procedures contained in this order apply to both Manufacturing and Flight Standards Airworthiness Aviation Safety Inspectors and private persons or organizations delegated authority to issue airworthiness certificates and related approvals.

Author

Aircraft Reliability; Certification; Manufacturing; Organizations

20000116110 National Inst. of Standards and Technology, Building and Fire Research Lab., Gaithersburg, MD USA

New Approaches to the Development of Fire-Safe Materials

Morgan, Alexander B., National Inst. of Standards and Technology, USA; Gilman, Jeffrey W., National Inst. of Standards and Technology, USA; Nyden, Marc R., National Inst. of Standards and Technology, USA; Jackson, Catheryn L., National Inst. of Standards and Technology, USA; February 2000; 24p; In English

Report No.(s): PB2000-101949; NISTIR-6465; No Copyright; Avail: National Technical Information Service (NTIS)

Thermoplastic polyetherimide-clay nanocomposites were synthesized from 1,3-phenylenediamine and bisphenol A dianhydride using an in situ approach. Two types of organically treated clays were utilized to synthesize these nanocomposites. The two organically treated clays were montmorillonite clays treated with the ammonium salts of n-dodecylamine or 12-ammino-1-dodecanoic acid. The dispersion of the clay in the polyetherimide was analyzed by wide-angle X-ray scattering and transmission electron microscopy. The results showed that the clay treated with the ammonium salt of 12-amino-1-dodecanoic acid gave a well-dispersed intercalated nanocomposite while the clay treated with the ammonium salt of n-dodecylamine gave a well-dispersed immiscible blend. These nanocomposites were then analyzed by thermal gravimetric analysis for their thermal stability.

Computation and experimental approaches were developed to explore the nature and consequences of thermally induced changes that occur in the condensed phase of burning polymers. A computational strategy for evaluating molecular weight distributions (which should enable us to calculate the melt viscosity during burning) from molecular dynamics simulations was developed based on a simple differential equation for the time dependence of the number average degree of polymerization, x, derived by Boyd. The experimental effort, which we hope to be able to use in validating the predictions of this model, was successful in obtaining real-time measurements of the mid-infrared spectra of burning polymers. The condensed phase spectra of nylon 6 and nylon 6/clay nanocomposite were measured using a fiber optic reflectance probe while they were burning on the cone calorimeter.
Author
Clays; Combustion; Molecular Dynamics; Real Time Operation; Mathematical Models; Temperature Effects; Thermal Stability; Thermal Analysis

20000116219 Naval Postgraduate School, Monterey, CA USA
A Case Study: Acquisition Reform and the Joint Primary Aircraft Training System (JPATS) Program
McKinley, Kenneth W., Naval Postgraduate School, USA; June 2000; 121p; In English
Report No.(s): AD-A379575; No Copyright; Avail: Defense Technical Information Center (DTIC)

Defense Acquisition Pilot Programs (DAPPs) were established to jump- start the initiatives outlined in the Federal Acquisition Streamlining Act (FASA) of 1994. DAPPs were provided legislative authority to implement the provisions of FASA before they were published in regulations, authority to use the commercial item exemptions for non-commercial items and were also given expedited deviation authority from the FAR/DFARS and the DOD 5000 series regulations. The Joint Primary Aircraft Training System (JPATS) was designated a pilot program by the Deputy Under Secretary of Defense for Acquisition Reform. The purpose of this paper is to provide insight into the Joint Primary Aircraft Training System (JPATS) acquisition and describe, if any, the results of acquisition reform on program effectiveness, cost, schedule, and performance. Eleven metrics were established by the JPATS program and then measured against established baseline programs to derive quantitative savings attributed to implementing acquisition reform. An analysis of those metrics concludes acquisition reform is having mixed results on this program. Only two measures seem successful indicators of acquisition reform, while the remaining nine seem to indicate more success is being realized from applying acquisition program management reform efforts highlighted in DOD directives than statutory and regulatory relief provided DAPPs.
DTIC
Defense Program; Project Management; Acquisition; Education; Weapon Systems

20000116364 Institute for Environmental Safety and Occupational Risk Analysis, Risk Analysis Directorate, Brooks AFB, TX USA
Aircraft Corrosion Control: Assessment and Reduction of Chromate Exposures ***Final Report, 1997-2000***
Carlton, Gary N.; England, Ellen E.; Jun. 2000; 52p; In English
Report No.(s): AD-A382245; IERA-RS-BR-TR-2000-0004; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

The corrosion inhibitor of choice in the Air Force is hexavalent chromium (CrVI). CrVI is present in aircraft coating pretreatments as chromic acid and in primers as metallic chromates. Worker exposures to chromate compounds can occur during application of the pretreatment and primer. In addition, depainting (removal of old organic coatings) and mechanical sanding of existing coating systems can release particulates that contain chromates from previously-applied primers. These particulates can also present a CrVI exposure risk. Cr VII compounds have been linked to occupational diseases, specifically dermatitis, nasal irritation, and lung cancer. Water soluble CrVI compounds, such as chromic acid, are confirmed human carcinogens; metallic chromates are considered either confirmed or suspected human carcinogens, depending on the specific metal attached to the chromate. Over the last three years, the industrial Hygiene Branch of the Air Force institute for Environment, Safety and Occupational Health Risk Analysis (AFIERA) collaborated with the Air Force Structural Maintenance community to identify improved methods to reduce CrVIj exposures during corrosion control procedures. We completed a series of field evaluations at Shaw, Cannon, Holloman, Nellis, Hill, Robins, Tinker, and McChord AFBs, and a chromate reduction study at Shaw and Cannon. This technical report summarizes our recommended sampling methodology, data interpretation, and chromate reduction techniques to reduce chromate exposures.
DTIC
Corrosion Prevention; Chromates; Chemical Analysis

20000116373 Air Univ., Center for Aerospace Doctrine Research and Education, Maxwell AFB, AL USA

Uninhabited Combat Aerial Vehicles: Airpower by the People, For the People, But Not With the People

Clark, Richard M.; Aug. 2000; 100p; In English

Report No.(s): AD-A382577; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

In one form or another, unmanned aerial vehicles (UAV) have been employed for over 2,000 years. Lt Col Richard M. Clark's Uninhabited Combat Aerial Vehicles: Airpower by the People, For the People, But Not With the People, draws on that long history to gauge what the future may hold for uninhabited combat aerial vehicles (UCAV). The USA (US) Air Force's experience with UCAVs dates back to World War I and the US Army Air Service's order for 25 Kettering Bugs, explosive-laden unmanned minibiplanes. Over the next 60 years, the Air Force continued to experiment with-and periodically employ-UAVs/UCAVs in peace and war. Operational results were decidedly mixed. The Air Force abandoned UCAV development in the aftermath of the Vietnam War, but by the 1990s there was a marked resurgence of interest in UCAVs as a means of doing more with less while reducing combat risks to pilots. Given the problematic history of UAVs/UCAVs, knowledge of past experience could prove beneficial to the current generation of UCAV developers and planners. to that end, Colonel Clark examines technological obstacles that have handicapped UCAVs historically and which could continue to impede their future evolution. He then turns to more contemporary organizational and cultural issues that might hinder integration of UCAVs into the force. Clark concludes his study by proposing answers to two fundamental questions: (1) What are the major obstacles to UCAVs achieving meaningful operational status in the Air Force, and (2) Can those obstacles be overcome?

DTIC

Pilotless Aircraft; Drone Aircraft; Design Analysis

20000117673 Coleman Aerospace Co., Orlando, FL USA

Flight Test Results for the SRALT RRF and Target Intercept Missions

Warren, Molly, Coleman Aerospace Co., USA; Krens, Frank, Coleman Aerospace Co., USA; Decesaris, Chet, Ballistic Missile Defense Organization, USA; [1999]; 11p; In English

Report No.(s): AD-A381340; CAC00-062; Paper 12-5; No Copyright; Avail: Defense Technical Information Center (DTIC)

This paper presents flight test results for the Short Range Air Launch Target (SRALT) risk reduction flight (RRF) and the four target intercept missions achieved during 1999, and compares them to simulation performance predictions. Lessons learned include ground and airdrop testing, target flight performance, instrumentation, and test range interfaces. The flight test targets were developed for the USA Army Space and Missile Defense Command (USASMDC) in support of Theater Missile Defense (TMD) interceptor flight testing. Successful execution of the SRALT RRF ended the total dependence on ground launch testing and associated test range constraints. The five targets used threat representative reentry vehicle (RV) front ends and common delivery vehicle subsystems to achieve realistic test scenarios covering a range of TMD threats. The extensive on-board instrumentation suite provided real-time telemetry data to confirm accomplishment of mission flight test objectives and a basis for comparison to simulation predictions. Successful completion of the target missions required a disciplined mission requirements analysis, design, fabrication, and test process. Extensive ground integration testing was conducted for every missile, with additional airdrop tests for SRALT.

DTIC

Flight Tests; Performance Prediction; Missile Defense; Launching; Weapon Systems; Interceptors

20000117680 NASA Langley Research Center, Hampton, VA USA

Aerospace Systems Design in NASA's Collaborative Engineering Environment

Monell, Donald W., NASA Langley Research Center, USA; Piland, William M., NASA Langley Research Center, USA; Acta Astronautica; 2000; ISSN 0094-5765; Volume 47, Nos. 2-9, pp. 255-264; In English; Copyright; Avail: Issuing Activity

Past designs of complex aerospace systems involved an environment consisting of collocated design teams with project managers, technical discipline experts, and other experts (e.g., manufacturing and systems operation). These experts were generally qualified only on the basis of past design experience and typically had access to a limited set of integrated analysis tools. These environments provided less than desirable design fidelity, often lead to the inability of assessing critical programmatic and technical issues (e.g., cost, risk, technical impacts), and generally derived a design that was not necessarily optimized across the entire system. The continually changing, modern aerospace industry demands systems design processes that involve the best talent available (no matter where it resides) and access to the the best design and analysis tools. A solution to these demands involves a design environment referred to as collaborative engineering. The collaborative engineering environment evolving within the National Aeronautics and Space Administration (NASA) is a capability that enables the Agency's engineering infrastructure to interact and use the best state-of-the-art tools and data across organizational boundaries. Using collaborative engineering, the collocated team is replaced with an interactive team structure where the team members are geographical distributed and the best engineering talent

can be applied to the design effort regardless of physical location. In addition, a more efficient, higher quality design product is delivered by bringing together the best engineering talent with more up-to-date design and analysis tools. These tools are focused on interactive, multidisciplinary design and analysis with emphasis on the complete life cycle of the system, and they include non-traditional, integrated tools for life cycle cost estimation and risk assessment. NASA has made substantial progress during the last two years in developing a collaborative engineering environment. NASA is planning to use this collaborative engineering engineering infrastructure to provide better aerospace systems life cycle design and analysis, which includes analytical assessment of the technical and programmatic aspects of a system from ”cradle to grave.” This paper describes the recent NASA developments in the area of collaborative engineering, the benefits (realized and anticipated) of using the developed capability, and the long-term plans for implementing this capability across Agency.
Author
Aerospace Systems; Control Systems Design; Complex Systems; Systems Analysis

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.

20000115866 California Univ., Irvine, CA USA
Mixing of an Airblast-Atomized Fuel Spray Injected Into a Crossflow of Air
Leong, May Y., California Univ., USA; McDonell, Vincent G., California Univ., USA; Samuelsen, G. Scott, California Univ., USA; October 2000; 386p; In English
Contract(s)/Grant(s): NCC3-412; RTOP 714-02-20
Report No.(s): NASA/CR-2000-210467; E-12463; NAS 1.26:210467; UCI-ARTR-00-05; No Copyright; Avail: CASI; A17, Hardcopy; A04, Microfiche

The injection of a spray of fuel droplets into a crossflow of air provides a means of rapidly mixing liquid fuel and air for combustion applications. Injecting the liquid as a spray reduces the mixing length needed to accommodate liquid breakup, while the transverse injection of the spray into the air stream takes advantage of the dynamic mixing induced by the jet-crossflow interaction. The structure of the spray, formed from a model plain-jet airblast atomizer, is investigated in order to determine and understand the factors leading to its dispersion. to attain this goal, the problem is divided into the following tasks which involve: (1) developing planar imaging techniques that visualize fuel and air distributions in the spray, (2) characterizing the airblast spray without a crossflow, and (3) characterizing the airblast spray upon injection into a crossflow. Geometric and operating conditions are varied in order to affect the atomization, penetration, and dispersion of the spray into the crossflow. The airblast spray is first characterized, using imaging techniques, as it issues into a quiescent environment. The spray breakup modes are classified in a liquid Reynolds number versus airblast Weber number regime chart. This work focuses on sprays formed by the ”prompt” atomization mode, which induces a well-atomized and well-dispersed spray, and which also produces a two-lobed liquid distribution corresponding to the atomizing air passageways in the injector. The characterization of the spray jet injected into the crossflow reveals the different processes that control its dispersion. Correlations that describe the inner and outer boundaries of the spray jet are developed, using the definition of a two-phase momentum-flux ratio. Cross-sections of the liquid spray depict elliptically-shaped distributions, with the exception of the finely-atomized sprays which show kidney-shaped distributions reminiscent of those obtained in gaseous jet in crossflow systems. A droplet trajectory analysis overpredicts the liquid mass penetration, and indicates a need for a more rigorous model to account for the three-dimensional mixing field induced by the jet-crossflow interaction. Nonetheless, the general procedures and criteria that are outlined can be used to efficiently assess and compare the quality of sprays formed under different conditions.
Author
Air Flow; Atomizing; Cross Flow; Fuel Sprays; Gas Injection; Mixing Length Flow Theory

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.

20000116403 NASA Langley Research Center, Hampton, VA USA
Real-Time Parameter Estimation in the Frequency Domain
Morelli, Eugene A., NASA Langley Research Center, USA; Journal of Guidance, Control and Dynamics; September - October 2000; Volume 23, No. 5, pp. 812-818; In English; Copyright Waived; Avail: CASI; A02, Hardcopy; A01, Microfiche

A method for real-time estimation of parameters in a linear dynamic state-space model was developed and studied. The application is aircraft dynamic model parameter estimation from measured data in flight. Equation error in the frequency domain was used with a recursive Fourier transform for the real-time data analysis. Linear and nonlinear simulation examples and flight test data from the F-18 High Alpha Research Vehicle were used to demonstrate that the technique produces accurate model parameter estimates with appropriate error bounds. Parameter estimates converged in less than one cycle of the dominant dynamic mode, using no a priori information, with control surface inputs measured in flight during ordinary piloted maneuvers. The real-time parameter estimation method has low computational requirements and could be implemented
Author
Estimating; Fourier Transformation; Frequency Domain Analysis; Real Time Operation; Simulation

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).

20000116133 NASA Goddard Space Flight Center, Greenbelt, MD USA
High-Speed Automated Tester for Vacuum Chamber Feedthrough Connectors and Cables
Swope, Robert H., NSI Technology Services Corp., USA; [2000]; 1p; In English; 21st; Space Sim. Conference, 25 Oct. 2000, Annapolis, MD, USA
Contract(s)/Grant(s): NAS5-32537; No Copyright; Avail: Issuing Activity; Abstract Only

The Goddard Space Flight Center's thermal vacuum laboratory has developed a high-speed automated system for testing the integrity of 37-pin MIL-C-5015 cylindrical electrical feedthrough connectors used on penetration plates of thermal vacuum chambers. The system consists of a desktop PC driving a data acquisition front end. The latter measures the resistance through each pin of the connector and the resistance from each pin to all other pins and the connector shell. In addition to identifying unacceptable feedthroughs, the system is also used for testing cables. In the special case of Type T thermocouples (used almost exclusively at the lab), the difference in resistance between the copper and constantan wires provides positive proof of accidentally reversed connector wiring. Data acquisition time to completely test a cable or feedthrough connector is less than thirty seconds. The system provides a hardcopy printout of the resistance readings. Connectors or cables with fewer wires are tested using simple adapter cables. Initial tests indicate that the performance of a given feedthrough connector can be predicted on the basis of measured resistance readings, reducing ongoing cost of connector replacement. The opportunity to positively certify the integrity of cables, cable connectors and feedthroughs before the start of a thermal vacuum test minimizes the likelihood of a circuit problem that would require returning the chamber to ambient conditions for repair. This system has two principal advantages for the Goddard thermal vacuum laboratory. Its only significant cost was the labor to fabricate the test cable and shorting cable -- about 40 man-hours total. The system was built around a computer and data acquisition unit that were already on hand. The second advantage is that it very quickly tests both of the parameters that are essential.
Author
Connectors; Data Acquisition; Electric Connectors; High Speed; Vacuum Chambers

13
ASTRODYNAMICS

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

20000115475 Lembaga Penerbangan dan Antariksa Nasional, Peneliti Bidang Matahari Dan Lingkungan Antariksa, Jakarta, Indonesia

Effects of Thermosphere Density Changes on Satellite Orbits ***Pengaruh Perubahan Kerapatan Termosfer Terhadap Orbit Satelit***

Yatini, Clara Yono, Lembaga Penerbangan dan Antariksa Nasional, Indonesia; Siahaan, Mabe, Lembaga Penerbangan dan Antariksa Nasional, Indonesia; Warta LAPAN; April - June 2000; ISSN 0126-9754; Volume 2, No. 2, pp. 61-67; In Malay-Indonesian; Copyright; Avail: Issuing Activity

Perturbations to the orbital elements of satellite flying in Earth orbit occur because of many changes in thermospheric conditions. The changes in this region, particularly in density and wind, cause significant effect on satellite. These changes in density and wind affect the aerodynamic drag on satellite, and forced by processes that include solar activity in long and short term, gravity waves, tides, and geomagnetic storm. Aerodynamic drag acting on satellite is linearly dependent on atmospheric density and quadratically dependent on the difference between the satellite velocity and in-track wind.

Author

Thermosphere; Atmospheric Density; Perturbation Theory; Orbital Elements; Satellite Orbits

20000115482 NASA Goddard Space Flight Center, Greenbelt, MD USA

Spacecraft Attitude Determination Methods

Markley, F. Landis, NASA Goddard Space Flight Center, USA; [2000]; 18p; In English, 7 Nov. 2000, Ithaca, NY, USA; Sponsored by Cornell Univ., USA; Original contains color illustrations; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This document is presentation in viewgraph form, which outlines the methods of determining spacecraft attitude. The presentation reviews several parameterizations relating to spacecraft attitude, such as Euler's Theorem, Rodriques parameters, and Euler-Rodriques parameters or Quaternion. Onboard attitude determination is the norm, using either single frame or filtering methods. The presentation reviews several mathematical representations of attitude. The mechanisms for determining attitude on board the Hubble Space Telescope, the Tropical Rainfall and Measuring Mission and the Solar Anomalous and Magnetospheric Particle Explorer are reviewed. Wahba's problem, Procrustes Problem, and some solutions are also summarized.

CASI

Attitude (Inclination); Horizontal Orientation; Vertical Orientation; Attitude Control; Computation; Quaternions

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.

20000115873 NASA Langley Research Center, Hampton, VA USA

Approximation Model Building for Reliability & Maintainability Characteristics of Reusable Launch Vehicles

Unal, Resit, Old Dominion Univ., USA; Morris, W. Douglas, NASA Langley Research Center, USA; White, Nancy H., NASA Langley Research Center, USA; Lepsch, Roger A., NASA Langley Research Center, USA; Brown, Richard W., NASA Langley Research Center, USA; [2000]; 6p; In English; 9th; Aviation, Range and Aerospace Meteorology, 11-15 Sep. 2000, Orlando, FL, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA

Report No.(s): AIAA Paper 2000-4712; Copyright Waived; Avail: CASI; A02, Hardcopy; A01, Microfiche

This paper describes the development of parametric models for estimating operational reliability and maintainability (R&M) characteristics for reusable vehicle concepts, based on vehicle size and technology support level. A R&M analysis tool (RMAT) and response surface methods are utilized to build parametric approximation models for rapidly estimating operational R&M characteristics such as mission completion reliability. These models that approximate RMAT, can then be utilized for fast analysis of operational requirements, for lifecycle cost estimating and for multidisciplinary sign optimization.

Author

Maintainability; Models; Operating Costs; Reliability

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.

20000115607 FDC/NYMA, Inc., Hampton, VA USA
A Study of a Lifting Body as a Space Station Crew Exigency Return Vehicle (CERV)
MacConochie, Ian O., FDC/NYMA, Inc., USA; October 2000; 42p; In English
Contract(s)/Grant(s): NAS1-96013; RTOP 242-33-01-50
Report No.(s): NASA/CR-2000-210548; NAS 1.26:210548; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A lifting body is described for use as a return vehicle for crews from a space station. Reentry trajectories, subsystem weights and performance, and costs are included. The baseline vehicle is sized for a crew of eight. An alternate configuration is shown in which only four crew are carried with the extra volume reserved for logistics cargo. A water parachute recovery system is shown as an emergency alternative to a runway landing. Primary reaction control thrusters from the Shuttle program are used for orbital maneuvering while the Shuttle verniers are used for all attitude control maneuvers.
Author
Lifting Bodies; Space Stations; Vehicles

20000116071 NASA Johnson Space Center, Houston, TX USA
STS-92 Crew Interview/L. Chiao
Sep. 14, 2000; In English; Videotape: 16 min. 37 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2000138908; JSC-1810C; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

The STS-92 Mission Specialist Leroy Chiao is seen being interviewed. He answers questions about his inspiration to become an astronaut, his training, and gives details of the mission, including overviews of the Z1 truss, the third pressurized mating adapter (PMA-3), the common berthing mechanism (CBM), and the spacewalks. He shares his thoughts on the role of STS-92 in preparing the International Space Station (ISS) for the first resident crew, Russia's contribution to the ISS, and the importance of the ISS and Space Shuttle in the future.
CASI
International Space Station; Astronauts; Prelaunch Summaries

20000116073 NASA Kennedy Space Center, Cocoa Beach, FL USA
STS-49 CPCG
Apr. 07, 1992; In English; Videotape: 20 min. 42 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2000152223; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

Marianna Long with the Center for Macromolecular Crystallography gives an overview of commercial protein crystal growth. She describes the applications of protein crystallography and explains why it is better to grow the crystals in space. She shows the results of experiments that have been performed on twelve previous Space Shuttle flights.
CASI
Crystallography; Protein Crystal Growth; Crystals; Spaceborne Experiments

20000116074 NASA Kennedy Space Center, Cocoa Beach, FL USA
STS-46 Post Launch News Conference
Jul. 31, 1992; In English; Videotape: 18 min. 4 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2000152229; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

Dick Young introduces Brewster Shaw, Deputy Director of the Space Shuttle Program, and Robert B. Sieck, Launch Director of Kennedy Space Center. Shaw and Young give an overview of the launch of the spaceship Atlantis and answer questions from the press.
CASI
Atlantis (Orbiter); Prelaunch Summaries; Spacecraft Launching

20000116075 NASA Kennedy Space Center, Cocoa Beach, FL USA
STS-46 Crew Training
Jul. 21, 1998; In English; Videotape: 25 min. 23 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2000152242; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

The crew of STS-46, Commander Loren J. Shriver, Pilot Andrew M. Allen, and Mission Specialists Franklin R. Chang-Diaz, Jeffrey A. Hoffman, Claude Nicollier, Marsha S. Ivins, and Franco Malerba are seen at various stages of their training. Footage includes firefighting training, helmet fit and T-38 checkout, bailout training in the weightless environment training facility, and remote manipulator training. The crew uses a computer simulation and the shuttle engineering simulator to practice using the tethered satellite system.
CASI
Spacecrews; Astronaut Training; Crew Procedures (Preflight)

20000116076 NASA Johnson Space Center, Houston, TX USA
STS-92 Crew Activity Report/Flight Day 7 Highlights
Oct. 18, 2000; In English; Videotape: 22 min. 9 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2000157373; 1424G; No Copyright; Avail: CASI; B02, Videotape-Beta; V02, Videotape-VHS

On this seventh day of the STS-92 mission, the flight crew, Commander Brian Duffy, Pilot Pamela A. Melroy, and Mission Specialists Koichi Wakata, Leroy Chiao, Peter J.K. Wisoff, Michael E. Lopez-Alegria, and William S. McArthur continue work on the Z1 truss and the third pressurized mating adapter (PMA-3) on the International Space Station (ISS). Footage is seen of Chiao's and McArthur's spacewalk while they install two DC-to-DC converter units and attach a second tool storage box on the Z1 truss.
CASI
International Space Station; Service Module (Iss); Discovery (Orbiter); Spacecraft Maintenance

20000116608 NASA Kennedy Space Center, Cocoa Beach, FL USA
STS-39/Breakfast, Suit-Up, Depart O&C, Launch, On-Orbit, and Landing
May 01, 1991; In English; Videotape: 60 min. 33 sec. playing time, in color, with sound
Report No.(s): NONP-NASA-VT-2000118015; No Copyright; Avail: CASI; B03, Videotape-Beta; V03, Videotape-VHS

Footage of various stages of the Discovery mission is shown, including shots of the crew at breakfast, getting suited up, and departing to board the orbiter. The launch is shown from many vantage points, as is the landing. Discovery, its payload (Space Test Payload 1), and Earth are shown from space while Discovery orbits.
CASI
Spacecraft Launching; Discovery (Orbiter); Crew Procedures (Preflight); Spacecraft Landing

20000117707 General Accounting Office, National Security and International Affairs Div., Washington, DC USA
Report to the Chairman, Committee on Commerce, Science and Transportation, US Senate. Space Shuttle: Human Capital and Safety Upgrade Challenges Require Continued Attention
August 2000; 22p; In English
Report No.(s): GAO/NSIAD/GGD-00-186; No Copyright; Avail: Defense Technical Information Center (DTIC)

The National Aeronautics and Space Administration's (NASA) space shuttle program is at a critical juncture as three key factors converge: its workforce has declined significantly since 1995, its flight rate will have to double over that of recent years to support assembly of the International Space Station, and costly safety upgrades are being planned to enhance the space shuttle's safe operation until at least 2012. As agreed with your office, we examined workforce and safety issues facing NASA and its shuttle program. Specifically, we assessed the impact of workforce reductions on the shuttle program, the challenges NASA faces in addressing workforce issues, and the status of planned shuttle safety and supportability upgrades.
DTIC
Congressional Reports; Management Planning; Personnel Management

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.

20000116200 NASA Goddard Space Flight Center, Greenbelt, MD USA

LIDAR Measurements During Aerosols99

Voss, Kenneth J., Miami Univ., USA; Welton, Ellsworth J., Science Systems and Applications, Inc., USA; Quinn, Patricia K., National Oceanic and Atmospheric Administration, USA; Johnson, James, National Oceanic and Atmospheric Administration, USA; Thompson, Anne, NASA Goddard Space Flight Center, USA; [2000]; 38p; In English; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Aerosols99 cruise took place during the period from January 14, to February 8 1999 on the R/V Ron Brown. The cruise track was almost a straight line from Norfolk, Va. to Cape Town, South Africa and afforded the opportunity to sample several different aerosol regimes over the North and South Atlantic. A Micro Pulse LIDAR system was used continually during this cruise to profile the aerosol vertical structure. Inversions of this data illustrated a varying vertical structure depending on the dominant air mass. In clean maritime aerosols in the Northern and Southern Hemispheres the aerosols were capped at 1 km. When a Dust event from Africa was encountered the aerosol extinction increased its maximum height to above 2 km. During a period in which the air mass was dominated by biomass burning from Southern Africa, the aerosol layer extended to 4 km. Comparisons of the aerosol optical depth derived from LIDAR inversion and surface sunphotometers showed an agreement within +/- 0.05 RMS Similar comparisons between the extinction measured with a nephelometer and particle soot absorption photometer (at 19 m altitude) and the lowest LIDAR measurement (75 m) showed good agreement (+/- 0.014/km . The LIDAR underestimated surface extinction during periods when an elevated aerosol layer was present over a relatively clean surface layer, but otherwise gave accurate results.

Author

Optical Radar; Absorption Spectroscopy; Air Masses; Biomass Burning; Radar Measurement

20000116409 Naval War Coll., Newport, RI USA

Protecting Satellites Without Weapons - Is it Logical ***Final Report***

Matawitz, David; May 16, 2000; 24p; In English

Report No.(s): AD-A381646; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Satellites are a critical vulnerability requiring protection against attack. The question facing U.S. planners is how this can be done. Two broad options are available to protect satellites: offensive and defensive means. On the surface, offensive weapons seem to offer the capability of deterring adversaries by threat of retaliation. Proponents claim the weapons will allow commanders to prepare the battle space for war by denying the enemy satellite connectivity. Furthermore, it seems like the USA would only be keeping pace with numerous rogue states that are already developing offensive Anti-Satellite (ASAT) weapons. However, offensive weapons are not the answer. They will not deter aggression, provide information dominance in the battle space, or protect satellite assets. Offensive weapons will only serve to encourage others to accelerate ASAT research, alienate allies, encourage the weaponization of space, and waste limited funding. The correct solution is defensive measures. Granted these are riskier, more costly, and in direct contradiction to military training, but these measures offer an ability to realistically protect assets without alienating allies or weaponizing space. Treaties, system redundancy, quick launch platforms, leased assets, and physical defenses will protect assets at a much reduce political and moral cost.

DTIC

Weapons; Defense Program; Protection; Warfare

19
SPACECRAFT INSTRUMENTATION AND ASTRIONICS

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

20000116140 NASA Goddard Space Flight Center, Greenbelt, MD USA
Advanced Sounders on EOS
Joiner, J., NASA Goddard Space Flight Center, USA; [2000]; 1p; In English, 2-9 Sep. 2000, Reading, UK; Sponsored by European Centre for Medium-Range Weather Forecasts, UK; No Copyright; Avail: Issuing Activity; Abstract Only

NASA's Earth Observing System is a series of three satellites that carry advanced instruments to observe and monitor the global atmosphere, ocean, and land surface. In this talk, I will describe the instruments and how they might be exploited in data assimilation.
Author
Assimilation; Earth Observing System (EOS); Ocean Surface; Sounding; Earth Atmosphere

20000116306 Air Force Research Lab., Space Vehicles Directorate, Hanscom AFB, MA USA
IBSS Low Light Level Television Baffle Design ***Interim Report***
Thorn, Willard F.; Dec. 13, 1998; 14p; In English
Contract(s)/Grant(s): Proj-2303
Report No.(s): AD-A382464; AFRL-VS-TR-1999-1573; IP-350; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report describes the design and construction process for the IBSS Low Light Level Television camera baffles. IBSS is short for Infrared Background Signature Survey, a space shuttle experiment. This design was done as a result of an earlier design that did not conform to the required specifications for off-axis radiation rejection. The description of the design process is followed by a description of the improvements made to increase the performance of the baffles.
DTIC
Television Cameras; Spaceborne Experiments; Infrared Radiation; Baffles; Infrared Signatures

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.

20000116148 Naval Air Warfare Center, Weapons Div., China Lake, CA USA
Pulsed Motor Firings ***Final Report, 191998***
Blomshield, Fred S.; Aug. 2000; 50p; In English
Report No.(s): AD-A382239; NAWC-WPNS,TP-8444; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Combustion stability additives like zirconium carbide (ZrC), aluminum oxide (Al2O3), and zirconium ortho-silicate (ZrSiO4) have long been known to suppress combustion instability in reduced smoke, composite propellant solid rocket systems. Often, as little as 0.5% additive can stabilize an otherwise unstable rocket motor. The additives appear to have effects on both linear and nonlinear pulsed instabilities. Although several theories have been proposed, the actual mechanism on how stability additives work remains unknown. The common belief that additive particle damping alone stabilizes rocket motors is not true. Somehow, the additives change the response behavior of the propellant. Past studies have shown that the additive effect is a combination of particle damping and a reduction in the combustion response of the propellant. In the past study, four propellants were studied containing 0, 1, 3, and 5% ZrC. In this study, the 3% propellant used before will be used again, except 3% HMX will be used in one formulation and 3% ultra fine aluminum or ALEX will be used in another. The emphasis here is to examine the combustion response changes. This paper will present the results of T-burner response testing and compare the results to past propellants containing additives. The reason for the work is that recent evidence suggests that traditional additives may not work as well when

solid motors are operating at higher pressures. In addition, additives like the ones proposed, add energy to the propellant which would be a performance advantage over classical additives like ZrC.
DTIC
Combustion Stability; Solid Propellant Rocket Engines; Propulsion; Composite Propellants; Combustion; Additives

20000116340 Mississippi State Univ., Center for Computational Systems, Mississippi State, MS USA
Altitude Compensating Nozzle Concepts Evaluation ***Final Report, 1 Jun. - 11 Aug. 2000***
Soni, Bharat, Mississippi State Univ., USA; Nov. 13, 2000; 10p; In English
Contract(s)/Grant(s): NASA Order H-30555-D; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
This report contains the summary of work accomplished during summer of 2000 by Mr. Chad Hammons, undergraduate senior student, Mississippi State University/ERC in support of NASA/MSFC mission pertinent to Altitude compensating nozzle concepts evaluations. In particular, the development of automatic grid generator applicable in conducting sensitivity analysis involving Aerospike engine is described.
Author
Computational Grids; Sensitivity

23
CHEMISTRY AND MATERIALS (GENERAL)

Includes general research topics related to the composition, properties, structure, and use of chemical compounds and materials as they relate to aircraft, launch vehicles, and spacecraft. For specific topics in chemistry and materials see categories 24 through 29. For astrochemistry see category 90 Astrophysics.

20000115414 Sandia National Labs., Albuquerque, NM USA
GaN CVD Reactions: Hydrogen and Ammonia Decomposition and the Desorption of Gallium; MRS Internet Journal of Nitride Semiconductor Research
Bartram, M. E.; Creighton, J.; May 26, 1999; 7p; In English
Report No.(s): DE00-007066; SAND99-1328J; No Copyright; Avail: Department of Energy Information Bridge
Isotopic labeling experiments have revealed correlations between hydrogen reactions, Ga desorption, and ammonia decomposition in GaN CVD. Low energy electron diffraction (LEED) and temperature programmed desorption (TPD) were used to demonstrate that hydrogen atoms are available on the surface for reaction after exposing GaN(0001) to deuterium at elevated temperatures. Hydrogen reactions also lowered the temperature for Ga desorption significantly. Ammonia did not decompose on the surface before hydrogen exposure. The findings suggest that the driving force of the high nitrogen-nitrogen bond strength (226 kcal/mol) can lead to the removal of nitrogen from the substrate when the surface is nitrogen rich. Overall, these findings indicate that hydrogen can influence G-aN CVD significantly, being a common factor in the reactivity of the surface, the desorption of Ga, and the decomposition of ammonia.
NTIS
Gallium Nitrides; Surface Reactions; Decomposition; Desorption; Reactivity; Vapor Deposition

20000115419 Sandia National Labs., Albuquerque, NM USA
Non-Classical Smoothening of Nano-Scale Surface Corrugations; Physical Review Letters
Aziz, M. J.; Chason, E.; Erlebacher, J.; Floro, J. A.; Sinclair, M. B.; May 20, 1999; 14p; In English
Report No.(s): DE00-007055; SAND99-1287J; No Copyright; Avail: Department of Energy Information Bridge
We report the first experimental observation of non-classical morphological equilibration of a corrugated crystalline surface. Periodic rippled structures with wavelengths of 290-550 nm were made on Si(001) by sputter rippling and then annealed.
NTIS
Morphology; Crystal Surfaces

20000116111 National Inst. of Standards and Technology, Materials Science and Engineering Lab., Gaithersburg, MD USA
Materials Reliability: 1999 Programs and Accomplishments
January 2000; 104p; In English
Report No.(s): PB2000-101945; NISTIR-6434; No Copyright; Avail: National Technical Information Service (NTIS)
The Materials Reliability Division develops measurement technologies that enable the producers and users of materials to improve the quality and reliability of their products. Measurement technologies, and the associated materials science base, are

developed for materials evaluation to assure reliable performance, for nondestructive evaluation to assure quality of finished materials and products, and for process control to improve the quality and consistency of materials. Within these broad areas of measurement technology, the Division focused its resources in FY1999 on the following three research themes: (1) microscale measurements, (2) microstructure sensing, and (3) process sensing and modeling.
Derived from text
Detection; Evaluation; Microstructure; Performance Tests; Reliability; Research

20000116112 National Inst. of Standards and Technology, Materials Science and Engineering Lab., Gaithersburg, MD USA
Metallurgy: 1999 Programs and Accomplishments
January 2000; 136p; In English
Report No.(s): PB2000-101374; NISTIR-6436; No Copyright; Avail: National Technical Information Service (NTIS)

This report describes areas of scientific expertise, major technical activities, and accomplishments of the Metallurgy Division of the National Institute of Standards and Technologies (NIST) Materials Science and Engineering Laboratory (MSEL) in 1999. The mission of the NIST Metallurgy Division is to provide leadership in developing measurement methods, standards, and fundamental understanding of materials behavior needed by the U.S. materials metrology infrastructure for the more effective production and use of both traditional and emerging materials. We hope that this report provides insight into how these research programs meet the objectives of our customers, how the capabilities of the Metallurgy Division are being used to solve problems important to the national economy and the materials metrology infrastructure, and how we interact with our customers to establish new priorities and programs.
Derived from text
Metrology; Priorities; Programs; Standards

20000116169 National Inst. of Standards and Technology, Gaithersburg, MD USA
Standard Reference Materials: Technical Specifications for Certification of Spectrophotometric NTRMs
Travis, John C., National Inst. of Standards and Technology, USA; Smith, Melody V., National Inst. of Standards and Technology, USA; Rasberry, Stanley D., National Inst. of Standards and Technology, USA; Kramer, Gary W., National Inst. of Standards and Technology, USA; Feb. 2000; 66p; In English
Report No.(s): PB2000-103299; NIST-SP-260-140; No Copyright; Avail: National Technical Information Service (NTIS)

This document provides the technical requirements for operating laboratories that prepare, measure, and certify visible absorbance spectrophotometric NIST Traceable Reference Materials (NTRMs) with quality assessment administered by the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology (NIST). Specifically, descriptions are given of the processes involved in qualifying a potential NTRM certifier, detailed specifications and construction of NTRM filters, the spectrophotometric certification and recertification process, and maintaining the measurement traceability to the reference spectrophotometer in the NIST Analytical Chemistry Division. Measurement traceability is assured through direct and indirect proficiency testing, including annual comparison measurements, control charts using certified NIST Standard Reference Materials and in-house working standards, and blind testing.
Author
Spectrophotometry; Transmittance; Certification; Construction; Specifications; Spectrophotometers

20000116343 Oregon State Univ., Corvallis, OR USA
Laboratory Comparison of Solvent-Loaded and Solvent-Free Emulsions ***Interim Report, Dec. 1997 - Jan. 00***
Leahy, R. B.; Root, S.; James, D. D.; September 2000; 58p; In English
Report No.(s): PB2001-100335; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Asphalt emulsions have been widely used in highway construction and maintenance since the 1920s, initially as dust palliatives and spray applications. More recently, they have been used in more diverse paving applications such as base and surface course mixes, surface treatments and maintenance activities. The Oregon Department of Transportation (ODOT) uses nearly 450,000 Mg (500,000t) of cold mix, i.e., emulsified asphalt concrete (EAC), for construction and maintenance at a cost of approximately $10 million per year. For safety, environmental and economic reasons, the use of emulsions is likely to increase dramatically in the next ten years. The decrease in highway funding and the public's heightened environmental awareness demand innovative technology for roads of the 21st century. Recognizing the opportunities inherent in this challenge, some commercial enterprises have already developed solvent-free alternatives. Preliminary laboratory testing of solvent-free emulsions in standard dense- and open-graded EAC mixes indicated that mechanical properties are comparable to or exceed those of conventional sol-

vent-loaded emulsions. Accordingly, the objective of this research was to quantify the difference between conventional solvent-loaded and solvent-free EAC as measured by indirect tensile strength.
NTIS
Pavements; Sealers; Asphalt; Emulsions; Concretes; Surface Treatment

20000116392 Oak Ridge National Lab., TN USA
Advanced microcharacterization of nickel-base superalloys
Anderson, I. M.; Miller, M. K.; Pike, L. M.; Klarstrom, D. L.; Feb. 01, 2000; 9p; In English
Report No.(s): DE00-752981; C/ORNL99-0553; No Copyright; Avail: Department of Energy Information Bridge

The purpose of this project was to characterize the microstructural and microchemical effects of a process revision on HAYNES(reg(underscore)sign) 242(trademark), a polycrystalline Ni-base superalloy used principally for high temperature applications, such as seal and containment rings in gas turbine engines. The process revision from the current one-step heat treating cycle to a two-step heat treatment would result in savings of energy and ultimately cost to the consumer. However, the proposed process revision could give rise to unforeseen microstructural modifications, such as a change in the size distribution of the ordered particles responsible for alloy strength or the formation of additional phases, which could affect alloy properties and hence performance. Advanced microcharacterization methods that allow images of the microstructure to be acquired at length scales from one micrometer down to the atomic level were used to reveal the effect of the process revision on alloy microstructure. Energy filtered imaging was used to characterize the size distribution and morphology of ordered precipitates and other phases, as well as the partitioning behavior of major elements (Ni, Mo, Cr) among these phases. The compositions of individual ordered particles, including fine-scale compositional variations at precipitate-matrix interfaces, and solute segregation behavior at grain boundaries were characterized at the atomic level by atom probe tomography. The atomic site distributions of selected elements in the ordered precipitates were characterized by atom-location by channeling-enhanced microanalysis (ALCHEMI). The results of these advanced microcharacterization methods were correlated with mechanical testing of similar alloys to address structure-property relationships.
NTIS
Nickel Alloys; Heat Resistant Alloys; Microstructure; Microanalysis

20000116483 Materials Research Society, Warrendale, PA USA
Symposium K, Materials Synthesis by Thermal Spraying, Held at the 1999 MRS Fall Meeting, Boston, MA during November 29-December 3, 1999 ***Final Report***
Gitzhofer, Francois; Lau, Y. C.; Heberlein, Joachim; Moreau, Christian; Dec. 03, 1999; 10p; In English
Contract(s)/Grant(s): N00014-00-1-0287
Report No.(s): AD-A382605; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Symposium K will focus on materials synthesis by thermal spraying. The need for engineered coatings with controlled composition and microstructure is increasing because of increasing demands on the materials properties in a variety of applications such as aerospace, environment, catalysis, and electrodes. A possible gain in productivity by using thermal spraying as a process for materials synthesis is a strong driving force that is coming from the industry. This symposium is intended to provide current knowledge in the field of thermal spraying synthesis of materials including ultrafine powder synthesis, with highlights on processing, modeling and diagnostics and nanostructure materials applications and characterization. As part of the symposium, an honorary session will be devoted to Professor Herbert Herman from SUNY-Stony Brook for his overall contribution in the field of thermal spraying. This symposium seeks to bring together researchers from academia and industry to discuss fundamental mechanisms and phenomena, as well as processing in the materials synthesis and thermal spraying field.
DTIC
Conferences; Coatings; Plasma Spraying; Crystal Growth

24
COMPOSITE MATERIALS

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

20000115488 Army Research Lab., Human Research and Engineering Directorate, Aberdeen Proving Ground, MD USA
A Survey of Current High-Performance Carbon Fiber Characterization Methods ***Final Report, Jan.-Jul. 1999***
Nguyen, Steven P.; Ghiorse, Linda L.; Mulkern, Thomas J.; Aug. 2000; 44p; In English
Contract(s)/Grant(s): ARL-TR-2293; Proj-622105.AH84
Report No.(s): AD-A381889; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report reviews various test techniques published in the literature for evaluating carbon fiber via the single-filament tensile test, the dry bundle test, the resin-impregnated strand test, and the single-fiber fragmentation test (optical microscopy and acoustic emission). Experimental procedures, data analysis, and statistical tensile strength theory are also described. Each technique is followed by a discussion of the advantages and limitations. Furthermore, a materials property database has been developed that includes mechanical properties for several commercially available carbon fibers.
DTIC
Carbon Fibers; Acoustic Emission; Characterization; Data Bases; Mechanical Properties

20000115902 TMS, Warrendale, PA USA
International Conference on Compliant and Alternative Substrate Technology, ***1 Jun. - 31 Dec. 1999***
Seaford, Matthew L., TMS, USA; Apr. 07, 2000; 42p; In English, 19-23 Sep. 1999, Lake Buena Vista, FL, USA; Special thanks to our ICAST Government and Industry Sponsors: Air Force Office of Scientific Research, Bolling AFB, DC; DARPA/ETO, Arlington, Virginia; Office of Naval Research, Arlington, Virginia; Boeing, Seattle, Washington; HRL Laboratories, Mali
Contract(s)/Grant(s): N0014-99-1-0325
Report No.(s): AD-A375867; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Contents include the following: Transfer of semiconductor and oxide films by wafer bonding and layer splitting. Compliant SOI substrates: preliminary research data. Strain relaxation in bonded compliant substrate structures.Use of wafer bonding for enhancements in device performance.. Selection of compliant substrates. Approaches to low threading dislocation density materials and related modeling. Compliant substrates by twist wafer bonding: fact of fiction? Low temperature wafer bonding. Processing of silicon for three-dimensional applications. Wafer bonding for InP materials and devices. Comparison of InGaSb/InAs superlattice structures grown by MBE on GaSb, GaAs, and compliant GaAs substrates. Compliant substrates and optoelectronic device integration by wafer bonding. Alternative approach to the growth of HGCdTe IR detectors. Nanostructured SOI compliant substrates.
CASI
Conferences; Elastic Properties; Gallium Antimonides; Gallium Arsenides; Infrared Detectors; Low Density Materials; Optoelectronic Devices; Semiconductors (Materials)

20000116371 Army Research Lab., Human Research and Engineering Directorate, Aberdeen Proving Ground, MD USA
Induction Heating of Carbon-Fiber Composites: Thermal Generation Model ***Final Report, Jan. 1995-Dec. 1998***
Fink, Bruce K.; McCullough, Roy L.; Gillespie, John W., Jr.; Sep. 2000; 56p; In English; Prepared in collaboration with the University of Delaware, Newark, DE.
Report No.(s): AD-A382423; ARL-TR-2261; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A theory of local and global mechanisms of heat generation and distribution in carbon-fiber-based composites subjected to an alternating magnetic field has been proposed. A model that predicts the strength and distribution of thermal generation through the thickness of carbon-fiber-based laminated composites has been developed. Earlier work has established the distribution of point voltages in the plane of the laminate that exist in the form of potential differences between fibers in adjacent plies in a cross-ply or angle-ply laminate system. In this work a capacitive-layer microstructure that models the actual fiber-reinforced-polymer microstructure from a square-packing assumption to a series of conductive parallel plates is formulated. An effective parameter of heating, gamma, that establishes the distribution of heating through the thickness is defined. Extreme gradients in this thermal source can exist with peaks occurring at the interfaces of ply-ply orientation changes. An optimization study establishes the effect of various microstructural and macrostructural parameters on the heating parameter, gamma. Several parametric studies are performed on the computer algorithm, which calculates gamma to further analyze these effects.
DTIC
Carbon Fibers; Induction Heating; Thermodynamic Properties; Mathematical Models; Heat Generation; Fiber Composites

20000116381 Science Univ. of Tokyo, Chiba, Japan
Proceedings of the Ninth USA-Japan Conference on Composite Materials
Jul. 14, 2000; 863p; In English; 9th; Composite Materials, 3-4 Jul. 2000, Mishima, Japan
Contract(s)/Grant(s): F62562-99-M-9241
Report No.(s): AD-A379549; AOARD-CSP-991016; ISBN 4-931136-03-6; No Copyright; Avail: CASI; A99, Hardcopy; A10, Microfiche

Proceedings from this conference include the following categories: Plenary session (Overview for Composites) (Low Cost Composite Structures) (Composites for Infrastructure) (Smart and Intelligent Composites). Low Cost Composite Structures, I and II. Smart and Intelligent Composites. MMC, CMC & C/C. Fiber and Repair. Fracture touchness. New Concept Composites, I and II. Composite Mechanics, I and II. Damage Tolerance. Composites for Infrastructure, I and II. Creep and Fatigue. Damage Identification; Cryogenic Composite Tank; and Braided and FW Composites.
DTIC
Composite Materials; Conferences; Ceramic Matrix Composites; Braided Composites; Creep Properties

20000116406 California Univ., Center for Aerospace Research and Education, Los Angeles, CA USA
Analysis of Sub-Interface Cracks
Liu, C. T., Air Force Research Lab., USA; Wang, L., California Univ., USA; Atluri, S. N., California Univ., USA; Jan. 1999; 6p; In English
Report No.(s): AD-A381471; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

In this study, linear elastic finite element analysis were conducted to analyze a bonded specimen with a sub-interface crack. The effect of the adhesive layer's thickness and stiffness, the initial sub-interface crack length, and the location of the sub-interface crack, on the stress intensity factors at the tip of the sub-interface crack were investigated. The results of the analyses are discussed.
DTIC
Crack Propagation; Stress Intensity Factors; Stiffness; Interfaces; Laminates

25
INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY

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

20000115426 Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
Pressure-induced magnetic collapse and metallization of molecular oxygen: The (zeta)-O2 phase
Serra, S.; Chiarotti, G.; Scandolo, S.; Tosatti, E.; Jan. 31, 1998; 7p; In English
Report No.(s): DE98-626902; No Copyright; Avail: Department of Energy Information Bridge

The behavior of solid oxygen in the pressure range between 5-116 GPa is studied by ab-initio simulations, showing a spontaneous phase transformation from the antiferromagnetic insulating (delta)-O2 phase to a non-magnetic, metallic molecular phase. The calculated static structure factor of this phase is in excellent agreement with X-ray diffraction data in the metallic (zeta)-O2 phase above 96 GPa. We thus propose that (zeta)-O2 should be base centered monoclinic with space group C2/m and 4 molecules per cell, suggesting a re-indexing of the experimental diffraction peaks. Physical constraints on the intermediate-pressure (epsilon)-O2 phase are also obtained.
NTIS
Collapse; Metallizing; Molecules; Oxygen; Solid Cryogens; Molecular Structure

20000115483 Norwegian Defence Research Establishment, Kjeller, Norway
Extraction of Phosphonic Acid From Water Using Solid Phase Extraction ***Ekstraksjon av Fosfonsyrer fra Vannfase ved Hjelp av Fast Fase Ekstraksjon***
Hansen, Lise-Lotte, Norwegian Defence Research Establishment, Norway; Kalfjos, Helen Therese, Norwegian Defence Research Establishment, Norway; Opstad, Aase Mari, Norwegian Defence Research Establishment, Norway; Roen, Bent Tore, Norwegian Defence Research Establishment, Norway; Tornes, John Aasulf, Norwegian Defence Research Establishment, Norway; Sep. 01, 2000; 36p; In Norwegian
Contract(s)/Grant(s): FFIBM Proj. 757/138
Report No.(s): FFI/RAPPORT-2000/04310; ISBN-82-464-0443-1; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Methylation of methylphosphonic acids with diazometane gives good results, even if the eluate is acidic. Extraction of methylphosphonic acids from water using solid phase extraction has been tested with three different columns, SAX, DEA and NH2. The SAX columns give highest recoveries. Different solvents for eluation were tested, and methanol with at least 0,6 % HBr in the eluent show the best recovery rates. Variation in pH does not influence the recovery rates. Different contents of salt in the sample were also tested. If the sample volumes are between 50 and 100 ml, the capacity of solid phase column has to be at least 500 mg. Amounts of methylphosphonic acids in samples below about 700 ng/ml will decrease the recovery rate. The limit of quantification for this method is less then 100 ng/mi with standard deviation less then 10 %.
Author
Phosphoric Acid; Extraction; Solid Phases; Water

20000116101 National Inst. of Standards and Technology, Chemical Science and Technology Lab., Gaithersburg, MD USA
Characterization of the Inlet Combustion Air in NIST's Reference Spray Combustion Facility: Effect of Vane Angle and Reynolds Number
Widmann, John F., National Inst. of Standards and Technology, USA; Charagundia, S. Rao, National Inst. of Standards and Technology, USA; Presser, Cary, National Inst. of Standards and Technology, USA; January 2000; 28p; In English
Report No.(s): PB2000-102877; NISTIR-6458; No Copyright; Avail: National Technical Information Service (NTIS)

The airflow through a 12-vane cascade swirl generator is examined numerically to characterize the inlet combustion air in the reference spray combustion facility at the National Institute of Standards and Technologies (NIST). A three-dimensional model is used to simulate the aerodynamics in the swirl generator that imparts the desired degree of angular momentum to the air in the annulus leading into the reactor. A parametric study is presented in which the effects of the vane angle and Reynolds number are examined. Reynolds numbers ranging from 5,000 to 30,000 and vane angles ranging from 30 deg to 60 deg, are investigated. For a vane angle of 50 deg, which is the current operating condition of the swirl generator, a recirculation zone develops at the exit of the annulus for Reynolds number, Re approx. equals 9500. The Renormalization Group method (RNG) k-epsilon turbulence model is used to model the transport, production, and dissipation of turbulence due to its superior performance (relative to the standard k-epsilon turbulence model) for this type of flow.
Author
Fluid Mechanics; Turbulence; Three Dimensional Models; Sprayers; Reynolds Number; Computational Fluid Dynamics; K-Epsilon Turbulence Model; Numerical Analysis; Renormalization Group Methods; Vanes

20000116164 National Inst. of Standards and Technology, Building and Fire Research Lab., Gaithersburg, MD USA
Numerical Modeling of Counterflow Diffusion Flames Inhibited by Iron Pentacarbonyl
Rumminger, Marc D., National Inst. of Standards and Technology, USA; Linteris, Gregory T., National Inst. of Standards and Technology, USA; October 1999; 16p; In English
Report No.(s): PB99-102626; NISTIR-6243; No Copyright; Avail: National Technical Information Service (NTIS)

This paper presents the first detailed numerical study of the extinction of methane-air counterflow diffusion flames by the super-effective agent iron pentacarbonyl. Calculations using a gas-phase chemical mechanism reproduce the magnitude of inhibition for small amounts of inhibitor in the air, but overpredict the inhibition effect for larger amounts of inhibitor. Reaction pathway and reaction flux analyses show that a catalytic cycle involving FeO, Fe(OH)2, and FeOH is primarily responsible for catalytic recombination of H atoms which produces the inhibition, and that a new cycle involving Fe(OH), FeOOH, and FE(OH)2, has a minor role. Reaction flux calculations demonstrate that the fractional fluxes level off. Saturation of the catalytic cycles can partially explain the diminishing effect of the inhibitor at high inhibitor loading shown in both the calculated and experimental results. Flame structure calculations are used to determine the reasons for stronger inhibition for air-side addition of the inhibitor than for fuel-side. Simulations using an idealized inhibitor confirm the important role of transport in inhibition of counterflow diffusion flames.
Author
Atomic Recombination; Counterflow; Diffusion Flames; Inhibitors; Mathematical Models; Numerical Analysis

20000116336 NASA White Sands Test Facility, NM USA
Thermodynamic Analysis of the Combustion of Metallic Materials
Wilson, D. Bruce, Wilson (D. Bruce), USA; Stoltzfus, Joel M., NASA White Sands Test Facility, USA; [2000]; 1p; In English; 9th; Flammability and Sensitivity of Materials in Oxygen-Enriched Atmospheres, 28-29 Sep. 2000, Paris, France; Sponsored by American Society for Testing and Materials, USA
Contract(s)/Grant(s): NAS9-95682; No Copyright; Avail: Issuing Activity; Abstract Only

Two types of computer codes are available to assist in the thermodynamic analysis of metallic materials combustion. One type of code calculates phase equilibrium data and is represented by CALPHAD. The other type of code calculates chemical reaction by the Gordon-McBride code. The first has seen significant application for alloy-phase diagrams, but only recently has it been considered for oxidation systems. The Gordon-McBride code has been applied to the combustion of metallic materials. Both codes are limited by their treatment of non-ideal solutions and the fact they are limited to treating volatile and gaseous species as ideal. This paper examines the significance of these limitations for combustion of metallic materials. In addition, the applicability of linear-free energy relationships for solid-phase oxidation and their possible extension to liquid-phase systems is examined.
Author
Combustion; Computer Programs; Thermodynamics; Metal Combustion; Combustion Chemistry

20000116337 NASA White Sands Test Facility, NM USA
Analysis of the NASA White Sands Test Facility (WSTF) Test System for Friction-Ignition of Metallic Materials
Shoffstall, Michael S., Allied-Signal Technical Services Corp., USA; Wilson, D. Bruce, Wilson (D. Bruce), USA; Stoltzfus, Joel M., NASA White Sands Test Facility, USA; [2000]; 1p; In English; 9th; Flammability and Sensitivity of Materials in Oxygen-Enriched Atmospheres, 28-29 Sep. 2000, Paris, France; Sponsored by American Society for Testing and Materials, USA
Contract(s)/Grant(s): NAS9-95682; No Copyright; Avail: Issuing Activity; Abstract Only

Friction is a known ignition source for metals in oxygen-enriched atmospheres. The test system developed by the NASA White Sands Test Facility in response to ASTM G-94 has been used successfully to determine the relative ignition from friction of numerous metallic materials and metallic materials pairs. These results have been ranked in terms of a pressure-velocity product (PV) as measured under the prescribed test conditions. A high value of 4.1(exp 8) watts per square meter for Inconel MA 754 is used to imply resistance to friction ignition, whereas a low value of 1.04(exp 8) watts per square meter for stainless steel 304 is taken as indicating material susceptible to friction ignition. No attempt has been made to relate PV values to other material properties. This work reports the analysis of the WSTF friction-ignition test system for producing fundamental properties of metallic materials relating to ignition through friction. Three materials, aluminum, titanium, and nickel were tested in the WSTF frictional ignition instrument system under atmospheres of oxygen or nitrogen. Test conditions were modified to reach a steady state of operation, that is applied, the force was reduced and the rotational speed was reduced. Additional temperature measurements were made on the stator sample. The aluminum immediately galled on contact (reproducible) and the test was stopped. Titanium immediately ignited as a result of non-uniform contact of the stator and rotor. This was reproducible. A portion of the stator sampled burned, but the test continued. Temperature measurements on the stator were used to validate the mathematical model used for estimating the interface (stator/rotor) temperature. These interface temperature measurements and the associate thermal flux into the stator were used to distinguish material-phase transitions, chemical reaction, and mechanical work. The mechanical work was used to analyze surface asperities in the materials and to estimate a coefficient of fiction. The coefficient of fiction was analyzed in terms of material properties that is, hardness, Young's modulus and elasticity/plasticity of the material.
Author
Friction; Ignition; Mathematical Models; Metals; Oxygen; Test Facilities; Metal Combustion

20000116380 Case Western Reserve Univ., Dept. of Chemistry, Cleveland, OH USA
In Situ and Ex Situ Non Linear Optical Techniques as Applied to the Study of Electrode Materials for Energy Storage Energy Generation and Electrocatalysis ***Final Report, 1 Mar. 1997 - 28 Feb. 1998***
Pozniak, Boguslaw; Mo, Yibo; Wang, Zhenghao; Alvarez, Bernabe; Stefan, Lonel; May 23, 2000; 12p; In English
Contract(s)/Grant(s): DAAG55-97-1-0078
Report No.(s): AD-A379542; ARO-36546.1-CH-RIP; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

An experimental set up has been designed and built for the acquisition of ultrafast second harmonic generation (SHG) measurements to monitor surface dynamics at electrified interfaces with special emphasis on processes induced by variations in the applied potential across single crystal metal-electrolyte solution interfaces. Much of the effort has been devoted to the study of reactions of interest to fuel cells, including hydrogen and CO adsorption, as well as methanol oxidation on Pt surfaces. As evidenced by the experimental results obtained, the feasibility of measuring transient effects is limited by the geometry of the cell and particularly by the electrode size. Attempts to overcome these problems are being made by using single crystal ultramicroelectrodes taking advantage of spontaneous facetting to allow single crystalline microsurfaces to be examined optically without interference from other areas of the electrode.
DTIC
Electrochemistry; Nonlinear Optics; Fuel Cells; Electrode Materials; Electrolytes; Electrocatalysts

20000116405 Engineering Research and Consulting, Inc., Edwards AFB, CA USA

Reactions of O-Atoms and O2 with Small Carbonaceous Free Radicals

Vaghjiani, Ghanshyam L.; Apr. 2000; 1p; In English

Report No.(s): AD-A381436; No Copyright; Avail: CASI; A01, Microfiche; A01, Hardcopy; Abstract Only; Abstract Only

The interactions of carbonaceous combustion species in rocket plumes with the atmosphere are thought to play an important role in the production of ultraviolet, visible and infrared radiation signatures at high altitude. A detailed understanding of the pertinent chemical reactions that produce the electronically exited species, and of the competing quenching reactions that remove the internal energy in radiation-less processes is needed to accurately calculate plume spectral signatures and absolute radiances (in the short wavelength region) in the oxidation of CH, CH2, C2H, and C2O2 with O-atoms and O2.

Derived from text

Atoms; Oxygen; Hydrocarbons; Free Radicals; Exhaust Gases

20000116469 Army Aviation and Missile Command, Propulsion and Structures Directorate, Redstone Arsenal, AL USA

Treatability Study of Pentaborane(9)

McDonald, Joseph K., Army Aviation and Missile Command, USA; Wright, Jeffery S., Army Aviation and Missile Command, USA; Gaines, Donald F., Wisconsin Univ., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 671-681; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

Procedures for the safe destruction of liquid pentaborane(9), B5H9, by solvolysis were investigated. The objective of the study was to establish the optimum conditions for a pilot plant operation that would use water, or alcohol, or water-alcohol mixtures as the solvolysis reagent. Small amounts of B5H9 sprayed from a syringe will not necessarily enflame, nor will a small pool on a spot plate. Therefore, a procedure was developed to reproducibly demonstrate the flammability of B5H9. In these tests every sample of neat B5H9 ignited and burned with a very sooty flame till the sample was consumed. The spontaneous self-ignition of B5H9 was quenched by the addition of small concentrations of ethers THF (tetrahydrofuran) or DME (1,2-dimethoxy ethane). It was found that ten percent (volume) of either provided total quenching with a large margin of safety. When these stabilized solutions were exposed to air, they decomposed and evaporated leaving a residue that was identified by nuclear magnetic resonance (NMR) analysis as boric acid. Most of the laboratory solvolysis experiments used the 90 percent B5H9, 10 percent THF solution. This mixture was safer to handle and its solvolysis reactivity was virtually identical to that of 100 percent B5H9. Reaction rates were analyzed by measurement of hydrogen evolved during the solvolysis reactions. In terms of the minimum overall complete reaction time, the data indicate that 50/50 alcohol/water is the optimum solvolysis reagent. This reaction produced a mixture of boric acid, B(OH)3, and triethoxyborane, B(OEt)3[Et = C2H5], and mixed exchange derivatives thereof.

Author

Flammability; Ignition; Solvolysis; Spontaneous Combustion; Pentaboranes

20000116496 Japan Atomic Energy Research Inst., Tokyo, Japan

Pulse shape measurements of scintillation emission

Yagi, H.; Itoh, H.; Usuda, S.; Asano, Y.; Sep. 30, 1998; 35p; In Japanese; In English

Report No.(s): DE99-725647; JAERI-TECH-98-043; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

The experimental investigations have been performed for the scintillation response that includes the relation between the emission spectra and the decay time. A simple and useful method was contrived to obtain the accurate pulse shapes of scintillation emission. Voltage pulse shapes appear on an accumulating capacitance charged by the output current of a photo multiplier, and these are observed by the digital oscilloscope. The scintillation emission pulse shapes are obtained by the arithmetic differentiation of the voltage pulse data. The emission decay time constants with multicomponents of the typical inorganic scintillators were estimated.

NTIS

Experimentation; Emission Spectra; Decay Rates; Time Functions; Scintillation

20000116510 NASA Kennedy Space Center, Cocoa Beach, FL USA

Update on N2O4 Molecular Sieving with 3A Material at NASA/KSC

Davis, Chuck, NASA Kennedy Space Center, USA; Dorn, Claudia, Wyle Labs., Inc., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 777-785; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

During its operational life, the Shuttle Program has experienced numerous failures in the Nitrogen Tetroxide (N2O4) portion of Reaction Control System (RCS), many of which were attributed to iron-nitrate contamination. Since the mid-1980's, N2O4 has been processed through a molecular sieve at the N2O4 manufacturer's facility which results in an iron content typically less than 0.5 parts-per-million-by-weight (ppmw). In February 1995, a Tiger Team was formed to attempt to resolve the iron nitrate problem. Eighteen specific actions were recommended as possibly reducing system failures. Those recommended actions include additional N2O4 molecular sieving at the Shuttle launch site. Testing at NASA White Sands Test Facility (WSTF) determined an alternative molecular sieve material could also reduce the water-equivalent content (free water and HNO3) and thereby further reduce the natural production of iron nitrate in N2O4 while stored in iron-alloy storage tanks. Since April '96, NASA Kennedy Space Center (KSC) has been processing N2O4 through the alternative molecular sieve material prior to delivery to Shuttle launch pad N2O4 storage tanks. A new, much larger capacity molecular sieve unit has also been used. This paper will evaluate the effectiveness of N2O4 molecular sieving on a large-scale basis and attempt to determine if the resultant lower-iron and lower-water content N2O4 maintains this new purity level in pad storage tanks and shuttle flight systems.
Author
Absorbents; Contamination; Purity; Research and Development

20000116511 Directorate of Aerospace Fuels, Vandenberg AFB, CA USA
1999 Correlation of N2O4 Analyses by Seven Laboratories
Wurzbach, Roy, Directorate of Aerospace Fuels, USA; Hunter, Philip, Air Force Center for Environmental Excellence, USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 757-775; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

This work describes the range of average values seven laboratories reported for the following attributes found in propellant dinitrogen tetroxide (N2O4): nitric oxide (NO) presented by weight (wt%); assay wt%; water equivalent wt%; chloride content wt%; nonvolatile residue (mg/L); iron content (ppmw); and particulate (mg/L). These analyses of propellant N2O4 are required for specification conformance testing and quality assurance of missile propellants. The paramount purpose of this investigation was to determine the range of values that laboratories report of NO wt% content of N2O4. It was found that one laboratory had significantly different NO wt% values for a single sample of N2O4. Future correlation investigations will be conducted using more replicate testing and more carefully specified replicate determinations.
Author
Propellants; Quality Control; Specifications; Laboratories; Comparison

20000116514 NASA White Sands Test Facility, NM USA
Resources Available for Hazards Analysis of Aerospace Fluids
Woods, S. S., Honeywell Technology Solutions, Inc., USA; Stewart, W. F., L and M Technologies, Inc., USA; Baker, D. L., NASA White Sands Test Facility, USA; Beeson, H. D., NASA White Sands Test Facility, USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 727-738; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

The rapid pace of transfer of government activities to the aerospace industry, along with the increasing incidence of aerospace corporate mergers, have the potential for disrupting coordination and flow of vital propellant safety and hazards information among personnel involved in design, operations, and safety. Coincident with these changes are new laws such as Public Law 104-113, also known as the National Technology Transfer and Advancement Act of 1995, which is designed to accelerate technology transfer to industry and promote government-industry partnership. The NASA Johnson Space Center (JSC) White Sands Test Facility (WSTF) has developed initiatives in response to these changes and is coordinating the interchange of NASA's propellant hazards and safety information with industry. This is being done through the development of voluntary consensus standards, propellant hazards analysis protocols, and safety courses for the industrial, propellant use of oxygen, hydrogen, and hypergols. NASA's Safety Standard for Oxygen and Oxygen Systems has already been transitioned to a manual published by the American Society for Testing and Materials (ASTM) entitled 'Safe Use of Oxygen and Oxygen Systems: Guidelines for Oxygen System Design, Materials Selection, Operation, Storage, and Transportation.' Work in progress includes transition of two NASA manuals to AIAA consensus standards: 'Safety Standards for Hydrogen and Hydrogen Systems'; 'Fire, Explosion, Compatibility, and Safety Hazards of Hydrazine'; and 'Fire, Explosion, Compatibility, and Safety Hazards of Monomethylhydrazine.' Also, an effort is underway to create an international standard on hydrogen safety through International Organization for Standardization (ISO). The move toward collaborating with voluntary consensus organization began several years ago, when WSTF began disseminating oxygen hazards information and expertise through the ASTM-sponsored 'Fire Hazards in Oxygen Systems' and through a WSTF-

developed oxygen hazards analysis protocol. Similar bodies of information are under development for hydrogen and hypergols. The information conveyed by these efforts constitutes a valuable resource for the aerospace industry. For the maximum benefit to accrue, industry must participate through technical committees of the voluntary consensus organizations chartered to manage this kind of information. This paper describes these WSTF initiatives more fully in an effort to inform the aerospace community of available resources and to encourage its involvement in voluntary standards organizations.
Author
Aerospace Industry; Information Dissemination; Technology Transfer; Hazards; Organizations; Safety

20000116584 Oak Ridge National Lab., TN USA
Environmental Technology Verification Report: Electrochemical Technique/Ion Specific Electrode. Dexsil Corporation L2000 PCB/Chloride Analyzer
Dindal, A. B.; Bayne, C. K.; Jenkins, R. A.; Aug. 1998; 116p; In English
Report No.(s): PB2001-100488; NERL-LV-98-108; No Copyright; Avail: National Technical Information Service (NTIS)
In July 1997, the US Environmental Protection Agency (EPA) conducted a demonstration of Polychlorinated biphenyl (PCB) field analytical techniques. The purpose of this demonstration was to evaluate field analytical technologies capable of detecting and quantifying PCBs in soils and solvent extracts. The fundamental objectives of this demonstration were (1) to obtain technology performance information using environmental and quality control samples; (2) to determine how comparable the developer field analytical results were wither conventional reference laboratory results; and (3) to report on the logistical operation of the technology. The demonstration design was subjected to extensive review and comment by EPA's National Exposure Research Laboratory (NERL) Environmental Sciences Division in Las Vegas, Nevada; Oak Ridge National Laboratory (ORNL); EPA Regional Offices; the US Department of Energy (DOE); and the technology developers.
NTIS
Environment Protection; Environmental Quality; Polychlorinated Biphenyls; Electrodes; Chlorides; Electrochemistry

26
METALS AND METALLIC MATERIALS

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

20000115422 Swedish Nuclear Power Inspectorate, Stockholm, Sweden
Microscopic examination of crack growth in a pressure vessel steel
Isacsson, M.; Narstroem, T.; Jan. 31, 1997; 28p; In English
Report No.(s): DE98-626930; SKI-R-97-1; No Copyright; Avail: Department of Energy Information Bridge
A fairly systematic microscopic study concerning ductile and ductile-brittle crack growth in the A508B pressure vessel steel has been performed. The main method of investigation was to subject fracture mechanics specimens (sub-sized three point bend specimens) to predetermined load levels corresponding to different amounts of ductile crack extension. The specimens were then cut perpendicularly to the plane of the crack and the area in front of the crack was examined in a SEM. The object of these examinations was to determine if newly encountered computational results could be correlated to crack extension characteristics and to study whether the mechanism of ductile growth was of the void growth type or of the fast shear mechanism. This is important for further numerical modelling of the process. Both the original material and a specially heat treated piece were investigated. The heat treatment was performed in order to raise the transition temperature to about 60 C with the object to provide a more convenient testing situation. Charpy V tests were performed for the specially heat treated material to obtain the temperature dependence of the toughness. This was also studied by performing fracture toughness determination on the same type of specimens as were used for the microscopic study. The heat treatment used fulfilled the above purpose and the microscopic studies provide a good understanding of the micro mechanisms operating in the ductile fracture process for this material.
NTIS
Crack Propagation; Fracture Mechanics; Ductility; Brittleness

20000115612 NASA Goddard Space Flight Center, Greenbelt, MD USA
Effects of Conformal Coat on Tin Whisker Growth
Kadesch, Jong S., Orbital Sciences Corp., USA; Leidecker, Henning, NASA Goddard Space Flight Center, USA; [2000]; 9p; In English; IMAP Conference, 10-13 Sep. 2000, Helsinger, Denmark; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
A whisker from a tin plated part was blamed for the loss of a commercial spacecraft in 1998. Although pure tin finishes are prohibited by NASA, tin plated parts, such as hybrids, relays and commercial off the shelf (COTS) parts, are something discovered

to have been installed in NASA spacecraft. Invariably, the assumption is that a conformal coat will prevent the growth of, or short circuits caused by, tin whiskers. This study measures the effect a Uralane coating has on the initiation and growth of tin whiskers, on the ability of this coating to prevent a tin whisker from emerging from the coating, and on the ability to prevent shorting. A sample of fourteen brass substrates (1 inch by 4 inches by 1/16 inch) were plated by two separate processes: half of the specimens were 'bright' tin plated directly over the brass substrate and half received a copper flash over the brass substrate prior to 'bright' tin plating. Each specimen was coated on one half of the substrate with three bi-directional sprays of Uralane 5750 to a nominal thickness of 25 to 75 micrometers (1 to 3 mils). Several specimens of both types, Cu and non-Cu flashed, were placed in an oven maintained at 50 C as others' work suggests that this is the optimal temperature for whisker formation. The remaining specimens were maintained at room ambient conditions. The surfaces of each specimen have been regularly inspected using both optical (15 to 400x power) and Scanning Electronic Microscopy (SEM). Many types of growths, including needle-like whiskers, first appeared approximately three months after plating on the non-conformally coated sides of all specimens. At four months, 4 to 5 times more growth sites were observed on the coated side; however, the density of growth sites on the non-conformally coated side has since increased rapidly, and now, at one year, is about the same for both sides. The density of growth sites is estimated at 90/sq mm with 30 percent of the sites growing whiskers (needle-like forms) with the potential to cause short circuit bridging. The average growth rate of the needle-like whiskers on the non-conformally coated areas is about 130 micrometers per year with some outliers reaching 800 micrometers after one year. It is more difficult to make growth measurements under the conformal coat. As yet no whiskers have been observed to penetrate through the coating surface, however, a number of tin nodules appear on the verge of breaking through the thinner regions of the coating surface. These domes are developing sharper and sharper tips, as if a growing whisker is about to push its way through a tough skin. Our observations are that the specimens with copper flash show a much lower density of nucleation sites and significantly slower whisker growth compared to the specimens that have only bright tin plating over brass. The specimens kept at room temperature have a higher whisker density than those stored at 50 C. This is an unexpected result and does not agree with the published findings of others. All of the whiskers originate from small surface defects (thin, tiny scratches) that appear over the entire surface of each specimen.
Author
Brasses; Coating; Coatings; Growth; Needles; Plating; Surface Defects; Tin

20000116150 Army Armament Research, Development and Engineering Center, Benet Labs., Watervliet, NY USA
Effect of Sputtering Parameters on Tantalum Coatings for Gun Bore Applications ***Final Report***
Matson, Dean W.; McClanahan, Edwin D.; Rice, Joseph P.; Lee, Sabrina L.; Windover, Donald; Aug. 2000; 20p; In English
Report No.(s): AD-A382266; ARCCB-TR-00014; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Tantalum offers a number of attractive properties for gun bore coating applications, including a high melting temperature, high ductility, and an environmentally friendly deposition method. However, vapor-deposited tantalum can appear in both the characteristic body-centered-cubic phase found in the bulk material, and in a very brittle and less desirable "beta" phase. Presence of the beta phase in bore coatings is considered undesirable because of its brittleness and resulting failure as the coating is stressed. A high-rate triode sputtering system with a cylindrical coating geometry was used to produce thick tantalum coatings on 4340 steel, smooth bore cylindrical substrates. A systematic series of tests was performed to evaluate the effects of sputtering gas species (argon, krypton, xenon) and substrate temperature (100 to 300 C) during deposition on the phase and microstructure of the coatings. Heavier sputtering gases and higher substrate temperatures were found to promote the formation of body-centered-cubic phase tantalum coatings. Use of a movable target assembly was shown to promote the production of dense, single-phase tantalum coatings.
DTIC
Tantalum; Metal Coatings; Vapor Deposition; Cylindrical Bodies; Sputtering; Steels; Guns (Ordnance)

20000116208 Pratt and Whitney Aircraft, West Palm Beach, FL USA
TiAl Sheet Development for Axisymmetric Hypersonic Structures ***Final Report, 25 Feb. - 31 Oct. 2000***
Das, Gopal, Pratt and Whitney Aircraft, USA; Oct. 31, 2000; 11p; In English; CD-ROM contains text in MS Word format; and color presentation in Power Point format
Contract(s)/Grant(s): NASA Order C-70682-K
Report No.(s): LS-17; No Copyright; Avail: CASI; C01, CD-ROM; A03, Hardcopy

Gamma Titanium aluminide sheet structure technologies are focused on in this effort, including experiments to evaluate laser beam welding of thin sheet structure; superplastic forming and diffusion bonding of thin sheet structure; and, demonstration of fabricability of a hot-formed "egg crate" type core with brazed top and bottom face sheets. The fabricated subelement is known

as ”gator hide” and has the potential to replace more conventional honeycomb structure. All three area demonstrations were successful.
Author
Titanium Aluminides; Metal Sheets; Honeycomb Structures

20000116295 Cincinnati Univ., Dept. of Materials Science and Engineering, OH USA
A Study of the Kinetics of Phase Transformations in Nb-Ti-Al Alloys ***Final Report***
Vasudevan, Vijay K.; Leonard, Keith J.; Mishurda, Joseph C.; Jun. 19, 2000; 183p; In English
Contract(s)/Grant(s): F49620-95-1-0487
Report No.(s): AD-A382596; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

The work reported herein was performed by two Ph.D. students Keith J. Leonard and Joseph C. Mishurda, under the supervision of the PI. The phase equilibria and solid state transformations within fifteen Nb-rich Nb-Ti-Al alloys were investigated. The alloys ranged in composition between 15 and 40 at.% Al with Nb:Ti ratios of 1:1.5 to 4:1. Examination of the as-cast microstructures revealed that all alloys solidified from the beta phase field, with subsequent solid-state transformations occurring within four of the alloys during cooling. The range of primary beta phase solidification was determined to extend beyond the limits of previous liquidus projections. The high temperature beta phase field was verified in each alloy through quenching experiments. The beta phase exhibited B2 ordering at room temperature with the order-disorder transition temperatures evaluated for select alloys. The site occupancy preferences within the beta phase were evaluated through the ALCHEMI technique, which determined that Ti substitution occurred for Nb on Nb sublattice sites with the degree of sublattice partitioning found to depend upon alloy composition. The phase equilibria and transformations that occurred within the alloys were explored over a complete range of temperatures, with experimental isotherms produced at 1400, 1100, 900 and 700 C, along with a plethal section between the beta and sigma phase fields. Formation of metastable O-Ti2AlNb plates occurred within several of the Al lean alloys at 700 C, instead of either the delta-Nb3Al or sigma-Nb2Al phases due to the slow diffusion growth kinetics of these phases below 900 C. The beta to O transformation was investigated through DTA analysis, with volume diffusion ahead of the advancing precipitate found to be the rate controlling mechanism. This feature was supported by the values of n equal to values between 1.3 and 1.4, along with values of Q applicable to the diffusion limited region of the TTT diagram.
DTIC
Aluminum Alloys; Phase Transformations; Niobium Alloys; Titanium Alloys; Reaction Kinetics; Metastable State; Thermal Analysis

20000116645 NASA Langley Research Center, Hampton, VA USA
Microstructural and Mechanical Property Characterization of Shear Formed Aerospace Aluminum Alloys
Troeger, Lillianne P., National Academy of Sciences - National Research Council, USA; Domack, Marcia S., NASA Langley Research Center, USA; Wagner, John A., NASA Langley Research Center, USA; October 2000; 45p; In English
Contract(s)/Grant(s): RTOP 522-63-41-02
Report No.(s): NASA/TM-2000-210540; L-17952; NAS 1.15:210540; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Advanced manufacturing processes such as near-net-shape forming can reduce production costs and increase the reliability of launch vehicle and airframe structural components through the reduction of material scrap and part count and the minimization of joints. The current research is an investigation of the processing-microstructure-property relationships for shear formed cylinders of the Al-Cu-Li-Mg-Ag alloy 2195 for space applications and the Al-Cu-Mg-Ag alloy C415 for airframe applications. Cylinders which had undergone various amounts of shear-forming strain were studied to correlate the grain structure, texture, and mechanical properties developed during and after shear forming.
Author
Aluminum Alloys; Manufacturing; Mechanical Properties; Shear Strain; Deformation; Shearing

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.

20000116135 Pohang Inst. of Science and Technology, Korea, Republic of
International Conference on Fracture and Strength of Solids, Part 1, Fracture Mechanics of Materials
Hwang, W., Editor; Han, K. S., Editor; Sep. 01, 2000; ISSN 1013-9826; 718p; In English; 4th, 16-18 Aug. 2000, Pohang, Korea, Republic of
Contract(s)/Grant(s): F62562-99-M-9182
Report No.(s): AD-A382021; EOARD-CSP-99-06; ISBN 0-87849-861-3; Copyright; Avail: Defense Technical Information Center (DTIC)

Part I: Fracture Mechanics of Materials. Includes: Fracture Mechanics; Dynamic Fracture; Computational Mechanics; and Damage Mechanics. (678 Pages) Part II: Behavior of Materials and Structure: Includes: Fracture Physics; Fatigue and Creep; Polymer and Polymer Composites; Metals. MMCs, Ceramics, and CMCs; and Welding. (672 Pages)
DTIC
Conferences; Mechanical Properties; Fracture Mechanics

20000116304 Southwest Research Inst., Belvoir Fuels and Lubricants Research Facility, San Antonio, TX USA
Low-Temperature Oil Pumpability Investigations in a 6.2L Diesel Engine ***Interim Report, Feb. 1994-Sep. 1999***
Frame, E. A.; Likos, W. E.; Aug. 2000; 31p; In English
Contract(s)/Grant(s): DAAK70-92-C-0059
Report No.(s): AD-A382457; TFLRF-318; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Low-temperature engine oil pumpability investigations were conducted in a 6.2L diesel engine. The engine was installed in a cold box chamber, and investigations were conducted at temperatures as low as -33 deg. Oil pumpability times were measured. Borderilne oil pumpability temperatures were defined for various petroleum and synthetic engine oils. The effects of soot in used engine oil on oil pumpability was determined.
DTIC
Diesel Engines; Lubricating Oils; Pumping

20000116377 Naval Facilities Engineering Service Center, Port Hueneme, CA USA
Guidance Development: High Build Acrylic Coating (HBAC) for Marking Pavements ***Interim Report***
Gaughen, C. D.; Brandon, Joseph H.; Aug. 2000; 49p; In English
Report No.(s): AD-A382586; SP-2088-SHR; NFGS-O2761E; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The objective of this effort was to implement the use of pavement markings based on a High Build Acrylic Coating (HBAC). HBACs are appropriate for use in marking crosswalk bars, stop bars, railroad crossings, lettering, centerlines, skip lines, and edge lines, with or without reflective glass beads. The following commercial guidance documents were drafted: A) Detailed Performance Standard (DPS), B) Intended Use Standard (lUS), and C) Commercial Item Description (CID). Following approval, the best commercial document will be placed into NAVFAC Guide Specification (NFUS)-02761 ”Pavement Markings.” In the interim, NFGS-O2761E was amended to include the HBAC through descriptive performance requirements.
DTIC
Acrylic Resins; Pavements; Coatings; Paints

20000116468 Naval Surface Warfare Center, Indian Head Div., Indian Head, MD USA
Thermal Stability of Otto Fuel Prepolymer
Tompa, Albert S., Naval Surface Warfare Center, USA; Sandagger, Karrie H., Naval Surface Warfare Center, USA; Bryant, William F., Jr., Naval Surface Warfare Center, USA; McConnell, William T., Naval Surface Warfare Center, USA; Lacot, Fernando, Naval Surface Warfare Center, USA; Carr, Walter A., Naval Surface Warfare Center, USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 683-717; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

Otto Fuel II contains a nitrate ester, plasticizer, and 2-NPDA as a stabilizer. Otto Fuel with stabilizers from three vendors was investigated by dynamic and isothermal differential scanning calorimetry (DSC) using samples sealed in a glass ampoule and by Isothermal Microcalorimetry (IMC) using 10 gram samples aged at 75 C for 35 days. DSC kinetics did not show differences

between the stabilizer; the samples had an activation energy of 36.7 +/- 0.6 kcal/mol. However, IMC analysis was sensitive enough to detect small differences between the stabilizer, namely energy of interaction values of 7 to 14 Joules. DSC controlled cooling and heating at 5 C/min from 30 to -60 to 40 C experiments were similar and showed a crystallization peak at -48 +/- 1 C during cooling, and upon heating there was a glass transition temperature step at approx. -54 +/- 0.5 C and a melting peak at -28 +/- 0.4 C.
Author
Heating; Thermal Stability; Prepolymers; Stabilizers (Agents)

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.

20000116234 Booz-Allen and Hamilton, Inc., McLean, VA USA
Model-Based Green Gun Propellant Formulations Demilitarization Module. Cost and Environmental Analysis
May 1999; 42p; In English
Report No.(s): AD-A37956; No Copyright; Avail: Defense Technical Information Center (DTIC)

The environmentally sound demilitarization of energetic materials is a significant issue for the energetic materials community. The Senate Armed Services' committee has described munitions storage depots in the USA as being at their maximum storage capacity, without room for new munitions until such time as the existing munitions stockpile is reduced. The Committee's Report for the FY99 Defense Authorization Bill estimates that there are over 400,000 tons of obsolete, unserviceable or unusable conventional munitions awaiting demilitarization, with that total expected to grow by an additional 400,000 tons by the end of Fiscal Year 1999. The Joint Demilitarization Technology Program estimates that the current demilitarization stockpile requiring resource recovery or disposition costs more than $11 million per year to store. The recent Strategic Environmental Research and Development Program (SERDP) energetic Materials Environmental Study reports that in the coming years, millions of pounds of gun propellant, with a typical shelf life in excess of 40 years, will be produced by DoD. Ensuring a safe and effective means of demilitarizing and disposing of these munitions has become a serious concern to regulators and a costly burden on the DoD logistic system.
DTIC
Gun Propellants; Explosives; Disposal; Congressional Reports; Logistics; Environment Effects

20000116289 Sandia National Labs., Albuquerque, NM USA
Development of a H2O2 Guidance Thruster for Target Applications
Grubelich, Mark C.; Escapule, William R.; Jan. 2000; 22p; In English
Contract(s)/Grant(s): DE-AC04-94AL85000
Report No.(s): AD-A381052; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Hydrogen peroxide was not available in the high concentration required. Sandia purchased hardware and developed processes to produce and handle greater than 95% pure H2O2. Sandia examined a variety of different catalyst materials and coating techniques.
Derived from text
Catalysts; Coating; Hydrogen Peroxide; Liquid Rocket Propellants; Technology Assessment

20000116386 MACH 1, Inc., King of Prussia, PA USA
Cylodextrin Polymer Nitrate
Kosowski, Bernard, MACH 1, Inc., USA; Ruebner, Anja, MACH 1, Inc., USA; Statton, Gary, MACH 1, Inc., USA; Robitelle, Danielle, Air Force Research Lab., USA; Meyers, Curtis, MACH 1, Inc., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 249-254; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA
Contract(s)/Grant(s): F08630-98-C-0015; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

The development of the use of cyclodextrin nitrates as possible components of insensitive, high-energy energetics is outlined over a time period of 12 years. Four different types of cyclodextrin polymers were synthesized, nitrated, and evaluated regarding

their potential use for the military and aerospace community. The synthesis of these novel cyclodextrin polymers and different nitration techniques are shown and the potential of these new materials is discussed.
Author
Nitrates; Nitration; Thermodynamics; Polymer Chemistry

20000116387 Hessler (R. O.), Sommerville, AL USA
Empirical Approaches to Motor Stability Problems
Hessler, R. O., Hessler (R. O.), USA; Glick, R. L., Glick, (R. L.), USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 197-217; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

Combustion stability remains a technical issue in some solid rocket motor development programs because techniques to characterize propellant and motor during a development program either do not exist or are inadequate. Moreover, the situation will remain uncertain until one or more stability related diagnostics that are routine, inexpensive, introduce no risk, and 'industrial strength' are qualified and accepted by the Department of Defense (DoD) and commercial customers. This paper describes an empirical diagnostic technique--passive motor diagnostics--with this potential and illustrates some of its characteristics. This methodology will provide customers with a level of confidence, after early development firing, that does not exist today.
Author
Combustion Stability; Propellants; Diagnosis

20000116396 Glick, (R. L.), Rensselaer, IN USA
Low Level Pressure Oscillation Measurements in High, Varying DC Pressure Environments
Glick, R. L., Glick, (R. L.), USA; Hessler, R. O., Hessler, (R. O.), USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 93-102; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

Passive motor stability diagnostics require high s/n measurements of low level (60 to 80 db below mean pressure) oscillatory pressures in environments with large and varying DC pressures. Three approaches are briefly examined relative to passive diagnostic demands. Although the high pass filter approach has been demonstrated by Hessler, the 'short time constant' approach is recommended because it enables the use of sensitive p-ducers (resolutions approx. 10(exp -4) psi). Pieso-electric transducers are described and a methodology for using high sensitivity designs for passive diagnostics measurements is presented.
Author
Diagnosis; High Pass Filters; Pressure Oscillations; Transducers

20000116397 Brigham Young Univ., Provo, UT USA
An Overview of Combustion Mechanisms and Flame Structures for Advanced Solid Propellants
Beckstead, M. W., Brigham Young Univ., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 77-92; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA
Contract(s)/Grant(s): N00014-95-I-1338; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

Ammonium perchlorate (AP) and cyclotretamethylenetetranitramine (HMX) are two solid ingredients often used in modern solid propellants. Although these two ingredients have very similar burning rates as monopropellants, they lead to significantly different characteristics when combined with binders to form propellants. Part of the purpose of this paper is to relate the observed combustion characteristics to the postulated flame structures and mechanisms for AP and HMX propellants that apparently lead to these similarities and differences. For AP composite, the primary diffusion flame is more energetic than the monopropellant flame, leading to an increase in burning rate over the monopropellant rate. In contrast the HMX primary diffusion flame is less energetic than the HMX monopropellant flame and ultimately leads to a propellant rate significantly less than the monopropellant rate in composite propellants. During the past decade the search for more energetic propellants and more environmentally acceptable propellants is leading to the development of propellants based on ingredients other than AP and HMX. The objective of this paper is to utilize the more familiar combustion characteristics of AP and HMX containing propellants to project the combustion

characteristics of propellants made up of more advanced ingredients. The principal conclusion reached is that most advanced ingredients appear to burn by combustion mechanisms similar to HMX containing propellants rather than AP propellants.
Author
Composite Propellants; Flames; HMX; Monopropellants; Propellants; Solid Propellant Combustion

20000116398 Brigham Young Univ., Provo, UT USA
Examples of Unsteady Combustion in Non-Metallized Propellants
Beckstead, M. W., Brigham Young Univ., USA; Meredith, K. V., Brigham Young Univ., USA; Blomshield, F. S., Naval Air Warfare Center, USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 59-75; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA
Contract(s)/Grant(s): N00014-95-I-1338; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

For over thirty years the T-Burner has been the de facto standard for determining the unstable response of solid propellants. This paper reviews some of the different approaches that have been used, and briefly summarizes advantages and disadvantages of the different techniques. Data from a variety of sources have been reviewed and summarized showing the effect of various test conditions and propellant formulation variations. Much of the data taken in the 60's and early 70's were with so-called research propellants, with relatively low solids loading and usually monomodal AP as the oxidizer. Later data were obtained with propellants containing solids loading more typical and practical propellants. Several distinct differences were observed in the data for the different types of propellants. Data varying AP particle size distributions indicate that either additional fine AP or finer AP usually increases the propellant response. A significant reduction in the response can be achieved by reducing the amount of fine AP, while holding burning rate constant either by adding a catalyst or by varying the overall AP size distribution. A significant amount of data has been obtained for reduced smoke propellants containing stability additives. The data indicate that the additives provide significant particle damping, and most often, also reduce the propellant response. Data from double base propellants indicate a much broader response over a wide frequency range. This implies that double base propellants should be more unstable in tangential modes than composite propellants. This trend seems to be consistent with observed motor data. Measuring the response of metallized propellants has been a challenge due to the large damping due to metal oxide particles in the gas. Data from metallized propellants are not presented here, but will be summarized in a future paper.
Author
Combustion; Composite Propellants; Double Base Propellants; Metal Propellants; Propellant Additives

20000116407 Defence Science and Technology Organisation, Weapons Systems Div., Melbourne Australia
Nomenclature and Cataloguing of Experimental Explosive Compositions
Cliff, Matthew D.; Dexter, Richard M.; May 2000; 17p; In English
Report No.(s): AD-A381490; DSTO-TN-0284; DODA-AR-011-471; Copyright; Avail: Issuing Activity

Australia is becoming increasingly involved with the development and assessment of new explosive compositions to meet the Australian Defense Force's Insensitive Munitions and performance requirements. Up to this point, however, no procedure has been in place to systematically record the details of new R&D explosive formulations developed by DSTO. This note describes the Australian Research eXplosive (ARX) nomenclature system which classifies experimental compositions, developed by DSTO, according to their binder type and/or processing method. The supporting Propellant/Explosives Processing Sheet (PEPS) database used to record ARX numbers, create formulation mixing instructions and record hazard and performance data is also described.
DTIC
Data Bases; Explosives; Data Acquisition; Experimentation; Classifications

20000116463 Naval Surface Warfare Center, Indian Head, MD USA
Guns and High Gas Output Devices Panel: Introduction
Simmons, Ronald L., Naval Surface Warfare Center, USA; Kaste, Pamela J., Army Research Lab., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 343-344; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

A new panel known as the Guns and High Gas Output Panel was organized in 1999 under the auspices of the JANNAF Propellant and Characterization SubCommittee (PDCS). This is an introduction to our first meeting, purpose of the panel, and the scope of activities to be covered. The primary purpose of the panel is very simple: to provide a single focal point for interfacing Govern-

ment Laboratories (Department of Defense and Department of Energy) and commercial industry researchers to share R&D activities and findings (i.e. facilitate the exchange of information) specifically aimed at gun-launched propulsion and high-gas output devices (gas generators and air bag inflators). Specific areas of interest included in the Panel's scope (and the Technical Data Base) are the following: (1) new propellant formulations and chemistry, (2) new ingredients, (3) ballistic effects of the new formulations and ingredients, (4) new processing methods unique to gun propellants, (5) thermochemistry of new ingredients, (6) unique physical and mechanical properties, (7) burning rates of new propellants and small scale closed bomb testing, (8) plasma effects on the propellant, and (9) unique safety and insensitive munitions properties.
Author
Gun Propellants; Panels; Propulsion; Research and Development; Mechanical Properties

20000116464 Alliant Techsystems, Inc., Radford, VA USA
Deterrent Concentration Measurement with FTIR and Subsequent Ballistic Performance in Medium Caliber Propellant
Furrow, Keith W., Alliant Techsystems, Inc., USA; Ritchie, Steve J., Alliant Techsystems, Inc., USA; Morris, Amy, Alliant Techsystems, Inc., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 415-431; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

To meet ballistic requirements, medium and small caliber propellants use deterrent coatings to obtain burn rate progressivity. The required amount and distribution of deterrent varies between gun systems, propellant types, and often between lots. Micro Fourier Transform Infrared (FTIR) spectroscopy was used to measure deterrent gradients in RP36 propellants coated with methyl centralite (MC) at different deterrent levels and different processing conditions. The aromatic C-C bonds at 1496 cm(exp -1) wavenumber were used to monitor the deterrent profiles through the grain. Deterrent gradients measured with FTIR spectroscopy were then used to estimate burn rate gradients in the deterred grains. Burn rates were calculated from literature models and from closed bomb data of RP36 containing uniform deterrent concentration. Finally, the burn rate gradients were input into an IBHFG2 model of a 200 cc-closed bomb. The early flame spreading portion of the closed bomb ballistic cycle (0 to 0.2 P/Pmax) was roughly modeled by dividing the charge up into five propellant decks and igniting them at different times in the ballistic cycle. Pressure traces and vivacity curves from closed bomb shots were compared to predictions. In addition to the burn rate gradient, the closed bomb pressure trace was heavily dependent on ignition and flame spread. These two phenomena were not readily distinguishable from one another in deterred grains. The same RP-36 propellant was shot in a 25 mm M793TP round which was again modeled with IBHVG2. Peak pressure and muzzle velocity were accurately modeled when erosive burning effects were empirically factored into the model.
Author
Burning Rate; Gun Propellants; Coatings

20000116465 Army Tank-Automative Research and Development Command, Picatinny Arsenal, NJ USA
Accelerated Aging of the M119 Simulator
Bixon, Eric R., Army Tank-Automative Research and Development Command, USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 433-442; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

This paper addresses the storage requirement, shelf life, and the reliability of M119 Whistling Simulator. Experimental conditions have been determined and the data analysis has been completed for the accelerated testing of the system. A general methodology to evaluate the shelf life of the system as a function of the storage time, temperature, and relative humidity is discussed.
Author
Accelerated Life Tests; Service Life; Storage Stability; Time Dependence; Simulators

20000116466 National Inst. of Standards and Technology, Analytical Chemistry Div., Gaithersburg, MD USA
NIST Efforts to Quality-Assure Gunpowder Measurements
MacCrehan, William A., National Inst. of Standards and Technology, USA; Reardon, Michelle R., National Inst. of Standards and Technology, USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 511-517; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

In the past few years, the National Institute for Standards and Technology (NIST) has been promoting the idea of quantitatively determining the additives in smokeless gunpowder using micellar capillary electrophoresis as a means of investigating the

criminal use of hand guns and pipe bombs. As a part of this effort, we have evaluated both supercritical fluid and ultrasonic solvent extractions for the quantitative recovery of nitroglycerin (NG), diphenylamine (DPA), N-nitrosodiphenylamine (NnDPA), and ethyl centralite (EC) from gunpowder. Recoveries were evaluated by repeat extraction and matrix spiking experiments. The final extraction protocol provides greater than 95 percent recoveries. to help other researches validate their own analytical method for additive determinations, NIST is exploring the development of a standard reference material, Additives in Smokeless Gunpowder. The evaluated method is being applied to two double-base (NG-containing) powders, one stabilized with diphenylamine and the other with ethyl centralite. As part of this reference material development effort, we are conducting an interlaboratory comparison exercise among the forensic and military gunpowder measurement community.
Author
Additives; Extraction; Gun Propellants

20000116467 NASA White Sands Test Facility, NM USA
Catalytic Decomposition of Propellant Hydrazines, N-Nitrosodimethylamine, and N-Nitrodimethylamine
Greene, Ben, Honeywell Technology Solutions, Inc., USA; Johnson, Harry T., NASA White Sands Test Facility, USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 719-726; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

Dilute, aqueous solutions of hydrazine, methylhydrazine (MMH), uns-dimethylhydrazine (UDMH), N-nitrosodimethylamine (NDMA), and N-nitrodimethylamine (DMNM) were decomposed by catalytic reduction with nickel-aluminum (Ni-Al) alloy under basic conditions. The reaction is based upon dissolution of Al from the Ni-Al alloy in aqueous media to form aluminum ion and hydrogen gas; the resultant finely divided nickel catalyzes reduction of the hydrazine, nitrosoamine, and/or nitroamine by the hydrogen produced. Greater than 99 percent of hydrazine, MMH, UDMH, NDMA, and DMNM in aqueous solution were decomposed when reacted with Ni-Al alloy in 0.5 M sodium hyroxide. The major reaction products were simple amines: hydrazine was decomposed to ammonia; MMH to methylamine and ammonia; UDMH,NDMA and DMNM to dimethylamine and ammonia. UDMH was an intermediate in the reduction of NDMA. NDMA and UDMH were intermediates in the reduction of DMNM. Control experiments with Al powder rather than Ni-Al alloy showed no effect on hydrazine, MMH, and UDMH; whereas NDMA and DMNM were reduced to UDMH where the reaction stopped. Spill pillows containing Ni-Al alloy and solid sodium hydroxide were also tested and found effective in absorption and decomposition of UDMH. These results showed that reductive decomposition of hydrazine, MMH, UDMH, NDMA, and DMNM is a promising method for propellant hydrazine waste treatment and spill control.
Author
Aluminum Alloys; Amines; Aqueous Solutions; Catalytic Activity; Decomposition; Hydrazines; Methyl Compounds; Nickel Alloys; Propellants; Reaction Products

20000116509 Naval Surface Warfare Center, Indian Head, MD USA
Supplier's Status for Critical Solid Propellants, Explosive, and Pyrotechnic Ingredients
Sims, B. L., Naval Surface Warfare Center, USA; Painter, C. R., Naval Surface Warfare Center, USA; Nauflett, G. W., Naval Surface Warfare Center, USA; Cramer, R. J., Naval Surface Warfare Center, USA; Mulder, E. J., Johns Hopkins Univ., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 787-796; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

In the early 1970's a program was initiated at the Naval Surface Warfare Center/Indian Head Division (NSWC/IHDIV) to address the well-known problems associated with availability and suppliers of critical ingredients. These critical ingredients are necessary for preparation of solid propellants and explosives manufactured by the Navy. The objective of the program was to identify primary and secondary (or back-up) vendor information for these critical ingredients, and to develop suitable alternative materials if an ingredient is unavailable. In 1992 NSWC/IHDIV funded Chemical Propulsion Information Agency (CPIA) under a Technical Area Task (TAT) to expedite the task of creating a database listing critical ingredients used to manufacture Navy propellant and explosives based on known formulation quantities. Under this task CPIA provided employees that were 100 percent dedicated to the task of obtaining critical ingredient suppliers information, selecting the software and designing the interface between the computer program and the database users. TAT objectives included creating the Explosive Ingredients Source Database (EISD) for Propellant, Explosive and Pyrotechnic (PEP) critical elements. The goal was to create a readily accessible database, to provide users a quick-view summary of critical ingredient supplier's information and create a centralized archive that CPIA would update and distribute. EISD funding ended in 1996. At that time, the database entries included 53 formulations and 108 critical used to manufacture Navy propellant and explosives. CPIA turned the database tasking back over to NSWC/IHDIV to

maintain and distribute at their discretion. Due to significant interest in propellant/explosives critical ingredients suppliers' status, the Propellant Development and Characterization Subcommittee (PDCS) approached the JANNAF Executive committee (EC) for authorization to continue the critical ingredient database work. In 1999, JANNAF EC approved the PDCS panel task. This paper is designed to emphasize the necessity of maintaining a JANNAF community supported database, which monitors PEP critical ingredient suppliers' status. The final product of this task is a user friendly, searchable database that provides a quick-view summary of critical ingredient supplier's information. This database must be designed to serve the needs of JANNAF and the propellant and energetic commercial manufacturing community as well. This paper provides a summary of the type of information to archive each critical ingredient.
Author
Data Bases; Explosives; Manufacturing; Monitors; Pyrotechnics; Solid Propellants

20000116512 NASA White Sands Test Facility, NM USA
Hypergolic Propellant Safety Course
Rathgeber, Kurt A., Honeywell Technology Solutions, Inc., USA; Hornung, Steve D., Honeywell Technology Solutions, Inc., USA; Baker, David L., NASA White Sands Test Facility, USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 751-756; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

A hypergolic propellant safety course has been developed in conjunction with the NASA Safety Training Center at the Johnson Space Center. Recognizing that numerous fuels and oxidizers can be hypergolic, the course is specific to hydrazine fuels and nitrogen tetroxide. The course objectives are to enable the student to identify and evaluate the hazards of hypergolic propellants, to understand the methods for controlling those hazards, and to respond to emergencies. The two-day course covers the properties and hazards of hypergols; design of hypergol facilities and systems including storage vessels, piping, and component considerations; materials selection; hypergol leak detection, and operating, transportation, and emergency procedures. The course also includes a discussion of accidents involving hypergols, provides references, and examines the applicability of certain regulatory documents. The course presents a hazards analysis methodology and a brief overview of other liquid propellants, including hydrogen peroxide.
Author
Education; Emergencies; Fuels; Hazards; Hydrazines; Hypergolic Rocket Propellants; Safety

20000116513 NASA White Sands Test Facility, NM USA
Effect of the Uncertainty of Fuel Property Values on Safety Analysis
Barragan, Michelle H., Honeywell Technology Solutions, Inc., USA; Woods, Stephen S., Honeywell Technology Solutions, Inc., USA; Julien, Howard L., Honeywell Technology Solutions, Inc., USA; Wilson, D. Bruce, Wilson (D. Bruce), USA; Saulsberry, Regor L., NASA White Sands Test Facility, USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 739-749; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

In previous work, the Peng Robinson (PR) and Soave-Redlich-Kwong (SRK) equations of state (EOS) were tested for thermodynamic consistency and met the criteria. In this work, the property data (critical properties and vapor pressure valves) used to test the PR and SKR EOS were also tested for thermodynamic consistency. The methodology in testing for thermodynamic consistency is included in this work. The PR and SKR EOS were then used to calculate vapor pressure valves that were compared to published experimental data and vapor pressure correlation values. EOS, critical properties, and vapor pressure correlations are recommended for hydrazine and MMH (methylhydrazine). To show the importance of utilizing the most accurate vapor pressure valves, a safety analysis was performed on a hypothetical hazardous fluids test cell at the White Sands Test Facility (WSTF). The analysis shows the effect that a +/- five percent difference in the initial vapor pressure can have on determining the amount of time it takes a cell to be flushed out with air in order to meet the toxicity limits permissible for personnel to enter the contaminated area.
Author
Equations of State; Safety; Thermodynamics; Vapor Pressure; Toxicity

20000116523 Army Construction Engineering Research Lab., Champaign, IL USA

Demonstration of Plasma Arc Environmental Technology Applications for the Demilitrization of DOD Stockpiles

Smith, Ed, Army Construction Engineering Research Lab., USA; Dee, P. E., Army Construction Engineering Research Lab., USA; Zaghloul, Hany, Army Construction Engineering Research Lab., USA; Filius, Krag, MSE Technology Applications, Inc., USA; Rivers, Tim, MSE Technology Applications, Inc., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 601-609; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

Since 1989 the US Army Construction Engineering Research Laboratories (USACERL) have been active participants in the research and development towards establishing Plasma Arc Technology (PAT) as an efficient, economical, and safe hazardous waste immobilization tool. A plasma torch capable of generating high temperatures makes this technology a viable and powerful tool for the thermal destruction of various military industrial waste streams into an innocuous ceramic material no longer requiring hazardous waste landfill disposal. The emerging plasma environmental thermal treatment process has been used to safely and efficiently meet the waste disposal needs for various demilitarized components disposal needs, such as: (1) pyrotechnic smoke assemblies, (2) thermal batteries, (3) proximity fuses, (4) cartridge actuated devices (CADs), and (5) propellant actuated devices (PADs). MSE Technology Applications, Inc., (MSE) has proposed and fabricated a Mobile Plasma Treatment System to be a technology demonstrator for pilotscale mobile plasma waste processing. The system is capable of providing small-scale waste remediation services, and conducting waste stream applicability demonstrations. The Mobile Plasma Treatment System's innovative concept provides the flexibility to treat waste streams at numerous sites and sites with only a limited quantity of waste, yet too hazardous to transport to a regional fixed facility. The system was designed to be operated as skid mounted modules; consisting of a furnace module, controls module, offgas module, and ancillary systems module. All system components have been integrated to be operated from a single control station with both semi-continuous feeding and batch slag-pouring capability.

Author

Hazardous Wastes; Industrial Wastes; Plasmas (Physics); Technology Utilization; Waste Disposal

20000116524 Naval Surface Warfare Center, Indian Head Div., Indian Head, MD USA

Lead-Free Propellant for Propellant Actuated Devices

Goodwin, John L., Naval Surface Warfare Center, USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 555-576; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

Naval Surface Warfare Center, Indian Head Division's CAD/PAD Department has been working to remove toxic compounds from our products for about a decade. In 1992, we embarked on an effort to develop a lead-free double base propellant to replace that of a foreign sole source. At the time there were availability concerns. In 1995, the department developed a strategic proposal to include a wider range of products. Efforts included such efforts as removing lead sheathing from linear explosives and replacing lead azide and lead styphnate compounds. This paper will discuss efforts specifically related to developing non-leaded double base propellant for use in various Propellant Actuated Devices (PADs) for aircrew escape systems. The propellants can replace their leaded counterparts, mitigating lead handling, processing, or toxic exposure to the environment and personnel. This work eliminates the use of leaded compounds, replacing them with a more environmentally benign metal-organic salt. Historically double-base propellants have held an advantage over other families of energetic materials through their relative insensitivity of the burning rate to changes in temperature and pressure. This desirable ballistic effect has been obtained with the use of a lead-organic salt alone or in a physical mixture with a copper-organic salt, or more recently with a lead-copper complex. These ballistic modifiers are typically added to the double-base 'paste' prior to gelatinization on heated calendars or one type or another. The effect of constant burning rate over a pressure range is called a 'plateau' while an even more beneficial effect of decreasing burning rate with increasing pressure is termed a 'mesa.' The latter effect results in very low temperature sensitivity of the propellant burning rate. Propellants with such effects are ideal tactical rocket motor propellants. The use of lead compounds poses a concern for the environment and personnel safety due to the metal's toxic nature when introduced into the atmosphere by propellant manufacturing, rocket firings, and disposal. Two separate programs are underway at Indian Head to replace the leaded ballistic modifiers in NOSIH-AA-2 and KU propellants. Although the system requirements were very different, the programs gained valuable information from one another throughout their course.

Author

Double Base Propellants; Burning Rate; Safety; Toxicity

20000116525 Naval Surface Warfare Center, Indian Head, MD USA

Lead-Free Double-Base Propellant for the 2.75 Inch Rocket Motor

Magill, B. T., Naval Surface Warfare Center, USA; Nauflett, G. W., Naval Surface Warfare Center, USA; Furrow, K. W., Alliant Techsystems, Inc., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 549-554; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

The current MK 66 2.75 inch Rocket Motor double-base propellant contains the lead-based ballistic modifier LC-12-15 to achieve the desired plateau and mesa burning rate characteristics. The use of lead compounds poses a concern for the environment and for personal safety due to the metal's toxic nature when introduced into the atmosphere by propellant manufacture, rocket motor firing, and disposal. Copper beta-resorcylate (copper 2,4-di-hydroxy-benzoate) was successfully used in propellant as a simple modifier in the mid 1970's. This and other compounds have also been mixed with lead salts to obtain more beneficial ballistic results. Synthesized complexes of lead and copper compounds soon replaced the mixtures. The complexes incorporate the lead, copper lack of organic liquids, which allows for easier propellant processing. About ten years ago, the Indian Head Division, Naval Surface Warfare Center (NSWC), initiated an effort to develop a lead-free propellant for use in missile systems. Several lead-free propellant candidate formulations were developed. About five years ago, NSWC, in conjunction with Alliant Techsystems, Radford Army Ammunition Plant, continued ballistic modifier investigations. A four component ballistic modifier system without lead for double-base propellants that provide adequate plateau and mesa burn rate characteristics was developed and patented. The ballistic modifier's system contains bismuth subsalicylate, 1.5 percent; copper salicylate, 1.0 percent, copper stannate, 0.77 percent; and carbon black, 0.1 percent. Action time and impulse data obtained through multiple static firings indicate that the new lead-free double-base propellant, while not a match for NOSIH-AA-2, will be a very suitable replacement in the 2.75 inch Rocket Motor. Accelerated aging of the double-base propellant containing the lead-free ballistic modifier showed that it had a much higher rate of stabilizer depletion than the AA-2. A comprehensive study showed that an increased rate of stabilizer depletion occurred in propellants containing monobasic copper salicylate. The study also showed that propellants containing a mixture of bismuth subsalicylate and copper salicylate, had only about one-half the stabilizer depletion rate than those with copper salicylate alone. The copper salicylate catalyzes the decomposition of nitroglycerin, which triggers a chain of events leading to the increased rate of stabilizer depletion. A program has been initiated to coat the ballistic modifier, thus isolating it from the nitroglycerin.
Author

Copper Compounds; Depletion; Double Base Propellants; Propellants; Replacing; Rocket Engines; Stabilizers (Agents)

20000116526 Engineering Research and Consulting, Inc., Edwards AFB, CA USA

Adiabatic Compression Sensitivity of Liquid Fuels and Monopropellants

Ismail, Ismail M. K., Engineering Research and Consulting, Inc., USA; Hawkins, Tom W., Air Force Research Lab., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 519-527; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA Contract(s)/Grant(s): F04611-99-C-0025; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

Liquid rocket propellants can be sensitive to rapid compression. Such liquids may undergo decomposition and their handling may be accompanied with risk. Decomposition produces small gas bubbles in the liquid, which upon rapid compression may cause catastrophic explosions. The rapid compression can result from mechanical shocks applied on the tank containing the liquid or from rapid closure of the valves installed on the lines. It is desirable to determine the conditions that may promote explosive reactions. At Air Force Research Laboratory (AFRL), we constructed an apparatus and established a safe procedure for estimating the sensitivity of propellant materials towards mechanical shocks (Adiabatic Compression Tester). A sample is placed on a stainless steel U-tube, held isothermally at a temperature between 20 and 150 C then exposed to an abrupt mechanical shock of nitrogen gas at a pressure between 6.9 and 20.7 MPa (1000 to 3000 psi). The apparatus is computer interfaced and is driven with LABTECH NOTEBOOK-pro (registered) Software. In this presentation, the design of the apparatus is shown, the operating procedure is outlined, and the safety issues are addressed. The results obtained on different energetic materials are presented.
Author

Adiabatic Conditions; Bubbles; Compression Tests; Explosions; Liquid Fuels; Liquid Rocket Propellants; Mechanical Shock; Monopropellants; Nitrogen

20000116527 Sandia National Labs., Albuquerque, NM USA

Development and Application of Tools to Characterize the Oxidative Degradation of AP/HTPB/Al Propellants in a Propellant Reliability Study

Celina, Mathew, Sandia National Labs., USA; Minier, Leanna, Sandia National Labs., USA; Assink, Roger, Sandia National Labs., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 471-475; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA

Contract(s)/Grant(s): DE-AC04-94AL-85000; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

The oxidative thermal aging of a crosslinked hydroxyl-terminated polybutadiene (HTPB)/isophorone diisocyanate (IPDI) polyurethane rubber was studied at temperatures between 25 C and 125 C. Changes in tensile elongation, mechanical hardening, polymer network properties, density, O2 permeation, and molecular chain dynamics were investigated as a function of age. The techniques used include solvent swelling, detailed modulus profiling, and NMR relaxation measurements. The Arrhenius methodology, which normally assumes a linear extrapolation of high temperature aging data, is critically evaluated by using extensive data superposition and highly sensitive oxygen consumption measurements. Significant curvature in the Arrhenius diagram of these oxidation rates is observed to be similar to previous results found for other rubber materials that have been evaluated by this technique. Preliminary gel/network properties suggest that crosslinking is the dominant process at higher temperatures. The effect on the oxidation rate of the binder when other constituents found in propellants are present, such as ammonium perchlorate, plasticizer and aluminum powder, is presented.

Author

Aging (Materials); Crosslinking; Degradation; Mechanical Properties; Propellants; Temperature Effects; Reliability; Oxidation

20000116528 Alliant Techsystems, Inc., Radford, VA USA

Accelerated Aging of Lead-Free Propellant

Furrow, Keith W., Alliant Techsystems, Inc., USA; Jervey, David D., Alliant Techsystems, Inc., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 443-457; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

Following higher than expected 2-NDPA depletion rates in a lead-free doublebase formulation (RPD-422), an accelerated aging study was conducted to verify the depletion rates. A test plan was prepared to compare the aging characteristics of lead-free propellant and NOSIH-AA2. The study was also designed to determine which lead-free ballistic modifiers accelerated 2-NDPA depletion. The increased depletion rate occurred in propellants containing monobasic copper salicylate. Four lead-free propellants were then formulated to improved aging characteristics over previous lead-free propellant formulations. The new formulations reduced or replaced the monobasic copper salicylate. The new formulations had improved aging characteristics. Their burn rates, however, were unacceptable for use in a 2.75 inch rocket. to compare aging characteristics, stabilizer depletion rates of RPD-422, AA2, M28, and RLC 470/6A were measured or taken from the literature. The data were fit to a kinetic model. The model contained first and zero order terms which allowed the stabilizer concentration to go to zero. In the model, only the concentration of the primary stabilizer was considered. Derivatives beyond the first nitrated or nitroso derivative of 2-NPDA were not considered. The rate constants were fit to the Arrhenius equation and extrapolated to lower temperatures. The time to complete stabilizer depletion was estimated using the kinetic model. The four propellants were compared and the RPD-422 depleted faster at 45 C than both A22 and M28. These types of predictions depend on the validity of the model and on confidence in the Arrhenius relationship holding at lower temperatures. At 45 C, the zero order portion of the model dominates the depletion rate.

Author

Accelerated Life Tests; Aging (Materials); Depletion; Propellants

20000116529 Army Research Lab., Weapons and Materials Research Directorate, Aberdeen Proving Ground, MD USA

SEM Characterization of Extinguished Grains from Plasma-Ignited M30 Charges

Kinkennon, A., Army Research Lab., USA; Birk, A., Army Research Lab., USA; DelGuercio, M., Army Research Lab., USA; Kaste, P., Army Research Lab., USA; Lieb, R., Army Research Lab., USA; Newberry, J., Army Research Lab., USA; Pesce-Rodriguez, R., Army Research Lab., USA; Schroeder, M., Army Research Lab., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 345-363; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

M30 propellant grains that had been ignited in interrupted closed bomb experiments were characterize by scanning electron microscopy (SEM). Previous chemical analysis of extinguished grains had given no indications of plasma-propellant chemical interactions that could explain the increased burning rates that had been previously observed in full-pressure closed bomb experiments. (This does not mean that there is no unique chemistry occurring with plasma ignition. It may occur very early in the ignition event and then become obscured by the burning chemistry.) In this work, SEM was used to look at grain morphologies to determine if there were increases in the surface areas of the plasma-ignited grains which would contribute to the apparent increase in the burning rate. Charges were made using 30 propellant grains (approximately 32 grams) stacked in two tiers and in two concentric circles around a plastic straw. Each grain was notched so that, when the grains were expelled from the bomb during extinguishment, it could be determined in which tier and which circle each grain was originally packed. Charges were ignited in a closed bomb by either a nickel wire/Mylar-capillary plasma or black powder. The bomb contained a blowout disk that ruptured when the pressure reached 35 MPa, and the propellant was vented into a collection chamber packed with polyurethane foam. SEM analysis of the grains fired with a conventional black powder igniter showed no signs of unusual burning characteristics. The surfaces seemed to be evenly burned on the exteriors of the grains and in the perforations. Grains that had been subjected to plasma ignition, however, had pits, gouges, chasms, and cracks in the surfaces. The sides of the grains closest to the plasma had the greatest amount of damage, but even surfaces facing the outer wall of the bomb had small pits. The perforations contained gouges and abnormally burned regions (wormholes) that extended into the web. The SEM photos indicated that a grain from the top tier, which was farther away from the plasma ignition source, sustained more plasma-induced damage to the perforations and the web than did the grains on the bottom tier.
Author
Combustion; Damage; Explosives; Ignition; Plasmas (Physics); Propellant Grains; Propellants; Characterization

20000116616 Minnesota Mining and Mfg. Co., Saint Paul, MN USA
Characterization of a New Hypergolic Fuel Candidate
Manzara, Tony, Minnesota Mining and Mfg. Co., USA; JANNAF 29th Propellant Development and Characterization Subcommittee Meeting; May 2000, pp. 627-633; In English; 29th; Propellant Development and Characterization, 8-12 May 2000, Cocoa Beach, FL, USA; Sponsored by Department of the Army, USA; No Copyright; Avail: CPIA, 10630 Little Patuxent Pkwy., Suite 202, Columbia, MD 21044-3200 HC

2-(Dimethylamino)ethylazide was identified by Darren Thompson of the US Army Aviation Missile Command (AMCOM) as a promising candidate to replace hydrazine derivatives in certain hypergolic fuel applications, and as a monopropellant using a heated catalyst bed. The preparation of the material has been scaled up to the pilot plant level, and evaluations of its relevant properties have indicated that it may have broader application than was originally foreseen. Physical, chemical, and hazardous properties are reported in this paper.
Author
Derivation; Hydrazines; Monopropellants; Research and Development

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.

20000116330 NASA Johnson Space Center, Houston, TX USA
Induction of Three-Dimensional Growth of Human Liver Cells in Simulated Microgravity
Pellis, Neal R., NASA Johnson Space Center, USA; Khaoustov, V. I., Baylor Coll. of Medicine, USA; Yoffe, B., Baylor Coll. of Medicine, USA; Murry, D. J., Purdue Univ., USA; Soriano, H. E., Northwestern Univ., USA; Risin, D., Wyle Labs., Inc., USA; [1999]; 1p; In English, 5-9 Nov. 1999, Dallas, TX, USA; Sponsored by American Association for the Study of Liver Diseases, USA; No Copyright; Avail: Issuing Activity; Abstract Only

We previously reported that a NASA-developed bioreactor that simulates microgravity environment and creates the unique environment of low shear force and high-mass transfer is conducive for maintaining long term 3-D cell cultures of functional hepatocytes (60 days). However, significant further expansion of liver mass, or the remodeling of liver in vitro was jeopardized by the appearance of apoptotic zones in the center of large cell aggregates. To optimize oxygenation and nutritional uptake within growing cellular aggregates we cultured primary human liver cells (HLC) in a bioreactor in the presence or absence of microcarriers and biodegradable scaffolds. Also, to promote angiogenesis, HLC were cultured with or without microvascular endothelial cells.

HLC were harvested from human livers by collagenase perfusion. While microcarriers did not affect cell growth, HLC cultured with biodegradable scaffolds made from polyglycolic acid (PGA) formed aggregates up to 3 cm in length. Culturing cells with PGA scaffolds increased the efficiency of cell self-assembly and the formation of larger cell aggregates. Based on histological evaluation it appears that the degree of apoptotic cells was diminished as compared to cultures without scaffolds. Histology of HLC with PGA-scaffolds revealed cell distribution between the fibers of the scaffolds, and cell-cell and cell-fiber interactions. Analyses of HLC spheroids revealed tissue-like structures comprised of hepatocytes, biliary epithelial cells and/or progenitor liver cells that were arranged as bile duct-like structures along nascent vascular sprouts. Electron microscopy revealed groups of cohesive hepatocytes and bile canaliculi with multiple microvilli and tight cellular junctions. Hepatocytes were further organized into tight clusters surrounded by complex stromal structures and reticulin fibers. Also, we observed higher levels of albumin mRNA expression when hepatocytes were co-cultured with endothelial cells. to evaluate viability and microsomal deethylation activity of hepatocytes we assessed the metabolism of midazolam by gas chromatography. Samples that were collected from HLC cultured in the bioreactor contained higher levels of midazolam metabolites (1-OH-midazolam and 4-OH-midazolam) than samples collected from conventional cultures. In summary, we have shown that co-culture of HLC with endothelial cells and/or culturing in the presence of PGA scaffolds provides additional advantages in maintaining functional activity of 3-D hepatocyte cultures that resemble liver tissue. This cell culture system may facilitate studies of liver regeneration and cell-to-cell interactions that occur in vivo and suggest the feasibility of using this approach for pre-clinical metabolic screening of novel drug candidates.
Author
Cells (Biology); Culture Techniques; Liver; Microgravity

31
ENGINEERING (GENERAL)

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

20000115481 NASA Goddard Space Flight Center, Greenbelt, MD USA
Parts Engineering Experiences, Philosophies and Trends
Shaw, Harry, NASA Goddard Space Flight Center, USA; [2000]; 49p; In English; 13th; Microelectronics, 25-26 Oct. 2000, Tsukuba, Japan; Sponsored by National Space Development Agency, Japan; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This document is the presentation viewgraphs of the NASA presentations to NASDA, outlining the philosophy and trends of the experiences with engineering parts. Included in the presentations: are (1) the assurance of COTS boards for Space flight, and (2) Peer Review for Ice, Cloud and land Elevation Satellite (ICESat) GPS flight receivers EEE parts. The emphasis is on the methods for qualification of available parts for space flight.
CASI
Qualifications; Spacecraft Components; Electronic Equipment

20000115491 Naval Postgraduate School, Monterey, CA USA
Effects of Shipboard Compartment Fuel Fire and Fire Extinguishing on RF Signal Propagation in the 2.4 GHz ISM Band
Deyannis, Christos; Xifaras, Dimitrios; Jun. 2000; 349p; In English
Report No.(s): AD-A381899; No Copyright; Avail: CASI; A15, Hardcopy; A03, Microfiche

The objective of this research was to quantify the effects of fuel fire and the follow-on fire extinguishing actions on wireless shipboard communications in the 2.4 GHz ISM band. Directional and non-directional antennas with horizontal and vertical polarization, and a PC-controlled scalar network analyzer, were used onboard ex-USS SHADEWELL to measure the attenuation of 2.4 - 2.485 GHz signals transmitted through diesel and heptane fire, water mist created by the fire extinguishing system, and subsequently developed steam. A MATLAB code has been used to analyze the data statistically. The attenuation for directional antennas exhibits relatively small variations wit time and frequency, but fire and the follow-on fire-extinguishing phases create sever non-stationary frequency selective fading for non-directional antennas. Therefor standard communication techniques effective against frequency selective fading (non stationary but slowly varying with time) are recommended for use with communication systems intended for shipboard indoors use. Even in normal conditions, without fire, water mist, or steam, we have determined that frequency selective fading would be problem for non-directional antennas used in shipboard compartments and thus a system with anti-fading ca ability should be considered for ship board use.
DTIC
Wave Propagation; Frequency Response; Fire Extinguishers; Directional Antennas; Communication; Radio Communication; Radio Frequencies

20000116123 National Inst. of Standards and Technology, Gaithersburg, MD USA

Characterization and Identification of Super-Effective Thermal Fire Extinguishing Agents

Pitts, William M.; Yang, Jiann C.; Huber, Marcia L.; Blevins, Linda G.; Oct. 1999; 69p; In English

Report No.(s): AD-A382268; NISTIR-6414; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The use of halons for fire fighting is being phased out due to their deleterious effects on stratospheric ozone. This report summarizes the first-year findings of a three-year study designed to characterize and identify supereffective thermal fire-fighting agents as possible replacements for these widely used compounds. Three distinct aspects related to the effectiveness of potential thermal agents have been considered. First, existing thermodynamic databases maintained by NIST have been searched in order to identity chemical compounds which are predicted to extract large amounts of heat from a combustion zone. Second, detailed chemical kinetic modeling has been used to characterize the effects of thermal agents on an idealized flame system, namely, a methane/air counterflow diffusion flame. Third, empirical heat transfer correlations for spray cooling of a surface have been used to estimate the efficiencies of surface cooling by thermal agents. The database search used two primary sources-the Design institute for Physical Properties database containing 1458 compounds from 83 family types and a smaller database, REFPROP, containing 43 compounds which is tailored to refrigerant applications. Additional substances Were included which are not well represented in these databases. Compounds having 1) high heats of vaporization, 2) liquid-phase heat capacities, and 3) total heat absorption due to phase changes (if applicable), heating of a liquid (if applicable), and the heating of the gas phase to combustion temperatures were identified. The results are reported in tables of compounds ordered in terms of their ability to extract heat.

DTIC

Ozone; Stratosphere; Reaction Kinetics; Thermodynamic Properties; Fire Extinguishers; Chemical Reactions; Combustion; Counterflow

20000116217 British Columbia Univ., Vancouver, British Columbia Canada

The Second International Conference on Intelligent Processing and Manufacturing of Materials, Volume 2

Meech, John A., Editor, British Columbia Univ., Canada; Veiga, Marcello M., Editor, British Columbia Univ., Canada; Smith, Michael H., Editor, British Columbia Univ., Canada; LeClair, Steven R., Editor, British Columbia Univ., Canada; June 2000; 746p; In English; 2nd; Intelligent Processing and Manufacturing of Materials, 10-15 Jul. 1999, Honolulu, HI, USA

Contract(s)/Grant(s): DAAD29-99-1-0074

Report No.(s): AD-A379607; ARO-39677-1-RT-CF-Vol-2; ISBN 0-7803-5489-3; No Copyright; Avail: Defense Technical Information Center (DTIC)

The second International Conference on Intelligent Processing and Manufacturing of Materials was held in Honolulu, Hawaii on July 10 - 15, 1999. IPMM'99 is the second in a series of conferences dealing with the application of Artificial Intelligence and related technologies such as expert systems, fuzzy logic, artificial neural networks, genetic algorithms, pattern recognition and hybrid systems to the processing and manufacturing of materials and products. The theme of this year's conference is "Intelligence in Materials Production - The Competitive Edge!"

DTIC

Artificial Intelligence; Conferences; Expert Systems; Manufacturing; Neural Nets; Production Engineering

20000116218 British Columbia Univ., Vancouver, British Columbia Canada

The Second International Conference on Intelligent Processing and Manufacturing of Materials, Volume 1

Meech, John A., Editor, British Columbia Univ., Canada; Veiga, Marcello M., Editor, British Columbia Univ., Canada; Smith, Michael H., Editor, British Columbia Univ., Canada; LeClair, Steven R., Editor, British Columbia Univ., Canada; June 2000; 751p; In English; 2nd; Intelligent Processing and Manufacturing of Materials, 10-15 Jul. 1999, Honolulu, HI, USA

Contract(s)/Grant(s): DAAD29-99-1-0074

Report No.(s): AD-A379606; ARO-39677-1-RT-CF-Vol-1; No Copyright; Avail: Defense Technical Information Center (DTIC)

The second International Conference on Intelligent Processing and Manufacturing of Materials was held in Honolulu, Hawaii on July 10 - 15, 1999. IPMM'99 is the second in a series of conferences dealing with the application of Artificial Intelligence and related technologies such as expert systems, fuzzy logic, artificial neural networks, genetic algorithms, pattern recognition and hybrid systems to the processing and manufacturing of materials and products. The theme of this years conference is "Intelligence in Materials Production - The Competitive Edge!"

DTIC

Conferences; Artificial Intelligence; Expert Systems; Manufacturing; Neural Nets; Production Engineering

20000116229 Pacific Environmental Services, Inc., Cincinnati, OH USA
National Metal Finishing Environmental R and D Plan: An Update
Bridges, J. S.; Patrick, R.; Feb. 2000; 48p; In English
Report No.(s): PB2000-107374; EPA/600/R-00/035; No Copyright; Avail: National Technical Information Service (NTIS)

This document is an update to the National Metal Finishing Environmental R&D Plan (EPA/600/R-97/095), dated September 1997. Based upon the finding of this update, it is recommended that Nickel be included as a high priority R&D area. Technology Transfer and technical assistance resurfaced as an important item by representatives in the industry. Hexavalent Chromium, Cyanide, and Cadmium remained high priority R&D areas, but the emphasis is shifting from emission control and other end of pipe approaches to research, development and demonstration of alternative materials and pollution prevention. Chlorinated Solvents require more emphasis on demonstration of alternative materials and information transfer. Technology Verification Protocol continues to be a high priority. Recycling and Metals Recovery should be focused more on finding technologies that will be appropriate for small platers. Emissions and Risk Characterization R&D has progressed. Past R&D in this area focused on the development of a metal finishing risk assessment tool that will target reduction of risks to workers. The R&D need in this area is shifting to the development of a tool that not only will identify risks to workers and the environment but also will consider cost-effective pollution prevention solutions.
NTIS
Metal Finishing; Research and Development; Pollution Monitoring; Pollution Control; Information Transfer; Technology Transfer

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.

20000115869 Norwegian Defence Research Establishment, Kjeller, Norway
Deinterleaving and Emitter Identification *Pulssortering og Emitteridentifikasjon*
Eirik, Malnes, Norwegian Defence Research Establishment, Norway; Aug. 14, 2000; 58p; In Norwegian; Original contains color illustrations
Contract(s)/Grant(s): FFIE Proj. 728/113
Report No.(s): FFI/RAPPORT-2000/02428; ISBN-82-464-0435-0; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report documents the work done in FFI project 728 KONTUR videreforing within the field deinterleaving and emitter identification. The first chapter gives a general introduction to ESM-sensors, and presents the measurement test-bed SYNNOVE in particular. Chapter 2 gives an introduction to pulsetrain deinterleaving and emitter identification. The advantages of doing pre-detection of the PRI before sorting are also discussed. Chapter 4 gives a theoretical introduction to a Fourier-based technique for pre-detection of pulsetrain PRIs. by representing a pulsetrain with a series of dirac-delta functions we easily achieve a PRF-spectrum where maximum is at the correct PRF. In chapter 5 we present an algorithm based on the theory in chapter 4, and give some examples of its use on various interleaved pulsetrains. Chapter 6 discusses PRF-tracking, i.e. the detection of the individual pulses in a pulsetrain after the PRF has been detected. Chapter 7 gives an overall description of the algorithm discussed in chapter 4-6. In chapter 8 we discuss and show examples of an alternative sequential deinterleaving algorithm which is based solely on the search of pulse triplets with approximately equal PRI. Chapter 10 contains some topics from the post-prosessing of deinterleavng.
Author
Fourier Analysis; Measure and Integration; Emitters; Test Stands; Character Recognition

20000116068 Naval Research Lab., Acoustic Simulation Section, Stennis Space Center, MS USA
Blind Deconvolution to Improve Classification of Transient Source Signals in Multipath *Final Report*
Pflug, Lisa A.; Smith, George B.; Broadhead, Michael K.; Apr. 13, 2000; 21p; In English
Report No.(s): AD-A377973; NRL/FR/7180--00-9931; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

General testing of several blind deconvolution techniques has indicated that one algorithm stands out as being the best choice for transient classification in shallow water. This is Cabrelli's algorithm, which was developed for oil and gas exploration in the seismic community. This work describes the algorithm and explores its applicability. Three aspects of performance were tested using simulation studies. The algorithm's ability to handle complicated transient signals was explored. Its ability to handle com-

plex shallow-water environments was tested. Finally, its ability to perform adequately in noise was investigated. Studies using correlation coefficient comparisons of Cabrelli output to ground truth showed that the algorithm can handle complex environments, although it might not perform as well with complicated transient signals. Classification operating characteristics (CLOC) analysis showed that Cabrelli's algorithm performs adequately in noise.
DTIC
Algorithms; Multipath Transmission; Ground Truth; Shallow Water

20000116069 Naval Postgraduate School, Monterey, CA USA
16TH Annual Review of Progress in Applied Computational Electromagnetics
Mar. 24, 2000; 528p; In English
Report No.(s): AD-A380099; No Copyright; Avail: CASI; A23, Hardcopy; A04, Microfiche
Contents include following: Finite element methods. Optimization in electromagnetics. Numerical techniques for packaging and interconnects. Student paper competition. Computational bio-electromagnetics.Virtual reality in real world applications. The domain method. Moment methods. Conformal antennas. Antenna arrays.
CASI
Conferences; Packaging; Finite Element Method; Computational Electromagnetics; Antenna Arrays

20000116095 New Jersey Inst. of Tech., Newark, NJ USA
Adaptive Space-Time, Processing for High Performance, Robust Military Wireless Communications ***Final Report, Apr. 1997 - Dec. 1999***
Haimovich, Alexander M.; Apr. 01, 2000; 76p; In English
Contract(s)/Grant(s): F49620-97-1-0241
Report No.(s): AD-A379564; AFRL-SR-BL-TR-00-0277; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
This report summarizes work on several topics related with the application of space-time processing to wireless communications: (I) performance of adaptive arrays for wireless communications over fading channels in the presence of cochannel interference particularly the case when the number of interference sources exceeds the array degrees of freedom (2) derivation of exact bit error probability for the detection of coherent binary PSK signals of the optimum combiner employing space diversity when both the desired signal and a Gaussian cochannel interferer are subject to flat Rayleigh fading (3) the application of adaptive arrays to relax power control requirements in CDMA communications (4) the application of reduced rank methods for improving wireless communication links in the presence of unknown interference. The work provides a better understanding and contributes new algorithms for the application of space-time to wireless communications.
DTIC
Radiotelephones; Time Functions; Wireless Communication; Communication Networks; Military Technology

20000116125 Naval Postgraduate School, Monterey, CA USA
Frame Rate Effects on Human Spatial Perception in Video Intelligence
Kempster, Kurt A.; Sep. 2000; 99p; In English
Report No.(s): AD-A382287; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche
This thesis examines the effect that the frame rate of a streaming video feed has on one's ability to maintain spatial perception. It defines the current technologies available to capture and encode digital video. It describes the current and near future wireless information systems that could be utilized to support streaming video. This thesis investigates through experimental trials of subjects viewing video streams at different frame rates, the effect those frame rates have on the subject's spatial perception. This thesis analyzes and summarizes the data collected from this experiment and provides recommendations. It is determined that the inherent chaotic nature of tactical movement and the method used to encode digital video are not compatible for video streams with high motion in the three dimensional planes. Results of this analysis suggest that a large amount of bandwidth would be consumed to provide the minimum quality of service indicated by the data and suggests that video to the commanders at the frontline is not a useful allocation of bandwidth.
DTIC
Intelligence; Video Signals; Perception; Digital Television

20000116156 Library of Congress, Copyright Office, Washington, DC USA
Report on Copyright and Digital Distance Education. A Report of the Register of Copyrights
May 1999; 358p; In English; Original contains color illustrations
Report No.(s): PB2000-108304; No Copyright; Avail: CASI; A03, Microfiche; A16, Hardcopy

Over the past five years, the application of copyright law to distance education using digital technologies has become the subject of public debate and attention in the USA. In the Digital Millennium Copyright Act of 1998 (DMCA), Congress charged the Copyright Office with responsibility to study the issue and report back with recommendations within six months. After an intensive process of identifying stakeholders, holding public hearings, soliciting comments, conducting research, and consulting with experts in various fields, the Office has issued this Report. Part I of the Report gives an overview of the nature of distance education today. Part II describes current licensing practices in digital distance education, including problems and future trends. Part III describes the status of technologies relating to the delivery and protection of distance education materials. Part IV analyzes the application of current copyright law to digital distance education activities. Part V discusses prior initiatives addressing copyright and digital distance education. Part VI examines the question of whether the law should be changed, first summarizing the views of interested parties and then providing the Copyright Office's analysis and recommendations.
NTIS
Copyrights; Education; Digital Systems

20000116157 Idaho Univ., Dept. of Electrical Engineering, Moscow, ID USA
Development of a Characteristic-Based Finite Volume Method for Patch Antennas ***Final Report, 15 Sep. 1996 - 14 Sep. 1999***
Young, Jeffrey L.; Oct. 14, 1999; 45p; In English
Contract(s)/Grant(s): F49620-96-1-0469; AF Proj. 3484
Report No.(s): AD-A381667; 96074; AFRL-SR-BL-TR-00-0422; No Copyright; Avail: Defense Technical Information Center (DTIC)

An overview of the work accomplished throughout the duration of the contract is contained herein. This overview is cast primarily in terms of measurable accomplishments (i.e., publications and numerical solvers) and challenges (technical and non-technical). With respect to the former, five manuscripts have been accepted for or submitted to refereed journals, four manuscripts were presented at technical conferences, two manuscripts were co-authored with AFRL personnel, and one manuscript was invited for publication by the IEEE Trans. on Antennas and Propagation. Additionally, five numerical solvers have been developed and extensively tested. Representative data associated with each of these solvers are provided to corroborate the numerical methodology with the expected outcomes. Additional information pertaining to graduate student involvement, interactions with AFRL personnel, facilities and future work is also provided. Attached as appendices to the report are specific technical details associated with two numerical solvers hitherto not published in the open literature.
DTIC
Patch Antennas; Method of Characteristics; Antenna Radiation Patterns; Cylindrical Antennas

20000116206 Communications Research Lab., Japan
Frontiers in Info-Communications Research
Dempa Newspaper; [1999], pp. 1-244; In English; No Copyright; Avail: CASI; A12, Hardcopy; A03, Microfiche

Ours is the era of communications technology. The telephone, the mobile phone, the internet-these are now part of everyday life, and are all predicated on a great deal of technology that is so advanced that it is well beyond experts in related fields, let alone the general public. Yet there is still scope for further progress in many areas. Developing advanced technology requires truly cutting-edge research; the public, however, generally hears little about what sort of research is being conducted and by whom, except in the form of the occasional news story. This book is an attempt to rectify the situation. It describes the work of the Communications Research Laboratory (CRL) of the Ministry of Posts and Telecommunications, Japan's foremost national research body in the field of information and communications technology. Written in plain and simple language by the researchers themselves, the book describes the work we are doing and the challenges we plan to tackle in the future. Our research is often the first of its kind in Japan, if not the world, and we are continually leading the field-which is why the words "at the forefront" feature in the title of this book. Chapter 1 gives a general overview of the CRL that covers staffing, facilities, budget, and our vision for the 21st century. The next four chapters describe the four major research areas. Chapter 2 talks about next-generation communications networks and associated applications, encompassing fundamental technology, space communication systems, and testing of international networks. Chapter 3 describes the development of frequency resources, and discusses mobile communications, optical and millimeter-wave devices, and measurement and standards. Chapter 4 looks at environmental measurement and advanced applications thereof, such as remote sensing technology and space science. Chapter 5 describes how research into the information processing capabilities of animals and humans can teach us about information and communications technology, an area which encompasses pure research fields such as bio-information and human communication technology. and finally, Chapter 6 discusses

preparations for the transition to the status of independent administrative corporation in April 2001. We hope that this book will provide an insight into the nature of research on information and communications technology.
Author
Communication Networks; Space Communication; Mobile Communication Systems; Frequencies

20000116284 National Telecommunications and Information Administration, Washington, DC USA
Spectrum Usage for the Fixed Services
Matheson, R. J.; 2000; 98p; In English
Report No.(s): PB2000-108082; NTIA-00-378; No Copyright; Avail: CASI; A02, Microfiche; A05, Hardcopy

This study in an update to a 1993 ITS staff study entitled 'A preliminary look at spectrum requirements for the Fixed Services.' That study included a description of the services provided in 30 of the Government and non-Government frequency bands between 406 MHz and 30 GHz known as point-to-point terrestrial microwave bands. Each of the 30 frequency bands were described in terms of the services provided, growth of licenses, and the geographical distribution of current licenses. The technical, regulatory, and economic factors affecting each band and the total microwave market were described, as well as a prediction of the rate of future growth (or decrease) for each band and market segment. This study adds 6 more years of license information and updates much data on recent regulatory and market trends. Some of the general technology and market descriptions have been left out of this update, but earlier predictions are compared to actual market performance and revised forecasts are made.
NTIS
Spectra; Radio Communication; Satellite Communication; Bandwidth; Microwave Frequencies

20000116400 National Inst. of Telecommunications, Wroclaw, Poland
Electromagnetic Compatibility, Part 1
Janiszewski, J. M., Editor; Moron, W., Editor; Sega, W., Editor; Jul. 24, 2000; 546p; In English; 15th, 27-30 Jun. 2000, Wroclaw, Poland
Contract(s)/Grant(s): F61775-00-W-F074
Report No.(s): AD-A382054; EOARD-CSP-00-5074; ISBN 83-901999-8-X; No Copyright; Avail: CASI; A04, Microfiche; A23, Hardcopy

The Final Proceedings for 15th International WROCLAW Symposium and Exhibition on Electromagnetic Compatibility, 27 June 2000 - 30 June 2000. This is an interdisciplinary conference. Subject matter will include all aspects of Electromagnetic Compatibility (EMC) theory and practice as seen in this partial list of topics for planned sessions: EMC on Component and PCB Level; Lightning and ESD; EMC in Communication and Power Systems; Modeling and Simulation Theory and Practice. NATO EMC issues: Military vs Civil EMC Standards - Comparisons and Problems, Standard Procedures for Simulation, Prediction and Modeling Antennas and Propagation, Biological Effects of EM Radiation - Technical Aspects, Spectrum Management and Monitoring, EM Hazards and Terrorism, EMC Matters and Satellite-based Systems, Computational EM Technique in Mobile Wireless Communications.
DTIC
Electromagnetic Compatibility; Conferences

20000116425 Department of Transportation, Joint Program Office for Intelligent Transportation Systems, Washington, DC USA
Federal Trade Commission Advisory Committee on Online Access and Security *Final Report*
May 15, 2000; 38p; In English
Report No.(s): PB2000-108300; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Contents include the following: Introduction; Online access; Security; Other considerations not fully addressed; Charter of the Federal Trade Commission Advisory Committee on Online Access and Security and Appendix B: Advisory Committee Members.
NTIS
Access Control; Information Systems; World Wide Web; On-Line Systems; Computer Information Security

20000117676 Draper (Charles Stark) Lab., Inc., Cambridge, MA USA
Filtering Strategies For Spiraling Targets
Zarchan, Paul, Draper (Charles Stark) Lab., Inc., USA; Lianos, Dimitrios, Army Space and Missile Defense Command, USA; [Mar. 2000]; 13p; In English
Report No.(s): AD-A381232; No Copyright; Avail: Defense Technical Information Center (DTIC)

Intentional and unintentional spiraling maneuvers on the part of a tactical ballistic missile target can make it particularly difficult for a pursuing missile to hit. The paper first reviews why it is difficult to hit a spiraling target with proportional navigation guidance. It is then shown that by using a special purpose linear Kalman filter that is specifically tuned for a spiral maneuver in conjunction with an advanced guidance law it is possible to dramatically improve system performance over that of a proportional navigation guidance system. However, for the necessary filtering and guidance to work properly the target's spiraling frequency must be known. If the spiraling frequency is unknown other methods must be used. This paper investigates two schemes for deriving the spiraling frequency of the target. The first scheme involves using a bank of Kalman filters, each of which is tuned to a different spiraling frequency. Various schemes for identifying which filter in the filter bank is tuned ot the actual target frequency is investigated. The second method for deriving the target frequency involves using a single extended Kalman filter that explicitly estimates the target spiraling frequency. It is shown that such an extended Kalman filter when used in conjunction with an advanced guidance law can dramatically improve system performance.
Author
Ballistic Missiles; Frequencies; Identifying; Kalman Filters; Missiles; Proportional Navigation

20000117710 Federal Reserve System, Board of Governors, Washington, DC USA
Interagency Financial Institution Web Site Privacy Survey Report, November 1999
Nov. 1999; 70p; In English
Report No.(s): PB2000-108180; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy

This report presents the results of the Interagency Financial Institution Web Site Privacy Survey conducted during May and July of 1999. The Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, Office of the Comptroller of the Currency, and Office of Thrift Supervision (the 'agencies') conducted this survey of bank and savings association Web sites to determine the extent to which financial institution Web sites posted privacy policies and information practice statements. More specifically, the survey was designed to answer the following questions: What proportion of Web sites collects personal information and what types of information are collected; What proportion of Web sites allows consumers to conduct banking transactions on-line, and What proportion of Web sites posts privacy disclosures, and what do these disclosures say. The purpose of the survey was to obtain an indication of the state of the financial services industry with respect to on-line privacy disclosures. The survey was designed to supplement previous Web site privacy surveys that did not focus on financial institutions. However, the survey differs materially from previous surveys, and no direct comparisons should be made. The report does not make any policy recommendations.
NTIS
Personnel Management; On-Line Systems; Computer Networks; Information Retrieval; Computer Programs; Financial Management

33
ELECTRONICS AND ELECTRICAL ENGINEERING

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

20000115494 Pennsylvania State Univ., Applied Research Lab., University Park, PA USA
Control-Loop Design for Nonlinear Sensors ***Final Report, 1 Jun. 1997-30 Jun. 2000***
Gabrielson, Thomas B.; Sep. 07, 2000; 21p; In English
Contract(s)/Grant(s): N00014-97-1-0676; Proj-5713
Report No.(s): AD-A381918; ARL/PSU/FD-321-00-02; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

While linear control theory is well developed, the practice of restricting systems to operate solely in linear regions can seriously limit the achievable performance. New technologies and new applications would be enabled by better understanding of the closed-loop control of nonlinear systems. If robust control loops can be designed in the presence of these nonlinearities and points of instability, the performance of these systems can be enhanced significantly. For example, controlled operation in or near regions of inherent instability can result in improved bandwidth, response time, and a wider envelope of operation.
DTIC
Nonlinear Systems; Control Theory; Loops; Feedback Control; Acoustic Measurement; Acoustic Imaging

20000115881 MRJ Technology Solutions, Moffett Field, CA USA

Efficient Multi-Dimensional Simulation of Quantum Confinement Effects in Advanced MOS Devices

Biegel, Bryan A., MRJ Technology Solutions, USA; Rafferty, Conor S., Bell Telephone Labs., Inc., USA; Ancona, Mario G., Naval Research Lab., USA; Yu, Zhi-Ping, Stanford Univ., USA; [2000]; 7p; In English

Contract(s)/Grant(s): NAS2-14303; RTOP 519-40-12; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We investigate the density-gradient (DG) transport model for efficient multi-dimensional simulation of quantum confinement effects in advanced MOS devices. The formulation of the DG model is described as a quantum correction to the classical drift-diffusion model. Quantum confinement effects are shown to be significant in sub-100nm MOSFETs. In thin-oxide MOS capacitors, quantum effects may reduce gate capacitance by 25% or more. As a result, the inclusion or quantum effects in simulations dramatically improves the match between C-V simulations and measurements for oxide thickness down to 2 nm. Significant quantum corrections also occur in the I-V characteristics of short-channel (30 to 100 nm) n-MOSFETs, with current drive reduced by up to 70%. This effect is shown to result from reduced inversion charge due to quantum confinement of electrons in the channel. Also, subthreshold slope is degraded by 15 to 20 mV/decade with the inclusion of quantum effects via the density-gradient model, and short channel effects (in particular, drain-induced barrier lowering) are noticeably increased.

Author

Confinement; Quantum Electrodynamics; Diffusion; Electrons; Field Effect Transistors

20000116108 National Telecommunications and Information Administration, Boulder, CO USA

Nonlinear Operation of a MMIC RF Power Amplifier and its Effects on Battery Current, Interference and Link Margin

Dalke, Roger A., National Telecommunications and Information Administration, USA; Achatz, Robert J., National Telecommunications and Information Administration, USA; Lo, Yeh, National Telecommunications and Information Administration, USA; January 2000; 44p; In English

Report No.(s): PB2000-103008; NTIA-00-375; No Copyright; Avail: National Technical Information Service (NTIS)

This report describes measurement, modeling, and simulation methods that are used to analyze the relationship between nonlinear operation of a typical Personal Communications Service (PCS) portable transcriver power amplifier and battery current, out-of-band power, and link margin. First the nonlinear characteristics of the PCS amplifier and associated battery current were obtained from amplifier measurements at various bias voltages and RF output signal levels. A mathematical model of the power amplifier based on these measurements was then used to simulate the communications link for purposes of determining the power spectral density and symbol-error ratio for a variable envelop digitally modulated signal using pi/4 DQPSK with 35 percent root raised cosine filtering. The out-of-band power and symbol-error ratio were computed to determine the link margin for a maximum symbol-error ratio of 10(exp-3).

Author

Electric Batteries; Electric Potential; Errors; Mathematical Models; Microwave Circuits; Nonlinearity; Power Amplifiers; Radio Frequencies

20000116113 National Inst. of Standards and Technology, Office of Law Enforcement Standards, Gaithersburg, MD USA

Electronics and Electrical Engineering Laboratory, Office of Law Enforcement Standards: Programs, Activities and Accomplishments

January 2000; 48p; In English

Report No.(s): PB2000-101325; NISTIR-6432; No Copyright; Avail: National Technical Information Service (NTIS)

The mission of the Office of Law Enforcement Standards (OLES) is to serve as the principal agent for standards development for the criminal justice and public safety communities. OLES has been instrumental in the development of numerous standards and the issuance of various technical reports that had significant impact on both of these communities. Through its programs, OLES helps criminal justice and public safety agencies acquire, on a cost-effective basis, the high quality resources they need to do their jobs. to accomplish this task, OLES: (1) Develops methods for testing equipment performance, (2) Develops methods for examining evidentiary materials, (3) Develops standards for equipment and operating procedures, (4) Develops standard reference materials, and (5) Performs other scientific and engineering research as required by the criminal justice and public safety communities. This paper outlines some of the technologies and programs OLES has developed.

Derived from text

Standards; Cost Effectiveness; Law (Jurisprudence); Safety; Tasks; Research Facilities

20000116144 Raytheon Co., Dallas, TX USA

Proposal to Develop Resonant-Tunneling Diode Circuits Using Epitaxial Liftoff ***Final Report, 16 Sep. 1996 - 15 Dec. 1999***

Brar, Berinder; Moise, D.; Dec. 15, 1999; 99p; In English

Contract(s)/Grant(s): F49620-96-C-0050

Report No.(s): AD-A382086; AFRL-SR-BL-TR-00-0444; No Copyright; Avail: CASI; A02, Microfiche; A05, Hardcopy

The program was to determine the potential performance advantages of integrating resonant tunneling diodes (RTDs) with complementary metal oxide semiconductor (CMOS) technology. In this program, a broad suite of circuits was fabricated and evaluated for logic memory, optoelectronic, and mixed-signal applications. We conclude that mixed-signal RT-CMOS circuits have performance advantages for niche applications in the short term, and broad use in logic when silicon-based RT technology reaches production maturity.

DTIC

Resonant Tunneling; Diodes; Integrated Circuits

20000116168 National Inst. of Standards and Technology, Electronics and Electrical Engineering Lab., Boulder, CO USA

NIST Measurement Services: Calibration Service of Optoelectronic Frequency Response at 1319 nm for Combined Photodiode/RF Power Sensor Transfer Standards

Hale, Paul D., National Inst. of Standards and Technology, USA; Wang, C. M., National Inst. of Standards and Technology, USA; December 1999; 56p; In English

Report No.(s): PB2000-103300; NIST-SP-250-51; No Copyright; Avail: National Technical Information Service (NTIS)

This document describes the Calibration Service provided by the National Institute of Standards and Technology (NIST) for optoelectronic frequency response transfer standards and their use in measuring optical modulation depth. The service supports the calibration of transfer standards consisting of a pigtailed photodiode, with access to the bias current, combined with an rf power sensor over the frequency range of 300 KHz to 55 GHz at 1319 nm. Typical measurement uncertainties are about 0.05 dB, which includes measurement repeatability, rf power meter scaling accuracy and offset, optical power drift, bias current measurement, and power sensor noise. The measurement technique, based on the heterodyne beat note between two single-frequency Nd:YAG lasers operating at 1319 nm, is reviewed and its implementation is described. A detailed analysis of sources of error and estimates of uncertainty are presented. Use of the transfer standards for measuring an arbitrary optical modulation depth is described along with some design considerations to achieve the lowest possible transfer uncertainty. A modification of the calibration service that allows calibration of photoreceivers that do not provide access to the bias current is also described. This modification, offered as a Special Test, allows the absolute responsivity of the photoreceiver to be measured, but with degraded uncertainty due to repeatability of the optical insertion loss of the fiber connectors.

Author

Frequency Response; Calibrating; Modulation; Photodiodes; Standards; Frequency Measurement; Optoelectronic Devices

20000116170 National Academy of Sciences - National Research Council, Transportation Research Board, Washington, DC USA

Understanding and Applying Advanced On-Board Bus Electronics ***Final Report***

Schiavone, John J., National Academy of Sciences - National Research Council, USA; 1999; 114p; In English

Report No.(s): PB2000-102884; TCRP-43; No Copyright; Avail: National Technical Information Service (NTIS)

This report will be of interest to transit managers, operations and maintenance professionals, bus procurement specialists, bus manufacturers and suppliers, and others interested in the application of advanced electronics to transit buses. It provides an overview of electronics and its applications to buses and other transportation sectors. The report then addresses electronic integration, potential benefits offered by integration, and transit agency experiences with the technology, The report concludes with guidelines for implementing transit bus electronics. It is intended to be a primer on the subject, providing essential background information to serve as a starting point for acquiring additional knowledge.

Author

Maintenance; Procurement; Transportation; Bus Conductors; Electronic Equipment

20000116198 State Univ. of New York, Dept. of Electrical and Computer Engineering, New Paltz, NY USA

Novel Planar and Integrated Microwave Antennas ***Final Report, Jan. 1997 - 31 Aug. 2000***

Saed, Mohammad A., State Univ. of New York, USA; Nov. 10, 2000; 15p; In English

Contract(s)/Grant(s): NAG8-1313; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This project dealt with design, analysis, and testing of new types of planar and integrated antennas operating in the microwave frequency range. The following was accomplished during this project period:
Author
Design Analysis; Microwave Antennas

20000116201 NASA Goddard Space Flight Center, Greenbelt, MD USA
Specification For ST-5 Li Ion Battery
Castell, Karen D., NASA Goddard Space Flight Center, USA; Jul. 21, 2000; 23p; In English
Report No.(s): STS-495-006; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This Specification defines the general requirements for rechargeable Space Flight batteries intended for use in the ST-5 program. The battery chemistry chosen for this mission is lithium ion (Li-Ion).
Derived from text
Recharging; Charge Efficiency; Lithium Batteries; Storage Batteries; Spacecraft Power Supplies

20000116210 NASA Ames Research Center, Moffett Field, CA USA
Towards Evolving Electronic Circuits for Autonomous Space Applications
Lohn, Jason D., NASA Ames Research Center, USA; Haith, Gary L., NASA Ames Research Center, USA; Colombano, Silvano P., NASA Ames Research Center, USA; Stassinopoulos, Dimitris, NASA Ames Research Center, USA; [2000]; 13p; In English; Aerospace, 2000; Sponsored by Institute of Electrical and Electronics Engineers, USA; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The relatively new field of Evolvable Hardware studies how simulated evolution can reconfigure, adapt, and design hardware structures in an automated manner. Space applications, especially those requiring autonomy, are potential beneficiaries of evolvable hardware. For example, robotic drilling from a mobile platform requires high-bandwidth controller circuits that are difficult to design. In this paper, we present automated design techniques based on evolutionary search that could potentially be used in such applications. First, we present a method of automatically generating analog circuit designs using evolutionary search and a circuit construction language. Our system allows circuit size (number of devices), circuit topology, and device values to be evolved. Using a parallel genetic algorithm, we present experimental results for five design tasks. Second, we investigate the use of coevolution in automated circuit design. We examine fitness evaluation by comparing the effectiveness of four fitness schedules. The results indicate that solution quality is highest with static and co-evolving fitness schedules as compared to the other two dynamic schedules. We discuss these results and offer two possible explanations for the observed behavior: retention of useful information, and alignment of problem difficulty with circuit proficiency.
Author
Analog Circuits; Autonomy; Circuits; Controllers; Robotics; Technology Utilization

20000116297 Army Research Lab., Sensors Directorate, Adelphi, MD USA
Steady-State Potential Scan at Rotating Disk Electrode and Applications ***Progress Report, Oct. 1998-1999***
Jiang, Rongzhong; Walker, Charles; Chu, Deryn; Aug. 2000; 20p; In English
Report No.(s): AD-A382650; ARL-TR-2230; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
A method of multiple small potential steps was applied to obtain current-potential curves at a rotating disk electrode (RDE), which is more accurate than the classical potential scan RDE method. Several basic benefits of the new RDE method were summarized, including reducing charging current, removing adsorption current, identifying kinetic current, and separating kinetic and diffusion reactions. The practical application of this new method is to study high-surface-area powder catalysts for fuel cell research. An example of using this new method was demonstrated by measurement of the current-potential curves of catalytic oxygen reduction on a heat-treated, metalloporphyrins-coated graphite RDE. A successful kinetic analysis of catalytic oxygen reduction at the powder-catalyst-coated electrode was achieved.
DTIC
Fuel Cells; Reaction Kinetics; Rotating Disks; Steady State; Electrodes

20000116480 National Inst. of Standards and Technology, Electromagnetic Technology Division, Boulder, CO USA
SQUIDs Past, Present, and Future. A Symposium in Honor of James E. Zimmerman
Kautz, R. L.; October 2000; 76p; In English
Report No.(s): PB2001-100759; NISTIR-5095; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

Contents include the following: Preface; Symposium Program; Attendees; Daily Camera Article; Biographical Sketch; Photographs; Banquet Address; Letters; Publication List; Patent List.
NTIS
Conferences; Radio Frequencies

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.

20000115493 Purdue Univ., School of Mechanical Engineering, West Lafayette, IN USA
Water Mist Impingement onto a Heated Surface. Proceeding of the ASME/JSME Joint Thermal Engineering Conference (5th) 1999, Held in San Diego, California
Fu, Chunming; Sojka, Paul E.; Sivathanu, Yudaya R.; Jan. 1999; 6p; In English; Prepared in collaboration with En'Urga, Inc. West Lafayette, IN.
Contract(s)/Grant(s): DASW01-98-C-0029
Report No.(s): AD-A381905; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

An experimental study on the interaction of a water mist with a heated surface is described. The long term objective is to produce experimental data that can be used to validate submodels for four key physical phenomena involved in the interaction of sprays with burning surfaces: (1) the effect of buoyancy (caused by the hot combustion products) on the trajectory of a single droplet, (2) the effect of evaporation on the trajectory of a single droplet, (3) the cessation of reaction and reduction in flame spread caused by the droplets on flaming surface combustion, and (4) the reduction in surface temperature caused by the effect of drop impingement, spreading, and evaporation, on surface combustion. The short term objective was to complete experiments that mapped the size history of water droplets as they approached a hot surface using a Malvern Spray Analyzer to study the effect of both buoyance and evaporation on droplet trajectory. Surface temperature profiles were recorded using fine-wire thermocouples. The influence of water mass flow rate and drop size distribution on the hot surface temperature profile is presented and discussed.
DTIC
Surface Temperature; Mist; Impingement; Drop Size; Evaporation; Physical Factors

20000116117 Technische Hogeschool Twente, Faculty of Applied Mathematics, Enschede, Netherlands
Decay Rates of Buffers in Continuous Flow Lines
Kroese, D. P.; Nov. 1997; ISSN 0169-2690; 26p; In English
Report No.(s): PB2000-103754; MEMO-1416; No Copyright; Avail: National Technical Information Service (NTIS)

Consider a tandem system of machines separated by infinitely large buffers. The machines process a continuous flow of products, possibly at different speeds. The life and repair times of the machines are assumed to be exponential. The authors claim that the stationary distribution of the content of each buffer has an exponential decay, and provide an algorithm to determine the exact decay rates in terms of the speeds and the failure and repair rates of the machines. These decay rates provide useful qualitative insight into the behavior of the flow line. In the derivation of the algorithm the authors use the theory of Large Deviations.
NTIS
Decay Rates; Production Planning; Assembling; Maintenance

20000116145 Academy of Sciences (USSR), Inst. of Theoretical and Applied Mechanics, Novosibirsk, USSR
International Conferences on Methods of Aerophysical Research (ICMAR'2000), Part 2
Aug. 28, 2000; 230p; In English, 9-16 Jul. 2000, Novosibirsk-Tomsk, Russia
Contract(s)/Grant(s): F61775-00-W-F022
Report No.(s): AD-A382159; EOARD-CSP-00-5022; Copyright; Avail: Defense Technical Information Center (DTIC)

The Final Proceedings for International Conferences on Methods of Aerophysical Research (ICMAR'2000). 9-16 Jul 2000. This is an interdisciplinary conference. Topics include "Problems of Modeling at Sub/Trans/Super/Hypersonic Velocities"; "Methods of Flow Diagnostics"; "Instrumentation in Aerophysical Experiments"; "Verification of Computational Fluid Dynamics (CFD) Models and Methods".
DTIC
Conferences; Atmospheric Physics

20000116146 Academy of Sciences (USSR), Inst. of Theoretical and Applied Mechanics, Novosibirsk, USSR
International Conferences on Methods of Aerophysical Research (ICMAR'2000), Part 1
Aug. 28, 2000; 246p; In English, 9-16 Jul. 2000, Novosibirsk-Tomsk, Russia
Contract(s)/Grant(s): F61775-00-W-F022
Report No.(s): AD-A382160; EOARD-CSP-00-5022; ISBN 5-7692-0305-6; Copyright; Avail: Defense Technical Information Center (DTIC)

The Final Proceedings for International Conferences on Methods of Aerophysical Research (ICMAR'2000), 9-16 Jul 2000. This is an interdisciplinary conference. Topics include "Problems of Modeling at Sub/Trans/Super/Hypersonic Velocities"; "Methods of Flow Diagnostics"; "Instrumentation in Aerophysical Experiments"; "Verification of Computational Fluid Dynamics (CFD) Models and Methods".
DTIC
Conferences; Atmospheric Physics

20000116235 Electricite de France, Clamart, France
Syrthes thermal code and Estet or N3S fluid mechanics codes coupling
Peniguel, C.; Rupp, I.; Jun. 30, 1997; 13p; In French; In English
Report No.(s): DE99-703284; EDF-97-NB-00133; No Copyright; Avail: Department of Energy Information Bridge

EDF has developed numerical codes for modeling the conductive, radiative and convective thermal transfers and their couplings in complex industrial configurations: the convection in a fluid is solved by Estet in finite volumes or N3S in finite elements, the conduction is solved by Syrthes and the wall-to-wall thermal radiation is modelled by Syrthes with the help of a radiosity method. Syrthes controls the different heat exchanges which may occur between fluid and solid domains, using an explicit iterative method. An extension of Syrthes has been developed in order to allow the consideration of configurations where several fluid codes operate simultaneously, using 'message passing' tools such as PVM (Parallel Virtual Machine) and the Calcium code coupler developed at EDF. Application examples are given.
NTIS
Thermal Radiation; Couplings; Fluid Mechanics

20000116475 NASA Langley Research Center, Hampton, VA USA
DSMC Simulation of Separated Flows About Flared Bodies at Hypersonic Conditions
Moss, James N., NASA Langley Research Center, USA; October 2000; 25p; In English; European Congress on Computational Methods in Applied Sciences and Engineering, 11-14 Sep. 2000, Barcelona, Spain; Original contains color illustrations
Contract(s)/Grant(s): RTOP 242-80-01-01
Report No.(s): NASA/TM-2000-210539; L-18024; NAS 1.15:210539; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This paper describes the results of a numerical study of interacting hypersonic flows at conditions that can be produced in ground-based test facilities. The computations are made with the direct simulation Monte Carlo (DSMC) method of Bird. The focus is on Mach 10 flows about flared axisymmetric configurations, both hollow cylinder flares and double cones. The flow conditions are those for which experiments have been or will be performed in the ONERA R5Ch low-density wind tunnel and the Calspan-University of Buffalo Research Center (CUBRC) Large Energy National Shock (LENS) tunnel. The range of flow conditions, model configurations, and model sizes provides a significant range of shock/shock and shock/boundary layer interactions at low Reynolds number conditions. Results presented will highlight the sensitivity of the calculations to grid resolution, contrast the differences in flow structure for hypersonic cold flows and those of more energetic but still low enthalpy flows, and compare the present results with experimental measurements for surface heating, pressure, and extent of separation.
Author
Monte Carlo Method; Computerized Simulation; Direct Numerical Simulation; Separated Flow; Wind Tunnel Tests

20000117686 University of Southern California, Dept. of Aerospace and Mechanical Engineering, Los Angeles, CA USA
Surface Tension and Fingering of Miscible Interfaces
Abib, Mohammed, University of Southern California, USA; Liu, Jian-Bang, University of Southern California, USA; Ronney, Paul D., University of Southern California, USA; [1999]; 14p; In English
Contract(s)/Grant(s): NAG3-1523; NAG3-2124; RTOP 101-32-OA; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Experiments on miscible, buoyantly unstable reaction-diffusion fronts and non-reacting displacement fronts in Hele-Shaw cells show a fingering-type instability whose wavelengths (lambda*) are consistent with an interfacial tension (sigma) at the front

caused by the change in chemical composition, even though the solutions are miscible in all proportions. In conjunction with the Saffman-Taylor model, the relation sigma = K/tau, where tau is the interface thickness and K approximately equal 4 +/- 2 x 10(exp -6) dyne, enables prediction of our measured values of lambda* as well as results from prior experiments on miscible interfaces. These results indicate that even for miscible fluids, surface tension is generally a more significant factor than diffusion in interfacial stability and flow characteristics.
Author
Interfacial Tension; Surface Stability; Solubility; Flow Characteristics

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.

20000115619 NASA Ames Research Center, Moffett Field, CA USA
Transverse Mode Dynamics of VCSELs Undergoing Current Modulation
Goorjian, Peter M., NASA Ames Research Center, USA; Ning, C. Z., NASA Ames Research Center, USA; Agrawal, Govind, Rochester Univ., USA; [2000]; 8p; In English; Photonics West, 23-28 Jan. 2000, San Jose, CA, USA
Contract(s)/Grant(s): RTOP 519-40-12; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Transverse mode dynamics of a 20-micron-diameter vertical-cavity surface-emitting laser (VCSEL) undergoing gain switching by deep current modulation is studied numerically. The direct current (dc) level is set slightly below threshold and is modulated by a large alternating current (ac). The resulting optical pulse train and transverse-mode patterns are obtained numerically. The ac frequency is varied from 2.5 GHz to 10 GHz, and the ac amplitude is varied from one-half to four times that of the dc level. At high modulation frequencies, a regular pulse train is not generated unless the ac amplitude is large enough. At all modulation frequencies, the transverse spatial profile switches from single-mode to multiple-mode pattern as the ac pumping level is increased. Optical pulse widths vary in the range 5-30 ps. with the pulse width decreasing when either the frequency is increased or the ac amplitude is decreased. The numerical modeling uses an approximation form of the semiconductor Maxwell-Bloch equations. Temporal evolution of the spatial profiles of the laser (and of carrier density) is determined without any assumptions about the type or number of modes. Keywords: VCSELs, current modulation, gain switching, transverse mode dynamics, computational modeling
Author
Cavities; Laser Outputs; Mathematical Models; Surface Emitting Lasers

20000116226 Academy of Sciences (USSR), General Physics Inst., Moscow, USSR
Active Materials For Lasing In The 4-5 Micron Spectral Range *Final Report*
Osiko, Academician V.; Jul. 2000; 133p; In English
Contract(s)/Grant(s): F61775-99-W-E033
Report No.(s): AD-A381730; EOARD-SPC-99-4033; No Copyright; Avail: Defense Technical Information Center (DTIC)

This report results from a contract tasking General Physics Institute of the RAS. as follows: The contractor will investigate new laser host materials having a ”short” phonon spectrum and doped with rare earths to achieve efficient, near-room-temperature operation of solid state lasers operating in the 4-5 micron spectral range.
DTIC
Laser Materials; Solid State Lasers; Infrared Lasers

20000116382 Academy of Sciences (USSR), Inst. of General Physics, Moscow, USSR
8th International Laser Physics Workshop
Jul. 05, 1999; 35p; In English; 8th; Laser Physics, 2-6 Jul. 1999, Budapest, Hungary
Contract(s)/Grant(s): N68171-99-M-5832
Report No.(s): AD-A379046; ARDSG-R/D-865-PH-03; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The workshop consists of the following seminars and symposium (organized by the respective cochairs) which feature invited plenary talks, contributed oral and poster papers: Seminar 1 - Modern Trends in Laser Physics; Seminar 2 - Strong Field Phenomena; Seminar 3 - Laser Spectroscopy; Seminar 4 - Solid State Lasers and Nonlinear Optics; Seminar 5 - Laser Methods in Medi-

cine; Symposium - Status and Future Directions of High-Power Laser Installations. The official language of the workshop will be English.
DTIC
Conferences; Laser Fusion; High Power Lasers; Laser Spectroscopy; Laser Outputs

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.

20000116197 Acceleron, Inc., East Granby, CT USA
Laser Welding of Gamma Ti-Al Using a LASAG 306 Nd YAG Laser
Doyle, Timothy C., Acceleron, Inc., USA; [2000]; 17p; In English; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The as-supplied material was flat rolled Gamma Ti-Al sheet stock that was 0.037 in. thick, The surface of the material was also ground in one direction. Microstructural analysis revealed a very fine grain size on the order of 10 - 12 microns, Test coupons were fabricated from a single sheet. The larger coupon blanks were 1.5 ft.wide by 6 ft. long. They were laser cut to this size. Along the 6 in. side numerous micro-cracks could be detected in the recast layer created by the laser processing. Therefore, when the smaller test samples were made from these blanks, they were abrasive water-jet cut to eliminate the stress cracking from the laser heat input.
Derived from text
Titanium Alloys; Aluminum Alloys; Fabrication; Fiber Optics; Grain Size; Metal Sheets; Microstructure

20000116391 Oak Ridge National Lab., TN USA
Heavy Vehicle Propulsion System Materials Program ***Semiannual Report, Apr. - Sep. 1999***
Johnson, D. R.; Jan. 01, 2000; 159p; In English
Report No.(s): DE00-754367; ORNL/TM-2000/16; No Copyright; Avail: Department of Energy Information Bridge
The purpose of the Heavy Vehicle Propulsion System Materials Program is the development of materials: ceramics, intermetallics, metal alloys, and metal and ceramic coatings, to support the dieselization of class 1-3 trucks to realize a 35% fuel-economy improvement over current gasoline-fueled trucks and to support commercialization of fuel-flexible LE-55 low-emissions, high-efficiency diesel engines for class 7-8 trucks.
NTIS
Propulsion; Diesel Engines; Gasoline

20000116588 Pacific Environmental Services, Inc., Research Triangle Park, NC USA
Testing of a 2-Stroke Lean Burn Gas-Fired Reciprocating Internal Combustion Engine to Determine the Effectiveness of an Oxidation Catalyst System for Reduction of Hazardous Air Pollutants, Volume 2 of 2 ***Final Report***
Falgut, D.; Maret, M. D.; Jul. 2000; 726p; In English
Report No.(s): PB2001-100346; EPA/454/R-00/036B; No Copyright; Avail: National Technical Information Service (NTIS)
The USA Environmental Protection Agency (EPA) is investigating Reciprocating Internal Combustion Engines (RICE) to characterize engine emissions and catalyst control efficiencies of hazardous air pollutants (HAPs). This document describes the results of emissions testing conducted on a Cooper-Bessemer GMV-4-TF natural-gas-fired 2-stroke, lean-burn (2SlB) engine. Early in 1998, several industry and EPA representatives agreed that the Cooper-Bessemer GMV-4-TF engine, at the Colorado State University's Engine and Energy conservation laboratory (CSU EECL) is adequately representative of existing and new natural-gas-fired 2SLB engines. The group agreed that a matrix of test results from testing conducted at the EECL could be used to develop Maximum Achievable Control Technology (MAVT) standards for RICE. The group further agreed that an oxidation catalyst installed on the Cooper-Bessemer GMV-4-TF could be used to determine the effectiveness of oxidation catalysts for these engines, and that the EPA could use the results from testing at the 2SLB matrix conditions at CSU as the basis for developing the MAVT standard for natural-gas-fired 2SLB engines. Emissions testing was conducted to measure pollutant concentrations in the exhaust gas both up- and downstream of an oxidation catalyst. Miratech Corporation manufactured the catalyst and CSU person-

nel installed it on the engine. Several sampling and analysis methodlogies were used to measure HAP emissions before and after the oxidation catalyst.
NTIS
Internal Combustion Engines; Oxidation; Catalysts; Combustion Products; Environment Protection; Air Pollution; Piston Engines

20000116589 Pacific Environmental Services, Inc., Research Triangle Park, NC USA
Testing of a 2-Stroke Lean Burn Gas-Fired Reciprocating Internal Combustion Engine to Determine the Effectiveness of an Oxidation Catalyst System for Reduction of Hazardous Air Pollutants, Volume 1 of 2 ***Final Report***
Falgout, D.; Maret, M. D.; Jul. 2000; 556p; In English
Report No.(s): PB2001-100345; EPA/454/R-00/036A; No Copyright; Avail: National Technical Information Service (NTIS)

The USA Environmental Protection Agency (EPA) is investigating Reciprocating Internal Combustion Engines (RICE) to characterize engine emissions and catalyst control efficiencies of hazardous air pollutants (HAPs). This document describes the results of emissions testing conducted on a Cooper-Bessemer GMV-4-TF natural-gas-fired 2-stroke, lean-burn (2SlB) engine. Early in 1998, several industry and EPA representatives agreed that the Cooper-Bessemer GMV-4-TF engine, at the Colorado State University's Engine and Energy conservation laboratory (CSU EECL) is adequately representative of existing and new natural-gas-fired 2SLB engines. The group agreed that a matrix of test results from testing conducted at the EECL could be used to develop Maximum Achievable Control Technology (MAVT) standards for RICE. The group further agreed that an oxidation catalyst installed on the Cooper-Bessemer GMV-4-TF could be used to determine the effectiveness of oxidation catalysts for these engines, and that the EPA could use the results from testing at the 2SLB matrix conditions at CSU as the basis for developing the MAVT standard for natural-gas-fired 2SLB engines. Emissions testing was conducted to measure pollutant concentrations in the exhaust gas both up- and downstream of an oxidation catalyst. Miratech Corporation manufactured the catalyst and CSU personnel installed it on the engine. Several sampling and analysis methodlogies were used to measure HAP emissions before and after the oxidation catalyst.
NTIS
Environment Protection; Internal Combustion Engines; Piston Engines; Oxidation; Catalysts; Air Pollution

20000116606 Army Tank-Automotive and Armaments Command, Warren, MI USA
Electromechanical Suspension Performance Testing
Bylsma, W., Army Tank-Automotive and Armaments Command, USA; Beno, J., Texas Univ., USA; Weeks, D., Texas Univ., USA; Bresie, D., Texas Univ., USA; Guenin, A., Texas Univ., USA; Raymond, M. E., Yuma Proving Ground, USA; May 2000; 29p; In English
Contract(s)/Grant(s): DAAE07-98-C-L020
Report No.(s): AD-A380174; TR-13786; No Copyright; Avail: Defense Technical Information Center (DTIC)

Under contract DAAEO7-98-C-L020 testing was conducted at the U.S. Army Yuma Proving Grounds by the U.S. Army Tank-automotive and Armaments Command, Research, Development and Engineering Center and the University of Texas Center for Electromechanics during 8, 9, and 10 November 1999 between an active (electromechanical suspension) and passive High Mobility Multi-Purpose Wheeled Vehicle (HMMWV) to determine performance improvements. Two tests, RMS courses and Lane Change Maneuver, produced the most complete performance results for Ride Quality and Maneuverability determination. For the Lane Change Maneuver, the active HMMWV has much less sprung mass (frame) acceleration, over 5 times reduction at higher speeds, than the passive HMMWV. For the active HMMWV, sprung mass acceleration remains mostly constant at around 0.1 g's to 55 MPH while the passive HMMWV shows noticeable increases, at times in excess of I g. For the RMS Courses, a comparison shows a 5 times reduction in absorbed power over courses 2 to 5 with the active HMMWV. The active HMMWV has much less sprung mass acceleration, over 4 times reduction at higher speeds, than the passive HMMWV. For the active HMMWV it remains mostly constant at around 0.75 g's to higher speeds while the passive HMMWV shows noticeable increases, at times in excess of 2 g's. Total peak power usage was in the range of 3 kW (RMS and Lane Change Maneuver Courses) and total peak regeneration in the range of 6 kW (RMS Courses) for the active suspension.
DTIC
Performance Tests; Military Vehicles; Automobiles; Electromechanical Devices; Suspension Systems (Vehicles)

38
QUALITY ASSURANCE AND RELIABILITY

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

20000116141 NASA Goddard Space Flight Center, Greenbelt, MD USA
A Bridge Health Monitoring Method Using the Hilbert-Huang Transform: A Case Study
Huang, Norden E., NASA Goddard Space Flight Center, USA; Chiang, Weiling, NASA Goddard Space Flight Center, USA; [2000]; 1p; In English; International Bridge Conference, 13-15 Sep. 2000, Taipei, Taiwan, Province of China; No Copyright; Avail: Issuing Activity; Abstract Only

We have developed a new method for nondestructive instrument method to monitor the health of a bridge. This new method is based on a transient test load and simple data collection. The nuclear of the method is the new invented nonstationary and nonlinear time series analysis method, the Empirical Mode Decomposition and Hilbert Spectral Analysis. The final decision on the health of the bridge structure is based on the nonlinear characteristic of the data, and on the comparison between the free and the forced vibration frequencies. Thus this alternative method enjoys many advantages: (1) no a priori data required, (2) simple data collection, and (3) minimum traffic disruption. Results from a case study of the Shing-Nan Bridge in Hou-Wei will be reported. Author

Data Acquisition; Stability; Nonlinearity; Time Series Analysis; Bridges (Structures)

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.

20000116106 Nebraska Univ., Dept. of Civil Engineering, Lincoln, NE USA
Superstructure/Substructure Joint Details *Final Report*
Tadros, Maher K., Nebraska Univ., USA; Badie, Sameh S., Nebraska Univ., USA; September 1999; 242p; In English
Contract(s)/Grant(s): SPR-PL-1(035)P514
Report No.(s): PB2000-102576; No Copyright; Avail: National Technical Information Service (NTIS)

Nebraska Department of Roads (NDOR) has a long experience with jointless bridges. Integral abutments and piers are used with bridges up to 600 feet long. However, for bridges built with the NU I-girders, which have a very wide bottom flange, and have large skews, current NDOR details require a wide pier cap and abutment back-wall. The main objective of this research is to simplify the superstructure/substructure joint details for the NU-I girder continuous bridges. This report gives recommendations for: (1) types of bearing devices that can be used with integral piers, (2) selection guide for bearing devices, (3) new details developed for fixed and expansion bearing joints, (4) new details for the pier cap to enhance it aesthetics, and (5) new details developed for replacing the concrete diaphragm with steel diaphragm. In addition, this report gives recommendations for making the girders continuous before casting the deck slab.
Author

Bridges (Structures); Girders; Joints (Junctions); Substructures; Wharves

20000116107 Swedish Defence Research Establishment, Weapons and Protection Div., Tumba, Sweden
Blunt-Nosed Projectile Perforation of Target Plates
Wijk, Gunnar, Swedish Defence Research Establishment, Sweden; Jun. 04, 1999; ISSN 1104-9154; 20p; In English
Report No.(s): PB2000-103071; FOA-R-99-01181-310-SE; No Copyright; Avail: National Technical Information Service (NTIS)

A new model is proposed to predict rigid, blunt-nosed projectile perforation of target plates for normal impact against the target surface. This is a logical extension of a recently suggested model for sharp-nosed projectiles. The main purpose is to use the model as a small but important part in large computer programs for assessment of effects and vulnerability of complex targets. Such application requires a model that is analytic and simple. Another purpose is to obtain a way of determining the energy consumption when BAD (Behind Armour Debris) particles perforate witness plates or vulnerable (vital) components in complex targets. A few old experimental results which support the model are reported, but more experimental work should follow.
Author

Computer Programs; Energy Consumption; Projectiles; Targets; Vulnerability

20000116596 Alabama Univ., Huntsville, AL USA

International Journal of Impact Engineering. December 1999. Hypervelocity Impact: Proceedings of the 1998 Symposium, Volume 23

Schonberg, William P., Alabama Univ., USA; January 2000; 1p; In English, 17-19 Nov. 1998, Huntsville, AL, USA

Contract(s)/Grant(s): DAAG55-95-I-0492

Report No.(s): AD-A380190; ARO-39164.1-EG-CF; No Copyright; Avail: Defense Technical Information Center (DTIC)

This volume contains the papers presented at the 1998 Hypervelocity impact Symposium (HVIS 98) held in Huntsville, Alabama, on November 17-19, 1998. This was the sixth symposium since the re-initiation of the symposia in 1986, and the proceedings for the 1986, 1989, 1992,1994, and 1996 HVIS are published as Volumes 5, 10, 14, 17, and 20, respectively, of the International Journal of Impact Engineering. The 85 papers in this volume address advancements in the basic understanding of hypervelocity impact physics, related phenomenology, and engineering applications. Each paper in this volume has undergone peer review by experts in their respective fields of research. The authors are to be commended for keeping to the schedule for providing their draft manuscripts for review, making appropriate modifications and corrections, and preparing the final manuscript.

DTIC

Conferences; Hypervelocity Impact; Phenomenology

20000116597 Alabama Univ., Huntsville, AL USA

International Journal of Impact Engineering. Hypervelocity Impact: Proceedings of the 1998 Symposium, Volume 23

Schonberg, William P., Alabama Univ., USA; January 2000; 1p; In English, 17-19 Nov. 1998, Huntsville, AL, USA

Contract(s)/Grant(s): DAAG55-98-I-0492

Report No.(s): AD-A-380191; ARO-39164.1-EG-CF; No Copyright; Avail: Defense Technical Information Center (DTIC)

This volume contains the papers presented at the 1998 Hypervelocity impact Symposium (HVIS 98) held in Huntsville, Alabama, on November 17-19, 1998. This was the sixth symposium since the re-initiation of the symposia in 1986, and the proceedings for the 1986, 1989, 1992,1994, and 1996 HVIS are published as Volumes 5, 10, 14, 17, and 20, respectively, of the International Journal of Impact Engineering. The 85 papers in this volume address advancements in the basic understanding of hypervelocity impact physics, related phenomenology, and engineering applications. Each paper in this volume has undergone peer review by experts in their respective fields of research. The authors are to be commended for keeping to the schedule for providing their draft manuscripts for review, making appropriate modifications and corrections, and preparing the final manuscript.

DTIC

Conferences; Hypervelocity Impact; Phenomenology

20000116627 NASA Langley Research Center, Hampton, VA USA

Bending Boundary Layers in Laminated-Composite Circular Cylindrical Shells

Nemeth, Michael P., NASA Langley Research Center, USA; Smeltzer, Stanley S., III, NASA Langley Research Center, USA; November 2000; 65p; In English; 41st; Structures, Structural Dynamics, and Materials, 3-6 Apr. 2000, Atlanta, GA, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA

Contract(s)/Grant(s): RTOP 522-63-31-03

Report No.(s): NASA/TP-2000-210549; NAS 1.60-210549; L-17997; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A study of the attenuation of bending boundary layers in balanced and unbalanced, symmetrically and unsymmetrically laminated cylindrical shells is presented for nine contemporary material systems. The analysis is based on the linear Sanders-Koiter shell equations and specializations to the Love-Kirchhoff shell equations and Donnell's equations are included. Two nondimensional parameters are identified that characterize the effects of laminate orthotropy and anisotropy on the bending boundary-layer decay length in a very general manner. A substantial number of structural design technology results are presented for a wide range of laminated-composite cylinders. For all laminates considered, the results show that the differences between results obtained with the Sanders-Koiter shell equations, the Love-Kirchhoff shell equations, and Donnell's equations are negligible. The results also show that the effect of anisotropy in the form of coupling between pure bending and twisting has a negligible effect on the size of the bending boundary-layer decay length of the balanced, symmetrically laminated cylinders considered. Moreover, the results show that coupling between the various types of shell anisotropies has a negligible effect on the calculation of the bending bound-

ary-layer decay length in most cases. The results also show that, in some cases, neglecting the shell anisotropy results in underestimating the bending boundary-layer decay length and, in other cases, results in an overestimation.
Author
Bending; Boundary Layers; Composite Structures; Cylindrical Shells; Laminates; Anisotropy; Shell Theory; Structural Design; Thin Walled Shells; Structural Analysis

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.

20000116098 Corvallis Environmental Research Lab., Corvallis, OR USA
Water Quality Effects of Hyporheic Processing
Fernaldi, A.; Landers, D.; Wigington, P. J.; 2000; 10p; In English
Report No.(s): PB2000-107420; EPA/600/A-00/026; No Copyright; Avail: National Technical Information Service (NTIS)
Water quality changes along hyporheic flow paths may have important effects on river water quality and aquatic habitat. Previous studies on the Williamette River, Oregon, showed that river water follows hyporheic flow paths through highly porous deposits created by river channel meandering. to determine water quality changes associated with hyporheic flow, we studied six bar deposits positioned between the river and closed lentic side-channel alcoves. At each site we measured water levels and water quality in river, hyporheic, and alcove water. At all sites we found hyporheic flow paths from the river through the bar deposits to the alcove surface water. At a majority of the sites hyporheic dissolved oxygen and ammonium decreased relative to river water, while hyporheic specific flow rates, hyporheic temperature decreased relative to river water, and there was little change in temperature at the other three sites. Hyporheic changes most affected receiving alcove water quality at sites with fast hyporheic flow rates. Strategies to promote ecosystem functions provided by hyporheic flow should focus on restoring natural hydrogeophmorphic river channel processes to create high porosity deposits conducive to hyporheic flow.
NTIS
Water Quality; Hydrology; Water Flow

20000116175 Dynamac Corp., Corvallis, OR USA
Methods for Multi-Spatial Scale Characterization Riparian Corridors
Moser, T. J.; Lindeman, D. R.; Wigington, P. J.; Schuft, M. J.; VanSickle, J.; 2000; 10p; In English; Prepared in cooperation with Oregon State Dept. of Forestry, Salem
Report No.(s): PB2000-107422; EPA/600/A-00/021; No Copyright; Avail: National Technical Information Service (NTIS)
This paper describes the application of aerial photography and GIS technology to develop flexible and transferable methods for multi-spatial scale characterization and analysis of riparian corridors. Relationships between structural attributes of riparian corridors and indicators of stream ecological conditions are not well established. As part of a research project focused on assessing riparian-stream systems in agricultural landscapes of Oregon's Willamette Valley, GIS land cover/land use databases were created from 1997 aerial photography and digital orthophotography for 23 predominantly agricultural watersheds, including detailed land cover-land use coverages within 150 m of perennial and intermittent streams. GIS functions were used to partition the stream networks at various lateral-longitudinal scales to quantify land cover/land use and to generate functionally relevant metrics of riparian vegetation, such as its composition, width, and continuity. The methods developed provide considerable flexibility for generating metrics characterizing attributes of riparian corridors and for exploring relationships among these metrics and indicators of stream ecological condition.
NTIS
Corridors; Aerial Photography; Geographic Information Systems

20000116348 Environmental Protection Agency, Cincinnati, OH USA
National Conference on Tools for Urban Water Resource Management and Protection. Proceedings
Kirschner, R.; Everson, A.; Minamyer, S.; July 2000; 436p; In English
Report No.(s): PB2001-100195; EPA/625/R-00/001; No Copyright; Avail: CASI; A19, Hardcopy; A04, Microfiche
A wide array of effective water quality management and protection tools has been developed for urban environments, but implementation is hindered by a shortage of technology transfer opportunities. This National Conference on Tools for Urban Water Resource Management and Protection was designed to facilitate the educational process and transfer state-of-the-art infor-

mation to state, regional, and local urban water quality practitioners. The timing for this Conference coincided well with the U.S. Environmental Protection Agency's release of the NPDES Storm Water Phase II Final Rule in October 1999. The conference provided participants with practical, applied information on the most effective tools and technologies for meeting these new NPDES permit requirements. Program topics were carefully chosen to reflect the Phase II Program's six priorities: public education, public involvement, detection and elimination of illicit discharges, construction site runoff control, post-construction storm water management, and pollution prevention for municipal operations. This document includes many of the papers presented during the conference, and a copy has been provided to each attendee. All papers included were peer reviewed.
NTIS
Conferences; Water Resources; Water Management; Water Quality

20000116351 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA USA
Evaluation of Methods to Calculate a Wetlands Water Balance ***Final Report, Jul. 1995 - Jun. 1999***
Daniels, W. L.; Cummings, A.; Schmidt, M.; Fomchenko, N.; Speiran, G.; August 2000; 82p; In English
Report No.(s): PB2001-100141; Copyright; Avail: National Technical Information Service (NTIS), Microfiche

The development of a workable approach to estimating mitigation site water budget is a high priority for VDOT and the wetlands research and design community in general as they attempt to create successful mitigation sites. Additionally, correct soil physical, chemical and biological properties must be restored that are appropriate to the intended wetlands biota in order for the sites to function similar to the natural sites that they are replacing. The major objectives of this research program were to evaluate the currently recommended procedures for estimating wetland water balances and to characterize the soil and hydrologic regime present at natural and constructed sites and their interaction with wetlands biota. This report records our efforts to develop an estimated overall water budget at VDOTS's Ft. Lee mitigation site along with a summary of our previous water budget studies at Manasses. Detail on supporting studies is also provided along with an overall summary of multi-year research results and implications. In this report, the terms water balance and water budget are used almost interchangeably. In our view, however, water budgets are developed by humans to interpret actual wetland water balances.
NTIS
Estimating; Wetlands; Water Balance

20000116354 Forest Service, Albuquerque, NM USA
Forests and Grasslands for the Next Millennium
February 2000; 56p; In English; Original contains color illustrations
Report No.(s): PB2000-108510; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Southwestern national forest lands are unique because of the extraordinary diversity of landforms, elevations, and the resulting biodiversity of plants and animals. The primary reason the national forests of the Southwest were established about a century ago was to protect watersheds from overuse and preserve water flows. These national forests are headwaters for about 90 percent of the springs, streams, and rivers in the Southwest.
NTIS
Forests; Grasslands; Grasses

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.

20000115614 NASA Langley Research Center, Hampton, VA USA
Validation of CERES/TERRA Data
Barkstrom, Bruce R., NASA Langley Research Center, USA; Wieliski, Bruce A., NASA Langley Research Center, USA; Smith, G. Louis, Virginia Polytechnic Inst. and State Univ., USA; Lee, Robert B., NASA Langley Research Center, USA; Priestley, Kory J., NASA Langley Research Center, USA; Charlock, Thomas P., NASA Langley Research Center, USA; Kratz, David P., NASA Langley Research Center, USA; [2000]; 13p; In English; Remote Sensing, 25-29 Sep. 2000, Barcelona, Spain; Sponsored by International Society for Optical Engineering, Unknown
Contract(s)/Grant(s): NCC1-405; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

There are 2 CERES scanning radiometer instruments aboard the TERRA spacecraft, one for mapping the solar radiation reflected from the Earth and the outgoing longwave radiation and the other for measuring the anisotropy of the radiation. Each CERES instrument has on-board calibration devices, which have demonstrated that from ground to orbit the broadband total and shortwave sensor responses maintained their ties to the International Temperature Scale of 1990 at precisions approaching radiances have been validated in orbit to +/- 0.3 % (0.3 W/sq m sr). Top of atmosphere fluxes are produced by use of the CERES data alone. by including data from other instruments, surface radiation fluxes and radiant fluxes within the atmosphere and at its top, shortwave and longwave, for both up and down components, are derived. Validation of these data products requires ground and aircraft measurements of fluxes and of cloud properties.
Author
Solar Radiation; Radiometers; Long Wave Radiation; Anisotropy; Measure and Integration

20000116097 National Health and Ecological Effects Research Lab., Newport, OR USA
Near Infrared Aerial Photo-Detection of 'Zostera japonica' Communities in Pacific Northwest Estuarine Intertidal Habitats
Specht, D. T.; Young, D. R.; Clinton, P. J.; 1999; 12p; In English; 6th; Remote Sensing for Marine and Coastal Environments, 1-3 May 2000, Charleston, SC, USA
Report No.(s): PB2000-107419; EPA/600/A-00/027; No Copyright; Avail: National Technical Information Service (NTIS)

Near infrared color aerial photography (-1:7200) of Yaquina Bay, Oregon, flown at minus tides during summer months of 1997 was used to produce digital stereo ortho-photographs covering tidally exposed eelgrass habitat. GIS analysis, coupled with GPS positioning of ground-truth data detected Zostera Japonica communities (non-indigenous eelgrass), which are physically separated by elevation in this and similar Pacific North-west coastal estuaries from Zostera marina (native eelgrass) communities. The non-indigenous Z, japonica typically occurs at or near mean high water while native Z, marina is restricted to -0.7 m above mean low water and below. Recognition of Z, japonica patches from adjacent bare sediment and emergent beach or marsh grasses was aided by combining specifically tailored detection algorithms and 'heads up' digitizing with digital bathymetry. Further progress in algorithm development should allow areal delineation, mapping and change analysis.
NTIS
Near Infrared Radiation; Aerial Photography; Aerial Reconnaissance; Color Infrared Photography; Color Photography; Infrared Detectors

20000116131 NASA Goddard Space Flight Center, Greenbelt, MD USA
Insights on How NASA's Earth Observing System (EOS) Monitors Our World Environment
King, Michael D., NASA Goddard Space Flight Center, USA; [2000]; 1p; In English; National Environmental Monitoring Technology Conference, 19-20 Sep. 2000, Boston, MA, USA; Sponsored by Environmental Protection Agency, USA; No Copyright; Avail: Issuing Activity; Abstract Only

The Earth Observing System (EOS) is a space-based observing system comprised of a series of satellite sensors by which scientists can monitor the Earth, a Data and Information System (EOSDIS) enabling researchers worldwide to access the satellite data, and an interdisciplinary science research program to interpret the satellite data. During this year, four EOS science missions were launched, representing observations of (1) total solar irradiance, (2) Earth radiation budget, (3) land cover and land use change, (4) ocean processes (vector wind, sea surface temperature, and ocean color), (5) atmospheric processes (aerosol and cloud properties, water vapor, and temperature and moisture profiles), and (6) tropospheric chemistry. In succeeding years many more satellites will be launched that will contribute immeasurably to our understanding of the Earth's environment. In this presentation I will describe how scientists are using EOS data to examine land use and natural hazards, environmental air quality, including dust storms over the world's deserts, cloud and radiation properties, sea surface temperature, and winds over the ocean.
Author
Earth Observing System (EOS); Earth Radiation Budget; EOS Data and Information System; Monitors; Satellite Instruments; Satellite Observation; Information Systems

20000116134 NASA Goddard Space Flight Center, Greenbelt, MD USA
Ocean Data from MODIS at the NASA Goddard DAAC
Leptoukh, Gregory G., NASA Goddard Space Flight Center, USA; [2000]; 1p; In English; 15th; Ocean Optics; No Copyright; Avail: Issuing Activity; Abstract Only

Terra satellite carrying the Moderate Resolution Imaging Spectroradiometer (MODIS) was successfully launched on December 18, 1999. Some of the 36 different wavelengths that MODIS samples have never before been measured from space. New ocean data products, which have not been derived on a global scale before, are made available for research to the scientific community.

For example, MODIS uses a new split window in the four-micron region for the better measurement of Sea Surface Temperature (SST), and provides the unprecedented ability (683 nm band) to measure chlorophyll fluorescence. At full ocean production, more than a thousand different ocean products in three major categories (ocean color, sea surface temperature, and ocean primary production) are archived at the NASA Goddard Earth Sciences (GES) Distributed Active Archive Center (DAAC) at the rate of approx. 230GB/day. The challenge is to distribute such large volumes of data to the ocean community. It is achieved through a combination of public and restricted EOS Data Gateways, the GES DAAC Search and Order WWW interface, and an FTP site that contains samples of MODIS data. A new Search and Order WWW interface at http://acdisx.gsfc.nasa.gov/data/ developed at the GES DAAC is based on a hierarchical organization of data, will always return non-zero results. It has a very convenient geographical representation of five-minute data granule coverage for each day MODIS Data Support Team (MDST) continues the tradition of quality support at the GES DAAC for the ocean color data from the Coastal Zone Color Scanner (CZCS) and the Sea Viewing Wide Field-of-View Sensor (SeaWiFS) by providing expert assistance to users in accessing data products, information on visualization tools, documentation for data products and formats (Hierarchical Data Format-Earth Observing System (HDF-EOS)), information on the scientific content of products and metadata. Visit the MDST website at http://daac.gsfc.nasa.gov/CAMPAIGN DOCS/MODIS/index.html
Author
Earth Sciences; Imaging Spectrometers; Oceans; Spectroradiometers; Spectral Reflectance

20000116231 Colorado State Univ., Coll. of Forestry and Natural Resources, Fort Collins, CO USA
Digital Terrain Modeling and Distributed Soil Erosion Simulation/Measurement for Minimizing Environmental Impacts of Military Training (CS-752) ***Final Report***
Warren, S. D.; Mitasova, H.; Jourdan, M. R.; Brown, W. M.; Johnson, B. E.; Feb. 2000; 76p; In English
Report No.(s): AD-A379446; No Copyright; Avail: Defense Technical Information Center (DTIC)

In recognition of the negative repercussions that soil erosion and sediment deposition can have on military preparedness and the environment, the Strategic Environmental Research and Development Program (SERDP) funded a research effort between Fiscal Years 1993 and 1998 to develop geographic information system (GIS) tools and methods to enhance the accuracy, spatial prediction and visual representation of erosion and deposition on military lands. Because of the variability in the quality and availability of data to support erosion/deposition modeling efforts, the project sought to enhance both relatively simple empirical models and more data-intensive process-based models. In addition, the project addressed the demands for long-term average annual estimates of erosion/deposition and single event-based predictions.
DTIC
Environment Effects; Soil Erosion; Geographic Information Systems; Environment Management

20000116347 Massachusetts Inst. of Tech., Lexington, MA USA
Earth Observing-1 Advanced Land Imager: Spectral Response Calibration
Mendenhall, J. A.; Ryan-Howard, D. P.; September 20, 2000; 106p; In English; Original contains color illustrations
Report No.(s): PB2001-100209; MIT-EO-1-2; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

An Advanced Land Imager (ALI) will be flown on the first Earth Observing mission (EO-1) under NASA's New Millennium Program (NMP). The focal plane of the ALI contains silicon and non-cryogenic HgCdTe multispectral and panchromatic (MS/Pan) detector arrays with a total of 10 spectral bands spanning the 0.4 to 2.5 micron wavelength region. These bands have been defined to correspond with heritage LANDSAT bands and provide two additional bands centered at 0.44 and 1.25 micron. The partially populated focal plane provides a 3deg cross-track coverage corresponding to 37 km on the ground and the focal plane temperature is maintained at 220 K by means of a passive radiator. This document outlines the techniques adopted during spectral calibration of the ALI and presents results derived from subsystem and system level measurements.
NTIS
LANDSAT Satellites; Earth Observing System (EOS); Satellite Imagery; Remote Sensing; Soil Mapping; Terrain Analysis

20000116361 NASA Goddard Space Flight Center, Greenbelt, MD USA
Surface Change Detection Using Large Footprint Laser Altimetry
Blair, J. Bryan, NASA Goddard Space Flight Center, USA; Hofton, Michelle A., Maryland Univ., USA; Aug. 07, 2000; 1p; In English; 10th; Working group of European Geoscientists for the Establishment of Networks for Earth-science Research (WEGENER), 2000; No Copyright; Avail: Issuing Activity; Abstract Only

Laser altimeters provide a precise and accurate method for mapping topography at fine horizontal and vertical scales. A laser altimeter provides range by measuring the roundtrip flight time of a short pulse of laser light from the laser altimeter instrument to the target surface. The range is then combined with laser beam pointing knowledge and absolute position knowledge to provide

an absolute measurement of the surface topography. Newer generations of laser altimeters measure the range by recording the shape and time of the outgoing and received laser pulses. The shape of the return pulse can also provide unique information about the vertical structure of material such as vegetation within each laser footprint. Distortion of the return pulse is caused by the time-distributed reflections adding together and representing the vertical distribution of surfaces within the footprint. Larger footprints (10 - 100m in diameter) can support numerous target surfaces and thus provide the potential for producing complex return pulses. Interpreting the return pulse from laser altimeters has evolved from simple timing between thresholds, range-walk corrections, constant-fraction discriminators, and multi-stop time interval units to actual recording of the time varying return pulse intensity - the return waveform. Interpreting the waveform can be as simple as digitally thresholding the return pulse, calculating a centroid, to fitting one or more gaussian pulse-shapes to the signal. What we present here is a new technique for using the raw recorded return pulse as a raw observation to detect centimeter-level vertical topographic change using large footprint airborne and space-borne laser altimetry. We use the correlation of waveforms from coincident footprints as an indication of the similarity in structure of the waveforms from epoch to epoch, and assume that low correlation is an indicator of vertical structure or elevation change. Thus, using vertically and horizontally geolocated waveforms as raw observables (i.e., waveforms tied to a common reference ellipsoid), we assess whether epoch-to-epoch vertical ground motion results in a decrease in the correlation of coincident waveforms over time, and whether this can be used to quantify the magnitude of the deformation. Results of computer models and an example over an area of eroded beachfront will be presented.
Author
Altimetry; Change Detection; Footprints; Laser Altimeters; Laser Beams; Pulsed Lasers; Shapes; Topography; Vertical Distribution; Waveforms

20000116362 NASA Goddard Space Flight Center, Greenbelt, MD USA
Light Scattering by Nonspherical Particles: Current Status and Challenging Issues
Mishchenko, Michael, NASA Goddard Space Flight Center, USA; [2000]; 1p; In English; IRS 2000, 24-29 Jul. 2000, Saint Petersburg, Russia; No Copyright; Avail: Issuing Activity; Abstract Only

Quantitative analyses of remote sensing measurements of aerosols, clouds, precipitation, and particulate surfaces as well as computations of the Earth's radiation balance require detailed understanding of the interaction of small particles with light and other electromagnetic radiation. The convenient availability of the Lorenz-Mie theory has led to a widespread practice of treating all particles as if they were spheres. However, many natural and anthropogenic particles have nonspherical shapes, and the accumulated knowledge suggests that their scattering and radiative properties can be dramatically different from those of equivalent spheres. This presentation will summarize the recent significant progress achieved in the area of electromagnetic scattering by nonspherical particles and outline major problems that still await solution. The talk will cover the following specific topics: (1) comparison of most widely used exact and approximate theoretical techniques; (2) outline of laboratory and field measurement techniques; (3) compare theory and experiment; (4) need for a statistical approach in dealing with natural particles; (5) remote sensing and radiative transfer applications; and (6) major unsolved problems.
Author
Atmospheric Radiation; Electromagnetic Scattering; Light Scattering; Quantitative Analysis; Spheres

20000116470 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS RSS-20 POLDER Helicopter-Mounted Measurements of Surface BRDF
Leroy, Marc, Centre d'Etudes Spatiales de la Biosphere, France; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Nickerson, Jaime, Editor, Raytheon Information Technology and Scientific Services, USA; August 2000; 22p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL79; Rept-2000-03136-0/VOL79; NAS 1.15:209891/VOL79; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The BOREAS HYD-9 team collected data on precipitation and strearnflow over portions of the NSA and SSA. This data set contains Cartesian maps of rain accumulation for I -hour and daily periods during the summer of 1994 over the SSA only (not the full view of the radar). A parallel set of 1-hour maps for the whole radar view has been prepared and is available upon request from the HYD-09 personnel. An incidental benefit of the areal selection was the elimination of some of the less accurate data,because for various reasons the radar rain estimates degrade considerably outside a range of about 100 km. The data are available in tabular ASCII files.
Author
Meteorological Radar; Rain; Measure and Integration

20000116471 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS RSS-20 POLDER C-130 Measurements of Surface BRDF

Leroy, Marc, Centre d'Etudes Spatiales de la Biosphere, France; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Nickerson, Jaime, Editor, Raytheon Information Technology and Scientific Services, USA; August 2000; 22p; In English

Contract(s)/Grant(s): RTOP 462-33-01

Report No.(s): NASA/TM-2000-209891/VOL78; Rept-2000-03136-0/VOL78; NAS 1.15:209891/VOL78; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This Boreal Ecosystem-Atmosphere Study (BOREAS) Remote Sensing Science (RSS)-20 data set contains measurements of surface bidirectional reflectance distribution function (BRDF) made by the polarization and Directionality of Earth reflectances (POLDER) instrument over several surface types (pine, spruce, fen) of the BOREAS southern study area (SSA) during the 1994 intensive field campaigns (IFCs). Single-point BRDF values were acquired either from the NASA Ames Research Center (ARC) C-130 aircraft or from a NASA Wallops Flight Facility (WFF) helicopter. A related data set collected from the helicopter platform is available as is POLDER imagery acquired from the C-130. The data are stored in tabular ASCII files.

Author

Distribution Functions; Spectral Reflectance; Surface Properties; Forests

20000116472 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS RSS-19 1994 Seasonal Understory Reflectance Data

Miller, John R., York Univ., Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Nickerson, Jaime, Editor, Raytheon Information Technology and Scientific Services, USA; White, H. Peter, York Univ., Canada; Peddle, Derek, Waterloo Univ., Canada; Freemantle, Jim, Institute for Space and Terrestrial Science, Canada; August 2000; 24p; In English

Contract(s)/Grant(s): RTOP 462-33-01

Report No.(s): NASA/TM-2000-209891/VOL77; Rept-2000-03136-0/VOL77; NAS 1.15:209891/VOL77; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The BOREAS RSS-19 team collected airborne remotely sensed images and ground reflectance data for characterizing the radiometric properties of the boreal forest landscape. One objective of BOREAS is to further the understanding of the spectral bidirectional reflectance of typical boreal ecosystem stands in the visible/near-infrared regime. An essential input for any canopy BRDF model is an accurate estimate of the average understory reflectance, both for sunlit and shaded conditions. These variables can be expected to vary seasonally because of species-dependent differences in the phenological cycle of foliar display. In response to these requirements, the average understory reflectance for the flux tower sites of both the NSA (Thompson, Manitoba) and the SSA (Candle Lake, SASkatchewan) was observed throughout the year during five field campaigns. This was done by measuring the nadir reflectance (400 to 850 nm) of sunlit and shaded understory (vegetation and snow cover) along a surveyed LAI transect line (Chen, RSS-07) at each site near solar noon and documenting an average site reflectance. Comparisons between sites reveal differences in the green and infrared regions of the spectra, because of the differing species in the understory for each site. Temporal (seasonal) variation for each site was also observed (06-Feb-1994 to 16-Sep-1994), indicating the changing flora mixtures and changing spectral signatures as the understory matures during the growing season. The data are stored in tabular ASCII files.

Author

Data Acquisition; Ecosystems; Imagery; Infrared Spectra; Radiometers; Remote Sensing; Spectral Reflectance; Spectral Signatures

20000116473 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS RSS-19 1996 CASI At-Sensor Radiance and Reflectance Images

Miller, John, York Univ., Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Nickerson, Jaime, Editor, Raytheon Information Technology and Scientific Services, USA; Freemantle, Jim, Center for Research in Earth and Space Technology, Canada; August 2000; 32p; In English

Contract(s)/Grant(s): RTOP 462-33-01

Report No.(s): NASA/TM-2000-209891/VOL76; Rept-2000-03136-0/VOL76; NAS 1.15:209891/VOL76; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The BOREAS RSS-19 team collected CASI images from the Chieftain Navaho aircraft in order to observe the seasonal change in the radiometric reflectance properties of the boreal forest landscape. CASI was deployed as a site-specific optical sensor as part of BOREAS. The overall objective of the CASI deployment was to observe the seasonal change in the radiometric reflectance properties of the boreal forest landscape. In 1996, image data were collected with CASI on 15 days during a field campaign between 18-July and 01 -August, primarily at flux tower sites located at study sites near Thompson, Manitoba, and Prince Albert,

SASkatchewan. A variety of CASI data collection strategies were used to meet the following scientific objectives: 1) canopy bidirectional reflectance, 2) canopy biochemistry, 3) spatial variability, and 4) estimates of up and downwelling PAR spectral albedo, as well as changes along transects across lakes at the southern site and transects between the NSA and SSA. The images are stored as binary image files.
Author
Bidirectional Reflectance; Biochemistry; Data Acquisition; Optical Measuring Instruments; Reflectance; Spectra

20000116474 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS RSS-18 Level-1B AVIRIS Imagery: At-Sensor Radiance in BIL Format
Newcomer, Jeffrey A., Raytheon Information Technology and Scientific Services, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Nickerson, Jaime, Editor, Raytheon Information Technology and Scientific Services, USA; Green, Robert O., Jet Propulsion Lab., California Inst. of Tech., USA; August 2000; 36p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL74; Rept-2000-03136-0/VOL74; NAS 1.15:209891/VOL74; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

These data were collected and processed by the BOREAS RSS-18 team at NASA JPL. Data were acquired for BOREAS with NASA's AVIRIS. This optical sensor measures images that consist of spectra from 400 to 2500 nm at 10-nm sampling. These spectra are acquired as images with 20-meter spatial resolution, 11-km swath width and up to 800-km length. The measurements are spectrally, radiometrically, and geometrically calibrated. Spatially, the data are focused on the BOREAS NSA and SSA near Thompson, Manitoba, and Candle Lake, SASkatchewan, Canada, respectively. AVIRIS data were collected in 1994 during the Thaw campaign at the NSA and SSA, at the SSA in IFC-1, and at the NSA and SSA in both IFC-2 and IFC-3. In 1996, AVIRIS was deployed in the winter and summer campaigns in the SSA only.
Author
Data Acquisition; Infrared Spectrometers; Optical Measuring Instruments; Spatial Resolution

20000116498 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-8 1996 Gravimetric Moss Moisture Data
Fernandes, Richard, Toronto Univ., Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; July 2000; 22p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL35; Rept-2000-03136-0/VOL35; NAS 1.15:209891/VOL35; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-8 team made measurements of surface hydrological processes that were collected at the southern study area-Old Black Spruce (SSA-OBS) Tower Flux site in 1996 to support its research into point hydrological processes and the spatial variation of these processes. Data collected may be useful in characterizing canopy interception, drip, throughfall, moss interception, drainage, evaporation, and capacity during the growing season at daily temporal resolution. This particular data set contains the gravimetric moss moisture measurements from July to August 1996. to collect these data, a nested spatial sampling plan was implemented to support research into spatial variations of the measured hydrological processes and ultimately the impact of these variations on modeled carbon and water budgets. These data are stored in ASCII text files. The HYD-08 1996 gravimetric moss moisture data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Data Sampling; Spatial Distribution; Temporal Resolution; Moisture; Air Land Interactions; Forests

20000116499 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-8 Throughfall Data
Wang, Xue-Wen, Toronto Univ., Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Fernandes, Richard, Toronto Univ., Canada; July 2000; 20p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL33; Rept-2000-03136-0/VOL33; NAS 1.15:209891/VOL33; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-8 team made measurements of surface hydrological processes at the Southern Study Area (SSA) and Northern Study Area (NSA) Old Black Spruce (OBS) Tower Flux sites, sup-

porting its research into point hydrological processes and the spatial variation of these processes. These data were collected during the 1994 and 1996 field campaigns. Data collected may be useful in characterizing canopy interception, drip, throughfall, moss interception, drainage, evaporation, and capacity during the growing season at daily temporal resolution. This particular data set contains the measurements of throughfall, which is the amount of precipitation that fell through the canopy. A nested spatial sampling plan was implemented to determine spatial variations of the measured hydrological processes and ultimately the impact of these variations on modeled carbon and water budgets. These data are stored in ASCII text files.
Author
Hydrology; Spatial Distribution; Temporal Resolution; Moisture

20000116500 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-6 Aircraft Gamma Ray Soil Moisture Data
Peck, Eugene L., Hydex Corp., USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Carroll, Thomas, National Weather Service, USA; July 2000; 28p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL29; Rept-2000-03136-0/VOL29; NAS 1.15:209891/VOL29; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-6 team collected several data sets related to the moisture content of soil and overlying humus layers. This data set contains percent soil moisture (by weight) (and/or water content if there is a moss/humus layer) measured from aircraft using a terrestrial gamma ray instrument. There are also data that indicate the location of the aircraft at the time it collected the terrestrial gamma ray data for the various flight lines and bins. The location information contains a list of coordinates that indicate the path of the aircraft for each bin. The data were collected during four time periods from September 1993 to September 1994 over the southern study area (SSA) and two time periods from February to August 1994 over the northern study area (NSA). The data are available in tabular ASCII files.
Author
Hydrology; Moisture Content; Soil Moisture; Soils

20000116501 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-5 Winter Surface Flux Data
Harding, Richard, Institute of Hydrology, UK; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Huemmrich, Karl Fred, Editor, Maryland Univ., USA; July 2000; 26p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-209891/VOL28; Rept-2000-03136-0/VOL28; NAS 1.15:209891/VOL28; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The BOREAS HYD-5 team collected tower flux, surface meteorological, and surface temperature data on a frozen lake (Namekus Lake) and in a mature jack pine forest in the Beartrap Creek watershed. Both sites were located in the BOREAS SSA. The objective of this study was to characterize the winter energy and water vapor fluxes, as well as related properties (such as snow density, depth, temperature, and melt) for forested and nonforested areas of the boreal forest. Data were collected on Namekus Lake in the winters of 1994 and 1996, and at Beartrap Creek in the winter of 1994 only. The data are available in tabular ASCII files.
Author
Hydrology; Water Vapor; Meteorological Parameters; Surface Temperature; Winter

20000116502 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-3 Tree Measurements
Hardy, Janet P., Army Cold Regions Research and Engineering Lab., USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; David Robert E., Army Cold Regions Research and Engineering Lab., USA; July 2000; 24p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL25; Rept-2000-03136-0/VOL25; NAS 1.15:209891/VOL25; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The BOREAS HYD-3 team collected several data sets related to the hydrology of forested areas. This data set contains measurements of canopy density (closure), stem density, and DBH from a variety of sites. Canopy density measurements were made during the FFC-W and FFC-T 1994 in both the SSA and the NSA. Stem density measurements were made during FFC-W 1996

in the SSA only. Canopy density measurements were made using a forest densiometer, while measurements of stem density and DBH were made using standard techniques. This study was undertaken to predict spatial distributions of energy transfer, snow properties important to the hydrology, remote sensing signatures, and transmissivity of gases through the snow and their relation to forests in boreal ecosystems. The data are available in tabular ASCII files.
Author
Hydrology; Forests; Remote Sensing; Transmissivity; Gases; Snow; Ecosystems

20000116503 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-3 Subcanopy Incoming Solar Radiation Measurements
Hardy, Janet P., Army Cold Regions Research and Engineering Lab., USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Davis, Robert E., Army Cold Regions Research and Engineering Lab., USA; July 2000; 22p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL24; Rept-2000-03136-0/VOL24; NAS 1.15:209891/VOL24; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-3 team collected several data sets related to the hydrology of forested areas. This data set contains solar radiation measurements from several pyranometers (solar radiometers) placed on the snow surface in jack pine (1994) and black spruce and aspen forests (1996) in the BOREAS southern study area (SSA). An array of radiometers was used to collect data for three to four consecutive days in each forest type to study the hypothesis that energy transfer and snow water equivalent would vary spatially as a function of canopy closure. The quality of the data is good, because the days were generally clear and the radiometers were checked daily to remove anything that landed on the radiometers. The data are available in tabular ASCII files. The subcanopy incoming solar radiation measurement data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Forests; Hydrology; Snow; Air Land Interactions; Spatial Distribution; Energy Transfer; Remote Sensing; Transmissivity

20000116504 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-3 Subcanopy Meteorological Measurements
Hardy, Janet P., Army Cold Regions Research and Engineering Lab., USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Davis, Robert E., Army Cold Regions Research and Engineering Lab., USA; July 2000; 24p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL23; Rept-2000-03136-0/VOL23; NAS 1.15:209891/VOL23; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-3 team collected several data sets related to the hydrology of forested areas. This data set includes measurements of wind speed and direction; air temperature; relative humidity; and canopy, trunk, and snow surface temperatures within three forest types. The data were collected in the southern study area/Old Jack Pine (SSA-OJP) (1994), and SSA-OBS (Old Black Spruce), and SSA-OA (Old Aspen) (1996). Measurements were taken for three days in 1994 and four days at each site in 1996. These measurements were intended to be short term to allow the relationship between subcanopy measurements and those collected above the forest canopy to be determined. The subcanopy estimates of wind speed were used in a snow melt model to help predict the timing of snow ablation. The data are available in tabular ASCII files. The subcanopy meteorological measurement data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Forests; Meteorological Parameters; Snow; Air Land Interactions; Spatial Distribution; Energy Transfer; Remote Sensing; Hydrology

20000116505 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-3 Snow Measurements
Hardy, Janet P., Army Cold Regions Research and Engineering Lab., USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Davis, Robert E., Army Cold Regions Research and Engineering Lab., USA; July 2000; 30p; In English
Contract(s)/Grant(s): RTOP 462-33-01

Report No.(s): NASA/TM-2000-209891/VOL22; Rept-2000-03136-0/VOL22; NAS 1.15:209891/VOL22; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-3 team collected several data sets related to the hydrology of forested areas. This data set contains measurements of snow depth, snow density in three cm intervals, an integrated snow pack density and snow water equivalent (SWE), and snow pack physical properties from snow pit evaluation taken in 1994 and 1996. The data were collected from several sites in both the southern study area (SSA) and the northern study area (NSA). A variety of standard tools were used to measure the snow pack properties, including a meter stick (snow depth), a 100 cc snow density cutter, a dial stem thermometer, and the Canadian snow sampler as used by HYD-4 to obtain a snow pack-integrated measure of SWE. This study was undertaken to predict spatial distributions of snow properties important to the hydrology, remote sensing signatures, and the transmissivity of gases through the snow. The data are available in tabular ASCII files. The snow measurement data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

Author

Forests; Depth; Snow; Spatial Distribution; Transmissivity; Air Land Interactions; Hydrology; Remote Sensing

20000116506 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS AFM-2 King Air 1994 Aircraft Flux and Moving Window Data

Kelly, Robert D., Wyoming Univ., USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Newcomer, Jeffrey A., Editor, Raytheon Information Technology and Scientific Services, USA; June 2000; 60p; In English

Contract(s)/Grant(s): RTOP 462-33-01

Report No.(s): NASA/TM-2000-209891/VOL2; Rept-2000-03136-0/VOL2; NAS 1.15:209891/VOL2; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The BOREAS AFM-2 team collected pass-by-pass fluxes (and many other statistics) for a large number of level (constant altitude), straight-line passes used in a variety of flight patterns. The data were collected by the University of Wyoming King Air in 1994 BOREAS IFCs 1-3. Most of these data were collected at 60-70 m above ground level, but a significant number of passes were also flown at various levels in the planetary boundary layer, up to about the inversion height. This documentation concerns only the data from the straight and level passes that are presented as original (over the NSA and SSA) and moving window values (over the Transect). Another archive of King Air data is also available, containing data from all the soundings flown by the King Air 1994 IFCs 1-3. The data are stored in tabular ASCII files.

Author

Airborne Equipment; Aircraft Equipment; Meteorology; Atmospheric Physics

20000116508 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS AFM-2 Wyoming King Air 1994 Aircraft Sounding Data

Kelly, Robert D., Wyoming Univ., USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; June 2000; 26p; In English

Contract(s)/Grant(s): RTOP 462-33-01

Report No.(s): NASA/TM-2000-209891/VOL3; Rept-2000-03136/VOL3; NAS 1.15:209891/VOL3; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The BOREAS AFM-2 team used the University of Wyoming King Air aircraft during IFCs 1, 2, and 3 in 1994 to collected pass-by-pass fluxes (and many other statistics) for the large number of level (constant altitude), straight-line passes used in a variety of flight patterns over the SSA and NSA and areas along the transect between these study areas. The data described here form a second set, namely soundings that were incorporated into nearly every research flight by the King Air in 1994. These soundings generally went from near the surface to above the inversion layer. Most were flown immediately after takeoff or immediately after finishing the last flux pattern of that particular day's flights. The parameters that were measured include wind direction, wind speed, west wind component (u), south wind component (v), static pressure, air dry bulb temperature, potential temperature, dew-point, temperature, water vapor mixing ratio, and CO2 concentration. Data on the aircraft's location, attitude, and altitude during data collection are also provided. These data are stored in tabular ASCH files.

Author

Airborne Equipment; Aircraft Equipment; Meteorology; Meteorological Instruments; Rocket Sounding; Sounding Rockets

20000116515 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS RSS-11 Ground Network of Sunphotometer Measurements

Markham, Brian L., NASA Goddard Space Flight Center, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Nickerson, Jaime, Editor, Raytheon Information Technology and Scientific Services, USA; Schafer, Joel, Raytheon Information Technology and Scientific Services, USA; August 2000; 30p; In English

Contract(s)/Grant(s): RTOP 462-33-01

Report No.(s): NASA/TM-2000-209891/VOL58; Rept-2000-03136-0/VOL58; NAS 1.15:209891/VOL58; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The BOREAS RSS-11 team operated a network of five automated (Cimel) and two hand-held (Miami) solar radiometers from 1994 to 1996 during the BOREAS field campaigns. The data provide aerosol optical depth measurements, size distribution, phase function, and column water vapor amounts over points in northern SASkatchewan and Manitoba, Canada. The data are useful for the correction of remotely sensed aircraft and satellite images. The data are provided in tabular ASCII files.

Author

Networks; Water Vapor; Size Distribution; Remote Sensing; Photometers; Distribution Functions; Depth Measurement

20000116516 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS HYD-9 Tipping Bucket Rain Gauge Data

Kouwen, Nick, Waterloo Univ., Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Soulis, Ric, Waterloo Univ., Canada; Jenkinson, Wayne, Waterloo Univ., Canada; Graham, Allyson, Waterloo Univ., Canada; Neff, Todd, Waterloo Univ., Canada; July 2000; 24p; In English

Contract(s)/Grant(s): RTOP 462-33-01

Report No.(s): NASA/TM-2000-209891/VOL39; Rept-2000-03136-0/VOL39; NAS 1.15:209891/VOL39; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The BOREAS HYD-9 team collected several data sets containing precipitation and strearnflow measurements over the BOREAS study areas. This data set contains the measurements from the tipping bucket rain gauges at the BOREAS NSA and SSA. These measurements were submitted in 15-minute and 1-hour intervals. Only the 15-minute interval data set was loaded into the data base tables. Data were collected from the tipping bucket gauges from mid-April until mid-October in 1994, 1995, and 1996. The data are available in tabular ASCII files.

Author

Measuring Instruments; Data Acquisition; Rain

20000116517 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS HYD-8 DEM Data Over the NSA-MSA and SSA-MSA in the UTM Projection

Wang, Xue-Wen, Toronto Univ., Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Band, L. E., Toronto Univ., Canada; July 2000; 16p; In English

Contract(s)/Grant(s): RTOP 462-33-01

Report No.(s): NASA/TM-2000-209891/VOL36; Rept-2000-03136-0/VOL36; NAS 1.15:209891/VOL36; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The BOREAS HYD-8 team focused on describing the scaling behavior of water and carbon flux processes at local and regional scales. These DEMs were produced from digitized contours at a cell resolution of 100 meters. Vector contours of the area were used as input to a software package that interpolates between contours to create a DEM representing the terrain surface. The vector contours had a contour interval of 25 feet. The data cover the BOREAS MSAs of the SSA and NSA and are given in a UTM map projection. Most of the elevation data from which the DEM was produced were collected in the 1970s or 1980s. The data are stored in binary, image format files.

Author

Hydrology; Ecosystems; Atmospheric Physics

20000116577 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS AFM-1 NOAA/ATDD Long-EZ Aircraft Flux data Over the SSA

Crawford, Timothy L., National Oceanic and Atmospheric Administration, USA; Baldocchi, Dennis, National Oceanic and Atmospheric Administration, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Gunter, Laureen, National Oceanic and Atmospheric Adminis-

tration, USA; Dumas, Ed, National Oceanic and Atmospheric Administration, USA; June 2000; 56p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL1; Rept-2000-03136-0/VOL1; NAS 1.15:209891/VOL1; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This data set contains measurements from the Airborne Flux and Meteorology (AFM)-1 National Oceanographic and Atmospheric Administration/Atmospheric Turbulence and Diffusion Division (NOAA/ATDD) Long-EZ Aircraft collected during the 1994 Intensive Field Campaigns (IFCs) at the southern study area (SSA). These measurements were made from various instruments mounted on the aircraft. The data that were collected include aircraft altitude, wind direction, wind speed, air temperature, potential temperature, water mixing ratio, U and V components of wind velocity, static pressure, surface radiative temperature, downwelling and upwelling total radiation, downwelling and upwelling longwave radiation, net radiation, downwelling and upwelling photosynthectically active radiation (PAR), greenness index, CO2 concentration, O3 concentration, and CH4 concentration. There are also various columns that indicate the standard deviation, skewness, kurtosis, and trend of some of these data. The data are stored in tabular ASCII files. The NOAA/ATDD Long-EZ aircraft flux data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Latent Heat; Heat Flux; Carbon Dioxide Concentration; Ozone; Meteorological Parameters; Water Vapor; Forests; Land Surface Temperature; Air Land Interactions; Atmospheric Temperature

20000116578 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS AFM-03-NCAR Electra 1994 Aircraft Sounding Data
Lenschow, Donald H., National Center for Atmospheric Research, USA; Oncley, Steven P., National Center for Atmospheric Research, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; June 2000; 28p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL5; Rept-2000-03136-0/VOL5; NAS 1.15:209891/VOL5; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Airborne Fluxes and Meteorology (AFM)-3 team used the National Center for Atmospheric Research's (NCAR) Electra aircraft to make sounding measurements to study the planetary boundary layer using in situ and remote-sensing measurements. Measurements were made of wind speed and direction, air pressure and temperature, potential temperature, dewpoint, mixing ratio of H, O, CO, concentration, and ozone concentration. Twenty-five research missions were flown over the Northern Study Area (NSA), Southern Study Area (SSA), and the transect during BOREAS Intensive Field Campaigns (IFCs) 1, 2, and 3 during 1994. All missions had from four to ten soundings through the top of the planetary boundary layer. This sounding data set contains all of the in situ vertical profiles through the boundary layer top that were made (with the exception of 'porpoise' maneuvers). Data were recorded in one-second time intervals. These data are stored in tabular ASCII files. The NCAR Electra 1994 aircraft sounding data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Planetary Boundary Layer; Forests; Air Land Interactions; Meteorological Parameters; Vertical Distribution

20000116579 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS AFM-04 Twin Otter Aircraft Flux Data
MacPherson, J. Ian, National Research Council of Canada, Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Desjardins, Raymond L., Agriculture Canada, Canada; June 2000; 66p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL6; Rept-2000-03136-0/VOL6; NAS 1.15:209891/VOL6; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The BOREAS AFM-5 team collected and processed data from the numerous radiosonde flights during the project. The goals of the AFM-05 team were to provide large-scale definition of the atmosphere by supplementing the existing AES aerological network, both temporally and spatially. This data set includes basic upper-air parameters collected from the network of upper-air

stations during the 1993, 1994, and 1996 field campaigns over the entire study region. The data are contained in tabular ASCII files.
Author
Data Acquisition; Data Processing; Radiosondes; Meteorological Instruments; Atmospheric Physics

20000116580 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS AFM-04 Twin Otter Aircraft Sounding Data
MacPherson, J. Ian, National Academy of Sciences - National Research Council, USA; Desjardins, Raymond L., Centre for Land and Biological Resources Research, Agriculture, Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, NASA Goddard Space Flight Center, USA; June 2000; 40p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL7; NAS 1.15:209891/VOL7; Rept-2000-03136-0/VOL7; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Airborne Fluxes and Meteorology (AFM)-4 team used the National Research Council, Canada (NRC) Twin Otter aircraft to make sounding measurements through the boundary layer. These measurements included concentrations of carbon dioxide and ozone, atmospheric pressure, dry bulb temperature, potential temperature, dewpoint temperature, calculated mixing ratio, and wind speed and direction. Aircraft position, heading, and altitude were also recorded. Data were collected at both the Northern Study Area (NSA) and the Southern Study Area (SSA) in 1994 and 1996. These data are stored in tabular ASCII files. The Twin Otter aircraft sounding data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Boundary Layers; Meteorological Parameters; Forests; Air Land Interactions

20000116581 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS AFM-06 Mean Temperature Profile Data
Wilczak, James, National Oceanic and Atmospheric Administration, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Newcomer, Jeffrey A., Editor, Raytheon Information Technology and Scientific Services, USA; June 2000; 22p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL13; Rept-2000-03136-0/VOL13; NAS 1.15:209891/VOL13; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Airborne Fluxes and Meteorology (AFM)-6 team from the National Oceanic and Atmospheric Adminsitration/Environment Technology Laboratory (NOAA/ETL) operated a 915-MHz wind/Radio Acoustic Sounding System (RASS) profiler system in the Southern Study Area (SSA) near the Old Jack Pine (OJP) tower from 21 May 1994 to 20 Sep 1994. The data set provides temperature profiles at 15 heights, containing the variables of virtual temperature, vertical velocity, the speed of sound, and w-bar. The data are stored in tabular ASCII files. The mean temperature profile data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Temperature Profiles; Forests; Air Land Interactions; Atmospheric Boundary Layer; Troposphere

20000116582 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS AFM-07 SRC Surface Meteorological Data
Osborne, Heather, SASkatchewan Research Council, Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Newcomer, Jeffrey A., Editor, Raytheon Information Technology and Scientific Services, USA; Young, Kim, SASkatchewan Research Council, Canada; Wittrock, Virginia, SASkatchewan Research Council, Canada; Shewchuck, Stan, SASkatchewan Research Council, Canada; June 2000; 82p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL15; Rept-2000-03136-0/VOL15; NAS 1.15:209891/VOL15; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The SASkatchewan Research Council (SRC) collected surface meteorological and radiation data from December 1993 until December 1996. The data set comprises Suite A (meteorological and energy balance measurements) and Suite B (diffuse solar and longwave measurements) components. Suite A measurements were taken at each of ten sites, and Suite B measurements were made at five of the Suite A sites. The data cover an approximate area of 500 km (North-South) by 1000 km (East-West) (a large

portion of northern Manitoba and northern SASkatchewan). The measurement network was designed to provide researchers with a sufficient record of near-surface meteorological and radiation measurements. The data are provided in tabular ASCII files, and were collected by Aircraft Flux and Meteorology (AFM)-7. The surface meteorological and radiation data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Energy Budgets; Meteorological Parameters; Forests; Air Land Interactions

20000116613 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS AFM-3 NCAR Electra 1994 Aircraft Flux and Moving Window Data
Lenschow, Donald H., National Center for Atmospheric Research, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Shanot, Al, National Center for Atmospheric Research, USA; Oncley, Steven P., National Center for Atmospheric Research, USA; Cooper, Al, National Center for Atmospheric Research, USA; June 2000; 60p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-209891/VOL4; Rept-2000-03136-0/VOL4; NAS 1.15:209891/VOL4; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The BOREAS AFM-3 team used the NCAR Electra aircraft data to make measurements of the fluxes of momentum, sensible and latent heat, carbon dioxide, and ozone over the entire BOREAS region to tie together measurements made in both the SSA and the NSA in 1994. These data were also used to study the planetary boundary layer using both in situ and remote sensing measurements. This data set contains both the aircraft flux and the moving window data. These data are stored in tabular ASCII files.
Author
Electra Aircraft; Aircraft Equipment; Airborne Equipment; Measuring Instruments; Meteorological Instruments; Remote Sensing

20000116614 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS AFM-06 Mean Wind Profile Data
Wilczak, James, National Oceanic and Atmospheric Administration, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Newcomer, Jeffrey A., Editor, Raytheon Information Technology and Scientific Services, USA; June 2000; 22p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL14; Rept-2000-03136-0/VOL14; NAS 1.15:209891/VOL14; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Airborne Fluxes and Meteorology (AFM)-6 team from the National Oceanic and Atmospheric Administration/Environment Technology Laboratory (NOAA/ETL) operated a 915-MHz wind/Radio Acoustic Sounding System (RASS) profiler system in the Southern Study Area (SSA) near the Old Jack Pine (OJP) tower from 21 May 1994 to 20 Sep 1994. The data set provides wind profiles at 38 heights, containing the variables of wind speed; wind direction; and the u-, v-, and w-components of the total wind. The data are stored in tabular ASCII files. The mean wind profile data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Wind Direction; Wind Profiles; Wind Velocity; Forests; Air Land Interactions

20000116620 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS AFM-12 1-km AVHRR Seasonal Land Cover Classification
Steyaert, Lou, EROS Data Center, USA; Hall, Forrest G., NASA Goddard Space Flight Center, USA; Newcomer, Jeffrey A., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Loveland, Thomas R., EROS Data Center, USA; June 2000; 26p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL17; Rept-2000-03136-0/VOL17; NAS 1.15:209891/VOL17; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Airborne Fluxes and Meteorology (AFM)-12 team's efforts focused on regional scale Surface Vegetation and Atmosphere (SVAT) modeling to improve parameterization of the heterogeneous BOREAS landscape for use in larger scale Global Circulation Models (GCMs). This regional land cover data set was developed

as part of a multitemporal one-kilometer Advanced Very High Resolution Radiometer (AVHRR) land cover analysis approach that was used as the basis for regional land cover mapping, fire disturbance-regeneration, and multiresolution land cover scaling studies in the boreal forest ecosystem of central Canada. This land cover classification was derived by using regional field observations from ground and low-level aircraft transits to analyze spectral-temporal clusters that were derived from an unsupervised cluster analysis of monthly Normalized Difference Vegetation Index (NDVI) image composites (April-September 1992). This regional data set was developed for use by BOREAS investigators, especially those involved in simulation modeling, remote sensing algorithm development, and aircraft flux studies. Based on regional field data verification, this multitemporal one-kilometer AVHRR land cover mapping approach was effective in characterizing the biome-level land cover structure, embedded spatially heterogeneous landscape patterns, and other types of key land cover information of interest to BOREAS modelers.The land cover mosaics in this classification include: (1) wet conifer mosaic (low, medium, and high tree stand density), (2) mixed coniferous-deciduous forest (80% coniferous, codominant, and 80% deciduous), (3) recent visible bum, vegetation regeneration, or rock outcrops-bare ground-sparsely vegetated slow regeneration bum (four classes), (4) open water and grassland marshes, and (5) general agricultural land use/ grasslands (three classes). This land cover mapping approach did not detect small subpixel-scale landscape features such as fens, bogs, and small water bodies. Field observations and comparisons with LANDSAT Thematic Mapper (TM) suggest a minimum effective resolution of these land cover classes in the range of three to four kilometers, in part, because of the daily to monthly compositing process. In general, potential accuracy limitations are mitigated by the use of conservative parameterization rules such as aggregation of predominant land cover classes within minimum horizontal grid cell sizes of ten kilometers. The AFM-12 one-kilometer AVHRR seasonal land cover classification data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Classifications; Forests; Mapping; Topography; Vegetation; Air Land Interactions

20000116621 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-1 Under-Canopy Precipitation Data
Cuenca, Richard H., Oregon State Univ., USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Kelly, Shaun, Oregon State Univ., USA; Stangel, David E., Oregon State Univ., USA; July 2000; 22p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL18; Rept-2000-03136-0/Vol18; NAS 1.15:209891/VOL18; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Under-canopy precipitation measurements were made by the BOREAS HYD-1 science team in 1994, 1995, and 1996 at various flux tower sites in the NSA and SSA. In 1994, these data were collected at the NSA-OJP, NSA-YJP, SSA-OJP, and SSA-YJP sites. Starting in 1995 and ending in 1997, data were collected at the NSA-OBS, NSA-OJP, NSA-YJP, and SSA-OA. These data were collected to support HYD-01 research by measuring the amount of water that falls through the canopy and is intercepted by the ground or moss. These data coincide with volumetric soil moisture measurements made by HYD-01. The data are stored in tabular ASCII files.
Author
Data Acquisition; Rain; Measure and Integration

20000116622 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-4 Areal Snow Course Data
Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Metcalfe, John R., Atmospheric Environment Service, Canada; Goodison, Barry E., Atmospheric Environment Service, Canada; Walker, Anne, Atmospheric Environment Service, Canada; July 2000; 22p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL26; Rept-2000-03136-0/VOL26; NAS 1.15:209891/VOL26; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-4 team focused on collecting data during the 1994 winter focused field campaign (FFCW) to improve the understanding of winter processes within the boreal forest. Knowledge of snow cover and its variability in the boreal forest is fundamental if BOREAS is to achieve its goals of understanding the processes and states involved in the exchange of energy and water. The development and validation of remote sensing algorithms will provide the means to extend the knowledge of these processes and states from the local to the regional scale. A specific thrust of the hydrology research is the development and validation of snow cover algorithms from airborne passive microwave measurements. Airborne remote sensing data (gamma, passive microwave) were acquired along a series of flight lines established in the

vicinity of the BOREAS study areas. Ground snow surveys were conducted along selected sections of these aircraft flight lines. These calibration segments were typically 10-20 km in length, and ground data were collected at one to two kilometer intervals. The data are provided in tabular ASCII files. The HYD-04 areal snow course data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Forests; Ground Tests; Hydrology; Snow; Snow Cover; Air Land Interactions

20000116623 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-4 Standard Snow Course Data
Metcalfe, John R., Atmospheric Environment Service, Canada; Goodison, Barry E., Atmospheric Environment Service, Canada; Walker, Anne, Atmospheric Environment Service, Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, NASA Goddard Space Flight Center, USA; July 2000; 20p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL27; Rept-2000-03136-0/VOL27; NAS 1.15:209891/VOL27; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-4 work was focused on collecting data during the winter focused field campaign (FFC-W) to improve the understanding of winter processes within the boreal forest. Knowledge of snow cover and its variability in the boreal forest is fundamental if BOREAS is to achieve its goals of understanding the processes and states involved in the exchange of energy and water. The development and validation of remote sensing algorithms will provide the means to extend the knowledge of these processes and states from the local to the regional scale. A specific thrust of the research is the development and validation of snow cover algorithms from airborne passive microwave measurements. Snow surveys were conducted at special snow courses throughout the 1993/94, 1994/95, 1995/96, and 1996/97 winter seasons. These snow courses were located in different boreal forest land cover types (i.e., old aspen, old black spruce, young jack pine, forest clearing, etc.) to document snow cover variations throughout the season as a function of different land cover. Measurements of snow depth, density, and water equivalent were acquired on or near the first and fifteenth of each month during the snow cover season. The data are provided in tabular ASCII files. The HYD-4 standard snow course data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Air Land Interactions; Forests; Time Series Analysis; Snow; Snow Cover; Depth; Data Acquisition

20000116624 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-6 Ground Gravimetric Soil Moisture Data
Carroll, Thomas, National Weather Service, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Peck, Eugene L., Hydex Corp., USA; July 2000; 24p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL31; Rept-2000-03136-0/VOL31; NAS 1.15:209891/VOL31; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-6 team collected several data sets related to the moisture content of soil and overlying humus layers. This data set contains percent soil moisture ground measurements. These data were collected on the ground along the various flight lines flown in the Southern Study Area (SSA) and Northern Study Area (NSA) during 1994 by the gamma ray instrument. The data are available in tabular ASCII files. The HYD-06 ground gravimetric soil moisture data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Soil Moisture; Moisture Content; Forests; Air Land Interactions

20000116625 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-8 Gross Precipitation Data
Fernandes, Richard, Toronto Univ., Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; July 2000; 18p; In English
Report No.(s): NASA/TM-2000-209891/VOL32; Rept-2000-03136-0/VOL32; NAS 1.15:209891/VOL32; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-08 team made measurements of surface hydrological processes at the Southern Study Area-Old Black Spruce (SSA-OBS) Tower Flux site to support its research into point hydrological processes and the spatial variation of these processes. Data collected may be useful in characterizing canopy interception, drip, throughfall, moss interception, drainage, evaporation, and capacity during the growing season at daily temporal resolution. This particular data set contains the gross precipitation measurements for July to August 1996. Gross precipitation is the precipitation that falls that is not intercepted by tree canopies. These data are stored in ASCII text files. The HYD-08 gross precipitation data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Hydrology; Spatial Distribution; Forests; Air Land Interactions; Precipitation (Meteorology)

20000116626 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-8 1994 Gravimetric Moss Moisture Data
Wang, Xuewen, Toronto Univ., Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; July 2000; 20p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL34; Rept-2000-03136-0/VOL34; NAS 1.15:209891/VOL34; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-8 team made measurements of surface hydrological processes that were collected at the Northern Study Area-Old Black Spruce (NSA-OBS) Tower Flux site in 1994 and at Joey Lake, Manitoba, to support its research into point hydrological processes and the spatial variation of these processes. The data collected may be useful in characterizing canopy interception, drip, throughfall, moss interception, drainage, evaporation, and capacity during the growing season at daily temporal resolution. This particular data set contains the gravimetric moss moisture measurements from June to September 1994. A nested spatial sampling plan was implemented to support research into spatial variations of the measured hydrological processes and ultimately the impact of these variations on modeled carbon and water budgets. These data are stored in tabular ASCII files. The HYD-08 1994 gravimetric moss moisture data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Forests; Air Land Interactions; Gravimetry; Moisture; Spatial Distribution; Hydrology; Bryophytes

20000116634 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYP-8 DEM Data Over The NSA-MSA and SSA-MSA in The AEAC Projection
Knapp, David E., Raytheon Information Technology and Scientific Services, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Wang, Xue-Wen, Toronto Univ., Canada; Band, L. E., Toronto Univ., Canada; July 2000; 18p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL37; Rept-2000-03136-0/VOL37; NAS 1.15:209891/VOL37; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

These data were derived from the original Digital Elevation Models (DEMs) produced by the Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-8 team. The original DEMs were in the Universal Transverse Mercator (UTM) projection, while this product is projected in the Albers Equal-Area Conic (AEAC) projection. The pixel size of the data is 100 meters, which is appropriate for the 1:50,000-scale contours from which the DEMs were made. The original data were compiled from information available in the 1970s and 1980s. This data set covers the two Modeling Sub-Areas (MSAs) that are contained within the Southern Study Area (SSA) and the Northern Study Area (NSA). The data are stored in binary, image format files. The DEM data over the NSA-MSA and SSA-MSA in the AEAC projection are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Forests; Air Land Interactions; Data Acquisition; Topography; Elevation

20000116635 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-9 Belfort Rain Gauge Data
Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Kouwen, Nick, Waterloo Univ., Canada; Soulis, Ric, Waterloo Univ., Canada; Jenkinson, Wayne, Waterloo Univ., Canada; Graham, Allyson, Waterloo Univ., Canada; Knapp, David E., Editor,

Raytheon Information Technology and Scientific Services, USA; July 2000; 22p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL38; Rept-2000-03136-0/VOL38; NAS 1.15:209891/VOL38; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-6 team collected several data sets related to the moisture content of soil and overlying humus layers. This data set contains water content measurements of the moss/humus layer, where it existed. These data were collected along various flight lines in the Southern Study Area (SSA) and Northern Study Area (NSA) during 1994. The data are available in tabular ASCII files. The HYD-9 Belfort rain gauge data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Moisture Content; Rain Gages; Forests; Air Land Interactions; Soil Moisture; Soil Sampling

20000116639 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-9 Streamflow Data
Hall, Forrest G., Editor, Raytheon Information Technology and Scientific Services, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Kouwen, Nick, Waterloo Univ., Canada; Soulis, Ric, Waterloo Univ., Canada; Jenkinson, Wayne, Waterloo Univ., Canada; Graham, Allyson, Waterloo Univ., Canada; Neff, Todd, Waterloo Univ., Canada; July 2000; 22p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL40; Rept-2000-03136-0/VOL40; NAS 1.15:209891/VOL40; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-9 team collected several data sets containing precipitation and streamflow measurements over the BOREAS study areas. These streamflow data were collected by the HYD-09 science team to support its research into meltwater supply to the soil during the spring melt period. These data were also collected for HYD-09's research into the evolution of soil moisture, evaporation, and runoff from the end of the snowmelt period through freeze up. Data were collected in the BOREAS Southern Study Area (SSA) and Northern Study Area (NSA) from April until October in 1994, 1995, and 1996. Gauges southwest-1 and northwest-1 were operated year-round; however, data may not be available for both gauges for all three years. The data are available in tabular ASCII files. The HYD-09 streamflow data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Soil Moisture; Forests; Air Land Interactions; Spatial Distribution; Temporal Distribution; Snow; Melting

20000116640 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-9 Hourly and Daily Rainfall Maps for the Southern Study Area
Eley, F. Joe, Atmospheric Environment Service, Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Krauss, Terry S., Weather Modification, Inc., Canada; July 2000; 22p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL41; Rept-2000-03136-0/VOL41; NAS 1.15:03136-0/VOL41; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-9 team collected data on precipitation and streamflow over portions of the Northern Study Area (NSA) and Southern Study Area (SSA). This data set contains Cartesian maps of rain accumulation for one-hour and daily periods during the summer of 1994 over the SSA only (not the full view of the radar). A parallel set of one-hour maps for the whole radar view has been prepared and is available upon request from the HYD-09 personnel. An incidental benefit of the areal selection was the elimination of some of the less accurate data, because for various reasons the radar rain estimates degrade considerably outside a range of about 100 km. The data are available in tabular ASCII files. The HYD-09 hourly and daily radar rainfall maps for the SSA are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Rain; Forests; Air Land Interactions

20000116641 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS RSS-17 1994 ERS-1 Level-3 Freeze/Thaw Backscatter Change Images

Rignot, Eric, Jet Propulsion Lab., California Inst. of Tech., USA; Nickeson, Jaime, Editor, Raytheon Information Technology and Scientific Services, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Way, JoBea, Jet Propulsion Lab., California Inst. of Tech., USA; McDonald, Kyle C., Jet Propulsion Lab., California Inst. of Tech., USA; August 2000; 22p; In English

Contract(s)/Grant(s): RTOP 923-462-33-01

Report No.(s): NASA/TM-2000-209891/VOL73; Rept-2000-03136-0/VOL73; NAS 1.15:209891/VOL73; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Remote Sensing Science (RSS)-17 team acquired and analyzed imaging radar data from the European Space Agency's (ESA's) European Remote Sensing Satellite (ERS)-1 over a complete annual cycle at the BOREAS sites in Canada in 1994 to detect shifts in radar backscatter related to varying environmental conditions. Two independent transitions corresponding to soil thaw and possible canopy thaw were revealed by the data. The results demonstrated that radar provides an ability to observe thaw transitions at the beginning of the growing season, which in turn helps constrain the length of the growing season. The data set presented here includes change maps derived from radar backscatter images that were mosaicked together to cover the southern BOREAS sites. The image values used for calculating the changes are given relative to the reference mosaic image. The data are stored in binary image format files. The imaging radar data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

Author

Backscattering; Forests; Air Land Interactions; Imaging Techniques; Imaging Radar; Melting

20000116642 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS RSS-20 POLDER Radiance Images From the NASA C-130

Leroy, M., Centre d'Etudes Spatiales de la Biosphere, France; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Nickeson, Jaime, Editor, Raytheon Information Technology and Scientific Services, USA; August 2000; 20p; In English

Contract(s)/Grant(s): RTOP 462-33-01

Report No.(s): NASA/TM-2000-209891/VOL80; Rept-2000-03136-0/VOL80; NAS 1.15:209891/VOL80; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

These Boreal Ecosystem-Atmosphere Study (BOREAS) Remote Sensing Science (RSS)-20 data are a subset of images collected by the Polarization and Directionality of Earth's Reflectance (POLDER) instrument over tower sites in the BOREAS study areas during the intensive field campaigns (IFCs) in 1994. The POLDER images presented here from the NASA ARC C-130 aircraft are made available for illustration purposes only. The data are stored in binary image-format files. The POLDER radiance images are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

Author

Radiance; Forests; Air Land Interactions; Bidirectional Reflectance

20000117669 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS AFM-5 Level-1 Upper Air Network Data

Barr, Alan, Atmospheric Environment Service, Canada; Hrynkiw, Charmaine, Atmospheric Environment Service, Canada; Newcomer, Jeffrey A., Editor, Raytheon Information Technology and Scientific Services, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; June 2000; 50p; In English

Contract(s)/Grant(s): RTOP 923-462-33-01

Report No.(s): NASA/TM-2000-209891/VOL8; Rept-2000-03136-0/VOL8; NAS 1.15:209891/VOL8; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Airborne Fluxes and Meteorology (AFM)-5 team collected and processed data from the numerous radiosonde flights during the project. The goals of the AFM-05 team were to provide large-scale definition of the atmosphere by supplementing the existing Atmospheric Environment Service (AES) aerological network, both temporally and spatially. This data set includes basic upper-air parameters collected from the network of upper-air stations during the 1993, 1994, and 1996 field campaigns over the entire study region. The data are contained in tabular ASCII files. The level-1

upper-air network data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Upper Atmosphere; Forests; Air Land Interactions; Atmospheric Models

20000117682 NASA Goddard Space Flight Center, Greenbelt, MD USA
Technical Report Series on the Boreal Ecosystem-Atmosphere Study (BOREAS) RSS-19 1994 CASI At-Sensor Radiance and Reflectance Images
Miller, John, York Univ., Canada; Freemantle, Jim, Center for Research in Earth and Space Technology, Canada; Nickeson, Jaime, Editor, Raytheon Information Technology and Scientific Services, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; August 2000; 36p
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL75; Rept-2000-03136-0/VOL75; NAS 1.15:209891/VOL75; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Remote Sensing Science (RSS)-19 team collected Compact Airborne Spectrographic Imager (CASI) images from the Chieftain Navaho aircraft in order to observe the seasonal change in the radiometric reflectance properties of the boreal forest landscape. CASI was deployed as a site-specific optical sensor during Boreal Ecosystem-Atmosphere Study (BOREAS) field campaigns. Image data were collected with CASI on 36 days during five field campaigns between February and September 1994, primarily at flux tower sites located at study sites near Thompson, Manitoba, and Prince Albert, SASkatchewan. A variety of CASI data collection strategies were used to meet the following scientific objectives: 1) canopy bidirectional reflectance, 2) canopy biochemistry, 3) spatial variability, and 4) estimates of up and downwelling Photosynthetically Active Radiation (PAR) and spectral albedo, as well as changes along transects across lakes and transects the Northern Study Area (NSA) and Southern Study Area (SSA). The images are stored as binary image files. A subset of the 1994 CASI acquisitions have been compressed and included on the BOREAS CD-ROM set. This subset includes three images for the NSA-OBS (Old Black Spruce) site on 06 Jun 94, 08 Aug 94, and 06 Sep 94, one image for the SSA-OBS site on 24 Jul 94; and one image for the NSA-Fen site on 08 Aug 94. The CASI imagery on the BOREAS CD-ROMs have been compressed using the Gzip program. The rest of the 1994 BOREAS CASI archive are not contained on the BOREAS CD-ROM set. Inventory listing files are supplied on the CD-ROM to inform users of the data that were collected. The RSS-19 1994 CASI images are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Data Acquisition; Forests; Radiance; Air Land Interactions; Canopies (Vegetation); Bidirectional Reflectance

20000117683 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS RSS-17 Xylem Flux Density Measurements at the SSA-OBS Site
Zimmerman, Reiner, Bayreuth Univ., Germany; Way, JoBea, Jet Propulsion Lab., California Inst. of Tech., USA; McDonald, Kyle, Jet Propulsion Lab., California Inst. of Tech., USA; Nickeson, Jaime, Editor, Raytheon Information Technology and Scientific Services, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; August 2000; 26p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL72; Rept-2000-03136-0/VOL72; NAS 1.15:209891/VOL72; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

As part of its efforts to determine environmental and phenological states from radar imagery, the Boreal Ecosystem-Atmosphere Study (BOREAS) Remote Sensing Science (RSS)-17 team collected in situ tree xylem flow measurements for one growing season on five Picea mariana (black spruce) trees. The data were collected to obtain information on the temporal and spatial variability in water uptake by trees in the Southern Study Area-Old Black Spruce (SSA-OBS) stand in the BOREAS SSA. Temporally, the data were collected in 30-minute intervals for 120 days from 31 May 1994 until 27 September 1994. The data are stored in tabular ASCII files. The xylem flux data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Density Measurement; Flow Measurement; Flux Density; Radar Imagery; Forests; Air Land Interactions; Water Consumption

20000117684 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS RSS-10 TOMS Circumpolar One-Degree PAR Images

Dye, Dennis G., Boston Univ., USA; Holben, Brent, NASA Goddard Space Flight Center, USA; Nickeson, Jaime, Editor, Raytheon Information Technology and Scientific Services, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; August 2000; 28p; In English

Contract(s)/Grant(s): RTOP 923-462-33-01

Report No.(s): NASA/TM-2000-209891/VOL57; Rept-2000-03136-0/VOL57; NAS 1.15:209891/VOL57; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Remote Sensing Science (RSS)-10 team investigated the magnitude of daily, seasonal, and yearly variations of Photosynthetically Active Radiation (PAR) from ground and satellite observations. This data set contains satellite estimates of surface-incident PAR (400-700 nm, MJ/sq m) at one-degree spatial resolution. The spatial coverage is circumpolar from latitudes of 41 to 66 degrees north. The temporal coverage is from May through September for years 1979 through 1989. Eleven-year statistics are also provided: (1) mean, (2) standard deviation, and (3) coefficient of variation for 1979-89. The PAR estimates were derived from the global gridded ultraviolet reflectivity data product (average of 360, 380 nm) from the Nimbus-7 Total Ozone Mapping Spectrometer (TOMS). Image mask data are provided for identifying the boreal forest zone, and ocean/land and snow/ice-covered areas. The data are available as binary image format data files. The PAR data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

Author

Diurnal Variations; Forests; Air Land Interactions; Spatial Distribution; Atmospheric Radiation

20000117688 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS RSS-8 Snow Maps Derived from LANDSAT TM Imagery

Hall, Dorothy, NASA Goddard Space Flight Center, USA; Chang, Alfred T. C., NASA Goddard Space Flight Center, USA; Foster, James L., NASA Goddard Space Flight Center, USA; Chien, Janeet Y. L., General Sciences Corp., USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Nickeson, Jaime, Editor, Raytheon Information Technology and Scientific Services, USA; August 2000; 20p; In English

Contract(s)/Grant(s): RTOP 923-462-33-01

Report No.(s): NASA/TM-2000-209891/VOL56; Rept-2000-03136-0/VOL56; NAS 1.15:209891/VOL56; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Remote Sensing Science (RSS)-8 team utilized LANDSAT Thematic Mapper (TM) images to perform mapping of snow extent over the Southern Study Area (SSA). This data set consists of two LANDSAT TM images that were used to determine the snow-covered pixels over the BOREAS SSA on 18 Jan 1993 and on 06 Feb 1994. The data are stored in binary image format files. The RSS-08 snow map data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

Author

Snow; Forests; Mapping; Air Land Interactions; Snow Cover

20000117689 NASA Goddard Space Flight Center, Greenbelt, MD USA

BOREAS HYD-2 Estimated Snow Water Equivalent (SWE) from Microwave Measurements

Powell, Hugh, NASA Goddard Space Flight Center, USA; Chang, Alfred T. C., NASA Goddard Space Flight Center, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; July 2000; 24p; In English

Contract(s)/Grant(s): RTOP 923-462-33-01

Report No.(s): NASA/TM-2000-209891/VOL21; Rept-2000-03136-0/VOL21; NAS 1.15:209891/VOL21; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The surface meteorological data collected at the Boreal Ecosystem-Atmosphere Study (BOREAS) tower and ancillary sites are being used as inputs to an energy balance model to monitor the amount of snow storage in the boreal forest region. The BOREAS Hydrology (HYD)-2 team used Snow Water Equivalent (SWE) derived from an energy balance model and in situ observed SWE to compare the SWE inferred from airborne and spaceborne microwave data, and to assess the accuracy of microwave retrieval algorithms. The major external measurements that are needed are snowpack temperature profiles, in situ snow areal extent, and SWE data. The data in this data set were collected during February 1994 and cover portions of the Southern Study Area (SSA), Northern Study Area (NSA), and the transect areas. The data are available from BORIS as comma-delimited tabular

ASCII files. The SWE data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Meteorological Parameters; Snow; Snow Cover; Temperature Profiles; Water; Forests; Air Land Interactions

20000117690 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-1 Soil Hydraulic Properties
Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; Kelly, Shaun F., Oregon State Univ., USA; Stangel, David E., Oregon State Univ., USA; July 2000; 26p; In English
Report No.(s): NASA/TM-2000-209891/VOL20; Rept-2000-03136-0/VOL20; NAS 1.15:209891/VOL20; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-1 team coordinated a program of data collection to measure and monitor soil properties in collaboration with other science team measurement needs. This data set contains soil hydraulic properties determined at the Northern Study Area (NSA) and Southern Study Area (SSA) flux tower sites based on analysis of in situ tension infiltrometer tests and laboratory-determined water retention from soil cores collected during the 1994-95 field campaigns. Results from this analysis are saturated hydraulic conductivity, and fitting parameters for the van Genuchten-Mualem soil hydraulic conductivity and water retention function at flux tower sites. The data are contained in tabular ASCII files. The HYD-01 soil hydraulic properties data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Data Acquisition; Forests; Air Land Interactions; Soil Science; Atmospheric Models

20000117691 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS HYD-1 Volumetric Soil Moisture Data
Cuenca, Richard H., Oregon State Univ., USA; Kelly, Shaun F., Oregon State Univ., USA; Stangel, David E., Oregon State Univ., USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Knapp, David E., Editor, Raytheon Information Technology and Scientific Services, USA; July 2000; 32p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL19; Rept-2000-03136-0/VOL19; NAS 1.15:209891/VOL19; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Hydrology (HYD)-1 team made measurements of volumetric soil moisture at the Southern Study Area (SSA) and Northern Study Area (NSA) tower flux sites in 1994 and at selected tower flux sites in 1995-97. Different methods were used to collect these measurements, including neutron probe and manual and automated Time Domain Reflectometry (TDR). In 1994, the measurements were made every other day at the NSA-OJP (Old Jack Pine), NSA-YJP (Young Jack Pine), NSA-OBS (Old Black Spruce), NSA-Fen, SSA-OJP, SSA-YJP, SSA-Fen, SSA-YA (Young Aspen), and SSA-OBS sites. In 1995-97, when automated equipment was deployed at NSA-OJP, NSA-YJP, NSA-OBS, SSA-OBS, and SSA-OA (Old Aspen), the measurements were made as often as every hour. The data are stored in tabular ASCII files. The volumetric soil moisture data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Soil Moisture; Forests; Air Land Interactions; Hydrology; Moisture Content

20000117692 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS AFM-08 ECMWF Hourly Surface and Upper Air Data for the SSA and NSA
Viterbo, Pedro, European Centre for Medium-Range Weather Forecasts, UK; Betts, Alan, Atmospheric Research, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Newcomer, Jeffrey A., Raytheon Information Technology and Scientific Services, USA; June 2000; 30p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL16; Rept-2000-03136-0/VOL16; NAS 1.15:209891/VOL16; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Airborne Fluxes and Meteorology (AFM)-8 team focused on modeling efforts to improve the understanding of the diurnal evolution of the convective boundary layer over the boreal forest. This data set contains hourly data from the European Center for for Medium-Range Weather Forecasts (ECMWF) operational model from

below the surface to the top of the atmosphere, including the model fluxes at the surface. Spatially, the data cover a pair of the points that enclose the rawinsonde sites at Candle Lake, SASkatchewan, in the Southern Study Area (SSA) and Thompson, Manitoba, in the Northern Study Area (NSA). Temporally, the data include the two time periods of 13 May 1994 to 30 Sept 1994 and 01 Mar 1996 to 31 Mar 1997. The data are stored in tabular ASCII files. The number of records in the upper air data files may exceed 20,000, causing a problem for some software packages. The ECMWF hourly surface and upper air data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Boundary Layers; Weather Forecasting; Forests; Air Land Interactions; Data Acquisition

20000117693 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS AFM-6 Surface Meteorological Data
Wilczak, James, National Oceanic and Atmospheric Administration, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Newcomer, Jeffrey A., Editor, Raytheon Information Technology and Scientific Services, USA; June 2000; 20p; In English
Contract(s)/Grant(s): RTOP 462-33-01
Report No.(s): NASA/TM-2000-209891/VOL12; Rept-2000-03136-0/VOL12; NAS 1.15:209891/VOL12; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Airborne Fluxes and Meteorology (AFM)-6 team from the National Oceanic and Atmospheric Adminsitration/Environment Technology Laboratory (NOAA/ETL) collected surface meteorological data from 21 May to 20 Sep 1994 near the Southern Study Area-Old Jack Pine (SSA-OJP) tower site. The data are in tabular ASCII files. The surface meteorological data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Meteorological Parameters; Forests; Air Land Interactions; Atmospheric Boundary Layer

20000117694 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS AFM-6 Boundary Layer Height Data
Wilczak, James, National Oceanic and Atmospheric Administration, USA; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Newcomer, Jeffrey A., Editor, Raytheon Information Technology and Scientific Services, USA; June 2000; 24p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-209891/VOL10; Rept-2000-03136-0/VOL10; NAS 1.15:209891/VOL10; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Boreal Ecosystem-Atmosphere Study (BOREAS) Airborne Fluxes and Meteorology (AFM)-6 team from National Oceanic and Atmospheric Adminsitration/Environment Technology Laboratory (NOAA/ETL) operated a 915-MHz wind/Radio Acoustic Sounding System (RASS) profiler system in the Southern Study Area (SSA) near the Old Jack Pine (OJP) site. This data set provides boundary layer height information over the site. The data were collected from 21 May 1994 to 20 Sep 1994 and are stored in tabular ASCII files. The boundary layer height data are available from the Earth Observing System Data and Information System (EOSDIS) Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).
Author
Forests; Air Land Interactions; Atmospheric Boundary Layer; Troposphere

20000117695 NASA Goddard Space Flight Center, Greenbelt, MD USA
BOREAS AFM-5 Level-2 Upper Air Network Standard Pressure Level Data
Barr, Alan, Atmospheric Environment Service, Canada; Hrynkiw, Charmaine, Atmospheric Environment Service, Canada; Hall, Forrest G., Editor, NASA Goddard Space Flight Center, USA; Newcomer, Jeffrey A., Editor, Raytheon Information Technology and Scientific Services, USA; June 2000; 52p; In English
Contract(s)/Grant(s): RTOP 923-462-33-01
Report No.(s): NASA/TM-2000-209891/VOL9; Rept-2000-209891/VOL9; NAS 1.15:209891/VOL9; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The BOREAS AFM-5 team collected and processed data from the numerous radiosonde flights during the project. The goals of the AFM-05 team were to provide large-scale definition of the atmosphere by supplementing the existing AES aerological network, both temporally and spatially. This data set includes basic upper-air parameters interpolated at 0.5 kiloPascal increments

of atmospheric pressure from data collected from the network of upper-air stations during the 1993, 1994, and 1996 field campaigns over the entire study region. The data are contained in tabular ASCII files.
Author
Airborne Equipment; Radiosondes; Aerology; Meteorological Parameters

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.

20000116393 Oak Ridge National Lab., TN USA
Characterization of Cassini GPHS fueled clad production girth welds
Franco-Ferreira, E. A.; Moyer, M. W.; Reimus, M. A. H.; Placr, A.; Howard, B. D.; Mar. 01, 2000; 55p; In English
Report No.(s): DE00-752977; ORNL/TM-2000/84; No Copyright; Avail: Department of Energy Information Bridge

Fueled clads for radioisotope power systems are produced by encapsulating (238)PuO2 in iridium alloy cups, which are joined at their equators by gas tungsten arc welding. Cracking problems at the girth weld tie-in area during production of the Galileo/Ulysses GPHS capsules led to the development of a first-generation ultrasonic test for girth weld inspection at the Savannah River Plant. A second-generation test and equipment with significantly improved sensitivity and accuracy were jointly developed by the Oak Ridge Y-12 Plant and Westinghouse Savannah River Company for use during the production of Cassini GPHS capsules by the Los Alamos National Laboratory. The test consisted of Lamb wave ultrasonic scanning of the entire girth weld from each end of the capsule combined with a time-of-flight evaluation to aid in characterizing nonrelevant indications. Tangential radiography was also used as a supplementary test for further evaluation of reflector geometry. Each of the 317 fueled GP HS capsules, which were girth welded for the Cassini Program, was subjected to a series of nondestructive tests that included visual, dimensional, helium leak rate, and ultrasonic testing. Thirty-three capsules were rejected prior to ultrasonic testing. of the 44 capsules rejected by the standard ultrasonic test, 22 were upgraded to flight quality through supplementary testing for an overall process acceptance rate of 82.6%. No confirmed instances of weld cracking were found.
NTIS
Cladding; Gas Tungsten Arc Welding; Thermoelectric Generators; Fuels

45
ENVIRONMENT POLLUTION

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

20000115485 Norwegian Defence Research Establishment, Kjeller, Norway
The Fate and Transport of PCB in AIR, Water, Soil, and Sediment ***PCBs Oppforsel i Luft, Vann, Jord og Sediment***
Voie, Oyvind Albert, Norwegian Defence Research Establishment, Norway; Sep. 20, 2000; 28p; In Norwegian
Contract(s)/Grant(s): FFIBM Proj. 720/138
Report No.(s): FFI/RAPPORT-2000/04842; ISBN-82-464-0448-2; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The literature on the fate and transport of PCB in air, soil, water and sediment has been reviewed. The sorption of PCB is primarily controlled by the distribution of organic material in soils and sediments. While the bulk of the PCBs are bound to particles in soils and sediments, the long-range transport of PCBs will occur via water and air. Degradation of PCB in soils and sediments occurs, but is very slow and do not contribute to elimination of these compounds from the environment. In contrast, the degradation of PCBs by reaction with free radicals in the air occurs in a wider extent.
Author
Organic Materials; Polychlorinated Biphenyls; Sediments; Transporter

20000115490 Parsons Engineering Science, Inc., Denver, CO USA
Remediation by Natural Attenuation Treatability Study for Site SS-04, Langley Air Force Base, Virginia ***Final Report***
Sep. 1999; 703p; In English
Report No.(s): AD-A381891; No Copyright; Avail: CASI; A99, Hardcopy; A06, Microfiche

This report presents the results of a treatability study for remediation by natural attenuation (RNA TS), completed by Parsons Engineering Science, Inc. (Parsons ES) at IRP Site SS-04, Langley Air Force Base (AFB),Virginia. The TS evaluates the use of natural attenuation with long-term monitoring (LTM) as a remedial option for dissolved hydrocarbon fuel constituents in groundwater. The occurrence of groundwater and soil contamination at the site, as a consequence of leakage of petroleum-based fuel (jet fuel or JP-4), has been documented during previous investigations. This TS focuses primarily on the impact of dissolved fuel constituents, in particular benzene, toluene, ethylbenzene, and xylene isomers (BTEX), in the groundwater system at, and downgradient from, the source area. Residual fuel hydrocarbon contamination in soil surrounding the source area (the abandoned USTs) was remediated from 1992 through 1996 with a vapor extraction system. The site history and the results of previously- completed soil and groundwater investigations are summarized in this report. Soil and groundwater samples were collected from the site and analyzed to obtain the information necessary for the transport evaluation and RNA demonstration. Physical and chemical data collected under this program were supplemented (where necessary) with data collected during previous site characterization investigations and monitoring events. Biodegradation of fuel hydrocarbons can occur when an indigenous population of hydrocarbon-degrading microorganisms is present in the subsurface, and sufficient concentrations of electron acceptors, nutrients, and electron donors (including fuel hydrocarbons) are available to these organisms. Several lines of chemical and geochemical evidence indicate that dissolved BTEX constituents are undergoing biodegradation within and downgradient from the contaminant source area.
DTIC
Water Pollution; Soil Pollution; Fuel Contamination; Hydrocarbon Fuels

20000115609 NASA Goddard Space Flight Center, Greenbelt, MD USA
Characteristics of the East Asian Winter Climate Associated with the Westerly Jet Stream and ENSO
Yang, Song, Science Applications International Corp., USA; Lau, K.-M., NASA Goddard Space Flight Center, USA; Kim, K.-M., Universities Space Research Association, USA; August 2000; 30p; In English; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In this study, the influences of the East Asian jet stream (EAJS) and El Nino/Southern Oscillation (ENSO) on the interannual variability of the East Asian winter climate are examined with a focus on the relative climate impacts of the two phenomena. Although the variations of the East Asian winter monsoon and the temperature and precipitation of China, Japan, and Korea are emphasized, the associated changes in the broad-scale atmospheric circulation patterns over Asia and the Pacific and in the extratropical North Pacific sea surface temperature (SST) are also investigated. It is demonstrated that there is no apparent relationship between ENSO and the interannual variability of EAJS core. The EAJS and ENSO are associated with distinctly different patterns of atmospheric circulation and SST in the Asian-Pacific regions. While ENSO causes major climate signals in the Tropics and over the North Pacific east of the dateline, the EAJS produces significant changes in the atmospheric circulation over East Asia and western Pacific. In particular, the EAJS explains larger variance of the interannual signals of the East Asian trough, the Asian continental high, the Aleutian low, and the East Asian winter monsoon. When the EAJS is strong, all these atmospheric systems intensify significantly. The response of surface temperature and precipitation to EAJS variability and ENSO is more complex. In general, the East Asian winter climate is cold (warm) and dry (wet) when the EAJS is strong (weak) and it is warm during El Nino years. However, different climate signals are found during different La Nina years. In terms of linear correlation, both the temperature and precipitation of northern China, Korea, and central Japan are more significantly associated with the EAJS than with ENSO.
Author
Winter; Climate; Climatology; Southern Oscillation; El Nino; Atmospheric Circulation; Jet Streams (Meteorology)

20000115610 NASA Goddard Space Flight Center, Greenbelt, MD USA
A Simulation of Bromoform's Contribution to Stratospheric Bromine
Nielsen, J. Eric, Emergent Information Technologies, Inc., USA; Douglass, Anne R., NASA Goddard Space Flight Center, USA; [2000]; 33p; In English; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Many chlorinated and brominated compounds that are inert in the troposphere are destroyed in the stratosphere and act as an in-situ source of stratospheric reactive chlorine and bromine. Other halogenated compounds that are reactive in the troposphere might contribute to the stratosphere's halogen budget in two ways. First, like their unreactive companions, rapid convective transport might carry them to the upper troposphere and make them available for subsequent advection by the mean circulation into the stratosphere before they are oxidized or photolyzed. Second, it is more likely that they are destroyed in the troposphere, and the chlorine and bromine that is released might then be transported to the stratosphere. We evaluate the relative influence of these processes on stratospheric bromine in a three-dimensional chemistry and transport model which simulates the distribution of bromoform (CHBr3). CHBr3 is parameterized as a short-lived, ocean-surface source gas whose destruction by photolysis and reac-

tion with hydroxyl (OH) in the troposphere and stratosphere yields inorganic bromine (Br(sub y)). Many of the observed features of CHBr3 are simulated well, and comparisons with observations are used to show that the model represents aspects of transport in the upper troposphere and lower stratosphere that are critical to the evaluation. In particular, the model maintains the observed troposphere-stratosphere distinctness in transport pathways and reproduces the observed seasonal dependence of the mixture of air in the middle- and high-latitude lowermost stratosphere. We estimate that adding CHBr3 to models which already include the long-lived organic brominated compounds (halons and methyl bromide) will increase the simulated stratospheric mass of Br(sub y) by about 15 percent. In-situ stratospheric destruction of CHBr3 produces Br(sub y) in amounts which are comparable to that transported into the stratosphere after photolysis and oxidation of CHBr3 in the troposphere. In our simulations the mass of Br(sub y) produced from the destruction of CHBr3 does not exceed the mass of Br(sub y) produced from the destruction of the long-lived compounds at any level in the stratosphere. However, Br(sub y) from the loss of CHBr3 accounts for approximately one-third of the total Br(sub y) in the lowest kilometer of the stratosphere.
Author
Bromine; Destruction; Reactivity; Simulation; Stratosphere; Troposphere

20000116094 Wisconsin Univ., Dept. of Chemistry, Madison, WI USA
Molecular Beam Studies of Reactions between Stratospheric Gases and Supercooled Sulfuric Acid ***Final Report, 1 Apr. 1996 - 31 Mar. 1999***
Nathanson, Gilbert M.; Morris, John R.; Behr, Peter M.; Antman, Melissa D.; Splan, Jennifer; Apr. 15, 2000; 6p; In English
Contract(s)/Grant(s): F49620-96-1-0117
Report No.(s): AD-A379797; AFRL-SR-BL-TR-00-0157; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
Sulfuric acid aerosols in the stratosphere contribute to the destruction of the ozone layer by converting inactive gases like HCl and HBr into molecules that fall apart into chlorine and bromine atoms, which catalytically destroy ozone. The first step in these reactions is the transport of gas phase HCl and HBr molecules through the surface of the liquid aerosol and into the acid, where they dissolve and dissociate. Our experiments show that the entry of HCl and HBr into sulfuric acid is often frustrated by immediate HCl and HBr evaporation from the surface of the acid. For mid-latitude stratospheric sulfuric acid, we find that only 11% of the HCl and 22% of the HBr molecules that strike the acid surface enter into the bulk. In contrast, water and nitric acid molecules enter the acid in nearly every collision. These measurements indicate that HCl and HBr are mostly unavailable for reaction with other solute molecules in mid-latitude aerosols because they evaporate from the acid's surface faster than the can dissolve.
DTIC
Ozone Depletion; Research; Molecular Beams; Stratosphere; Gas Transport; Sulfuric Acid; Atmospheric Composition

20000116096 Office of Air Quality Planning and Standards, Research Triangle Park, NC USA
Municipal Solid Waste Landfills: Background Information Document for Federal Plan. Public Comments and Responses ***Final Report***
Warner, M. A.; Fanjoy, J.; Sep. 1999; 10p; In English
Report No.(s): PB2000-107376; EPA/456/R-99/001; No Copyright; Avail: National Technical Information Service (NTIS)
This document addresses the comments that EPA received on the proposed Federal Plan for Municipal Solid Waste Landfills, published December 16, 1998. The final Federal Plan was published November 8, 1999.
NTIS
Landfills; Solid Wastes; Pollution Control; Pollution Monitoring; Air Pollution

20000116155 Miami Univ., Rosenstiel School of Marine and Atmospheric Science, FL USA
A Compact Airborne System for SO2 and DMS Measurements for Use on Future GTE Missions Aboard the P-3 or DC-8 ***Final Report***
Saltzman, Eric S., Miami Univ., USA; DeBruyn, Warren J., Miami Univ., USA; [2000]; 6p; In English
Contract(s)/Grant(s): NAG1-2002; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
This project involved the design and construction of a new instrument for airborne measurement of DMS and SO2. The instrument is intended for use on field missions to study the global atmospheric sulfur cycle. The ultimate scientific goal is to provide insight into the mechanisms of atmospheric transport and transformations impacting both natural and anthropogenic sulfur emissions. This report summarizes the progress made to date and the goals for future work on the project. The PI's for this project have recently relocated from the University of Miami to the University of California, Irvine, and a request has been made to transfer remaining funds to UCI. All equipment associated with this project has been transferred to UCI. The instrument design goal was to develop an instrument roughly one quarter the size and weight of currently available airborne instrumentation used for DMS

and S02 measurements. Another goal was full automation, to allow unattended operation for the duration of a P-3 or DC-8 flight. The original performance design specifications for the instrument are given.
Author
Airborne Equipment; Atmospheric Circulation; Performance Tests

20000116232 Harris, Miller, Miller and Hanson, Inc., Lexington, MA USA
Mitigating the Effects of Military Aircraft Overflights on Recreational Users of Parks ***Final Report, Dec. 1995 - Jul. 1999***
Miller, Nicholas P.; Anderson, Grant S.; Horonjeff, Richard D.; Thompson, Richard H.; Baumgartner, Robert M.; Jul. 1999; 251p; In English; Prepared in cooperation with Hagler Bailly Consulting, Madison, WI.
Contract(s)/Grant(s): F41624-96-C-9002; AF Proj. 3037
Report No.(s): AD-A379467; Rept-294470.04; AFRL-HE-WP-TR-2000-0034; No Copyright; Avail: Defense Technical Information Center (DTIC)

This study was initiated as part of the cooperative US Air Force/National Park Service efforts to understand and effectively manage the potential adverse effects military air crew training can have on the National Parks. Through simultaneous sound data acquisition and Park user interviews, data were collected that provided a basis for determining how military jet overflights can affect visitor experience at a site in White Sands National Monument, New Mexico. Several useful findings resulted from the analysis. First, visitors can distinguish between the concepts of ”annoyance” and ”interference” produced by aircraft sound. Annoyance is an emotional reaction, while interference is more of an objective judgment. Visitors can find that the sound of aircraft interferes with the natural soundscape, but are not necessarily annoyed. Visitors believe annoyance results if the interference is often or severe enough. Second, visitors tend to be less annoyed by aircraft noise if they remember learning that they could hear or see aircraft while in the Park. This finding shows the importance of informing visitors about possible aircraft overflights - i.e., managing visitor expectations. Finally, aircraft noise is likely to produce less annoyance if aircraft fly over in close succession, rather than widely spaced, one at a time.
DTIC
Noise Pollution; Aircraft Noise; National Parks; Emotional Factors

20000116342 NASA Goddard Space Flight Center, Greenbelt, MD USA
Global Warming: Evidence from Satellite Observations
Prabhakara, C., NASA Goddard Space Flight Center, USA; Iacovazzi, R., Raytheon Information Technology and Scientific Services, USA; Yoo, J.-M., Ewha Woman’s Univ., Korea, Republic of; Dalu, G., Consiglio Nazionale delle Ricerche, Italy; [2000]; 4p; In English; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Observations made in Channel 2 (53.74 GHz) of the Microwave Sounding Unit (MSU) radiometer, flown onboard sequential, sun-synchronous, polar-orbiting NOAA (National Oceanic and Atmospheric Administration) operational satellites, indicate that the mean temperature of the atmosphere over the globe increased during the period 1980 to 1999. In this study, we have minimized systematic errors in the time series introduced by satellite orbital drift in an objective manner. This is done with the help of the onboard warm-blackbody temperature, which is used in the calibration of the MSU radiometer. The corrected MSU Channel 2 observations of the NOAA satellite series reveal that the vertically-weighted global-mean temperature of the atmosphere, with a peak weight near the mid troposphere, warmed at the rate of 0.13 +/- 0.05 K/decade during 1980 to 1999. The global warming deduced from conventional meteorological data that have been corrected for urbanization effects agrees reasonably with this satellite-deduced result.
Author
Atmospheric Temperature; Global Warming; Meteorological Parameters; Satellite Observation; Systematic Errors

20000116345 ManTech Environmental Technology, Inc., Research Triangle Park, NC USA
Fort Hall Source Apportionment Study ***Final Report***
Willis, R. D.; Ellenson, W. D.; September 1999; 152p; In English; Sponsored by Environmental Protection Agency, Research Triangle Park, NC. Human Exposure and Atmospheric Sciences Div
Report No.(s): PB2001-100329; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

Air quality monitoring on the Fort Hall Indian Reservation has revealed numerous exceedances of the National Ambient Air Quality Standard (NAAQS) for 24-h average PM10 mass. Wind-directional analysis coupled with PM10 measurements have identified the FMC elemental phosphorus plant as the major source of PM10. This study attempts to identify specific sources or operations within the FMC complex that contribute to the PM10 violations. Data used to identify FMC emission sources were collected at two downwind and one background monitoring sites and include 24-h PM10 concentrations, met data (wind speed and wind direction), 24h PM2.5 and coarse (PM10 minus PM2.5) mass and elemental concentrations, organic and elemental car-

bon data on selected ambient samples, continuous PM10 and PM2.5 measurements, and electron microscopy characterization of individual source and ambient particles. A limited source sampling effort was conducted, which yielded qualitative source profiles of selected FMC sources or processes. Ambient data show that PM10 is dominated by the fine faction (PM2.5) but that both fine and coarse-fraction aerosols are generally required to produce an exceedance. PM10 mass during exceedance events is split approximately evenly (with significant mass unaccounted for) between fine-faction phosphate, believed to be emitted predominantly from the ground and elevated CO flares and coarse-faction Ca and Si-rich dust believed to come from numerous sources at FMC.
NTIS
Air Quality; Pollution Monitoring; Ambience

20000116350 Office of Air Quality Planning and Standards, Research Triangle Park, NC USA
Current Knowledge of Particulate Matter (PM) Continuous Emission Monitoring *Final Report*
Bivins, D.; September 08, 2000; 102p; In English
Report No.(s): PB2001-100154; EPA/454/R-00/039; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche
This report provides detailed information on the current knowledge of PM CEMS. This information was gained from literature reviews; attendance at many meetings and conferences where the use of PM CEMS was discussed; shared knowledge between the EPA, industry, and consultants experienced with PM CEMS in both the USA and Europe; discussions with PM CEMS vendors; and personal experiences from performing a field demonstration of PM CPMS. The report will be maintained as a 'living document' with periodic updates as needed.
NTIS
Particulates; Air Pollution; Pollution Control

20000116352 Environmental Protection Agency, National Center for Environmental Assessment, Research Triangle Park, NC USA
Air Quality Criteria for Particulate Matter. Volume 2
Hasselblad, V.; Ito, K.; Kinney, P.; Kotchmar, D. J.; Marcus, A.; October 1999; 446p; In English
Report No.(s): PB2000-108517; NCEA-R-1072-V2; EPA/600/P-99/002B; No Copyright; Avail: CASI; A19, Hardcopy; A04, Microfiche
This external review draft is an updated revision of the Air Quality Criteria for Particulate Matter, published by the USA EPA (EPA) in 1996, and it will serve as the basis for reevaluating the current National Ambient Air Quality Standards (NAAQS) for particulate matter (PM) set in 1997. The present external review draft critically assesses the latest scientific information relative to determining the health and welfare effects associated with exposure to various concentrations of PM in ambient air. The document is not intended as a complete and detailed literature review, but it does thoroughly evaluate information relevant to PM NAAQS criteria development based on pertinent literature available through mid 1999. Two sections of the Clean Air Act (CAA), (Sections 108 and 109, U.S. Code, 1991) govern the establishment, review, and revision of NAAQS. Section 108 directs the Administrator of the EPA to list pollutants that may reasonably be anticipated to endanger public health or welfare, and to issue air quality criteria for them. The air quality criteria for them. The air quality criteria are to reflect the latest scientific information useful in indicating the kind and extent of all exposure-related effects on public health and welfare that may be expected from the presence of the pollutant in ambient air.
NTIS
Air Quality; Particulates; Aerosols

20000116358 NASA Goddard Space Flight Center, Greenbelt, MD USA
Status of The SPARC-GRIPS Initiative
Pawson, Steven, NASA Goddard Space Flight Center, USA; Kodera, Kunihiko, Meteorological Research Inst., Japan; [2000]; 1p; In English; SPARC 2000, 6-10 Nov. 2000, Mar del Plata, Argentina
Contract(s)/Grant(s): NAS5-98181; No Copyright; Avail: Issuing Activity; Abstract Only
The GCM-Reality Intercomparison Project for the Symbolic Processing Algorithmic Research Computer (SPARC) is an initiative designed to provide a comprehensive assessment of our ability to model the present-day climate and the impacts of different physical perturbations. This poster will show the different scientific experiments being conducted in the general purpose rocket instrumentation and payload system (GRIPS) and include some summaries of the results. The three concurrent aspects of GRIPS are: (1) studies of the climate and transient features simulated by the models; (2) examinations of different parametrizations and their impacts on the model climate; (3) studies of the impact of physical perturbations, such as solar forcing, volcanic aerosols

and ozone change. Sample results from a number of these areas will be presented, with discussion of their implications for our ability to model the climate of the present and future atmosphere.
Author
Climate; Perturbation; Climatology; Long Term Effects; Climate Change

20000116359 NASA Goddard Space Flight Center, Greenbelt, MD USA
Model Study of the Sources of Upper Tropospheric Ozone Over The Atlantic, with Emphasis on Interhemispheric Asymmetries
Pawson, Steven, NASA Goddard Space Flight Center, USA; Thompson, Anne M., NASA Goddard Space Flight Center, USA; Lin, Shian-Jiann, NASA Goddard Space Flight Center, USA; [2000]; 1p; In English; SPARC 2000, 6-10 Nov. 2000, Mar del Plata, Argentina
Contract(s)/Grant(s): NAS5-98181; No Copyright; Avail: Issuing Activity; Abstract Only

Measurements of ozone and aerosols from ships transecting the Atlantic Ocean reveal considerable interhemispheric asymmetries in the vertical structure of the ozone distribution. There is much more upper tropospheric ozone to the South of the Equator than in the northern hemisphere. These profiles suggest that the air in the southern hemispheric tropics and subtropics has a source in the stratosphere, while that in the northern hemisphere originates in the boundary layer. A model experiment designed to investigate this problem will be discussed. They are based on a new general circulation model, based on a Finite-Volume dynamical core and the physical parametrizations from the Community Climate Model at the National Center for Atmospheric Research (NCAR). The model simulates a climatological state in reasonable agreement with observations, comparable to other contemporary climate models, but has a much more accurate transport capability than most other present-day models. The experiment involves using a suite of tracers, designed to highlight air from different source regions. Some of these (water vapor and ozone) represent real atmospheric quantities, while others are markers which indicate whether the air originates in the stratosphere, the boundary layer, or has traversed regions of convection (for example). The experiments were run for periods of up to one month, initialized from snapshots from a long climate integration of the model. A sample of results will be presented, chosen to illustrate the different sources of air in the upper troposphere and the physical mechanisms by which these air parcels arrived there.
Author
Aerosols; Asymmetry; Boundary Layers; Climate Models; Climatology; Ozone; Stratosphere; Troposphere

20000116363 NASA, Washington, DC USA
Toward Creating A Global Retrospective Climatology of Aerosol Properties
Curran, Robert J., NASA, USA; Mishchenko, Michael I., NASA Goddard Space Flight Center, USA; [2000]; 1p; In English; IRS 2000, 24-29 Jul. 2000, Saint Petersburg, Russia; No Copyright; Avail: Issuing Activity; Abstract Only

Tropospheric aerosols are thought to cause a significant direct and indirect climate forcing, but the magnitude of this forcing remains highly uncertain because of poor knowledge of global aerosol characteristics and their temporal changes. The standard long-term global product, the one-channel Advanced Very-High-Resolution Radiometer (AVHRR) aerosol optical thickness over the ocean, relies on a single predefined aerosol model and can be inaccurate in many cases. Furthermore, it provides no information on aerosol column number density, thus making it impossible to estimate the indirect aerosol effect on climate. Total Ozone Mapping Spectrometer (TOMS) data can be used to detect absorbing aerosols over land, but are insensitive to aerosols located below one kilometer. It is thus clear that innovative approaches must be employed in order to extract a more quantitative and accurate aerosol climatology from available satellite and other measurements, thus enabling more reliable estimates of the direct and indirect aerosol forcings. The Global Aerosol Climatology Project (GACP) was established in 1998 as part of the Global Energy and Water Cycle Experiment (GEWEX). Its main objective is to analyze satellite radiance measurements and field observations to infer the global distribution of aerosols, their properties, and their seasonal and interannual variations. The overall goal is to develop advanced global aerosol climatologies for the period of satellite data and to make the aerosol climatologies broadly available through the GACP web site.
Author
Aerosols; Climate; Climatology; Troposphere; Radiance

20000116368 Naval Facilities Engineering Service Center, Port Hueneme, CA USA
MTBE Remediation Using Hollow Fiber Membrane and Spray Aeration Vacuum Extraction Technologies ***Final Report***
Kram, Mark; Sirivithayapakorn, Sanya; Joy, Michael; Lory, Ernest; Keller, Arturo; Sep. 2000; 52p; In English
Report No.(s): AD-A382396; NFESC-CR-00-004-ENV; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report summarizes the results of a demonstration of selected technologies used to treat groundwater contaminated with dissolved MTBE and other VOCs. The specific technologies include Spray Aeration Vacuum Extraction (SAVE), developed by

Remediation Service International (RSI), and Hollow Fiber Membrane (HFM) degasification, developed by the University of California at Santa Barbara. The test was conducted at the Hydrocarbon National Test Site located at the Naval Construction Battalion Center at Port Hueneme, California, between 21-25 June 1999. The project scope consisted of demonstrating the combined SAVE and HFM systems at the field scale for treating groundwater contaminated with MTBE and other gasoline components. The main objectives were to: (1) meet a target remediation goal of 5 ug/L for MTBE (the secondary drinking water standard for California water supplies); (2) quantitatively define the component-by- component performance in terms of removal efficiency and mass transfer coefficient for each technology; (3) evaluate these treatment technologies from a cost-and-performance perspective; and (4) develop a set of recommendations for routine application of this combination of remediation technologies. During the 5-day demonstration effort, approximately 34,200 L (9,000 gallons) of contaminated groundwater was treated while continuously meeting the project's MTBE clean up goal of 5 ug/L. Specific operation and performance details are presented and discussed, as well as suggestions for design improvement.
DTIC
Cost Analysis; Ground Water; Water Pollution; Water Treatment; Fuel Contamination; Potable Water

20000116479 Environmental Protection Agency, National Exposure Research Lab., Research Triangle Park, NC USA
Chemical Mass Balance Model: EPA-CMB8.2
Coulter, C. T.; Wagoner, R. A.; Lewis, C. W.; 2000; 18p; In English
Report No.(s): PB2001-100771; EPA/600/A-00/099; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The Chemical Mass Balance (CMB) method has been a popular approach for receptor modeling of ambient air pollutants for over two decades. For the past few years the U.S. Environmental Protection Agency's office of Research and Development (ORD) and Office of Air Quality Planning and Standards (OAQPS) have collaborated to develop a new generation of CMB software, CMB8. Developmental work was initiated under EPA contract by the Desert Research Institute and is being continued by Pacific Environmental Services. The current version, EPA-CMB8.2, incorporates the upgrade features that CMB8 has over CMB7, but also addresses problems identified with CMB8 and has been reconfigured and enhanced for a more robust and user-friendly system.
NTIS
Air Pollution; Pollution Monitoring; Air Quality; Chemical Analysis; Mass Distribution; Volatile Organic Compounds; Contaminants

20000116585 Sandia National Labs., Environmental Characterization and Monitoring Dept., Albuquerque, NM USA
Technology Evaluation Report: Laser-Induced Breakdown Spectrometer for Metals-Contaminated Soil Characterization, Los Alamos National Laboratory
Einfeld, W.; Brown, G.; Oct. 1998; 92p; In English
Report No.(s): PB2001-100484; NERL-LV-98-081; No Copyright; Avail: National Technical Information Service (NTIS)
Contents include the following: Annual Review; Structure of Studies; Study Modules; Funding; Personnel; Research Services and Projects; Coordination of Intelligent Mine; Implementation - Technology Program; (Project 1.1); Layout for Advanced Mining; Corrosion protected cable bolts in long-term reinforcement (KOVA); The effect of capacity in open pit optimization; The influence of rock stress on dimension stone quarrying; Theses; Activities.
NTIS
Laser Spectrometers; Technology Assessment; Breakdown

20000116586 Sandia National Labs., Environmental Characterization and Monitoring Dept., Albuquerque, NM USA
Technology Evaluation Report: Laser-Induced Breakdown Spectrometer for Metals-Contaminated Soil Characterization. Melok Instruments, Inc
Einfeld, W.; Brown, G.; Oct. 1998; 92p; In English
Report No.(s): PB2001-100481; NERL-LV-98-080; No Copyright; Avail: National Technical Information Service (NTIS)
The US Environmental Protection Agency (EPA), through the Environmental Technology Verification Program, is working to accelerate the acceptance and use of innovative technologies that improve the way the USA manages its environmental problems. This report describes the results of a field demonstration conducted at contaminated soil sites near Butte, Montana, in which developers of soil characterization technologies were invited to participate. The Consortium classifies each candidate technology into one of three development levels on the basis of maturity of the technology and its expected time to commercialization. A demonstration of selected Department of Energy-funded technologies was being planned by MSE-HKM, Inc., under contract to

the Department of Energy. The demonstration plan incorporated the use of reference laboratories to analyze metals in the soil samples using standard EPA Laboratory protocols.
NTIS
Environment Protection; Laser Spectrometers; Breakdown

20000116587 Environmental Protection Agency, National Center for Environmental Assessment, Cincinnati, OH USA
Methodology for Assessing Health Risks Associated with Multiple Pathways of Exposure to Combustor Emissions
Sep. 1999; 592p; In English
Report No.(s): PB2001-100347; EPA/600/R-98/137; No Copyright; Avail: National Technical Information Service (NTIS)

The National Center for Environmental Assessment (NCEA) has prepared this methodology in response to the 1993 Combustion Strategy for Hazardous Waste Incinerators released by the Administrator of the US Environmental Protection Agency (EPA). Among other mandates regarding the regulation of this industrial sector, the strategy involved the requirement of EPA, or the regulated community, or both to conduct indirect exposure assessments to evaluate the impact of stack emissions. Although this mandate was specific to hazardous waste incinerators, the importance of the indirect pathways has extended to all combustors. The available methodologies at that time to conduct an indirect risk assessment were a 1990 document titled, 'Methodology for Assessing Health Risks Associated with Indirect Exposure to Combustor Emissions' (IEM) and the 1992 NCEA dioxin exposure reassessment to the Administrator's strategy, a workgroup composed of Office of Research and Development (ORD), Office of Solid Waste and Emergency Response (OSWER), Office of Air Quality Planning and Standards (OAQPS) and others, convened. The result of this workgroup was an 'Addendum' document to the 1990 Indirect Exposure document released in November of 1993. This 1993 document described updates and other changes to the 1990 document; these two documents, together with other relevant information such as that from the dioxin exposure document and the Exposure Factors Handbook, provided guidance on conducting indirect risk assessments. The Purpose of this document is to update the 1990 IEM. Most of the revisions provided in this document are based on EPA's Science Advisory Board (SAB) and Public comments to the 1993 Addendum. Earlier versions of this document have undergone internal Agency and external peer review.
NTIS
Environment Protection; Health; Risk; Air Pollution

20000116590 Research Triangle Inst., Research Triangle Park, NC USA
Investigation of the Potential Antimicrobial Efficacy of Sealants Used in HVAC Systems
Foarde, K. K.; VanOsdell, D. W.; Menetrez, M. Y.; 2000; 16p; In English
Report No.(s): PB2001-100339; EPA/600/A-00/066; No Copyright; Avail: National Technical Information Service (NTIS)

The paper gives results of an investigation of the potential antimicrobial efficacy of sealants used in heating, ventilation, and air-conditioning systems. Recent experiments confirm field experience that duct cleaning alone may not provide adequate protection from regrowth of fungal contamination in fiberglass duct liner. Current recommendations for remediation of fungally contaminated fiberglass duct materials specify complete removal of the materials. But removal of contaminated materials can be extremely expensive. Therefore, a common practice in the duct cleaning industry is the post-cleaning use of antimicrobial surface coatings with the implication that they may contain or limit regrowth. The paper describes a study to evaluate whether three commercially available coatings, placed on a cleaned surface that 1 year previously had been actively growing microorganisms, would be able to prevent regrowth. The three coatings contained different active antimicrobial compounds.
NTIS
Sealers; Antibiotics; Antiinfectives and Antibacterials; Pollution Control; Air Pollution

20000116600 Battelle Columbus Labs., OH USA
Design, Construction, and Monitoring of the Permeable Reactive Barrier in Area 5 at Dover Air Force Base ***Final Report, Apr. 1997 - Mar. 2000***
Gavaskar, Arun, Battelle Columbus Labs., USA; Gupta, Neeraj, Battelle Columbus Labs., USA; Sass, Bruce, Battelle Columbus Labs., USA; Yoon, Woong-Sang, Battelle Columbus Labs., USA; Janosy, Robert, Battelle Columbus Labs., USA; Drescher, Eric, Battelle Columbus Labs., USA; Hicks, James, Battelle Columbus Labs., USA; March 2000; 371p; In English
Contract(s)/Grant(s): F08637-95-C-6004; AF Proj. 5503
Report No.(s): AD-A380005; AFRL-ML-TY-TR-2000-4546; No Copyright; Avail: Defense Technical Information Center (DTIC)

The primary objective of this project was to test the performance of two different reactive media in the same aquifer. to satisfy this objective, Battelle designed, constructed, and monitored a pilot-scale permeable reactive barrier (PRB) in Area 5 at Dover Air Force Base, DE. The PRB was installed in December 1997 to treat a perchloroethylene plume and was monitored over 18

months of operation. The PRB is a funnel-and-gate system with two gates. Both gates contain granular iron as the reactive medium an were installed with the use of caissons. Gate 1 had a pretreatment zone (PTZ) consisting of 10% iron and sand, and Gate 2 had a PTZ consist in of 10% pyrite and sand. The PTZs were designed to remove dissolved oxygen before it entered the 100% iron reactive cell. The pyrite PTZ had the proposed benefit of pH control. However, monitoring showed that the reduced pH in the pyrite PTZ could not be sustained in the 100% iron reactive cell. The PRB is functioning as designed in terms of chlorinated solvent reduction, hydraulic performance, and geochemistry. The use of caissons was found to be a viable method for installing a PRB in the midst of several utility lines and in a relatively deep aquifer.
DTIC
Aquifers; Solvents; Chlorination; Contamination; Constrictions

20000116602 Battelle Columbus Labs., OH USA
Design Guidance for Application of Permeable Reactive Barriers for Groundwater Remediation ***Final Report, Apr. 1997 - Mar. 2000***
Gavaskar, Arun, Battelle Columbus Labs., USA; Gupta, Neeraj, Battelle Columbus Labs., USA; Sass, Bruce, Battelle Columbus Labs., USA; Janosy, Robert, Battelle Columbus Labs., USA; Hicks, James, Battelle Columbus Labs., USA; March 2000; 273p; In English
Contract(s)/Grant(s): F08637-95-C-6004; AF Proj. 5503
Report No.(s): AD-A379980; AFRL-ML-TY-TR-2000-4547; No Copyright; Avail: Defense Technical Information Center (DTIC)
Battelle, under contract to the Air Force, has prepared a comprehensive update to the February 1997 version of a design guidance document for the proposed use of site managers, contractors, and regulators. The design guidance covers permeable barrier application to sites with contaminated groundwater. The document does not purport to replace the scientific judgment of the on-site engineer or hydrogeologist, but provides guidance on the issues and options that need to be considered based on the current understanding of the technology. The guidance addresses design, construction, and monitoring of permeable barriers in various hydrogeologic settings. This update includes the lessons learned during the design, construction, and monitoring of a permeable reactive barrier at Dover AFB, DE, as well as progress made at other sites. It also includes the advances in the technology since the completion of the previous version of the report.
DTIC
Contamination; Ground Water; Military Air Facilities; Constrictions

20000116611 Oak Ridge National Lab., TN USA
Environmental Technology Verification Report: Immunoassay Kit. Strategic Diagnostics Inc. RaPID Assay System for PCB Analysis
Dindal, A. B.; Bayne, C. K.; Jenkins, R. A.; Aug. 1998; 124p; In English
Report No.(s): PB2001-100490; NERL-LV-98-110; No Copyright; Avail: National Technical Information Service (NTIS)
In July 1997, the US Environmental Protection Agency (EPA) conducted a demonstration of polychlorinated biphenyl (PCB) field analytical techniques. The demonstration design was subjected to extensive review and comment by EPA's National Exposure Research Laboratory (NERL) Environmental Sciences Division in Law Vegas, Nevada; Oak Ridge National Laboratory (ORNL); EPA Regional Offices; the US Department of Energy (DOE); and the technology developers. The demonstration study was conducted at ORNL under two sets of environmental conditions. The reference laboratory method used to evaluate the comparability of data was EPA SW-846 Method 8081. The field analytical technologies tested in this demonstration were the L2000 PCB/Chloride Analyzer, the PCB Immunoassay Kit, the 4100 Vapor Detector, and three immunoassay kits: D Tech, EnviroGard, and RaPID Assay System. The RaPID Assay system is a field portable instrument that applies the principles of enzyme-linked immunosorbent assay to the determination of PCBs. The RaPID Assay System's quantitative results were based on initial calibrations. The data of the extract samples were highly correlated with the reference laboratory.
NTIS
Immunoassay; Environment Protection; Polychlorinated Biphenyls

20000117709 Analytical Technology Applications Corp., Sunnyvale, CA USA
Integrated Noise Model (INM) Version 6.0 User's Guide ***Final Report, Jan. 1997 - Sep. 1999***
Gulding, J.; Fleming, G.; Olmstead, J.; Fleming, G.; D'Aprile, J.; Sep. 1999; 318p; In English
Report No.(s): PB2000-108002; FAA-AEE-99-03; No Copyright; Avail: CASI; A03, Microfiche; A14, Hardcopy
The Federal Aviation Administration, Office of Environment and Energy, Noise Division (AEE-100) has developed Version Version, 6.0 of the integrated Noise Model (INM) with support from the ATAC Corporation and the Department of Transportation

Volpe National Transportation Center. New features in INM 6.0 include: four new aircraft; modified engine and aerodynamic coefficients for ten aircraft; approach and departure average noise spectra for all aircraft; C-weighted noise metrics for low frequency noise analysis; NPD curves using SAE-APR-866A atmospheric absorption; a new function to compute pounds thrust using EPR or N1 values; a revised acceleration algorithm for computing procedural profiles; a jet thrust equation for high temperature/altitude cases; a subdivided first climb segment for more accurate exposure calculation; a revised noise exposure fraction algorithm for more accurate exposure calculation; a revised noise exposure fraction algorithm for more processing; flight segment significance testing for faster run time; 32-bit NMPlot contour generation; and support for long directory names. INM Version 6.0 software runs on PCs using a minimum hardware configuration of a Pentium II processor, Microsoft Windows 95, 98, or NT 4.0 operating systems, 64-Mb RAM, mouse input device, hard disk drive, and CD-ROM drive.
NTIS
User Manuals (Computer Programs); Aircraft Noise; Engine Noise; Aerodynamic Noise; Computer Programs

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.

20000115411 Stockholm Univ., Dept. of Physics, Sweden
Monte Carlo Study of Atmospheric Muon-Neutrinos in AMANDA
Dalberg, E.; Jan. 31, 1998; 47p; In English
Report No.(s): DE98-621598; USIP-98-02; No Copyright; Avail: Department of Energy Information Bridge

The response of AMANDA detector to atmospheric muon-neutrinos has been simulated. The neutrino flux, which has its origin from cosmic ray interactions with the atmosphere, induce muons in the vicinity of the detector. These muons will be relativistic and emit Cerenkov photons which can be detected by the optical modules buried in the deep South Pole glacier ice. The aim of the simulations is to predict the trigger rates in the existing detector, as well as in future extensions. The efficiency to detect muons with different angles and energies is also studied. Some of the simulated events have been analysed and it is discussed how the quality of this analysis can be judged.
NTIS
Monte Carlo Method; Muons; Neutrinos; Neutron Counters

20000115473 Lembaga Penerbangan dan Antariksa Nasional, Peneliti Bidang Komunikasi HF Puslitbang Pengetahuan Ionosfer, Jakarta, Indonesia
Reliability of Autoregressive Methods for Predicting Ionosphere foF2 ***Reliabilitas Metode Auto Regresi Untuk Memprediksi foF2 Ionosfer***
Rachyany, Sity, Lembaga Penerbangan dan Antariksa Nasional, Indonesia; Habirun, Lembaga Penerbangan dan Antariksa Nasional, Indonesia; Syarifudin, Lembaga Penerbangan dan Antariksa Nasional, Indonesia; Warta LAPAN; April - June 2000; ISSN 0126-9754; Volume 2, No. 2, pp. 73-81; In Malay-Indonesian; Copyright; Avail: Issuing Activity

In this paper we discussed reliability of prediction of critical frequency foF2 by using Auto Regression on quiet solar activity, moderate and maximum solar activity. The reliability of prediction results has been done by using verification with qualitative and quantitative correlation, based on data of prediction results and observation of MUF (Maximum Usable Frequency) for communication in various distance from 120 to 2129 km. by analyzing data of foF2 over Pontianak (0.02 S, 109.20 E), Biak (1.11 S, 13.07 E), and Sumedang (6.90 S, 107.50 E), it is obtained that reliability with using AR prediction method which is explained by standard deviation MUF varied from 1.05 MHz to 4.45 MHz and with ASAPS (Advanced Stand Alone Prediction System) prediction method varied from 2.67 MHz to 5.31 MHz in solar activity toward minimum year 1995. From dispersion of MUF between observed data and calculated data of AR prediction method is obtain correlation value which is varied from 0.61 to 0.97 for each solar activity level.
Author
Reliability; Autoregressive Processes; Regression Analysis; Prediction Analysis Techniques; Critical Frequencies; Solar Activity

20000115474 Lembaga Penerbangan dan Antariksa Nasional, Peneliti Bidang Dinamika Ionosfer, Jakarta, Indonesia

Technology of Atmosphere Wave Observations on Radar and Airglow Imaging in Support of Investigations of Atmospheric Dynamics ***Teknologi Pengamatan Gelombang Atmosfer Dengan Radar Dan Airglow Imaging (Pencitraan Airglow) Untuk Mendukung Penelitian Dinamika Atmosfer***

Martiningrum, Dyah Rahayu, Lembaga Penerbangan dan Antariksa Nasional, Indonesia; Warta LAPAN; April - June 2000; ISSN 0126-9754; Volume 2, No. 2, pp. 68-72; In Malay-Indonesian; Copyright; Avail: Issuing Activity

Atmosphere dynamics is an exciting science related to mechanism of momentum and energy circulation between equator and polar region. The sources and mechanism of the phenomena of atmospheric dynamics such as turbulence, global circulation, planetary and tidal waves have not been fully solved quantitatively yet. Investigations and studies of atmospheric dynamics, especially atmospheric waves need sufficient observational techniques. LAPAN cooperated with RASC (Kyoto University) have planned to install airglow imager system in Indonesia as an addition to MF and MW radars that have been operated before.

Author

Atmospheric Physics; Airglow; Imaging Techniques

20000115613 NASA Goddard Space Flight Center, Greenbelt, MD USA

Wave Driven Non-linear Flow Oscillator for the 22-Year Solar Cycle

Mayr, Hans G., NASA Goddard Space Flight Center, USA; Wolff, Charles L., NASA Goddard Space Flight Center, USA; Hartle, Richard E., NASA Goddard Space Flight Center, USA; August 2000; 14p; In English; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In the Earth's atmosphere, a zonal flow oscillation is observed with periods between 20 and 32 months, the Quasi Biennial Oscillation. This oscillation does not require external time dependent forcing but is maintained by non-linear wave momentum deposition. It is proposed that such a mechanism also drives long-period oscillations in planetary and stellar interiors. We apply this mechanism to generate a flow oscillation for the 22-year solar cycle. The oscillation would occur just below the convective envelope where waves can propagate. Using scale analysis, we present results from a simplified model that incorporates Hines' gravity wave parameterization. Wave amplitudes less than 10 m/s can produce reversing zonal flows of 25 m/s that should be sufficient to generate a corresponding oscillation in the poloidal magnetic field. Low buoyancy frequency and the associated increase in turbulence help to produce the desired oscillation period of the flow.

Author

Earth Atmosphere; Nonlinearity; Oscillating Flow; Oscillations; Oscillators

20000115617 NASA Goddard Space Flight Center, Greenbelt, MD USA

Mesosphere Dynamics with Gravity Wave Forcing, 1, Diurnal and Semi-Diurnal Tides

Mayr, H. G., NASA Goddard Space Flight Center, USA; Mengel, J. G., SM and A Corp., USA; Chan, K. L., Hong Kong Univ. of Science and Technology, Hong Kong; Porter, H. S., Furman Univ., USA; [2000]; 34p; In English; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We present results from a nonlinear, 3D, time dependent numerical spectral model (NSM), which extends from the ground up into the thermosphere and incorporates Hines' Doppler Spread Parameterization for small-scale gravity waves (GW). Our focal point is the mesosphere that is dominated by wave interactions. We discuss diurnal and semi-diurnal tides ill the present paper (Part 1) and planetary waves in the companion paper (Part 2). to provide an understanding of the seasonal variations of tides, in particular with regard to gravity wave processes, numerical experiments are performed that lead to the following conclusions: 1. The large semiannual variations in tile diurnal tide (DT), with peak amplitudes observed around equinox, are produced primarily by GW interactions that involve, in part, planetary waves. 2. The DT, like planetary waves, tends to be amplified by GW momentum deposition, which reduces also the vertical wavelength. 3.Variations in eddy viscosity associated with GW interactions tend to peak in late spring and early fall and call also influence the DT. 4. The semidiurnal semidiurnal tide (SDT), and its phase in particular, is strongly influenced by the mean zonal circulation. 5. The SDT, individually, is amplified by GW's. But the DT filters out GW's such that the wave interaction effectively reduces the amplitude of the SDT, effectively producing a strong nonlinear interaction between the DT and SDT. 6.) Planetary waves generated internally by baroclinic instability and GW interaction produce large amplitude modulations of the DT and SDT.

Author

Mesosphere; Amplitude Modulation; Diurnal Variations; Gravity Waves; Mathematical Models; Planetary Waves; Wave Interaction; Zonal Flow (Meteorology)

20000116114 National Geophysical Data Center, Boulder, CO USA

Solar-Geophysical Data: Data for July 1999 and Miscellaneous, Part 2, Comprehensive Reports

Coffey, Helen E., Editor, National Geophysical Data Center, USA; January 2000; ISSN 0038-0911; 78p; In English

Report No.(s): PB2000-103329; SGD-665-Pt-2; LC-79-640375; No Copyright; Avail: National Technical Information Service (NTIS)

Solar-geophysical data is reported for July 1999. Graphs, charts, and tables show solar activity through measurements taken on solar flares, solar radio bursts, solar X-ray radiation from the Geostationary Operational Environmental Satellite (GOES), active prominences and filaments, and solar irradiance. Plots of solar wind and interplanetary magnetic field strengths are shown.

CASI

Geophysics; Graphs (Charts); Light (Visible Radiation); Magnetic Flux; Solar Activity; Solar Flares; Solar Physics; Solar Prominences; Solar Radiation; Solar Radio Bursts; Solar Wind; Solar X-Rays

20000116124 Joint Inst. for Lab. Astrophysics, Boulder, CO USA

State-to-State Thermal/Hyperthermal Collision Dynamics of Atmospheric Species ***Final Report, 1 Jun 1997-31 May 2000***

Nesbitt, David J.; Aug. 31, 2000; 6p; In English

Contract(s)/Grant(s): F49620-97-1-0458

Report No.(s): AD-A382278; JILA-153-1108; AFRL-SR-BL-TR-00-0452; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Direct absorption IR laser methods developed under AFOSR support have been study state-to-state reactive scattering dynamics in collisions systems under crossed supersonic jet, single collision conditions. Time resolved flash kinetic studies of the OH/HO2/O3 chemical chain reaction has been performed from 300K down to 190K, providing first access to temperature conditions relevant to accurate modeling of the lower stratosphere. Most recently, these methods have been extended to study ”airglow” dynamics of highly rotationally excited OH(v,N) radicals formed from H+O3 reactions.

DTIC

Chemical Reactions; Atmospheric Chemistry; Particle Collisions; Radicals; Supersonic Jet Flow

20000116142 NASA Goddard Space Flight Center, Greenbelt, MD USA

A New View of Earthquake Ground Motion Data: The Hilbert Spectral Analysis

Huang, Norden, NASA Goddard Space Flight Center, USA; [2000]; 1p; In English; Chi-Chi Earthquake Conference, 18-20 Sep. 2000, Taipei, Taiwan, Province of China; No Copyright; Avail: Issuing Activity; Abstract Only

A brief description of the newly developed Empirical Mode Decomposition (ENID) and Hilbert Spectral Analysis (HSA) method will be given. The decomposition is adaptive and can be applied to both nonlinear and nonstationary data. Example of the method applied to a sample earthquake record will be given. The results indicate those low frequency components, totally missed by the Fourier analysis, are clearly identified by the new method. Comparisons with Wavelet and window Fourier analysis show the new method offers much better temporal and frequency resolutions.

Author

Earth Movements; Earthquakes; Spectrum Analysis; Temporal Resolution; Wavelet Analysis

20000116165 Geological Survey, Reston, VA USA

Geologic Studies in Alaska by the US Geologic Survey, 1997

Kelley, Karen D., Editor, Geological Survey, USA; 1997; 168p; In English

Report No.(s): PB2000-103307; USGS/PP-1614; No Copyright; Avail: Issuing Activity

The eight papers that follow continue the series of U.S. Geological Survey (USGS) reports on investigations in the geologic sciences in Alaska. The series presents new and sometimes preliminary findings that are of interest to earth scientists in academia, government, and industry; to land and resource managers; and to the general public. Reports presented in Geologic Studies in Alaska over a broad spectrum of topics from all parts of the State, which serves to emphasize the diversity of USGS efforts to meet the Nation’s needs for earth-science information in Alaska. The papers in this volume are organized under the topics Resources, Geologic Framework, and Environment and Climate. Such an organization is intended to reflect the scope and objectives of USGS programs currently active in Alaska. Two bibliographies at the end of the volume present reports about Alaskan earth sciences in USGS publications during 1997, and reports about Alaska by USGS authors in non-USGS publications during the same period.

Derived from text

Alaska; Climate; Earth Sciences; Geological Surveys; Surveys

20000116167 National Geophysical Data Center, Boulder, CO USA

Solar-Geophysical Data: Data for November and December 1999, Part 1, Prompt Reports

Coffey, Helen E., Editor, National Geophysical Data Center, USA; January 2000; ISSN 0038-0911; 162p; In English

Report No.(s): PB2000-103328; SGD-665-Pt-1; LC-79-640375; No Copyright; Avail: National Technical Information Service (NTIS)

Solar-geophysical data is reported for December 1999. Graphs, charts, and tables show solar activity through indices such as daily sunspot numbers, daily solar flux, solar flares, intervals of no flare patrol, and solar radio emission. Plots of Geostationary Operational Environmental Satellite (GOES) X-rays, particles, and magnetometer data are shown.

CASI

Geophysics; Graphs (Charts); Magnetic Fields; Solar Activity; Solar Flares; Solar Flux; Solar Physics; Solar Radio Emission; Sunspots; X Rays

20000116212 NASA Goddard Space Flight Center, Greenbelt, MD USA

What Controls the Temperature of the Arctic Stratosphere during the Spring?

Newman, Paul A., NASA Goddard Space Flight Center, USA; Nash, Eric R., Emergent Information Technologies, Inc., USA; Rosenfield, Joan E., General Sciences Corp., USA; [2000]; 41p; In English; Original contains color illustrations; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Understanding the mechanisms that control the temperature of the polar lower stratosphere during spring is key to understanding ozone loss in the Arctic polar vortex. Spring ozone loss rates are directly tied to polar stratospheric temperatures by the formation of polar stratospheric clouds, and the conversion of chlorine species to reactive forms on these cloud particle surfaces. In this paper, we study those factors that control temperatures in the polar lower stratosphere. We use the National Centers for Environmental Prediction (NCEP)/NCAR reanalysis data covering the last two decades to investigate how planetary wave driving of the stratosphere is connected to polar temperatures. In particular, we show that planetary waves forced in the troposphere in mid- to late winter (January-February) are principally responsible for the mean polar temperature during the March period. These planetary waves are forced by both thermal and orographic processes in the troposphere, and propagate into the stratosphere in the mid and high latitudes. Strong mid-winter planetary wave forcing leads to a warmer Arctic lower stratosphere in early spring, while weak mid-winter forcing leads to cooler Arctic temperatures.

Author

Arctic Regions; Atmospheric Temperature; Ice Clouds; Ozone; Planetary Waves; Polar Meteorology; Polar Regions; Stratosphere; Troposphere

20000116349 Environmental Protection Agency, Research Triangle Park, NC USA

New Land-Surface Model in MM5

Pleim, J. E.; Xiu, A.; 2000; 8p; In English

Report No.(s): PB2001-100182; EPA/600/A-00/076; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

There has recently been a general realization that more sophisticated modeling of land-surface processes can be important for mesoscale meteorology models. Land-surface models (LSMs) have long been important components in global-scale climate models because of their more complete representation of the surface energy and moisture budgets as well as their ability to represent and respond to changing climatic conditions and changing ecosystems. For mesoscale meteorology modeling such long-term changes are not important, however, seasonal changes in vegetation and synoptic changes in surface moisture conditions have important effects on meteorological simulations. Surface processes, such as soil moisture and canopy conductance, control the partitioning of net radiation into sensible, latent, and ground heat fluxes which in turn have strongly influenced ground level air temperature and humidity as well as PBL development. Since these parameters are especially important for air quality modeling, inclusion of a sophisticated LSM is critical for air quality modeling studies. Furthermore, the dry deposition component of the air quality model can greatly benefit by direct use of LSM parameters such as bulk stomatal conductance and aerodynamic resistance.

NTIS

Environment Models; Climate Models; Atmospheric Models; Mesometeorology; Mesoscale Phenomena; Climatology

20000116372 State Univ. of New York, Research Foundation, Albany, NY USA

Idealized Modeling Studies of Long-Lived Large Amplitude Inertia Gravity Waves ***Final Report, 1 Sep. 1995-31 Aug. 1999***

Bosart, Lance F.; Keyser, Daniel; Dec. 01, 1999; 12p; In English

Contract(s)/Grant(s): F49620-95-1-0492

Report No.(s): AD-A382539; AFRL-SR-BL-TR-00-0487; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

AFOSR/ASSERT funds for FY-99 have been used in support of: (1) continuing research designed to elicit the three-dimensional structure and evolution of large-scale environments conducive to the formation and presence of long-lived large-amplitude inertia-gravity waves (IGW): (2)IGW case studies IGWs in support of (1); and (3) the preparation and submission of manuscripts describing previously completed research findings for formal publication (abstracts are attached elsewhere to this report). The results from (2) show that a significant mesoscale pressure disturbance passes through the Flatland Atmospheric Observatory just after 1600 UTC 28 April 1996. This originated over northeastern KS and is associated with the back edge of a stratiform rain region which extends north of mesoscale convective system. NCEP Reanalyses and NWS soundings show that this convective event occurs in a region with many characteristics of an inertia-gravity wave environment (see report for FYs 97 and 98). The 50 MHz profiler shows that the wave is associated with strong downward motion in the middle troposphere. It is hypothesized that this downward motion penetrates into the low-level stable layer creating substantial adiabatic warming and hence driving the pressure falls observed at the surface.
DTIC
Climatology; Gravity Waves; Wavelet Analysis; Mesoscale Phenomena

20000116385 NASA Goddard Space Flight Center, Greenbelt, MD USA
PV Theories For Planetary Atmospheric Circulations
Allison, Michael, NASA Goddard Space Flight Center, USA; [2000]; 1p; In English; Geophysical Fluid Dynamics Program, 17-21 Jun. 2000, Woods Hole, MA, USA; No Copyright; Avail: Issuing Activity; Abstract Only

Potential vorticity (or PV) has become an important tool for the diagnosis and modeling of the Earth's atmospheric and oceanic circulations. More recently, the application of PV thinking to numerical simulations and spacecraft observations of other atmospheres, including those of Mars, Venus, and Titan, has encouraged the hope for a unified understanding of planetary circulation regimes encompassing a wide range of rotation, stratification, and forcing parameters. Specifically, the accumulated evidence suggests that zonal-mean winds and temperatures at upper tropospheric levels approximate a state of zero potential vorticity within the bounding latitudes of the westerly jets, while the poleward regions of cyclonic shear conform to a PV state that is well mixed with respect to its polar limit. This review of the prospects for conceptual planetary circulation models will explore the possibility that the zonal-mean state of an atmosphere can be calculated in terms of a simple link between the latitudinal PV and potential temperature variation at an upper baroclinic steering level.
Author
Atmospheric Models; Baroclinity; Planetary Atmospheres; Vorticity; Planetary Environments

20000116404 NASA Langley Research Center, Hampton, VA USA
Advanced Concepts, Technologies and Flight Experiments for NASA's Earth Science Enterprise
Meredith, Barry D., NASA Langley Research Center, USA; [2000]; 6p; In English; Space 2000, 19-21 Sep. 2000, Long Beach, CA, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Report No.(s): AIAA Paper 2000-5177; Copyright Waived; Avail: CASI; A02, Hardcopy; A01, Microfiche

Over the last 25 years, NASA Langley Research Center (LaRC) has established a tradition of excellence in scientific research and leading-edge system developments, which have contributed to improved scientific understanding of our Earth system. Specifically, LaRC advances knowledge of atmospheric processes to enable proactive climate prediction and, in that role, develops first-of-a-kind atmospheric sensing capabilities that permit a variety of new measurements to be made within a constrained enterprise budget. These advances are enabled by the timely development and infusion of new, state-of-the-art (SOA), active and passive instrument and sensor technologies. In addition, LaRC's center-of-excellence in structures and materials is being applied to the technological challenges of reducing measurement system size, mass, and cost through the development and use of space-durable materials; lightweight, multi-functional structures; and large deployable/inflatable structures. NASA Langley is engaged in advancing these technologies across the full range of readiness levels from concept, to components, to prototypes, to flight experiments, and on to actual science mission infusion. The purpose of this paper is to describe current activities and capabilities, recent achievements, and future plans of the integrated science, engineering, and technology team at Langley Research Center who are working to enable the future of NASA's Earth Science Enterprise.
Author
Earth Sciences; Research and Development; Spacecraft Construction Materials; Technologies; Technology Utilization

47
METEOROLOGY AND CLIMATOLOGY

Includes weather observation forecasting and modification

20000115616 NASA Goddard Space Flight Center, Greenbelt, MD USA
Intercomparison of Global Precipitation Products: The Third Precipitation Intercomparison Project (PIP-3)
Adler, Robert F., NASA Goddard Space Flight Center, USA; Kidd, Christopher, Birmingham Univ., UK; Petty, Grant, Wisconsin Univ., USA; Morrissey, Mark, Oklahoma Univ., USA; Goodman, H. Michael, NASA Marshall Space Flight Center, USA; [2000]; 55p; In English; Original contains color illustrations; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A set of global, monthly rainfall products has been intercompared to understand the quality and utility of the estimates. The products include 25 observational (satellite-based), four model and two climatological products. The results of the intercomparison indicate a very large range (factor of two or three) of values when all products are considered. The range of values is reduced considerably when the set of observational products is limited to those considered quasi-standard. The model products do significantly poorer in the tropics, but are competitive with satellite-based fields in mid-latitudes over land. Over ocean, products are compared to frequency of precipitation from ship observations. The evaluation of the observational products point to merged data products (including rain gauge information) as providing the overall best results.
Author
Climatology; Estimates; Precipitation (Meteorology); Observation

20000116176 Los Alamos National Lab., NM USA
Mean Flow and Turbulence Measurements Around a 2-D Array of Buildings in a Wind Tunnel
Brown, M. J.; Lawson, R. E.; DeCroix, D. S.; Lee, R. L.; 2000; 10p; In English
Report No.(s): PB2000-107423; EPA/600/A-00/011; No Copyright; Avail: National Technical Information Service (NTIS)

In order to predict the dispersion of harmful materials released in or near an urban environment, it is important to first understand the complex flow patterns which result from the interaction of the wind with buildings and, more commonly, clusters of buildings. Recent advances in the application of computational fluid dynamics (CFD) models to such problems have shown great promise, but there is a need for high-quality data with which to evaluate CFD models. This study was performed to fill that need for a limited range of conditions. High-resolution measurements of the three coponenets of the mean and turbulent velocity statistics were obtained around a 2-D array of model buildings in the USEPA meteorological wind tunnel. In this paper, we briefly review prior field and laboratory experiments on building flows, describe our experimental set-up and measurement apparatus, present the flow measurements, and discuss their significance in relation to current understanding.
NTIS
Environment Protection; Flow Measurement; Flow Distribution; Atmospheric Turbulence

20000116288 Colorado State Univ., Dept. of Atmospheric Science, Fort Collins, CO USA
Rooftop and Ground Standard Temperatures: A Comparison of Physical Differences
Griffith, Brian D.; Jan. 2000; 59p; In English
Report No.(s): AD-A380992; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Accuracy and continuity of surface air temperature measurements are critical for many meteorological activities including short-term weather forecasting, warnings, and climate monitoring. In addition, surface air temperature records are widely used by the private sector for activities such as energy demand planning and the public sector through media forecast outlets, Surface air temperature is probably the most publicly familiar and widely used meteorological variable.
Derived from text
Atmospheric Temperature; Meteorology; Surface Temperature; Climate; Forecasting; Meteorological Parameters

20000116360 NASA Goddard Space Flight Center, Greenbelt, MD USA
Design and Performance of McRas in SCMs and GEOS I/II GCMs
Sud, Yogesh C., NASA Goddard Space Flight Center, USA; [2000]; 1p; In English; Cloud Physics in Models, 26 Sep. 2000, Tallassee, FL, USA; No Copyright; Avail: Issuing Activity; Abstract Only

The design of a prognostic cloud scheme named McRAS (Microphysics of clouds with Relaxed Arakawa-Schubert Scheme) for general circulation models (GCMs) will be discussed. McRAS distinguishes three types of clouds: (1) convective, (2) stratiform, and (3) boundary-layer types. The convective clouds transform and merge into stratiform clouds on an hourly time-scale, while the boundary-layer clouds merge into the stratiform clouds instantly. The cloud condensate converts into precipitation following the auto-conversion equations of Sundqvist that contain a parametric adaptation for the Bergeron-Findeisen process of

ice crystal growth and collection of cloud condensate by precipitation. All clouds convect, advect, as well as diffuse both horizontally and vertically with a fully interactive cloud-microphysics throughout the life-cycle of the cloud, while the optical properties of clouds are derived from the statistical distribution of hydrometeors and idealized cloud geometry. An evaluation of McRAS in a single column model (SCM) with the GATE Phase III and 5-ARN CART datasets has shown that together with the rest of the model physics, McRAS can simulate the observed temperature, humidity, and precipitation without many systematic errors. The time history and time mean incloud water and ice distribution, fractional cloudiness, cloud optical thickness, origin of precipitation in the convective anvil and towers, and the convective updraft and downdraft velocities and mass fluxes all show a realistic behavior. Performance of McRAS in GEOS 11 GCM shows several satisfactory features but some of the remaining deficiencies suggest need for additional research involving convective triggers and inhibitors, provision for continuously detraining updraft, a realistic scheme for cumulus gravity wave drag, and refinements to physical conditions for ascertaining cloud detrainment level. Author

Atmospheric General Circulation Models; Cloud Cover; Cloud Physics; Condensates; Convection

20000116401 Federal Aviation Administration, William J. Hughes Technical Center, Atlantic City, NJ USA

Juneau Terrain Induced Turbulence Project: FAR, Part 121, User Needs

Benner, William; Carty, Thomas; McGettigan, Starr; May 2000; 77p; In English

Report No.(s): AD-A382116; DOT/FAA/CT-TN99/19; No Copyright; Avail: CASI; A01, Microfiche; A05, Hardcopy

Juneau International Airport (PAJN), Alaska, has a combination of extreme terrain features and adverse weather patterns that creates moderate to severe Terrain Induced Turbulence. As a result of this turbulence, the Federal Aviation Administration (FAA) has funded the National Center for Atmospheric Research (NCAR) to develop a Wind Hazard Information System (WHIS) for use by aviation users. This report describes the user needs assessment of the Juneau Terrain Induced Turbulence Project by ACT-320. Current practices were base lined and wind information needs were identified and defined for FAR Part 121 Pilots and Airline Dispatchers. Surveys and on-site interviews were used to gather information. Part 121 Pilots and Dispatchers are most impacted by the operations specification currently in place. Pilots are most concerned about wind shear and turbulence in the vicinity of the airport, in the Gastineau Channel, and near Taku Inlet.

DTIC

Terrain; Information Systems; Atmospheric Turbulence

20000116411 Naval Pacific Meteorology and Oceanography Center/Joint Typhoon Warning Center, Pearl Harbor, HI USA

Tropical Cyclone Report *Annual Report, 1999*

McPherson, Terry; Stapler, Wendell; Jan. 1999; 216p; In English

Report No.(s): AD-A381672; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

Tropical cyclone genesis regions compared to the 15-year average are shown. This year's tropical cyclones are listed. The monthly distribution of tropical cyclones for each year since 1959 are shown and the monthly average occurrence of tropical storms separated into: (1) typhoons only; and (2) tropical storms and typhoons. A summary of this year's Tropical Cyclone Formation Alerts is shown. The annual number of tropical cyclones of tropical storm strength and higher and the number of super typhoons are shown. Composites of the tropical cyclone best tracks for the North West Pacific is also shown.

DTIC

Typhoons; Cyclones

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.

20000115605 NASA Goddard Space Flight Center, Greenbelt, MD USA

Significant Findings: Seasonal Distributions of Global Ocean Chlorophyll and Nutrients With a Coupled Ocean General Circulation, Biogeochemical, and Radiative Model, 2, Comparisons With Satellite and In Situ Data

Gregg, Watson W., NASA Goddard Space Flight Center, USA; [2000]; 38p; In English

Contract(s)/Grant(s): RTOP 622-51-31; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A coupled ocean general circulation, biogeochemical, and radiative model was constructed to evaluate and understand the nature of seasonal variability of chlorophyll and nutrients in the global oceans. Biogeochemical processes in the model were determined from the influences of circulation and turbulence dynamics, irradiance availability, and the interactions among three func-

tional phytoplankton groups (diatoms, chlorophytes, and picoplankton) and three nutrients (nitrate, ammonium, and silicate). Basin scale (>1000 km) model chlorophyll seasonal distributions were statistically positively correlated with CZCS chlorophyll in 10 of 12 major oceanographic regions, and with SeaWiFS in all 12. Notable disparities in magnitudes occurred, however, in the tropical Pacific, the spring/summer bloom in the Antarctic, autumn in the northern high latitudes, and during the southwest monsoon in the North Indian Ocean. Synoptic scale (100-1000 km) comparisons of satellite and in situ data exhibited broad agreement, although occasional departures were apparent. Model nitrate distributions agreed with in situ data, including seasonal dynamics, except for the equatorial Atlantic. The overall agreement of the model with satellite and in situ data sources indicated that the model dynamics offer a reasonably realistic simulation of phytoplankton and nutrient dynamics on basin and synoptic scales.
Author
Annual Variations; Seasons; Ocean Models; Ocean Dynamics; Biogeochemistry; In Situ Measurement; Remote Sensing

20000116171 National Marine Fisheries Service, Pascagoula, MS USA
Hierarchical Estimation of Oceanic Surface Velocity Fields from Satellite Imagery
Leming, Thomas D., National Marine Fisheries Service, USA; November 1999; 234p; In English
Report No.(s): PB2000-103292; NOAA-TM-NMFS-SEFSC-431; No Copyright; Avail: National Technical Information Service (NTIS)

Oceanic surface velocity fields are objectively estimated from time-sequential satellite images of sea-surface temperature from the Advanced Very High Resolution Radiometer on board with National Oceanic and Atmospheric Administration's polar orbiters. The hierarchical technique uses the concept of image pyramids and multi-resolution grids for increased computational efficiency. Images are Gaussian filtered and sub-sampled from fine to coarse grid scales. The number of pyramid levels is selected such that the maximum expected velocity in the image results in a displacement of less than one pixel at the coarsest spatial scale. Maximum Cross-Correlation at the sub-pixel level with orthogonal polynomial approximation is used to compute a velocity field at each level of the pyramid which is then iterated assuming a locally linear velocity field. The first image at the next finer level of the pyramid is warped towards the second image by the calculated velocity field. At each succeeding finer grid scale, the velocity field is updated and process repeated. The final result is an estimated velocity at each pixel at the finest resolution of the imagery. There are no free parameters as used in some gradient-based approaches and the only assumption is that the velocity field is locally linear. Test cases are shown using both simulated and real images with numerically simulated velocity field which demonstrate the accuracy of the technique. Results are compared to gradient-based techniques using concepts of optical flow and projection onto convex sets and to the standard maximum cross-correlation technique. The hierarchical computations for a real satellite image numerically advected by a rotational sheared flow recover the original field with a rms speed error of 12.6 percent and direction error of 4.9 deg. Hierarchically-estimated velocity fields from real image pairs are compared to ground-truth estimates of the velocity from satellite-tracked drifters in the eastern Gulf of Mexico. Results indicate the technique underestimates daily mean buoy vector speeds, but with reasonable good direction. The problems of ground truth relations to hierarchically computed flows are discussed with regard to mismatches of time and space scales of measurement.
Author
Cross Correlation; Estimating; Pixels; Satellite Imagery; Velocity Distribution; Oceanography

20000116202 National Environmental Satellite Service, Suitland, MD USA
OCTS and Seawifs Bio-Optical Algorithm and Product Vaildattion and Intercomparison in US Coastal Waters ***Final Report, 21 Jul. 1997 - 20 Jul. 2000***
Brow, Chirstopher, National Environmental Satellite Service, USA; Subramaniam, Ajit, Maryland Univ., USA; Culver, Mary, National Oceanic and Atmospheric Administration, USA; Brock, John C., Geological Survey, USA; [2000]; 11p; In English; Original contains color illustrations
Contract(s)/Grant(s): NASA Order S-97879-F; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Monitoring the health of U.S. coastal waters is an important goal of the National Oceanic and Atmospheric Administration (NOAA). Satellite sensors are capable of providing daily synoptic data of large expanses of the U.S. coast. Ocean color sensor, in particular, can be used to monitor the water quality of coastal waters on an operational basis. to appraise the validity of satellite-derived measurements, such as chlorophyll concentration, the bio-optical algorithms used to derive them must be evaluated in coastal environments. Towards this purpose, over 21 cruises in diverse U.S. coastal waters have been conducted. of these 21 cruises, 12 have been performed in conjunction with and under the auspices of the NASA/SIMBIOS Project. The primary goal of these cruises has been to obtain in-situ measurements of downwelling irradiance, upwelling radiance, and chlorophyll concentrations in order to evaluate bio-optical algorithms that estimate chlorophyll concentration. In this Technical Memorandum, we evaluate the ability of five bio-optical algorithms, including the current SeaWiFS algorithm, to estimate chlorophyll concentra-

tion in surface waters of the South Atlantic Bight (SAB). The SAB consists of a variety of environments including coastal and continental shelf regimes, Gulf Stream waters, and the Sargasso Sea. The biological and optical characteristics of the region is complicated by temporal and spatial variability in phytoplankton composition, primary productivity, and the concentrations of colored dissolved organic matter (CDOM) and suspended sediment. As such, the SAB is an ideal location to test the robustness of algorithms for coastal use.
Author
Bays (Topographic Features); Chlorophylls; Coastal Water; Dissolved Organic Matter; Surface Water; Phytoplankton; Algorithms

20000116203 NASA Goddard Space Flight Center, Greenbelt, MD USA
Estimates of Internal Tide Energy Fluxes from TOPEX/Poseidon Altimetry: Central North Pacific
Ray, Richard D., NASA Goddard Space Flight Center, USA; Cartwright, David E., Southampton Oceanography Centre, UK; [2000]; 15p; In English; Original contains color illustrations; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Energy fluxes for first-mode M(sub 2) internal tides are deduced throughout the central North Pacific Ocean from TOPEX/Poseidon satellite altimeter data. Temporally coherent internal tide signals in the altimetry, combined with climatological hydrographic data, determine the tidal displacements, pressures, and currents at depth, which yield power transmission rates. For a variety of reasons the deduced rates should be considered lower bounds. Internal tides were found to emanate from several large bathymetric structures, especially the Hawaiian Ridge, where the integrated flux amounts to about six gigawatts. Internal tides are generated at the Aleutian Trench near 172 deg west and propagate southwards nearly 2000 km.
Author
Displacement; Estimates; Internal Energy; Tides; Altimetry

20000116222 Naval Postgraduate School, Monterey, CA USA
Transient Localization in Shallow Water Environments with a Vertical Line Array
Tas, Gerard; Jun. 2000; 89p; In English
Report No.(s): AD-A381469; No Copyright; Avail: Defense Technical Information Center (DTIC)

Several algorithms based on autocorrelation matching of multiple hydrophone elements in a vertical line array have been developed to localize a broadband transient signal. An earlier developed frequency-domain autocorrelation matching (FACM) algorithm was based on autocorrelation matching of only a single hydrophone. The success and robustness of this algorithm in the presence of environmental mismatch was the motivation to adapt it to include the additional information of multiple hydrophones. The new algorithms developed were based on joint autocorrelation matching, specifically depth- and frequency-domain autocorrelation matching ((KzFACM)), wavenumber- and frequency-domain autocorrelation matching (ZFACM), and an incoherent summation of the FACM results of all the elements in a vertical line array (lFACM). These algorithms were tested in simple, shallow water environments with and without mismatch in the specification of acoustic parameters (e.g., bathymetry and sound speed). The results suggest that the use of the additional information from multiple elements does improve both the accuracy and robustness of the localizations. All of the algorithms produced similar results, although the lFACM and the KzFACM algorithms appeared to perform slightly better than the ZFACM algorithm in the presence of mismatch. However, the relative performance of the algorithms appeared to be sensitive to the environment and placement of the source and receivers in the waveguide.
DTIC
Algorithms; Autocorrelation; Data Correlation; Shallow Water; Hydrophones

20000116353 Alaska Univ., Fairbanks, AK USA
University of Alaska Coastal Marine Institute, Annual Report No. 6, Fiscal Year 1999
June 2000; 98p; In English
Report No.(s): PB2000-108515; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

Contents include: Kachemak Bay Experimental and Monitoring Studies; Wind Field Representations and Their Effect on Shelf Circulation Models: A Case Study in the Chukchi Sea; Historical Changes in Trace Metals and Hydrocarbons in the Inner Shelf Sediments, Beaufort Sea: Prior and Subsequent to Petroleum-Related Industrial Developments; An Economic Assessment of the Marine Sport Fisheries for Halibut, and Chinook and Coho Salmon in Lower Cook Inlet; The Relationship of Diet to Habitat Preferences of Juvenile Flatfishes in Kachemak Bay, Alaska: Phase I; Feeding Ecology of Maturing Sockeye Salmon (Oncorhynchus nerka) in Nearshore Waters of the Kodiak Archipelago; Correction Factor for Ringed Seal Surveys in Northern Alaska; Circulation, Thermohaline Structure, and Cross-Shelf Transport in the Alaskan Beaufort Sea; The Alaskan Frozen Tissue Collection

and Associated Electronic Database: A Resource for Marine Biotechnology, Phase II; New Projects; Funding Summary; and University of Alaska CMI Publications.
NTIS
Alaska; Coastal Water; Marine Biology

20000116592 Naval Postgraduate School, Monterey, CA USA
The Role of the Planetary Beta Effect on Currents and Meddies in the Northern Canary Current System
Murray, Patrick J., Naval Postgraduate School, USA; June 2000; 115p; In English
Report No.(s): AD-A380248; No Copyright; Avail: Defense Technical Information Center (DTIC)

To investigate the role of planetary beta on classical as well as unique features in the northern Canary Current System (NCCS), four numerical experiments are conducted with varying Coriolis parameterizations (f-plane or beta plane). The first two experiments use a closed boundary and annual salinity forcing for the Mediterranean Outflow (MO). The latter two experiments use an open Mediterranean Sea at the Strait of Gibraltar and seasonal forcing for MO to permit a more accurate investigation of the role of the beta effect on subsurface spreading of MO and Meddies. All four experiments use seasonal climatological winds and seasonal thermohaline gradients along the western boundary to force the model. Experiments run on a beta-plane (Experiments 2 and 4) accurately portray classical eastern boundary current (EBC) mesoscale features. In addition, these experiments depict unique NCCS features associated with a large embayment (the Gulf of Cadiz), poleward spreading of MO, and the generation of Meddies. Experiments run on an f-plane (Experiments 1 and 3) show the unrealistic dominance of a continuously strengthening equatorward jet that inhibits development of classical EBC and unique NCCS features. The complex upper layer and subsurface flow regimes of Experiment 4 most realistically portray currents, mesoscale features and Meddies similar to NCCS observations.
DTIC
Ocean Currents; Thermodynamic Properties; Mediterranean Sea; Oceanography; Climatology; Mesoscale Phenomena

20000116598 Massachusetts Inst. of Tech., Cambridge, MA USA
Zinc and Cadmium in Benthic Foraminifera as Tracers of Ocean Paleochemistry
Marchitto, Thomas M., Jr.; February 2000; 204p; In English
Contract(s)/Grant(s): NSF OCE-94-02804; NSF OCE-95-03135; NSF OCE-96-33499; JSG-CY-12-4
Report No.(s): AD-A380183; MIT/WHOI-00-07; No Copyright; Avail: Issuing Activity

Benthic foraminiferal delta 13-C, Cd/Ca, and Ba/Ca are important tools for reconstructing nutrient distributions, and thus ocean circulation, on glacial-interglacial timescales. However, each tracer has its own ”artifacts” that can complicate paleoceanographic interpretations. It is therefore advantageous to measure multiple nutrient proxies with the aim of separating the various complicating effects. Zn/Ca is introduced as an important aid toward this goal. Benthic (Hoeglundina elegans) Cd/Ca ratios from the Bahama Banks indicate that the North Atlantic subtropical gyre was greatly depleted in nutrients during the last glacial maximum (LGM). A high-resolution Cd/Ca record from 965 m water depth suggests that Glacial North Atlantic Intermediate Water formation was strong during the LGM, weakened during the deglaciation, and strengthened again during the Younger Dryas cold period. Comparison of Cd/Ca and delta C-13 data reveals apparent short-term changes in carbon isotopic air-sea signatures.
DTIC
Ocean Currents; Zinc; Cadmium; Air Water Interactions; Glaciers; Oceanography; Paleontology; Atlantic Ocean; Isotopic Labeling

20000116601 Naval Research Lab., Ocean Sciences Branch, Bay Saint Louis, MS USA
Boundary Conditions in the Pacific West Coast Princeton Ocean Model of CoBALT *Final Report*
Rochford, Peter A., Naval Research Lab., USA; Shulman, Igor, University of Southern Mississippi, USA; Jul. 19, 2000; 18p; In English
Report No.(s): AD-A379994; NRL/MR/7330-00-8245; No Copyright; Avail: Defense Technical Information Center (DTIC)

The boundary conditions (BCs) implemented in the Pacific West Coast (PWC) version of the Princeton Ocean Model (POM) as developed at the Naval Research Laboratory (NRL) are described. BCs for the barotropic velocities along the open boundaries are a Flather form for the normal component and an advective form for the tangential component with matching to externally supplied transports. Baroclinic velocities use a radiational BC for the normal component, and an advectional BC for the tangential component. Sea surface height, temperature, and salinity use radiational or advective BCs. Simple relaxation techniques are used for the assimilation of sea surface temperature (SST) and sea surface salinity (SSS). The interior state of the ocean is maintained by relaxation to a monthly climatology. A zero gradient boundary condition is applied for the vertical velocity, a clamped condition

is applied to the turbulent kinetic energy and turbulent length scale. The explicit treatment of these BCs is given here to serve as a reference for PWC POM users.
DTIC
Ocean Models; Ocean Surface; Boundary Conditions; Ocean Currents; Turbulence; Climatology; Coasts

20000116604 Massachusetts Inst. of Tech., Cambridge, MA USA
Mechanisms and Variability of Salt Transport in Partially-Stratified Estuaries
Bowen, Melissa Marie; February 2000; 172p; In English; Sponsored in part by Hudson River Foundation
Contract(s)/Grant(s): N00014-97-1-0134; NSF OCE-94-15617; HRF-006/96A; NOAA-NA-46RG0470; WHOI Proj. R/O-30
Report No.(s): AD-A380123; MIT/WHOI-00-04; No Copyright; Avail: Issuing Activity

The variability of salt transport determines the variation of the length of the salinity intrusion and the large-scale density gradient in an estuary. This thesis contains three studies that address salt transport and the salt balance. The variation of salt transport with the depth, the along-channel salinity gradient, and the amplitude of the tidal velocity is investigated with analytic and numerical models. The results indicate that salt transport increases dramatically during stratified periods when vertical mixing is weak. Analysis of salt transport from observations in the Hudson Estuary show that stratified periods with elevated estuarine salt transport occur in five-day intervals once a month during apogean neap tides. Oscillatory salt transport, which is hypothesized to be primarily caused by lateral exchange and mixing of salt, appears to play a more minor role in the salt balance of the estuary. The salt balance of the estuary adjusts very little to the spring-neap modulation of salt transport but adjusts rapidly to pulses of freshwater flow. A simple model is used to investigate the process and time scales of adjustment of the salt balance by connecting variations of salt transport to the variations of freshwater flow and vertical mixing. The results show the length of the salinity intrusion adjust via advection to rapid and large increases in freshwater flow. The salinity intrusion adjusts more rapidly to the spring-neap cycle of tidal mixing the higher the freshwater flow.
DTIC
Salinity; Mixing; Estuaries; Mathematical Models; Water Flow; Sediment Transport; Tides

20000117659 Woods Hole Oceanographic Inst., Applied Ocean Physics and Engineering, MA USA
Spatial Coherence and Crest-length Statistics of Waves ***Final Report, 1999 - 2000***
Elgar, Steve, Woods Hole Oceanographic Inst., USA; Herbers, T. H. C., Naval Postgraduate School, USA; Sep. 02, 2000; 3p; In English
Contract(s)/Grant(s): N00014-99-1-1070
Report No.(s): AD-A381747; No Copyright; Avail: CASI; A01, Microfiche; A01, Hardcopy

The methodology to simulate realizations of a nonlinear sea surface with a specified frequency-directional spectrum and a specified bispectrum has been developed. The simulation algorithm accounts for interactions between waves travelling in different directions. The target wavenumber spectrum can be obtained from observations, the output of a wave prediction model, or theory. The target bispectrum can be obtained from observations or from second-order nonlinear theory given the wavenumber spectrum. The bispectrum estimated from the wavenumber spectrum from LIDAR observations and second-order theory compares well with the bispectrum estimated directly from the images of approximately 1 m high waves in 20-30 m water depth near the North Carolina coast. Third-order statistics of the sea surfaces obtained from numerical simulations using the observed wavenumber spectrum and either the observed or theoretical bispectrum compare well with the statistics of the observed sea surface, verifying both the simulation technique and second-order nonlinear theory.
Author
Water Depth; Ocean Surface; Mathematical Models; Nonlinearity; Surface Waves; Spectrum Analysis; Seas

20000117708 Naval Postgraduate School, Monterey, CA USA
Swell Transformation Across the Continental Shelf
Tinder, Cynthia Viernes, Naval Postgraduate School, USA; June 2000; 72p; In English
Report No.(s): AD-A380797; No Copyright; Avail: Defense Technical Information Center (DTIC)

A preliminary analysis of swell decay across the continental shelf was conducted using data from the SHOaling Waves EXperiment (SHOWEX). Six Datawell Directional Waverider buoys were deployed along a cross-shelf transect, offshore of Duck, North Carolina during an active hurricane season in the fall of 1999.
DTIC
Continental Shelves; Ocean Dynamics; Waves

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.

20000116166 National Bioethics Advisory Commission, Rockville, MD USA
Research Involving Human Biological Materials: Ethical Issues and Policy Guidance, Executive Summary
August 1999; 14p; In English
Report No.(s): PB2000-103305; No Copyright; Avail: National Technical Information Service (NTIS)

Biomedical researchers have long studied human biological materials--such as cells collected in research projects, biopsy specimens obtained for diagnostic purposes, and organs and tissues removed during surgery--to increase knowledge about human diseases and to develop better means of preventing, diagnosing, and treating these diseases. Today, new technologies and advances in biology provide even more effective tools for using such resources to improve medicine's diagnostic and therapeutic potential. Yet, the very power of these technologies raises a number of important ethical issues. In this report, National Bioethics Advisory Commission (NBAC) offers a series of recommendations that have been developed to address perceived difficulties in the interpretation of federal regulations and in the language of position statements of some professional organizations; ensure that research involving human biological materials will continue to benefit from appropriate oversight and review, the additional burdens of which are kept to a minimum; provide investigators and Institutional Review Boards (IRBs) with clear guidance regarding the use of human biological materials in research, particularly with regard to informed consent; provide a coherent public policy for research in this area that will endure for many years and be responsive to new developments in science, and provide the public with increased confidence in research that makes use of human biological materials. In particular, this report provides interpretation to several important concepts and terms in the Common Rule and recommends ways both to strengthen and clarify the regulations and to make the implementation more consistent.
Derived from text
Diseases; Organizations; Policies; Regulations; Ethics; Research; Bioassay

20000116331 NASA Johnson Space Center, Houston, TX USA
Lymphocyte Functions in Microgravity
Pellis, Neal R., NASA Johnson Space Center, USA; Risin, Diane, Wyle Labs., Inc., USA; Sundaresan, A., Wyle Labs., Inc., USA; Cooper, D., La Jolla Inst., USA; [1999]; 1p; In English; 15th, 10-13 Nov. 1999, Seattle, WA, USA; Sponsored by American Society for Gravitational and Space Biology, USA
Contract(s)/Grant(s): NRA-OLMSA-02/NSCORT; No Copyright; Avail: Issuing Activity; Abstract Only

To understand the mechanism of immunity impairment in space it is important to analyze the direct effects of space-related conditions on different lymphocytes functions. Since 1992, we are investigating the effect of modeled and true microgravity (MG) on numerous lymphocyte functions. We had shown that modeled (MMG) and true microgravity inhibit lymphocyte locomotion through type I collagen. Modeled microgravity also suppresses polyclonal and antigen-specific lymphocyte activation. Polyclonal activation of lymphocytes prior to exposure to MMG abrogates the MG-induced inhibition of lymphocyte locomotion. The relationship between activation deficits and the loss of locomotion in MG was investigated using PKC activation by phorbol ester (PMA) and calcium ionophore (ionomycin). Direct activation of PKC by PMA substantially restored the MMG-inhibited lymphocyte locomotion and PHA-induced lymphocyte activation lonomycin by itself did not restore either locomotion or activation of the lymphocytes, indicating that these changes are not related to the impairment in the calcium flux in MMG. Treatment of lymphocytes with PMA before exposure to MMG prevented the loss of locomotion. It was observed that DNA synthesis is not necessary for restoration of locomotion since mitomicin C treated and untreated cells recovered their locomotion to the same level after PKC activation. Our recent data indicate that microgravity may selectively effect the expression of novel Ca2+ independent isoforms of PKC, in particularly PKC sigma and delta. This provides a new insight in understanding of the mechanisms of MG-sensitive cellular functions.
Author
Lymphocytes; Microgravity; Immune Systems; Gravitational Physiology; Aerospace Medicine

20000116332 NASA Johnson Space Center, Houston, TX USA
Novel Approaches to Cellular Transplantation from the US Space Program
Pellis, Neal R., NASA Johnson Space Center, USA; Diabetes Technology and Therapeutics; 1999; Volume 1, No. 1, pp. 73-75; In English; Copyright; Avail: Issuing Activity; Abstract Only

Research in the treatment of type I diabetes is entering a new era that takes advantage of our knowledge in an ever increasing variety of scientific disciplines. Some may originate from very diverse sources, one of which is the Space Program at National Aeronautics and Space Administration (NASA). The Space Program contributes to diabetes-related research in several treatment modalities. As an ongoing effort for medical monitoring of personnel involved in space exploration activities NASA and the extra-mural scientific community investigate strategies for noninvasive estimation of blood glucose levels. Part of the effort in the space protein crystal growth program is high-resolution structural analysis insulin as a means to better understand the interaction with its receptor and with host immune components and as a basis for rational design of a ”better” insulin molecule. The Space Program is also developing laser technology for potential early cataract detection as well as a noninvasive analyses for addressing preclinical diabetic retinopathy. Finally, NASA developed an exciting cell culture system that affords some unique advantages in the propagation and maintenance of mammalian cells in vitro. The cell culture system was originally designed to maintain cell suspensions with a minimum of hydrodynamic and mechanical sheer while awaiting launch into microgravity. Currently the commercially available NASA bioreactor (Synthecon, Inc., Houston, TX) is used as a research tool in basic and applied cell biology. In recent years there is continued strong interest in cellular transplantation as treatment for type I diabetes. The advantages are the potential for successful long-term amelioration and a minimum risk for morbidity in the event of rejection of the transplanted cells. The pathway to successful application of this strategy is accompanied by several substantial hurdles: (1) isolation and propagation of a suitable uniform donor cell population; (2) management of host immune rejection; (3) protection from the autoimmune component of the disease; and (4) anatomic placement of the engrafted cells that permits timely response to blood sugar levels as well as effective release and deployment of insulin. Bioreactor technology may provide some critical advances for surmounting some of these scientific hurdles. The NASA bioreactor is a horizontally rotating cylinder that is completely filled with culture medium. Gaseous exchange is maintained by a concentric cylinder of permeable silicon. In slow rotation (15-25 rpm) particles of small mass such as cells and tissue aggregates remain suspended in the rotating body of fluid. This novel approach suspends cells without stirring thus, allowing objects of different size mass to colocate and interact in a very low shear environment. In fact, analysis of the forces acting on individual cells in the rotating bioreactor reveals that the cells are continuously falling through the fluid medium. The conditions in the bioreactor permit assembly of cells into aggregates. three-dimensional tissue growth, synthesis of intercellular matrix,10 differentiation, and some sinusoid formations that may serve as a surrogate vasculature for larger tissue segments.

Derived from text

Bioreactors; Culture Techniques; Insulin; Metabolic Diseases; Diabetes Mellitus

20000116339 Notre Dame Univ., Dept. of Biological Sciences, IN USA

Structure/Function Studies of Insect Antifreeze Proteins ***Final Report, 1 Jan. 1995 - 31 Dec. 1997***

Duman, John G.; Dec. 31, 1997; 11p; In English

Contract(s)/Grant(s): F49620-1-95-0188

Report No.(s): AD-A380908; AFRL-SR-BL-TR-00-0369; No Copyright; Avail: Defense Technical Information Center (DTIC)

Antifreeze proteins (AEPs) from overwintering larvae of the beetle Dendroides canadensis are the most active AFPs known. Thirteen similar AFPs were purified and characterized. These consist of varying numbers of 12 and 13 mer repeating units with the consensus sequence Cys-Thr-X3-Ser-x5-x6-Cys-X8-X9-Ala-X11-Th-X13 where X3 and X1 tend toward charged residues, X5 toward threonine or serine, X9 toward asparagine or aspartate, X6 toward asparagine or lysine, and X13 toward alanine. All of the cysteine residues are disulfide bridged, usually to the other cysteine within the repeat unit. This provides an extremely stable protein structure and probably positions the hydroxyl group of the highly conserved serine and threonine residues so they can hydrogen bond to ice, a requisite for the antifreeze activity. The secondary structure of these AFPs is 46% 6-sleet, 39% turn, 2% helix and 13% random. Several low molecular mass salutes, mostly organic, were shown to enchance the activity of the AFPs several fold. The most active of these is citrate which enchances activity as much as sixfold. Succinate, malate, aspartate, glutamate, ammonium sulfate, glycerol, sorbitol, alanine and ammonium bicarbonate were also very effective. The mechanism of the enhancement is unknown.

DTIC

Antifreezes; Insects; Larvae; Proteins; Glutamic Acid; Hydroxyl Radicals; Ammonium Sulfates

20000116346 Agency for Toxic Substances and Disease Registry, Atlanta, GA USA

Report of the Expert Panel Workshop on the Psychological Responses to Hazardous Substances.

Tucker, P.; 2000; 94p; In English; Original contains color illustrations

Report No.(s): PB2001-100288; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This purpose of this workshop was to thoroughly explore and examine all that is known about how communities and individuals respond socially and psychologically to hazardous substances and the possible effects of those responses on their health.
NTIS
Physiological Effects; Psychological Effects; Psychophysiology; Stress (Psychology)

20000116497 Ibadan Univ., Nigeria
Background radiation and man-made and sources of radiation
Babalola, I. A.; Dec. 31, 1997; 13p; In English; National workshop on radiation protection and waste management
Report No.(s): DE99-626787; INIS-NG-0010; No Copyright; Avail: Department of Energy Information Bridge, Microfiche
This paper describes the development of the use of the atom and its present applications in food and agriculture, industry medicine and health care, energy- environment and research. These applications have inevitably led to concerns about nuclear safety and radioactive waste management and the need for the adoption of procedures for control, safe use and disposal of radioactive sources.
NTIS
Atoms; Food; Background Radiation; Safety Management; Energy Technology

20000116518 Czech Technical Univ., Faculty of Nuclear Sciences and Physical Engineering, Prague, Czechoslovakia
Proceedings of the IRPA regional symposium on radiation protection in neighbouring countries of Central Europe
Dec. 31, 1998; 24p; In English; IRPA regional symposium on radiation protection in neighboring countries of Central Europe
Report No.(s): DE99-626783; INIS-CZ-0021; No Copyright; Avail: Department of Energy Information Bridge
At the Symposium, a total of 169 papers were presented at six sessions: 1. General aspects of radiation protection; 2. Natural radiation exposure; 3. Radiation protection at workplace; 4. Environmental aspects of radiation protection; 5. Instrumentation of methods; 6. Non-ionizing radiation protection. Of the papers, 162 were input to INIS.
NTIS
Radiation Dosage; Conferences; Radiation Protection

20000116593 Old Dominion Univ., Research Foundation, Norfolk, VA USA
Multi-Dimensional Data Assimilation for Physical-Biological Models ***Final Report, Jun. 1998 - Jun. 2000***
Hofmann, Eileen E., Old Dominion Univ., USA; [2000]; 3p; In English
Contract(s)/Grant(s): N00014-98-1-0100
Report No.(s): AD-A380222; No Copyright; Avail: Defense Technical Information Center (DTIC)
This study focused on the development of Empirical Orthogonal Function (EOF) techniques that can be used to determine data needs for marine ecosystem models. The EOF structures allow determination of the primary interconnections of the ecosystem, which in turn, allow insight into the processes that need to be well represented in the forward model developed for a particular ecosystem. The method was tested with a model developed to simulate time development of lower trophic levels observed in an enclosed microcosm. For this system, the EOF model improved data reproducibility even when a reduced number of eigenstructures was used. The results imply that the model and data were inconsistent. The EOF approach used in this study potentially provides a powerful method for evaluating data%model consistency, and for determining data needs for marine ecosystem models, which are important factors in combining data and forward models in a data assimilative mode.
DTIC
Bionics; Ecosystems; Marine Environments; Marine Biology; Environment Models

20000117675 Wisconsin Univ., Madison, WI USA
Investigating the Role of Cooperative Interactions Between the Neu Protooncogene and the Other erbB Family Members in Rat Mammary Carcinogenesis ***Annual Report, 1 Jul. 1998 - 30 Jun. 1999***
Gould, Michael N., Wisconsin Univ., USA; Watson, Philip, Wisconsin Univ., USA; July 1999; 19p; In English
Contract(s)/Grant(s): DAMD17-96-1-6263
Report No.(s): AD-A381235; No Copyright; Avail: Defense Technical Information Center (DTIC)
The phenotype of two additional MMTV-neu N transgenic rats has been determined. Females of both of these lines do not display an abnormal phenotype. In contrast, males of the line 6500 develop mammary carcinomas with an average latency of 387 days. This phenotype is highly penetrant, with 77.8 percent and 100 percent of the transgenic males carcinoma positive at 14 months and 18 months of age, respectively. Among those rats with carcinomas, the average number of carcinomas per rat was 9.6 and 11.7 for 14 months and 18 months of age, respectively. Nuclease protection assays have shown that 6500 transgenic females overexpress neu within the mammary gland by approximately tenfold. This demonstrates that the lack of mammary carci-

nomas in the 6500 females is not due ot lack of neu overexpression in the mammary gland. Experiments are in progress to investigate the mechanisms underlying the male-specific mammary carcinogenesis in line 6500. In additional experiments, retrovival vectors were used to direct expression of EGFR, erbB3, or erbB4 in the mammary gland of the 6500 transgenic and non-transgenic females. None of these retrovival constructs resulted in mammary carinomas for transgenic or non-transgenic females.
Author
Cancer; Carcinogens; Females; Males; Mammary Glands

20000117705 Gordon Research Conferences, Inc., Kingston, RI USA
Molecular Membrane Biology Gordon Research Conference ***Final Report, 1 May 1999 - 30 Apr. 2000***
Rapoport, Tom, Gordon Research Conferences, Inc., USA; Storm, Carlyle B., Gordon Research Conferences, Inc., USA; July 2000; 7p; In English; Molecular Membrane Biology, 4-9 Jul. 1999, Andover, NH, USA
Contract(s)/Grant(s): DAMD17-99-1-9470
Report No.(s): AD-A380876; No Copyright; Avail: Defense Technical Information Center (DTIC)
The Molecular Membrane Biology Gordon Research Conference schedule is presented.
DTIC
Conferences; Membranes; Molecular Biology; Proteins; Metabolism; Cells (Biology)

52
AEROSPACE MEDICINE

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

20000115486 Air Force Academy, Dean of Faculty, CO USA
Near Infrared, High Energy, Ultrashort Pulse Laser-Light Exposure Genetically Induces p53, a Gene in the DNA Repair and Cell Suicide Pathways in Cultured Human Cells
Obringer, John W., Air Force Academy, USA; Phipps, Steve, Air Force Academy, USA; Johnson, Martin D., Air Force Academy, USA; Nov. 1999; 13p; In English; Prepared in collaboration with B&J Enterprises, Inc., Colorado Springs, Colorado.
Report No.(s): AD-A381797; USAFA-TR-2000-01; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The use of laser light for targeting devices and weapons has sharply increased the likelihood that aircrew and support personnel will be exposed to laser light during operations. The increased potential for exposure of humans highlights the need for scientifically-based safety standards for laser exposure at the ultrashort pulse lengths. Current safety standards are largely extrapolations of exposure limits at longer pulse lengths using a minimal visible lesion endpoint in the Rhesus monkey retinal model. A non-animal model for assessing laser-light damage to tissue, particularly human, is quite desirous for obvious scientific, political, and fiduciary reasons. We assessed the sublethal insult to human cells using a tissue culture system for specific genes that have been shown to be important in several biological processes that could lead to cancer or cell death. Using the CAT-Tox (L) (Xenometrix, Inc.) assay, it appears that 1064 nm, nanosecond pulses of laser light is sensed and induces several stress response genes, including p53, a gene in the DNA repair and apoptosis (cell suicide) regulatory pathways in a dose dependent fashion. This approach provides insight into a more global methodology for characterizing environmental stressors via genetic profiling.
DTIC
Exposure; Laser Beams; Cells (Biology); Culture Techniques; Assaying; Cancer; Genes; High Power Lasers; Tissues (Biology); Deoxyribonucleic Acid

20000116072 Naval Health Research Center, San Diego, CA USA
Review of the Naval Health Research Center's Development of Medical Information Systems for Far-Forward Echelons of Care: 1983-1997 ***Final Report, Jan. 1983-Dec. 1997***
Tropeano, Anne M.; Pugh, William M.; Dec. 1997; 32p; In English
Contract(s)/Grant(s): Proj-M2332
Report No.(s): AD-A381330; NHRC-00-07; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
It is imperative that medical treatment information be gathered quickly and accurately to ensure continuity of care at far-forward echelons. Each echelon employs a manual method of recording the medical information required for that particular level of care. The methods in use prior to and during the Vietnam War revealed the need for considerable improvements in medical information documentation, patient registration, patient tracking, facility status reporting, and effective transference of data

throughout each of the first three echelons of care. The US military targeted these inadequacies for development; automation was determined as the direction in which documentation techniques could most significantly be enhanced. The Naval Health Research Center (NHRC) has been an integral part of the development of automation for the far-forward echelons of care. The prototypes designed by NHRC for Echelons I and II can successfully raise the standard of treatment while simultaneously reducing the number of individuals needed for administrative duties, and increasing the number of medical staff available for patient care. An overview of NHRC's work in automation from 1983 to 1997 is presented.
DTIC
Information Systems; Medical Services; Automation; Health

20000116214 Pacific Northwest National Lab., Richland, WA USA
Using Mode of Action of Assess Health Risks From Mixtures of Chemical/Physical Agents ***Annual Report***
December 1998; 17p; In English
Report No.(s): AD-A379649; No Copyright; Avail: Defense Technical Information Center (DTIC)
Mixtures of carcinogenic chemicals are a major problem in ground water and soils on DoD and DOE facilities. While there is frequently data available for interactions between chemicals to judge risks from short term exposures, data that describe how interactions influence the development of cancer are very rare. This is largely because of the high cost associated with conducting complex interaction studies over the lifetime of experimental animals. Therefore, it is important that the limited resources that are available for studying interactions be directed towards the development of general principles that can be applied to wide variety of circumstances. The co- occurrence of chlorinated solvents at DoD and DOE facilities such as trichloroethylene (TCE), tetrachloroethylene (PERC) and carbon tetrachloride (CT) is a case in point.
DTIC
Health; Toxicity; Carcinogens; Chlorination; Cancer; Chemical Compounds; Solvents

20000116215 Army Medical Center, Aurora, CO USA
Prevention and Control of Plague
September 1995; 105p; In English
Report No.(s): AD-A379617; USACHPPM-TG-103; No Copyright; Avail: Defense Technical Information Center (DTIC)
Plague can infect a wide variety of wild and domestic animals, although some species are much more susceptible than others. Plague is believed to circulate in small rodent populations such as mice, rats, and chipmunks, causing little mortality. Known, probable, and susceptible primary maintenance hosts of plague include rodent species that exhibit: (1) Moderately high resistance to plague. (2) Broad heterogeneity to challenge with Yersinia pestis within a population. (3) Long multiestrous breeding season with successive multiple litters and high reproductive potential. (4) Short natural life expectancy and a high replacement rate of individuals in a population. Occasionally, populations of more susceptible mammals (e.g., prairie dogs, rock squirrels and California ground squirrels) are infected with plague. These rodents live, for the most part, in colonies covering large areas of land. When a plague outbreak within these colonial rodent populations occurs, the potential for human exposure to infected mammals and fleas increases greatly. Plague-susceptible rodents are called "amplifying hosts" because they are highly infective and enable the disease to spread rapidly.
DTIC
Breeding (Reproduction); Reproduction (Biology); Mammals; Mortality; Diseases; Exposure

20000116216 Burnham Inst., La Jolla, CA USA
Training in Support of Research Project Entitled "Tumor Cell De-adhesion by Aberrant, Single Skubmit Integrins" ***Annual Report, 1 Jul. 1998 - 30 Jun. 1999***
Zhang, Yan, Burnham Inst., USA; July 1999; 6p; In English
Contract(s)/Grant(s): DAMD17-96-1-6212
Report No.(s): AD-A379615; No Copyright; Avail: Defense Technical Information Center (DTIC)
My purpose is try to identify a plasma membrane protein fingerprint which can be used to distinguish invasive breast cancer cell lines from non- invasive breast cancer lines. The methods included those for purification of plasma membrane proteins , extraction of proteins using urea/thiourea mixture, a standard procedure for 2D PAGE, excision of polypeptide "spots" from gels, trypsin digestion, MALDI TOF mass spectrometry and database searching for protein identity are well-established for this project. Three breast cancer cell lines (MDA-MB435, MDA-MB23 1 and MCF7) with different metastatic potential have been grown and 2-D maps of plasma membrane proteins have been generated in the laboratory. Computer- assisted analysis of the 2D polypeptide pattern showed that 56% of the polypeptide spots were the same between MCF7 and MDA-MB23 1 (two non-metastatic Breast Cancer cell lines), only 42% of the polypeptide spots were the same between MCF7 and MDA-MB435 (metastatic vs non-meta-

static Breast Cancer cell lines). This differential expression of proteins is being characterized in order to determine which proteins are important to the metastatic condition. A number of proteins from the 2D gels has been identified by MALDI TOF mass spectrometry. Recently, antibody library phage display, has been expanded for further identifying the plasma membrane proteins.
DTIC
Plasmas (Physics); Cells (Biology); Mammary Glands; Cancer; Proteins; Adhesion; Antibodies

20000116223 Baylor Coll. of Medicine, Houston, TX USA
The Role of Cyclin Dependent Kinase Inhibitor, CIP1, in Breast Cancer ***Final Report, 15 Sep. 1994 - 14 Sep. 1999***
Harper, J. W.; Oct. 1999; 27p; In English
Contract(s)/Grant(s): DAMD17-94-J-4399
Report No.(s): AD-A381538; No Copyright; Avail: Defense Technical Information Center (DTIC)

The final report for my award, DAMDl7-94-J-4399 was prematurely submitted in the Fall of 1998 and approved in 1999. This report was changed from a final to an annual by the Office of the Deputy Chief of Staff for Information Management due to the fact that we had asked for and was granted a one year no cost extension. This extension allowed us to finish up our work on the p2l knockout mouse, as summarized below, and led to an additional publication. The attached material is submitted as an appendices to our report submitted in the Fall of 1998. The Fall 1998 report should be reclassified as a final and this award closed. All pertinent information relating to a final report can be found in the Fall 1998 report.
DTIC
Mammary Glands; Cancer; Information Systems; Inhibitors

20000116307 Pennsylvania Univ., Medical Image Processing Group, Philadelphia, PA USA
A Novel Fuzzy Topological Approach to the Detection of Mammographic Lesions and Qualifications of Parenchymal Density ***Annual Report, 1 Aug. 1998-31 Jul. 1999***
Udupa, Jayaram K.; Aug. 1999; 33p; In English
Contract(s)/Grant(s): DAMD17-97-1-7271
Report No.(s): AD-A382475; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This research focuses on mammographic image processing for the purpose of density quantification, lesion detection and classification. The approaches proposed are different from those taken in the literature in two respects: (1) They emphasize on identifying the dense regions and analyzing their parenchymal architecture. (2) They use a novel fuzzy connectedness method of object definition and image segmentation. During this report period, the following have been accomplished. The development of a novel method of defining the ”hanging togetherness” of dense regions via scale-based affinity and connectedness. An interactive method of lesion segmentation using live wire. An automatic, validated method of mammographic density quantification and the development of a host of intensity-based parameters that are more accurate than the measure of the area of dense regions. A novel method of detecting architectural distortions without explicitly delineating lesions (the method being tested for its effectiveness in predicting the on- set of lesions).
DTIC
Computer Techniques; Diagnosis; Image Processing; Fuzzy Systems; Connective Tissue; Identifying; Imaging Techniques

20000116308 Michigan Univ., Ann Arbor, MI USA
An Examination of Ultrasound Measured Tissue Perfusion on Breast Cancer ***Final Report, 1 Jun. 1994-30 Nov. 1998***
Fowlkes, Jeffrey B.; Dec. 1998; 37p; In English
Contract(s)/Grant(s): DAMD17-94-J-4144
Report No.(s): AD-A382522; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Mammography has proven reliable as a screening tool for breast cancer. However, its specificity may be as low as 10% as evidenced by the number of biopsies recommended compared to the number of cancers. This research was designed to develop measurement techniques for tissue perfusion including ultrasound contrast agent interruption and decorrelation techniques. Contrast interruption allows control of contrast agent flow in selected vessels and is used in conjunction with common ultrasound imaging methods that measure contrast agent signal levels dynamically or statically. The technique provides temporally sharp boluses not achievable by Iv administration and durations similar to arterial administration without catheterization. These are important attributes for tissue perfusion measurements by indicator-dilution techniques. The technique can also be used to eliminate the flow of contrast agents in selected vessels to demonstrate the vascular supply for specific tissues. Contrast decorrelation measures motion of contrast through the ultrasound beam by examining the gradual loss of speckle coherence. The technique

directly estimates a mean transit time, and at least in preliminary studies, appears to be quite angle independent. With certain modifications, the technique may directly yield perfusion in a real-time imaging application of flow in ultrasound accessible tissues. DTIC

Cancer; Mammary Glands; Real Time Operation; Imaging Techniques; Ultrasonics; Tissues (Biology)

20000116310 Scripps Research Inst., La Jolla, CA USA

Chronic Stress and Neuronal Pathology: Neurochemical, Molecular and Genetic Factors ***Annual Report, 15 Jun. 1999-14 Jun. 2000***

Koob, George F.; Jul. 2000; 18p; In English

Contract(s)/Grant(s): DAMD17-99-1-9501

Report No.(s): AD-A382530; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this proposal is to test the hypothesis that chronic stress produces lasting changes in brain dopamine function leading to permanent neuronal damage through oxidative mechanisms. Certain subject populations may be uniquely susceptible to this pathological cascade through hyperresponsiveness of the corticotropin releasing factor stress response system. to test this hypothesis, two specific aims are currently in progress: 1) to examine the effects of chronic stress on behavioral, neurochemical and molecular measures of neuronal pathology to the brain dopamine system; 2) to develop a phenotype of hyperresponsiveness of the CRF hypothalamic pituitary adrenal axis by selective breeding. The results show evidence of CRF induced hypoactivity in the brain dopamine system as measured by an increase in catalepsy and a decrease in amphetamine-induced stereotyped behavior that last up to four months. In addition, the first phase of selective breeding of rats hyperresponsive to stress has been accomplished. The initial separation in HPA axis activity showed a two- to four-fold difference between low and high responders. These results should ultimately provide not only key information about neuronal dysfunction produced by chronic stress but critical knowledge of the genetic/molecular factors that contribute to individual vulnerability to stress and its pathological consequences. DTIC

Nervous System; Pathology; Genetics; Neurophysiology; Brain; Stress (Biology)

20000116333 NASA Johnson Space Center, Houston, TX USA

Suppression of Antigen-Specific Lymphocyte Activation in Simulated Microgravity

Pellis, Neal R., NASA Johnson Space Center, USA; Cooper, D., La Jolla Inst. for Allergy and Immunology, USA; Pride, M., Weyth-Lederle, USA; Brown, E., Texas A&M Univ., USA; Risin, D., Wyle Labs., Inc., USA; [1999]; 1p; In English; No Copyright; Avail: Issuing Activity; Abstract Only

Various parameters of immune suppression are observed in astronauts during and after spaceflight, and in isolated immune cells in true and simulated microgravity. Specifically, polyclonal activation of T cells is severely suppressed in true and simulated microgravity. These recent findings with various polyclonal activators suggests a suppression of oligoclonal lymphocyte activation in microgravity. We utilized rotating wall vessel (RWV) bioreactors that simulate aspects of microgravity for cell cultures to analyze three models of antigen-specific activation. A mixed-lymphocyte reaction (MLR), as a model for a primary immune response; a tetanus toxoid (TT) response and a B. burgdorferi (Bb) response, as models of a secondary immune response, were all suppressed in the RWV bioreactor. Our findings confirm that the suppression of activation observed with polyclonal models also encompasses oligoclonal antigen-specific activation.

Author

Gravitational Physiology; Immunology; Microgravity; Physiological Responses; Immune Systems; Aerospace Medicine; Bioastronautics

20000116366 Johns Hopkins Univ., School of Medicine, Baltimore, MD USA

Clinical Evaluation of Digital Mammography ***Annual Report, 1 Feb. 1999-31 Jan. 2000***

Feb. 2000; 163p; In English

Contract(s)/Grant(s): DAMD17-99-1-9001

Report No.(s): AD-A382368; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

Our study entails two aspects of translational research related to the clinical application of digital mammography: technology optimization (Phase 1) and a clinical evaluation (Phase 2). The technology/system optimization work is near completion and has focused on optimizing the operational parameters most likely to impact mammographic image quality for radiodense breasts, including x-ray tube target material, filter composition, tube voltage, and x-ray exposure level/radiation dose. We have evaluated digital mammography systems from 3 different manufacturers - comprising the systems to be used in the Phase 2 portion of this research. Expert physicists collaborating in this work have developed optimization parameters for each system to enable the best image quality within reasonable x-ray dose ranges. In addition, quality control standards have also been established to maintain

optimized system performance and control the above cited parameters during the Phase 2 clinical study. The second phase of this project is a multicenter clinical evaluation comparing optimized digital mammography to SFM in women with moderate or marked breast density who present for problem-solving mammography. Eligible women consenting to participate will undergo a 4-view screen-film and digital mammogram. Total accrual will be 1075 women with moderately or markedly dense breasts. The clinical trial is scheduled to open July 1,2000. Our Phase 1 results demonstrate that successful system optimization and quality control of digital mammography systems can be efficiently achieved in a manner similar to conventional screen-film mammography. The clinical research to be carried out during Phase 2 will determine whether digital mammography has the same or better diagnostic accuracy as conventional mammography in the population of women who have radiodense breast tissue.
DTIC
Clinical Medicine; Mammary Glands; Digital Systems; Cancer; X Rays; Diagnosis

20000116367 Thomas Jefferson Univ., Philadelphia, PA USA
Contrast Enhanced 3D Color Amplitude Imaging of the Breasts ***Annual Report, 15 Sep. 1998-14 Sep. 1999***
Forsberg, Flemming; Oct. 1999; 33p; In English
Contract(s)/Grant(s): DAMD17-97-1-7116
Report No.(s): AD-A382383; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In total, 22 patients with 6 cancers and 16 benign lesions have been enrolled in the Levovist arm of the study. These numbers were less than anticipated, and an initial data analysis indicated that Levovist was not as efficacious as expected. to increase recruitment and improve results the ultrasound contrast agent was changed to Optison. to date 13 patients with 3 cancers and 10 benign lesions have been enrolled in this part of the study. Moreover, 3D parameter extraction algorithms for the LIS 6000A system has been designed and tested, but no data analysis has yet been carried out due to the limited data set available for Optison. The histomorphometry system has been used to analyze vessel distribution and vessel density maps from 10 patients. Contrast enhanced color flow imaging was found to provide some quantitative parameters, which correlated with direct pathologic vascularity assessments such as the iMVD. Specifically, the microvessel area and count for vessels 30 to 39 microns in diameter were most significant. These results indicate that ultrasound imaging with contrast may produce a quantitative measure of the neovascularity within breast tumors. However, the current patient population in the sub-study is very small and further cases are currently being analyzed.
DTIC
Image Processing; Diagnosis; Mammary Glands; Cancer; Histology; Morphology; Lesions; Imaging Techniques; Computer Techniques

20000116591 Cornell Univ., Ithaca, NY USA
The Role of Dipeptidyl Peptidase 4 in Lung Metastasis of Breast Cancer Cells ***Annual Report, 1 May 1998 - 30 Apr. 2000***
Cheng, Hung-Chi, Cornell Univ., USA; May 1999; 35p; In English
Contract(s)/Grant(s): DAMD17-98-1-8056
Report No.(s): AD-A381154; No Copyright; Avail: Defense Technical Information Center (DTIC)

Our studies focused on (1) cloning and sequencing of wild-type endothelial DPP IV (wtDPP IV) and preparation of truncated DPP IV (tDPP IV); (2) identification of surface-associated fibronectin polymers (polyFN) as DPP IV ligand; (3) use of DPP IV Fischer 344/CRJ rats as protein-knock-outs in metastasis; and (4) identification of the DPP IV/FN binding domains. A lull- length clone of endothelial wtDPP IV was isolated from a rat lung cDNA library that was identical to hepatic DPP IV. Acid extraction of rat lung yielded a tDPP IV, which was an effective inhibitor of breast cancer cell adhesion to wtDPP IV and lung metastasis. The DPP IV ligand, polyFN, provides multiple binding sites for DPP IV, thereby allowing lung vascular arrest of cancer cells under hemodynamic conditions. Fischer 344/CRJ rats are unsuitable as DPP IV protein knock-out model, because lung endothelia leak expression of DPP IV and are able to support breast cancer cell arrest. The DPP IV binding domains of FN was localized to an N- terminal 30-kDa region and FN type III repeats 13 to 14. Three approximately equal size fragments of the extracellular domain of DPP IV were expressed as GST fusion proteins and are currently studied for FN binding.
DTIC
Lungs; Cloning (Biology); Genetic Engineering; Cells (Biology); Blood Circulation; Mammary Glands; Proteins; Cancer; Rats

20000116605 Army Research Inst. of Environmental Medicine, Natick, MA USA
Amino Acid and Protein Requirements: Cognitive Performance, Stress, and Brain Function, Chapter 14
Lieberman, Harris R., Army Research Inst. of Environmental Medicine, USA; Protein and Amino Acids; 1999, pp. 289-307; In English
Report No.(s): AD-A380146; No Copyright; Avail: Defense Technical Information Center (DTIC)

This chapter will focus on amino acid and protein requirements and brain function. A particular focus will be the possibility that central demands for amino acids may modify nutritional requirements when individuals are exposed to extreme environments and other stresses associated with combat and high intensity military or civilian occupations.
DTIC
Brain; Mental Performance; Nutritional Requirements; Amino Acids; Cognition

20000116629 Army Medical Dept. Center and School, Dept. of Academic Support, Fort Sam Houston, TX USA
US Army Medical Department Journal, April-June 2000 ***Quarterly Report, Apr. - Jun. 2000***
Nelson, Bruce, Editor, Army Medical Dept. Center and School, USA; April - June 2000; ISSN 1524-0436; 35p; In English
Report No.(s): AD-A381186; No Copyright; Avail: Defense Technical Information Center (DTIC)
Clinical and nonclinical professional information designed to keep U.S. Army Medical Department personnel informed of healthcare, research, and combat and doctrine development information. The Army Medical Department Journal is prepared quarterly for the Surgeon General by the U.S. Army Medical Department Center and School.
DTIC
Armed Forces; Medical Personnel; Medical Services; Research

20000116630 Pacific Northwest Cancer Foundation, Seattle, WA USA
The Assessment of Prostate Cells in Semen Using Flow Cytometry, For the Early Detection and Staging of Prostate Cancer (Prostate) ***Annual Report, 1 Sep. 1998 - 31 Aug. 1999***
Murphy, Gerald, Pacific Northwest Cancer Foundation, USA; September 1999; 11p; In English
Contract(s)/Grant(s): DAMD17-98-1-8541
Report No.(s): AD-A381183; No Copyright; Avail: Defense Technical Information Center (DTIC)
This study involves the detection of prostatic epithelial cells in the seminal fluid. Relatively normal cells are identified by Cytokeratin 8/18. Up-regulated, or cancerous cells, are identified by means of PSMA staining. Increased prostate specific membrane antigen is associated with a poor prognosis. Data is being collected to differentiate the seminal fluid values in a ratio between the cytokeratin cells and the PSMA positive cells. At the present time, these clearly distinguish between BPH patients and prostate cancer patients, with prostatitis patients being intermediate. As more and additional patients are followed for repeat studies, and additional patients are seen from our control vasectomy clinic, we will define this test to its ultimate possibilities. The obtaining of fresh samples and the elimination of viable sperm have been two of our key progress notes at this particular time.
DTIC
Prostate Gland; Prognosis; Cancer; Cytometry; Epithelium; Sampling; Detection

20000116631 New York Univ. Medical Center, New York, NY USA
The Role of RPTP-Alpha-Like Protein Tyrosine Phosphatases in Mammary Tumorigenesis ***Annual Report, 1 May 1998 - 30 Apr. 1999***
Sap, Jan M., New York Univ. Medical Center, USA; May 1999; 46p; In English
Contract(s)/Grant(s): DAMD17-98-1-8136; NIH-R29-CA-68365; NIH-5R21-CA-66229-04
Report No.(s): AD-A381182; No Copyright; Avail: Defense Technical Information Center (DTIC)
RPTPa is a protein tyrosine phosphatase implicated in the activation of SRc family kinases, and in the regulation of integrin signaling, cell adhesion, and growth factor responsiveness, to explore its potential contribution to human neoplasia, we surveyed RPTPa protein levels in 51 primary breast cancer samples. We found RPTPa expression to vary widely among individual tumors, with significant overexpression occurring in approx. 27% of cases. RPTPa overexpression reflected reduced tumor aggressiveness, being strongly negatively correlated with tumor grade. In cell culture, expression of RPTPa in MCF-7 breast carcinoma cells led to growth inhibition, associated with increased accumulation in the G1 phase of the cell cycle. RPTPa expression also resulted in delayed tumor growth and metastasis in nude mice tumorigenicity as says. We propose that RPTPa overexpression in breast cancer constitutes a secondary response by which the cell attempts to maintain homeostasis perturbed during neoplastic transformation. to our knowledge, this is the first example of a study correlating expression level of a bonafide protein tyrosine phosphatase with neoplastic disease in humans.
DTIC
Cancer; Cell Division; Mammary Glands; Proteins; Tumors; Tyrosine; Physiological Responses

20000116632 Wistar Inst. of Anatomy and Biology, Philadelphia, PA USA

Characterization of Two Proteins Which Interact With the BRCA1 Gene ***Annual Report, 1 Jun. 1998 - 31 May 1999***

Rauscher, Frank J., Wistar Inst. of Anatomy and Biology, USA; June 1999; 34p; In English

Contract(s)/Grant(s): DAMD17-96-1-6141

Report No.(s): AD-A381176; No Copyright; Avail: Defense Technical Information Center (DTIC)

We have made extensive progress in the past year to support our analysis of the BAP1 - BRCA1 interaction. We have published the co-localization and cell-cycle patterns of internuclear distribution for the two proteins. In addition, we have shown that BAP-1 is a bonafide tumor suppressor gene which is able to inhibit the malignant growth characteristics of cell lines when transfected back into the BAP1 null cells. This activity is dependent upon enzymatic function of the ubiquitin hydrolysis domain. In exciting preliminary studies we have shown that BAP1, like BRCA1, has a direct role in transcription-coupled DNA repair. The work accomplished conforms to the original SOW and has shed new light on the role of BRCA1 as a tumor suppressor in early onset familial breast-ovarian cancer families.

DTIC

Genes; Hydrolysis; Cancer; Growth; Enzymes; Proteins; Cell Division; Deoxyribonucleic Acid

20000116633 Alabama Univ., Birmingham, AL USA

Gene Therapy of Disseminated Breast Cancer Using Adenoviral Vectors Targeted Through Immunological Methods ***Annual Report, 1 Aug. 1998 - 30 Jul. 1999***

Rogers, Buck E., Alabama Univ., USA; August 1999; 21p; In English

Contract(s)/Grant(s): DAMD17-97-1-7244

Report No.(s): AD-A381175; No Copyright; Avail: Defense Technical Information Center (DTIC)

Targeting of adenovirus vectors, encoding for therapeutic genes, to tumor-specific receptors on breast cancer cells should result in specific killing of these cells. Targeting is necessary to prevent gene transfer in normal tissues resulting from the infection of normal cells by adenovirus. We have previously reported the use of an anti-knob antibody fragment (Fab), which prevents Ad infection, conjugated to folate to target adenovirus to folate receptor positive cells. In this report, the Fab has been conjugated on a large scale to an anti-EGFR antibody (425) and an anti-erbB-2R antibody (Herceptin) to yield Fab-425 and Fab-Herceptin conjugates, respectively. These conjugates were used to target adenovirus specifically to E()F and erbB-2 receptors on BT-474, MDA-MB-468, MDA-MB-134, MDA-MB-231, MDA-MBA-453, and SK-BR-3 breast cancer cells. In addition, the conjugates could specifically target adenovirus to the receptors in a heterogeneous cell population. Preliminary in vivo studies were conducted which will be valuable for future evaluation of the conjugates. Also, studies using an adenovirus encoding for a therapeutic gene were evaluated. These results are significant in that they demonstrate that adenovirus vectors can be specifically delivered to breast cancer cells in a heterogeneous cell population. This will be significant for treating disseminated breast cancer with adenovirus vectors.

DTIC

Genes; Immunology; Cells (Biology); Mammary Glands; Cancer; Infectious Diseases; Antibodies

20000116636 California Univ., Lawrence Berkeley Lab., Berkeley, CA USA

Mechanisms of Abnormal Cell-Extracellular Matrix Interactions in Human Breast Cancer ***Final Report, 1 Jul. 1994 - 30 Sep. 1999***

Chen, Huei-Mei, California Univ., Lawrence Berkeley Lab., USA; September 1999; 40p; In English; Sponsored in part by Danish Cancer Society, Thayssen Foundation and NOVO Foundation

Contract(s)/Grant(s): MIPR-94MM4558; DE-AC03-76SF-00098; CRADA-BG98-053(00); NIH-CA-64786-02

Report No.(s): AD-A381192; No Copyright; Avail: Defense Technical Information Center (DTIC)

To identify genes misregulated in the final stages of breast carcinogenesis, we performed differential display to compare the gene expression patterns of the human tumorigenic mammary epithelial cells, HMT-3522-T4-2, with that of their immediate premalignant progenitors, HMT-3522-S2. We identified a novel gene, called AZU-1, that was abundantly expressed in non- and premalignant cells and tissues but was appreciably reduced in breast tumor cell types and in primary tumors. The AZU-1 gene encodes an acidic 571 amino acid protein containing at least two structurally distinct domains with potential protein- binding functions: an N-terminal serine and proline-rich domain with a predicted Ig-like fold and a C-terminal coiled-coil domain.

DTIC

Cancer; Mammary Glands; Genes; Proteins; Tumors; Amino Acids

20000116637 Georgetown Univ., Washington, DC USA

Molecular Diagnosis for Breast Malignancy ***Final Report, 1 Jul. 1994 - 30 Jun. 1998***

Chen, Wen-Tien, Georgetown Univ., USA; July 1998; 75p; In English

Contract(s)/Grant(s): DAMD17-94-J-4033

Report No.(s): AD-A381191; No Copyright; Avail: Defense Technical Information Center (DTIC)

The overall project goal is to identify and evaluate new prognostic markers that can be used to indicate the metastatic potential of node-negative breast cancer. Cell surface antigens in the invading front; invadopodia, of cancer cells are considered as promising diagnostic indicators of metastatic potential. Five invasion-associated proteins are being examined in this project: seprase, dipeptidyl peptidase IV (DPPIV), membrane type matrix metalloprotease (MT-MMP), fibronectin, and extracellular matrix metalloprotease inducer (EMMPRIN).

DTIC

Mammary Glands; Cancer; Enzymes; Proteins; Deoxyribonucleic Acid; Diagnosis

20000116638 Sloan-Kettering Inst. for Cancer Research, New York, NY USA

Synthesis of Clustered ST-Antigens for the Development of Novel Breast Cancer Vaccines ***Annual Report, 16 Mar. 1998 - 15 Mar. 2000***

Carson, Matthew W., Sloan-Kettering Inst. for Cancer Research, USA; Danishefsky, Samuel J., Sloan-Kettering Inst. for Cancer Research, USA; April 2000; 14p; In English

Contract(s)/Grant(s): DAMD17-98-1-8154

Report No.(s): AD-A381188; No Copyright; Avail: Defense Technical Information Center (DTIC)

The development of efficient routes for the preparation of complex oligosacoharide or carbohydrate conjugates has been a goal in the Danishefsky group for some time. Synthetic investigations in this area can help to provide a detailed knowledge of the structural and chemical behavior of carbohydrates and their conjugates. Moreover, it has been known for some time now that specific types of glycolipids or glycoproteins, which are chemically detectable in normal cells, are more highly expressed in tumors. It should be noted that abnormally high levels of expression on tumor cells cause an antibody response, consequently rendering the cell- surface glycoconjugate a tumor-associated antigen. The idea of such glycoconjugates as tumor-associated antigens is the basis for using carbohydrates in the development of antitumor vaccines. Since tumor antigens and vaccine constructs are usually inaccessible from natural sources, it falls to the organic chemist to supply necessary quantities of carbohydrates, in the form of both glycolipids and glycopeptides.

DTIC

Neoplasms; Organic Chemistry; Mammary Glands; Cancer; Tumors; Proteins

20000117655 Loyola Univ. Chicago, Maywood, IL USA

Prostate Cancer Immunotherapy Development in Prostate Specific Antigen Transgenic Mice

Kast, W. Martin, Loyola Univ. Chicago, USA; September 1999; 16p; In English

Contract(s)/Grant(s): DAMD17-98-1-8480

Report No.(s): AD-A380895; No Copyright; Avail: Defense Technical Information Center (DTIC)

Our research is focused towards the development of an immunotherapy for prostate cancer that specifically targets the expressed prostate specific antigen (PSA) of prostate tumor cells. With over forty thousand deaths a year and the near lack of curative treatments, an effective therapy would greatly benefit society. Our research to date has suggested that PSA can serve as a tumor rejection marker in our PSA transgenic mice whose prostates express human PSA. Vaccination with a tumor cell that expresses PSA elicited a specific anti- PSA response that prevented the outgrowth of a tumor challenge of PSA expressing cells. After indicating the pertinence of PSA as a target of an immunotherapy, we attempted to identify PSA derived peptides that are immunogenic in the HLA- A*020l haplotype. of nine PSA peptides selected for our study based on binding studies, two have proven to be immunogenic in the HLA- A*0201/Dd transgenic mouse model after vaccination of peptide pulsed dendritic cells. These results indicate that not only can we use PSA as a plausible rejection marker but we can also elicit a CTL response directed against the human PSA peptides in a HLA- A*020l/Dd transgenic mouse. These results allow us to experiment with our vaccination strategies for the development of an efficacious anti-prostate cancer immunotherapy.

DTIC

Antigens; Cancer; Prostate Gland; Therapy; Peptides

20000117656 Georgetown Univ., Washington, DC USA

A Modulator of FGF's in Breast Cancer ***Annual Report, 1 Aug. 1998 - 31 Jul. 1999***

Harris, Violaine K., Georgetown Univ., USA; Kagan, Benjamin L., Georgetown Univ., USA; August 1999; 64p; In English

Contract(s)/Grant(s): DAMD17-97-1-7109

Report No.(s): AD-A381144; No Copyright; Avail: Defense Technical Information Center (DTIC)

Fibroblast growth factors (FGF) are highly potent angiogenic factors. However, their role in cancer is not clear since they are frequently expressed by then stored in a non-secreted form. Recently a binding protein for FGF has been described, FGF-BP, which can activate dormant FGF during tumorigenesis. FGF-BP is aberrantly expressed in tumors and causes the development of tumors in vivo. In this grant the role of FGF-BP in breast cancer is examined. In order to understand the regulation of FGF-BP more clearly the principal investigator has cloned the gene promoter for FGF-BP and analyzed the transcription factors necessary for its activation in cancer cell lines. In addition the FGF-BP gene was found to be highly inducible by phorbol esters and by epidermal growth factor (EGF) in breast and other cancer cell lines. This induction occurs selectively through MEK2/ERK2 and p38 kinase pathways and suggests that pharmacological inhibition of these pathways could be useful for cancer therapy. During the analysis of the FGF-BP promoter a novel repressor site was found which controls the level of EGF and TPA regulation of this gene. Future studies will determine the role of this factor in breast tumorigenesis.

Author

Cancer; Mammary Glands; Proteins; Therapy; Tumors; Modulators

20000117657 Minnesota Univ., Minneapolis, MN USA

Biotherapy of Breast Cancer With EGF-Genistein ***Annual Report, 16 Sep. 1998 - 15 Sep. 1999***

Gunther, Roland, Minnesota Univ., USA; October 1999; 96p; In English

Contract(s)/Grant(s): DAMD17-96-C-6064

Report No.(s): AD-A380880; No Copyright; Avail: Defense Technical Information Center (DTIC)

Our proposed research plan involves laboratory studies using a SCID mouse model of human metastatic breast cancer, as well as in vitro MTT(3- 4,5- DIMETHYLTHIAZOL-2-YL -2,5-diphenyl tetrazolium bromide) and colony assays, using established breast cancer cell lines, to examine the potency and toxicity of various EGE-Genistein conjugates. In an effort to generate more effective conjugates, we have employed a variety of crosslinking agents and photolysis conditions. Furthermore, we have established HPLC(high performance liquid chromatography) procedures to characterize and isolate the EGF components of the reaction mixture. We have also conjugated EGF to other small molecules which by themselves have been shown to possess anti-cancer activity. The knowledge gained from these studies is expected to lead to more effective biotherapy and combined biochemotherapy regimens for the treatment of breast cancer patients.

DTIC

Mammary Glands; Cancer; Photolysis; Therapy; Clinical Medicine

20000117661 Johns Hopkins Univ., Baltimore, MD USA

Recombinant Vaccine Strategies for Breast Cancer Prevention ***Annual Report, 1 Oct. 1998 - 30 Sep. 1999***

Jaffee, Elizabeth M., Johns Hopkins Univ., USA; September 1999; 74p; In English

Contract(s)/Grant(s): DAMD17-96-1-6138

Report No.(s): AD-A381767; No Copyright; Avail: Defense Technical Information Center (DTIC)

Exciting new findings in autoimmune disease and cancer have led to the realization that a large set of antigenic determinants of the self have not induced self-tolerance. The peptide determinants could provide targets for antimmune attack as well as antitumor immune responses. We hypothesized that vaccine strategies can be devised that specifically generate an immune response against breast ductal epithelial cells. Since the overwhelming majority of breast tumors arise in these cells, destroying these cells prior to the development of neoplasia will effectively prevent cancer. We are attempting to augment the immune response to the breast-specific antigen, HER-2/neu, which is expressed by mammary tissue in HER-2/neu transgenic mice prior to mammary tumor development, by enhancing the T cell response using selected vectors that may alter antigen procession and T cell activation, thereby influencing antigen-specific immunity. We have evaluated vaccinia constructs that express antigen alone or together in co-simulatory molecules, to determine if immunity can be further enhanced. In our preliminary studies, we have found that this vaccinia approach is superior to vaccination with plasmid DNA. We are currently exploring additional methods of enhancing this potency of this vaccine approach, including test a fusion protein that enhances the induction of helper T cell responses, and testing the vaccine in combination with other recently identified T cell activating signals, such as CD40, OX40, and anti-CTLA-4. This study will provide a paradigm for novel vaccine approaches to breast cancer prevention.

Author

Vaccines; Cancer; Prevention; Antigens; Mammary Glands; Physiological Responses; Tumors; Health

20000117663 Meharry Medical Coll., Nashville, TN USA

Breast Cancer and Risk Factors Among African-American Women Aged 20-54: A Case-Control Study According to Estrogen Receptor Status ***Final Report, 1 Sep. 1996 - 28 Feb. 1999***

Zhu, Kangmin, Meharry Medical Coll., USA; March 1999; 41p; In English

Contract(s)/Grant(s): DAMD17-96-1-6270

Report No.(s): AD-A381706; No Copyright; Avail: Defense Technical Information Center (DTIC)

This is the final report of our exploratory case-control study on breast cancer. This study aimed to examine whether risk factor profiles differ according to estrogen receptor (ER) status among African-American women. During the period of the project, we established collaborations with the Tennessee Cancer Reporting System, hospitals in the study areas, and basic science researchers; we formulated a series of data collection and quality-control procedures; we identified and interviewed a number of cases and controls that is nearly equivalent to that expected in the study design; we collected breast cancer tissue specimens and measured ER status for most cases; and we conducted some preliminary analysis with results that are presented in this report. We also have published a hypothesis article based on the molecular biological progress on the topic. At the time of data analysis for this report, we were still waiting for responses from some cases and their doctors. We still need to collect tumor tissues and measure ER status for some cases and recruit some controls because these procedures lag the interviews with cases. These can be done soon and more deliberated analyses will be conducted.

Author

Cancer; Data Acquisition; Estrogens; Females; Mammary Glands; Risk; Public Health

20000117664 Texas Univ., Medical Branch, Galveston, TX USA

Mammography Use by Older Mexican American Women ***Final Report, 1 Jul. 1996 - 31 Jul. 1999***

Freeman, Jean L., Texas Univ., USA; August 1999; 142p; In English

Contract(s)/Grant(s): DAMD17-96-1-6215

Report No.(s): AD-A381714; No Copyright; Avail: Defense Technical Information Center (DTIC)

This study examined the correlates of mammographic screening in older Mexican-American women, with a focus on the influence of strong family relationships on promoting screening behavior. A random sample of 549 Mexican-American women age 50-74 years in southeast Texas was identified through a one stage cluster sample. Data were collected on 452 subjects through in-home interviews on factors related to ever having a mammogram in the past two years. Mammography use increases with years of education, household income, having some private insurance, having a usual source of care, and perceived susceptibility to breast cancer. Use is significantly associated with age, marital status, and attitudes towards perceived care. Use increases with acculturation, with language use and proficiency having the strongest association. There is strong potential for family to play an important role in promoting screening behavior, particularly having young female family members encourage their older relatives to have mammograms. Self reports of mammography for 192 women were validated with medical chart reviews. The positive prediction value was 74 percent and the overall agreement was 77 percent.

Author

Cancer; Females; Mammary Glands; Random Sampling; Texas; Public Health

20000117665 Michigan Univ., Ann Arbor, MI USA

The Effect of Radiotherapy Upon Primary Human Mammary Epithelial Cells Which Harbor a Breast Cancer Susceptibility Gene ***Final Report, 1 Sep. 1996 - 31 Aug. 1999***

Pierce, Lori, Michigan Univ., USA; September 1999; 15p; In English

Contract(s)/Grant(s): DAMD17-96-1-6194

Report No.(s): AD-A381716; No Copyright; Avail: Defense Technical Information Center (DTIC)

The purpose of this work is to determine whether genomic instability following radiotherapy is increase in breast cells that harbor either a BRCA-1 mutation relative to cells which carry two normal copies of the gene. Therefore mammary epithelial cells from women at high risk for carrying either BRCA-1 or BRCA-2 germline mutation were tested and two cell lines were found to harbor a germline mutation. These cells will be compared with mammary cells from women not at risk for carrying a mutation following radiation using the following assays: (1) growth factor independence, (2) growth in soft agar, and (3) tumor igenicity in vivo. Radiation experiments using immortalization, growth factor independence, and soft agar growth as endpoints have not identified any differences in genomic stability in the presence of a mutated gene. The final phase of this research, i.e. injecting immuno deficient mice with irradiated breast cells, has also not shown differences relative to irradiated wild-type cells.

Author

Cancer; Females; Irradiation; Mammary Glands; Mutations; Radiation Therapy; Risk; Public Health

20000117666 Howard Univ., Washington, DC USA

Selectivity of Very High Dose Methotrexate in MCF-7 and Normal Cells Using a Priming and Non-Toxic 5-Fluorouracil Dose ***Annual Report, 16 Sep. 1998 - 15 Sep. 1999***

Bowen, Donnell, Howard Univ., USA; October 1999; 17p; In English

Contract(s)/Grant(s): DAMD17-96-1-6291

Report No.(s): AD-A381717; No Copyright; Avail: Defense Technical Information Center (DTIC)

The growth inhibitory effects of high-dose methotrexate (MTX) and trimetrexate (TMQ) are maintained in MCF-7 breast cancer but is decreased in Hs824.T human bone marrow by a priming- and nontoxic 5-fluorouracil (5-FU) dose. Incubation of MCF-7 breast cells with a ten micro-M MTX, ten micro-M TMQ alone or in combination with ten micro-M 5-FU (MTX or TMQ two hours prior to 5-FU [MTX/5-FU or TMQ/5-FU] or 5-FU two hours prior to MTX or TMQ [5-FU/MTX or 5-FU/TMQ]) resulted in similar inhibitory patterns but dissimilar effects occurred in bone marrow cells. These studies suggest that a) MTX or TMQ and 5-FU combinations on the growth of breast cancer cells are independent of sequence of administration and are best related to MTX or TMQ rather than 5-FU (since 5-FU had no effect which differed from control and sequential MTX or TMQ plus 5-FU had no effect which differed from MTX or TMQ alone), b) a priming- and nontoxic dose of 5-FU will protect bone marrow against MTX and TMQ cytotoxicity while not affecting the maximum inhibitory effects of MTX or TMQ in breast cancer cells, and c) the results from the rise of nonclassical and nonpolyglutamyl antifolate TMQ suggest that polyglutamation is not a critical determinant of MTX cytoxicity in bone marrow.

Author

Bone Marrow; Cancer; Dosage; Mammary Glands; Public Health; Medical Science

20000117667 RAND Health, Santa Monica, CA USA

Managed Care and the Evaluation and Adoption of Emerging Medical Technologies

Garber, Steven, RAND Health, USA; Ridgely, M. Susan, RAND Health, USA; Taylor, Roger S., RAND Health, USA; Meili, Robin, RAND Health, USA; [2000]; 83p; In English; Sponsored by Health Industry Manufacturers Association and California Goldstrike Partnership

Report No.(s): AD-A381755; No Copyright; Avail: Defense Technical Information Center (DTIC)

New medical technologies--pharmaceuticals, medical devices, and procedures--often allow great improvements of medical care, but they are also widely believed to be a major cause of increasing costs. Selective adoption of new technologies, the taking on of only those technologies for which the medical benefits exceed the costs to society of developing and using them, is a crucial element in the quest to control healthcare costs while preserving or enhancing the quality of care. This report focuses on adoption of innovative medical technologies by managed care organizations (MCOs). We gathered empirical information from in-depth, semi-structured interviews with eight manufacturers of innovative devices and nine MCOs. We also collected information from representatives of manufacturers, MCOs, and the sponsors of this study. We had four primary audiences in mind when conducting this research and reporting our findings: (1) medical device developers and manufacturers, (2) MCOs, (3) public policy makers, and (4) researchers and analysts. Members of all four audiences will find something of interest here.

Derived from text

Public Health; Clinical Medicine; Policies; Operations Research; Cost Reduction; Decision Making; Regulations

20000117668 Washington Univ., Seattle, WA USA

Mutations in ATM, Radiation Exposure and Breast Cancer Risk Among Black and White Women ***Final Report, 1 Aug. 1996 - 31 Jul. 1999***

Schubert, Elizabeth, Washington Univ., USA; August 1999; 18p; In English

Contract(s)/Grant(s): DAMD17-96-1-6248

Report No.(s): AD-A381762; No Copyright; Avail: Defense Technical Information Center (DTIC)

In some families, Predisposition to breast cancer is inherited as a genetic trait. Thus far, a few highly penetrant genes responsible for inherited breast cancer have been identified. An important and unresolved question of breast cancer etiology is whether there are other genes which have a more moderate effect on breast cancer risk, possibly involving more women than do other inherited mutations, It has been suggested that mutations in the Ataxia-Telangiectasia gene (ATM) and cellular damage such as radiation exposure could be involved with breast cancer in this manner. In order to address this question, we screened a population-based series of African-American and Caucasian breast cancer patients and controls as well as a series of patients with particular phenotypes for mutations in the ATM gene which confer breast cancer risk.

Author

Cancer; Females; Genetics; Mammary Glands; Mutations

20000117670 Civil Aeromedical Inst., Oklahoma City, OK USA

Galactic Cosmic Radiation Exposure of Pregnant Aircrew Members, 2 ***Final Report***

Nicholas, Joyce S., Medical Univ. of South Carolina, USA; Copeland, Kyle, Civil Aeromedical Inst., USA; Duke, Frances E., Civil Aeromedical Inst., USA; Friedberg, Wallace, Civil Aeromedical Inst., USA; OBrien, Keran, III, University of Northern Arizona, USA; October 2000; 10p; In English

Contract(s)/Grant(s): AM-PHY305

Report No.(s): DOT/FAA/AM-00/33; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This report is an updated version of a previously published Technical Note in the Journal Aviation, Space, and Environmental Medicine. The main change is that improved computer programs were used to estimate galactic cosmic radiation. The calculations also cover a greater range of altitudes. Small differences in the calculated doses were obtained, but the conclusions are the same. The International Commission on Radiological Protection (ICRP) and the Federal Aviation Administration (FAA) consider aircrews to be occupationally exposed to ionizing radiation. Although the USA has no regulations limiting aircrew exposure to cosmic radiation, the FAA has recommended limits. For pregnant crewmembers, starting when the pregnancy is reported to management, the FAA recommends: (1) a limit of one millisievert to the conceptus for the remainder of the pregnancy, in accordance with the ICRP policy/recommendation, and (2) a monthly limit of 0.5 millisievert to the conceptus, as recommended by the National Council on Radiation Protection and Measurements (NCRP). Here we address, principally, the ICRP policy. The stated ICRP policy is that a standard of radiation protection for any conceptus be broadly comparable with that provided for members of the general public, i.e. a yearly limit of one millisievert. In their 1990 recommendations, the ICRP indicated that this standard could be met by limiting the equivalent dose to the surface of pregnant women's abdomen to two millisieverts for the remainder of the pregnancy, once declared. They apparently assumed that the equivalent does to the conceptus would be about half the dose to the surface of the abdomen. We tested this assumption with respect to galactic cosmic radiation, the principal ionizing radiation to which aircrews are exposed.

Author

Cosmic Rays; Flight Crews; Ionizing Radiation; Pregnancy; Radiation Dosage; Radiation Protection

20000117671 Seattle Biomedical Research Inst., Seattle, WA USA

Mechanism of Integrim-Mediated Growth Control in Normal, Transformed and Neoplastic Breast Cells ***Final Report, 30 Sep. 1994 - 29 Sep. 1999***

Wayner, Elizabeth, Seattle Biomedical Research Inst., USA; Tamura, Richard, Seattle Biomedical Research Inst., USA; October 1999; 21p; In English

Contract(s)/Grant(s): DAMD17-94-J-4303

Report No.(s): AD-A381108; No Copyright; Avail: Defense Technical Information Center (DTIC)

Anchorage-dependent cell growth by normal cells and the loss of this dependence during tumorigenesis is a phenomenon that has been recognized for many years. The primary cell adhesion receptors that mediate binding to extracellular matrix proteins are integrins. Our data suggest that (alpha)3(beta)1 and (alpha6(beta)4are the primary integrins responsible for mediating the GI/S transitiion in normal mammary epithelial cells and that these mechanisms may be defective in metastatic cancer cells. Other integrins also appears to influence components of the cell cycle regulatory machinery. For example,binding of GRDGS peptides to integrins((alpha)v(beta)5, (alpha)v(beta3), (alpha)5(beta)1) on both normal and cancer cells appears to regulate the activities of cdc2 kinase and cyclinaA-associated kinases. Cancer cells appear to have numerous defects in both cell adhesion components ((alpha)6(beta)4, E-cadherin, laminin-5) and cell cycle regulatory components (cyclin D2, p21)which my contribute to the adhesion-independent phenotype. A difference in expression of the alternatively-spliced forms of the integrin ((alpha)6, (alpha)6A and (alpha)6B, suggests that this marker may have diagnostic or prognostic value. Further study of the significance of these defects may lead to the development of novel therapeutics for the treatment or cure of breast cancer.

Author

Peptides; Mammary Glands; Defects; Cell Division; Cancer

20000117672 Arkansas Univ. for Medical Sciences, Little Rock, AR USA

Inhibiting Tumorigeneis by Growth Factor Receptor Down Regulation Using a Sorting Nexin ***Annual Report, 15 Apr. 1998 - 14 Apr. 1999***

Kurten, Richard C., Arkansas Univ. for Medical Sciences, USA; May 1999; 14p; In English

Contract(s)/Grant(s): DAMD17-98-1-8175

Report No.(s): AD-A381344; No Copyright; Avail: Defense Technical Information Center (DTIC)

Excessive activation of growth factor receptors can lead to the unrestrained cellular proliferation characteristic of tumors. Our objective is to determine if SNX1, a protein involved in intracellular membrane trafficking, can be used to downregulate EGF

receptors in mammary gland. Our approach is to characterize the gene for SNX1 and to generate transgenic animals overexpressing SNX1 in mammary glands. We have characterized a genomic clone for SNX1 and had planned to use this clone for transgenic vector construction. However the size of the first intron in SNX1 is too large for this approach to be used successfully. The revised plan is to construct a WAP-SNX1 cDNA vector for transgenic mouse production. A Career Development Award was a second component of the application. Career development activities include: presentation of the inaugural seminar for the Arkansas Cancer Research Center Forum, participation as reviewer on the American Cancer Society Cell Structure and Metastasis study section, and participation on a search committee charged with identifying a Director for Breast Cancer Research at UAMS. In addition, the State of Arkansas Breast Cancer Research Program awarded me a one-year pilot research grant to examine the relationship between HER-2lneu and EGF receptors in mammary gland cell proliferation.
DTIC
Mammary Glands; Cells (Biology); Regeneration (Physiology); Mice; Cancer; Proteins; Deoxyribonucleic Acid

20000117674 Vermont Univ., Burlington, VT USA
Effect of Folate on the Efficacy and Toxicity of Cancer Chemotherapy
Branda, Richard F., Vermont Univ., USA; McCormack, John, Vermont Univ., USA; September 1999; 45p; In English
Contract(s)/Grant(s): DAMD17-98-1-8345
Report No.(s): AD-A381230; No Copyright; Avail: Defense Technical Information Center (DTIC)

The purpose of this research project is to understand better the effect of dietary folate levels on the cellular pharmacology and toxicology of chemotherapeutic agents. The scope of the research involves in vitro studies with cell lines and in vivo assessments in rats of folate-chemotherapeutic drug interactions. Studies at a molecular level led to a new model to explain the synergy between nutritional folate deficiency and alkylating agents. Our studies at a cellular level suggest that folate metabolism can modulate gluathione levels. This observation may explain at least in part why dietary folate levels influence the efficacy and toxicity of alkylating agents. Studies in rats confirm that dietary folate levels affect the toxicity of cyclophosphamide, but there may be an optimal amount of dietary folate to reduce that toxicity. These in vivo studies also indicate that other aspects of diet are important in determining sensitivity to chemotherapy. Rats maintained on a cereal based diet were much more resistant to the toxic effects of cyclophosphamide than rats eating a Purified Diet. Taken together, our studies suggest that dietary changes can have a profound and largely unappreciated effect on the outcome of cancer chemotherapy.
Author
Cancer; Chemotherapy; Diets; Toxicity; Toxicology; Pharmacology

20000117696 Texas Univ., M. D. Anderson Cancer Center, Houston, TX USA
Structural and Signaling Requirements for C-erbB2 Antiapoptosis in Breast Cancer ***Annual Report, 1 Jun. 1998 - 31 May 1999***
Jing, Tong, Texas Univ., USA; June 1999; 19p; In English
Contract(s)/Grant(s): DAMD17-98-1-8313
Report No.(s): AD-A381239; No Copyright; Avail: Defense Technical Information Center (DTIC)

The c-erbB2 (or HER-2,neu) gene encodes a 185-kDa transmembrane glycoprotein (p815), which is a growth factor receptor of the epidermal growth factor receptor (EGF-r) family. Our previous studies demonstrated that c-erbB2 overexpression can enhance metastatic potential and infer increased chemoresistance to breast cancer cells, thereby leading to poor clinical outcome in breast cancer patients. Our recent study demonstrated that overexposure of c-erbB2 gene can protect human breast cancer cells from apoptosis induced by the chemotherapeutic agent Taxol, by gamma-radiation, or by serum starvation. These new findings provided an explanation on c-erbB2-mediated chemoresistance of breast cancer cells and poor prognosis of the patients. Therefore, it is very important to understand the mechanism of antiapoptosis by c-erbB2 overexposure in breast cancer cells. Since the p185(sup c-erbB2) is a receptor tyrosine kinase (RTK), we hypothesize that c-erbB2 overexposure may enhance the RTK signaling capacity that activates downstream effectors for antiapoptitic signaling. In this application, I will study: (1) Identify structural requirements for c-erbB2 receptor antiapoptosis signaling. (2) Investigate the involvement of c-erbB2 immediate-downstream signaling (Shc-Grb2-Ras or PI2K) in antiapoptosis.
Author
Cancer; Chemotherapy; Mammary Glands; Patients; Prognosis; Public Health

20000117697 State Univ. of New York, Buffalo, NY USA

Risk Factors for Osteoporosis and Oral Bone Loss in Postmenopausal Women ***Annual Report, 16 Sep. 1998 - 15 Sep. 1999***

Wactawski, Jean, State Univ. of New York, USA; October 1999; 24p; In English

Contract(s)/Grant(s): DAMD17-96-1-6319

Report No.(s): AD-A381140; No Copyright; Avail: Defense Technical Information Center (DTIC)

The overall purpose of this study is to determine the relationship between skeletal and oral bone density, identify factors influencing bone loss, and determining the relationship between osteoporosis and oral bone loss, periodontal disease and tooth loss. We hypothesize that reduction in bone density leading to osteoporosis plays a significant role in increasing susceptibility to destructive periodontis and tooth loss. Sensitive and accurate measurements of skeletal and oral bone mineral density, periodontal disease and tooth loss will be used. A wide variety of other risk factors for both osteopenia and periodontal disease will be assessed. A total of 1300 subjects are being recruited from an ongoing NIH funded study cohort, the Women's Health Initiative (WHI). Preliminary research findings from our pilot study determined that bone loss in the hip or spine is strongly associated with bone loss in the jaw. Also that bone loss in the hip was associated with tooth loss even with such controlling factors such as age, menopause, estrogen use, body mass, and smoking. We have just completed year three of a four year study. Data collection will continue into year-four, and as such, findings are not yet available to report.

Author

Bone Demineralization; Bones; Data Acquisition; Estrogens; Females; Health; Musculoskeletal System; Osteoporosis; Risk; Diseases

20000117698 Meharry Medical Coll., Nashville, TN USA

Obstacles to the Primary and Secondary Prevention of Breast Cancer In African-American Women ***Final Report, 1 Sep. 1996 - 30 Aug. 1999***

Hargreaves, Margaret K., Meharry Medical Coll., USA; August 1999; 134p; In English

Contract(s)/Grant(s): DAMD17-96-1-6272

Report No.(s): AD-A381138; No Copyright; Avail: Defense Technical Information Center (DTIC)

Study objectives were to describe the barriers to primary and secondary prevention of breast cancer in African-American women, to develop tools to measure these barrier, and to describe prevalence in a community sample. This final report describes all four phases of our research. After a comprehensive review of the literature, we developed a structured interview, interviewed 155 African-American women, and developed a systematic and detailed coding system to successfully describe the barriers to reducing fat intake, increasing consumption of fruits and vegetables, doing breast self-examination, and getting a mammogram. These results were used to develop four questionnaires that were demonstrated to be reliable and valid in a sample of 117 African-American women. The questionnaires were then used to survey the occurrence of the barriers to behavioral change in a community sample of older white and black women in Nashville, TN. While many women in the community described themselves as already compliant with cancer prevention guidelines, a substantial subgroup reported varying degrees of difficulty with both psychological and environmental barriers to behavioral changes. Few differences were found between African-American and Caucasian women with members of each ethnic group falling into the five stages of change.

Author

Cancer; Ethnic Factors; Females; Mammary Glands; Prevention; Surveys; Public Health

20000117699 Whitehead Inst. for Biomedical Research, Cambridge, MA USA

Regulation of TGF-Beta Signal Transduction Pathways in Breast Cancer ***Annual Report, 4 May 1998 - 3 May 1999***

Liu, Xue-Dong, Whitehead Inst. for Biomedical Research, USA; June 1999; 181p; In English

Contract(s)/Grant(s): DAMD17-98-1-8267

Report No.(s): AD-A381137; No Copyright; Avail: Defense Technical Information Center (DTIC)

The goal of my studies under the BCRP fellowship is to understand the role of the Smad proteins and the TGF-beta signal transduction pathways in breast cancer cell proliferetion, tumor progression, and prognosis. In the past nine months, I have focused on identifying intracellular molecules and trsnscription factors that might be involved in the TGF-beta signal transduction pathways. Using both genetic and biochemical approaches, I have successfully isolated a few key molecules that are either mediator of the TGF-beta-induced transcriptional response or suppressors of the TGF-beta signal pathways. Future studies will be focused on understanding the detail mechanism of how the molecules interplay in mediating TGF-beta signaling and the significance of these interactions in tumor cell proliferation, progression, and prognosis.

Author

Tumors; Mammary Glands; Cells (Biology); Cancer; Regeneration (Physiology)

20000117700 Illinois Univ., Chicago, IL USA

Breast Carcinoma Cell Targeted Therapy by Novel Vitamin D Analog ***Annual Report, 1 Sep. 1998 - 31 Aug. 1999***

Mehta, Rajeshwari, Illinois Univ., USA; September 1999; 17p; In English

Contract(s)/Grant(s): DAMD17-97-1-7263

Report No.(s): AD-A381134; No Copyright; Avail: Defense Technical Information Center (DTIC)

Vitamin D and its analogs have growth-suppressing and cell-defferentiating effect on various carcinoma cell types. We have synthesized a vitamin D analog (1(alpha)(OH)D(sub 5)) that is nontoxic and has both growth-inhibitory and cell-differentiating actions in various established breast cancer cell line. Our original goal was to covalently link this vitamin D analog to antibody against Her-2/neu protein and thus deliver 1(alpha)(OH)D(sub 5) specifically to highly aggressive human breast cancer cells. Using the xenograft model, we previously confirmed that 1(alpha)(OH)D(sub 5) supplemented in the diet inhibits growth of human breast carcinoma cells transplanted into athymic mice. As a second phase of the study, we covalently linked 1(alpha)(OH)D(sub 5) to Her-2/neu antibody using sulfo-SANPAH linker. The 1(alpha)(OH)D(sub 5)-Her-2 conjugate specifically binds for Her-2 receptor binding sites on the cancer cells. Our preliminary results show that the conjugate, when injected into Her-2+ tumor-bearing athymic mice, shows significantly higher accumulation in tumor than in other visceral organs. Experiments are in progress to further characterize the properties of 1(alpha)(OH)D(sub 5)-Her-2-antibody immunoconjugate and its effect on in vivo growth of human breast carcinoma cells.

Author

Calciferol; Cancer; Conjugates; Mammary Glands; Tumors

20000117701 Miami Univ., FL USA

Enhancing the Anti-Tumor Activity of Breast Cancer-Specific Cytotoxic T Lymphocytes ***Annual Report, 1 Jul. 1998 - 30 Jun. 1999***

Malek, Thomas R., Miami Univ., USA; July 1999; 24p; In English

Contract(s)/Grant(s): DAMD17-98-1-8208

Report No.(s): AD-A381119; No Copyright; Avail: Defense Technical Information Center (DTIC)

Directing the immune system to attack tumors represents a potential powerful non-toxic approach for the treatment of breast cancer.Our goal is to ultimately engineer the interleukin-2 receptor (IL-2R) in cytotoxic T cells (CTL) to control signal transduction through this receptor and to improve the in vivo efficacy upon adoptive transfer to a tumor-bearing host. to this aim we have prepared a series of chimeric IL-2R constructs and show that signaling of one such pair appears to be induced by a small molecular weight dimerizing drug, We also established a sensitive in vivo animal tumor model system to be used to characterize such ”engineering” CTL. The initial studies in this model indicate that unprimed tumor-specific T cell are essentially ignorant of growing tumor in vivo. by contrast, tumor growth is initially inhibited when adoptively transferred to tumor-bearing mice.

Author

Animals; Cancer; Dimerization; Drugs; Genetics; Lymphocytes; Toxins and Antitoxins; Tumors

20000117702 Nebraska Univ., Omaha, NE USA

Inhibition of Stem Cell Mobilization in Breast Cancer Patients by a Circulating Factor

Sharp, John G., Nebraska Univ., USA; September 1999; 30p; In English

Contract(s)/Grant(s): DAMD17-97-1-7238

Report No.(s): AD-A381106; No Copyright; Avail: Defense Technical Information Center (DTIC)

Some breast cancer patient are candidates for high dose therapy requiring collection of a cytokine-mobilized blood stem cell harvest for subsequent reinfusion to restore hematopoiesis and immune function. A proportion of patients respond poorly to mobilizing cytokines making collection of an adequate harvest inconvenient, prolonged and costly. The hypothesis of this project was that such patients had a circulating inhibitor of stem cell mobilization. Plasma from poorly versus vigorously mobilizing individuals was assayed in a mouse model for its ability to inhibit cytokine mobilization of stem and progenitor cells. THere was a significant positive correlation between the number of CD34+ stem cell per collection and inhibition or stimulation of CD45CD34+cell, GM-CFC progenitor cells and spleen weight of mice receiving plasma injections prior to cytokine injection. The majority of individuals who mobilized poorly (less than 10(exp 6) CD34+cells/coollection) showed inhibitation of mobilization. In contrast, plasma from some vigorous mobolizers (over 5 x 10(exp 6)CD34+cells/collection) enhanced mobilization. These data suggest that circulating inhibitor(s) and potentially, stimulator(s) of mobilization are generated as a result of cytokine injection. Genetic factors and prior therapy may influence this response. The inhibitor(s) might be TGF-beta. The identity of the simulator(s) is unknown. Characterization and manipulation of these factors might permit adequate mobilization of all breast cancer patient.

Author

Cancer; Dosage; Hematopoiesis; Inhibitors; Stimulation; Therapy

20000117703 Sloan-Kettering Inst. for Cancer Research, New York, NY USA
Enhancement of Breast Cancer Therapy by 6-Aminonicotinamide ***Annual Report, 6 Apr. 1998 - 5 Apr. 1999***
Koutcher, Jason A., Sloan-Kettering Inst. for Cancer Research, USA; May 1999; 14p; In English
Contract(s)/Grant(s): DAMD17-98-1-8153
Report No.(s): AD-A381102; No Copyright; Avail: Defense Technical Information Center (DTIC)

6-Aminonicotinamide (6AN) has been shown to enhance the effect of radiation both in vivo and in vitro in a murine tumor models. This study was undertaken to determine whether enhanced efficacy of radiation, adriamycin and taxol could be obtained by pretreating with 6AN. MCF-7 cells were grown on beads and perfused in the NMR magnet. P31 NMR spectra were obtained on cells at 4.7 T (81.03 MHz) which were treated with 6AN or control. Treatment with 6AN caused a new peak to be detected which has been previously assigned to 6-phosphogluconate. In addition, a decrease in phosphocreatine was noted. These results were analygous to results found with murine RIF-1 tumor cells. Surviving fraction studies were subsequently done. Cells were perfused for four hours with 6AN, the 6AN washed out and the cells incubated for three hours before being treated with radiation, adriamycin or taxol. Enhanced efficacy to radiation (2 Gy dose) and adriamycin (10 nM) was noted. 6AN inhibited the effect of Taxol. In vivo studies have been started and it appears that the maximum tolerance dose for 6AN will be between 10 and 12 mg/kg.
Author
Antibiotics; Augmentation; Cancer; Cells (Biology); Dosage; Radiation Effects; Therapy; Mammary Glands

20000117706 Dana Farber Cancer Inst., Boston, MA USA
Differential Regulation of Cell Cycle Progression in Human Breast Cancer Cell Lines by the Estrogen Receptor ***Annual Report, 1 Aug. 1998 - 31 Jul. 1999***
Direnzo, James, Dana Farber Cancer Inst., USA; Brown, Myles, Dana Farber Cancer Inst., USA; August 1999; 11p; In English
Contract(s)/Grant(s): DAMD17-97-1-7069
Report No.(s): AD-A381101; No Copyright; Avail: Defense Technical Information Center (DTIC)

Critical predictions as to the biological behavior, and thus the therapeutic strategy, of breast cancer can be made based upon the estrogen receptor (ER). In support of DOD grant no. DAMD17-97-1-7069, our goal is to better understand the mechanisms by which ER controls the expression of target genes and therefore mediates the biological effects upon gene regulation and cell cycle progression. Our detailed studies of the regions of ER that control cell cycle progression in breast cancer cell lines have indicated an absolute requirement for the Activating Function-2 (AF-2) region of ER for hormone-dependent cell cycle progression. In many different cases of nuclear receptors, this area has been vigorously studied and has been shown to be important for the physical interaction between hormone bound receptors and coactivators. Our studies have demonstrated that mechanisms involving the chemical and structural modification of chromatin are critical for transcriptional responses to estrogen and may also be important for estrogen-dependent cell cycle progression.
Author
Cancer; Mammary Glands; Gene Expression; Hormones

53
BEHAVIORAL SCIENCES

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

20000115495 Air Force Academy, Dept. of Behavioral Sciences and Leadership, CO USA
Development of a Basic Flight Instruction Tutoring System (BFITS) Research Station
Miller, James C.; Kirk, Michael T.; Flynn, John S.; Hurt, Morgan P.; Schlueter, Jeffrey C.; Apr. 2000; 48p; In English
Report No.(s): AD-A381920; HERC-2000-03; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Basic Flight Instruction Tutoring System (BFITS) was designed to observe and track the behavior of students as they attempt to learn basic flight procedures. Several modifications were required to adapt the BFITS to the needs of researchers at the USA Air Force Academy. These modifications were accomplished by a team of five cadets enrolled in Behavioral Sciences 473, Human Factors Engineering, and their instructor. A limited test and evaluation assured that the BFITS research station worked as desired. The BFITS is a rich resource for investigations of fundamental learning processes associated with novice pilot learning. It may be used extensively as a tool to support faculty and cadet investigations of those processes.
DTIC
Flight Training; Human Factors Engineering; Flight Simulators; Flight Simulation; Universities

20000115618 San Jose State Univ., CA USA
Evaluation of a Computational Model of Situational Awareness
Burdick, Mark D., San Jose State Univ., USA; Shively, R. Jay, Army Aviation and Missile Command, USA; [2000]; 5p; In English; 14th, 30 Jul. 4 Aug. 2000, San Diego, CA, USA; Sponsored by Human Factors and Ergonomics Society, USA
Contract(s)/Grant(s): 21-1614-2360; RTOP 581-31-22; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Although the use of the psychological construct of situational awareness (SA) assists researchers in creating a flight environment that is safer and more predictable, its true potential remains untapped until a valid means of predicting SA a priori becomes available. Previous work proposed a computational model of SA (CSA) that sought to Fill that void. The current line of research is aimed at validating that model. The results show that the model accurately predicted SA in a piloted simulation.
Author
Evaluation; Simulation; Computerized Simulation; Physiological Factors

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..

20000116093 Air Force Research Lab., Human Effectiveness Directorate, Brooks AFB, TX USA
Testing and Evaluation of the Northrop Grumman Corporation Model 9602 Life Support for Trauma and Transport (LSTAT) Unit, Part Number ATBX01006A002 ***Final Report, Nov. 98***
Blake, Butch O.; Sylvester, James C.; Mar. 2000; 26p; In English
Contract(s)/Grant(s): Proj-7184
Report No.(s): AD-A377368; AFRL-HE-BR-TR-2000-0027; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Northrop Grumman Corporation Model 9602 Life Support for Trauma and Transport (LSTAT) Unit, Part Number ATBX01006A002 is conceptually designed for use in military medical evacuation on board USAF aeromedical evacuation aircraft. Specific components of the LSTAT that under went the evaluation process included: The Protocol Systems Inc., Propaq Model 106 LCD Physiological Monitor; IMPACT Corporation, Model 326 Continuous/Intermittent Suction Unit (CISU); IMPACT Corporation, Model 754 ”Eagle” Transport Ventilator; SurVivaLink Corporation, Automated External Defibrillator (AED); IVAC, Inc. Model MedSystem III Infusion Pump; i-STAT, Inc., Blood Analyzer; Internal 480 Liter Bottle Oxygen System; Display and Data Logging Subsystem (DDLS) to include Fujitsu Model Stylistic 1000 Secondary Display; and Electrical Power Subsystem (EPS).
DTIC
Life Support Systems; Medical Equipment; Armed Forces; Oxygen Supply Equipment; Medical Services; Evacuating (Transportation)

20000116149 Air Force Research Lab., Human Effectiveness Directorate, Wright-Patterson AFB, OH USA
Evaluation of the Effects of the ZetaLiner During Helmet Impact ***Interim Report, Aug.-Nov. 1999***
Perry, Chris E.; Nov. 1999; 36p; In English
Contract(s)/Grant(s): Proj-7184
Report No.(s): AD-A382259; AFRL-HE-WP-SR-2000-0005; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

An experimental effort was conducted to compare the ZetaLiner, a new foam flight helmet liner manufactured by Oregon Aero, to the Thermal Plastic Liner (TPL), the helmet liner used in the USAF’s standard flight helmet, the HGU-55/P. The liners were compared based on their effectiveness in attenuating impact acceleration and minimizing head injury potential. A series of vertical drops with a Helmet Drop Tower (HDT) were conducted using HGU-55/P flight helmets, TPLs, and several ZetaLiner samples. In addition to the liner comparison, helmet impacts were also conducted to evaluate Oregon Aero’s Ballistic Liner Upgrade (BLU) compared to the rigid foam liner used in the HGU-55/P. All tests exposed the helmet shell to impacts against a hemispherical anvil as outlined in military standard MIL-H-87174. The probability of head injury, as defined by the Head Injury Criteria (HIC), was calculated using measured impact acceleration of the HDT headform for each helmet configuration. Test results indicated that all impact configurations passed the acceleration standard as outlined in MIL-H-87174. The headform acceleration, resulting HIC values, and probability of severe brain injury values for the ZetaLiner tests were less than the comparative values for either the standard ACES II TPL or the HGU-55/P helmet with the BLU.
DTIC
Flight Clothing; Helmets; Head (Anatomy); Linings

20000116335 NASA Johnson Space Center, Houston, TX USA

Spacecraft Minimum Allowable Concentrations: Determination, Application, and Contingency Situations

Marshburn, Thomas H., NASA Johnson Space Center, USA; [1999]; 1p; In English; Hyperbaric Breathing Gas, 30 Sep. Sep. - 1 Oct. 1999, Aberdeen, Scotland, UK; Sponsored by UK Health and Safety Initiative, UK; No Copyright; Avail: Issuing Activity; Abstract Only

This document is an outline of a presentation about the determination of minimum allowable concentrations in spacecraft. The presentation reviews the type of toxins and mechanisms to determine the acceptable concentrations of these toxic substances. The considerations for the unique situation that spaceflight entails including zero gravity, and the intense scrutiny are reviewed. The current measurement hardware is reviewed. The spacecraft atmospheres on the Shuttle, airflow, the Space Station and the EMU in respect to airflow, pressure, constituents are also summarized. Contingency situations and potential hazards are also discussed.

CASI

Toxicity; Spacecraft Environments; Bioastronautics; Spacecraft Cabin Atmospheres; Environmental Control

20000116402 Institut Franco-Allemand de Recherches, Saint-Louis France

Artificial Heads for High-Level Impulse Sound Measurement, *5-8 Jul. 1999*

Buck, K.; Parmentier, G.; Jan. 1999; 8p; In English

Report No.(s): AD-A382230; ISL-PU-341/99; No Copyright; Avail: CASI; A01, Microfiche; A02, Hardcopy

If the Insertion Loss (IL) of hearing protectors has to be determined with very high impulse or continuous noise levels, the acoustic insulation of the Artificial Test Fixture has to exceed at least the Insertion Loss (IL) of the hearing protector. An another requirement when evaluating ear muffs, is an adequate reproduction of the pinna and the circumaural area. For the evaluation of ear plugs and hearing protectors using Active Noise Cancellation (ANR) the impedance of the eardrum must be properly reproduced. These requirements have not been always fulfilled by commercially available artificial heads. Therefore, a special device for this type of measurement has been designed and built in our laboratories. The head has been molded with Polyurethane material in a way, that the HEAD Acoustics external ear and circumaural area could be fit. In order to simulate the acoustic impedance of the human ear, a Bruel & Kjaer ear simulator has been used. The acoustic insulation of the ATF is better than the requirements of the different standards. The Transfer Function of the Open Ear (TFOE) is very close to the data published by Shaw. The device is linear up to peak pressure levels of 190 dB. It is possible with this ATF, to evaluate the IL of all types of hearing protectors up to pressure levels of 190 dB.

DTIC

Acoustic Measurement; Ear Protectors; Continuous Noise; High Impulse

55
EXOBIOLOGY

Includes astrobiology; planetary biology; and extraterrestrial life. For the biological effects of aerospace environments on humans see 52 Aerospace medicine; on animals and plants see 51 Life Sciences. For psychological and behavioral effects of aerospace environments see 53 Behavioral Science.

20000115621 NASA Ames Research Center, Moffett Field, CA USA

How Common are Habitable Planets?

Lissauer, Jack J., NASA Ames Research Center, USA; [2000]; 12p; In English

Contract(s)/Grant(s): RTOP 344-30-50-01; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Earth is teeming with life, which, occupies a diverse array of environments; other bodies in our Solar System offer fewer, if any, niches which are habitable by life as we know it. Nonetheless, astronomical studies suggest that a large number of habitable planets-are likely to be present within our Galaxy.

Author

Habitability; Earth (Planet); Planets; Extraterrestrial Life

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.

20000116130 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
Design and Implementation of a Self-Securing Storage Device
Strunk, John D.; Goodson, Garth R.; Scheinholtz, Michael L.; Soules, Craig A.; Ganger, Gregory R.; May 2000; 32p; In English
Report No.(s): AD-A382316; CMU-CS-00-129; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Self-securing storage prevents intruders from undetectably tampering with or permanently deleting stored data. to accomplish this, self-securing storage devices internally audit all requests and keep all versions of all data for a window of time, regardless of the commands received from potentially compromised host operating systems. Within the window, system administrators are guaranteed to have this valuable information for intrusion diagnosis and recovery. The S4 implementation combines log-structuring with novel metadata journaling and data replication techniques to minimize the performance costs of comprehensive versioning. Experiments show that self-securing storage devices can deliver performance that is comparable with conventional storage. Further, analyses indicate that several weeks worth of all versions can reasonably be kept on state-of-the-art disks, especially when differencing and compression technologies are employed.
DTIC
Data Storage; Wide Area Networks; Computer Information Security; Access Control

20000116152 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
Towards Higher Disk Head Utilization: Extracting ”Free” Bandwidth From Busy Disk Drives
Lumb, Christopher R.; Schindler, Jiri; Ganger, Gregory R.; Riedel, Erik; Nagle, David F.; May 2000; 31p; In English
Report No.(s): AD-A382318; CMU-CS-00-130; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Freeblock scheduling is a new approach to utilizing more of disks’ potential media bandwidths. by filling rotational latency periods with useful media transfers, 20?50% of a never-idle disk’s bandwidth can often be provided to background applications with no effect on foreground response times. This paper describes freeblock scheduling and demonstrates its value with two concrete applications: free segment cleaning and free data mining. Free segment cleaning often allows an LFS file system to maintain its ideal write performance when cleaning overheads would otherwise cause up to factor of 3 performance decreases. Free data mining can achieve 45 - 70 full disk scans per day on an active transaction processing system, with no effect on transaction performance.
DTIC
Architecture (Computers); Information Retrieval; Data Mining; Memory (Computers)

20000116487 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
Operating System Management of MEMS-Based Storage Devices
Griffin, John L.; Schlosser, Steven W.; Ganger, Gregory R.; Nagle, David F.; May 2000; 23p; In English
Report No.(s): AD-A382628; CMU-CS-00-136; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

MEMS-based storage devices promise significant performance, reliability, and power improvements relative to disk drives. This paper explores how the physical characteristics of these devices change four aspects of operating system management: request scheduling, data placement, failure management, and power management. Adaptations of disk request scheduling algorithms are found to be appropriate for these devices; however, new data placement schemes are shown to better match their differing mechanical positioning characteristics. With aggressive internal redundancy, MEMS-based storage devices can tolerate failure modes that cause data loss for disks. In addition, MEMS-based storage devices enable a finer granularity of OS-level power management because the devices can be stopped and started rapidly and their mechanical components can be individually enabled or disabled to reduce power consumption.
DTIC
Microelectromechanical Systems; Data Management; Operating Systems (Computers); Random Access Memory

20000116489 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
Designing Computer Systems with MEMS-Based Storage
Schlosser, Steven W.; Griffin, John L.; Nagle, David F.; Ganger, Gregory R.; May 2000; 34p; In English
Report No.(s): AD-A382630; CMU-CS-00-137; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

For decades the RAM-to-disk memory hierarchy gap has plagued computer architects. An exciting new storage technology based on microelectromechanical systems (MEMS) is poised to fill a large portion of this performance gap, significantly reduce power consumption, and enable many new classes of applications. This research explores the impact that several different MEMS-based storage designs will have on computer systems. Results from five application studies show these devices reduce application I/O stall times by 3-10X and improve overall application performance by 1.6-8.1X. Further, integrating MEMS-based storage as a disk cache achieves a 3.5X performance improvement over a standalone disk drive. Power consumption simulations show that MEMS-based storage devices use up to 10X less power than state-of-the-art low-power disk drives. Many of these improvements stem from the fact that average access times for MEMS-based storage are 10X faster than disks and that MEMS devices are able to rapidly move between active and power-down mode. Combined with the differences in the physical behavior of MEMS-based storage, these characteristics create numerous opportunities for restructuring the storage/memory hierarchy.
DTIC
Microelectromechanical Systems; Architecture (Computers); Computers

61
COMPUTER PROGRAMMING AND SOFTWARE

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

20000115484 Norwegian Defence Research Establishment, Kjeller, Norway
Turbo Code: Some Simulation Results ***Turko Kode: Noen Simuleringsresultater***
Farsund, Bodil Hvesser, Norwegian Defence Research Establishment, Norway; Jul. 04, 2000; 28p; In Norwegian; Original contains color illustrations
Contract(s)/Grant(s): FFIE Proj. 742/110
Report No.(s): FFI/RAPPORT-2000/03465; ISBN-82-464-0443-1; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This document shows some simulation results of a Turbo Code. Turbo Codes combine a convolutional code along with a pseudorandom interleaver and maximum a posteriori probability (MAP) iterative decoding to achieve performance very close to the Shannon limit. Because of its good qualities Turbo Codes is a good candidate for use in an adaptive FEC in tactical networks.
Author
Networks; Data Acquisition; Computerized Simulation

20000115611 Veridian, Moffett Field, CA USA
JavaGenes: Evolving Graphs with Crossover
Globus, Al, Veridian, USA; Atsatt, Sean, Sierra Imaging, Inc., USA; Lawton, John, California Univ., USA; Wipke, Todd, California Univ., USA; [2000]; 24p; In English
Contract(s)/Grant(s): NAS2-14303; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Genetic algorithms usually use string or tree representations. We have developed a novel crossover operator for a directed and undirected graph representation, and used this operator to evolve molecules and circuits. Unlike strings or trees, a single point in the representation cannot divide every possible graph into two parts, because graphs may contain cycles. Thus, the crossover operator is non-trivial. A steady-state, tournament selection genetic algorithm code (JavaGenes) was written to implement and test the graph crossover operator. All runs were executed by cycle-scavagging on networked workstations using the Condor batch processing system. The JavaGenes code has evolved pharmaceutical drug molecules and simple digital circuits. Results to date suggest that JavaGenes can evolve moderate sized drug molecules and very small circuits in reasonable time. The algorithm has greater difficulty with somewhat larger circuits, suggesting that directed graphs (circuits) are more difficult to evolve than undirected graphs (molecules), although necessary differences in the crossover operator may also explain the results. In principle, JavaGenes should be able to evolve other graph-representable systems, such as transportation networks, metabolic pathways, and computer networks. However, large graphs evolve significantly slower than smaller graphs, presumably because the space-of-all-graphs explodes combinatorially with graph size. Since the representation strongly affects genetic algorithm performance, adding graphs to the evolutionary programmer's bag-of-tricks should be beneficial. Also, since graph evolution operates directly on the phenotype, the genotype-phenotype translation step, common in genetic algorithm work, is eliminated.
Author
Java (Programming Language); Algorithms; Computer Networks; Genetic Algorithms; Circuits; Graph Theory

20000115615 MRJ Technology Solutions, Moffett Field, CA USA

JavaGenes and Condor: Cycle-Scavenging Genetic Algorithms

Globus, Al, MRJ Technology Solutions, USA; Langhirt, Eric, Sterling Software, Inc., USA; Livny, Miron, Wisconsin Univ., USA; Ramamurthy, Ravishankar, Wisconsin Univ., USA; Soloman, Marvin, Wisconsin Univ., USA; Traugott, Steve, Sterling Software, Inc., USA; [2000]; 12p; In English; Java Grande, 3-4 Jun. 2000, San Francisco, CA, USA

Contract(s)/Grant(s): NAS2-14303; NCC2-5323; RTOP 519-40-12; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A genetic algorithm code, JavaGenes, was written in Java and used to evolve pharmaceutical drug molecules and digital circuits. JavaGenes was run under the Condor cycle-scavenging batch system managing 100-170 desktop SGI workstations. Genetic algorithms mimic biological evolution by evolving solutions to problems using crossover and mutation. While most genetic algorithms evolve strings or trees, JavaGenes evolves graphs representing (currently) molecules and circuits. Java was chosen as the implementation language because the genetic algorithm requires random splitting and recombining of graphs, a complex data structure manipulation with ample opportunities for memory leaks, loose pointers, out-of-bound indices, and other hard to find bugs. Java garbage-collection memory management, lack of pointer arithmetic, and array-bounds index checking prevents these bugs from occurring, substantially reducing development time. While a run-time performance penalty must be paid, the only unacceptable performance we encountered was using standard Java serialization to checkpoint and restart the code. This was fixed by a two-day implementation of custom checkpointing. JavaGenes is minimally integrated with Condor; in other words, JavaGenes must do its own checkpointing and I/O redirection. A prototype Java-aware version of Condor was developed using standard Java serialization for checkpointing. For the prototype to be useful, standard Java serialization must be significantly optimized. JavaGenes is approximately 8700 lines of code and a few thousand JavaGenes jobs have been run. Most jobs ran for a few days. Results include proof that genetic algorithms can evolve directed and undirected graphs, development of a novel crossover operator for graphs, a paper in the journal Nanotechnology, and another paper in preparation.

Author

Biological Evolution; Genetic Algorithms; Prototypes; Scavenging; Java (Programming Language)

20000115903 Naval Air Warfare Center, Aircraft Div., Patuxent River, MD USA

Establishing a Software Cost Estimating Process

Chin, Robert; Jan. 04, 2000; 20p; In English

Report No.(s): AD-A375777; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

State-of-the-art high speed document scanning and reproduction equipment were used. In addition stringent quality control techniques at each stage of the scanning and reproduction process was employed to ensure that our documents reproduction is as true to the original as current scanning and reproduction technology allows.

CASI

Computer Programs; Cost Estimates; Control Systems Design

20000116120 International Atomic Energy Agency, Vienna Austria

Millennium problem and physical protection systems in UK

Groves, J.; Dec. 31, 1999; 3p; In English; Year 2000 (Y2K): Progress and Cooperation

Report No.(s): DE99-637260; INIS-XA-180; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

In the UK the Competent Authority is Nuclear Industries Directorate of the UK Government's department of Trade and Industry. It is charged with ensuring that the security regimes at all civil nuclear sites in the country conform with the rules laid down by Government. This task is achieved through giving advice, issuing and interpreting policy, performing trustworthiness checks and conducting security assessments of all aspects of security. This presentation is not concerned with safety or safeguards systems but purely with those concerned with physical protection.

NTIS

Protection; Governments; Computers

20000116121 International Atomic Energy Agency, Vienna Austria

Myanmar and Y2K problem

Kyaw, Zwa Soe; Dec. 31, 1999; 3p; In English; Year 2000 (Y2K): Progress and Cooperation

Report No.(s): DE99-637259; INIS-XA-179; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

Government of Myanmar set up a national committee for steering to overcome the Y2K problem smoothly. The responsibility of this committee is: to survey the governmental and private organizations using the computers or computer controlled machines;

to identify whether they are compliant to year 2000 and to give information on the subject to the public through the media. Identification and certification are to be carried out as well.
NTIS
Surveys; Organizations; Governments

20000116122 International Atomic Energy Agency, Vienna Austria
Y2K program of the US Nuclear Regulatory Commission
Breskovic, C.; Dec. 31, 1999; 17p; In English; Year 2000 (Y2K): Progress and Cooperation
Report No.(s): DE99-637258; INIS-XA-178; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

The NRC is pursuing a comprehensive program for dealing with the potential Y2K problems. Continuous work is being done concerning licensees to ensure that potential Y2K problems are being identified and rectified. Remediation of the NRC computer based system was done and it will continue functioning properly passing from 1999 to 2000. The problems concerning nuclear power plants operation, control and management are described as well as the nuclear materials management. NRC has a contingency plan based on reasonably conservative assumptions and is considered to be a living document that requires ongoing coordination with external stake holders and NRC licensees
NTIS
Nuclear Power Plants; Computers

20000116126 Naval Postgraduate School, Monterey, CA USA
A Formal Model for Risk Assessment in Software Projects
Nogueira, Juan C.; Sep. 2000; 178p; In English
Report No.(s): AD-A382304; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

The current state of the art techniques of risk assessment rely on checklists and human expertise. This thesis introduces a formal method to assess the risk and the duration of software projects automatically. The method has been designed according the characteristics of evolutionary software processes such as productivity, requirement volatility and complexity. The formal model based on these three indicators estimates the duration and risk of evolutionary software processes. The approach introduces benefits in two fields: a) automation of risk assessment and, b) early estimation method for evolutionary software processes.
DTIC
Software Engineering; Risk; Data Management; Software Reliability; Mathematical Models

20000116129 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
Selective Enumeration
Damon, Craig A.; Jul. 2000; 230p; In English
Report No.(s): AD-A382315; CMU-CS-00-151; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

Selective enumeration is an approach to pruning search trees with the goal of preventing the generation of extraneous paths in the search tree, rather than generating paths that will later be pruned. The reduction in the size of the search tree scales exponentially with both the number of variables and the number of values, making complete coverage of very large (in excess of 1e100 nodes) search trees tractable. This dissertation demonstrates that selective enumeration enables an analysis of formal specifications of software systems. This analysis discovers counterexamples to user-defined claims about properties of a specification by solving formulae derived the specification. Ladybug is a new tool that incorporates selective enumeration to check software designs. Ladybug's input language is essentially a first-order subset of Z, one of the most broadly used software specification languages. Ladybug includes implementations of three significant new algorithms to help reduce the search space: bounded generation, domain coloring, and isomorph-eliminating relation generators. Bounded generation improves upon traditional tree pruning techniques by preventing the generation of many subtrees that would subsequently be eliminated. Domain coloring provides an efficient means of building a sound approximation to the automorphism group of an assignment. The isomorph-eliminating generators yield a nearly perfect superset of an isomorph-free set of assignments with minimal cost. In this thesis, I have applied Ladybug to a suite of software specifications, including both artificial and "real-world" specifications, to quantify the success and failure of Ladybug at analyzing software specifications. I have also used Ladybug as part of a larger case study examining portions of the DoD High Level Architecture specification.
DTIC
Decision Support Systems; Relational Data Bases; Software Engineering; Enumeration

20000116159 International Atomic Energy Agency, Vienna Austria
Business survival through year 2000. How is it really going to be
Di Maio, A.; Dec. 31, 1999; 18p; In English; Year 2000 (Y2K): Progress and Cooperation
Report No.(s): DE99-637257; INIS-XA-177; No Copyright; Avail: Department of Energy Information Bridge, Microfiche
A forecast is presented of computer system failures that could occur due to Y2K problem, as well as process controller failures and embedded chip failures. Detailed analysis of microprocessors with both co-mounted real time clock and no real time clock is shown in the danger domain. Year 2000 risks and spending are demonstrated with the essential planning for dealing with the problem globally.
NTIS
Commerce; System Failures; Information Systems; Computer Programs; Industrial Management

20000116160 International Atomic Energy Agency, Vienna Austria
Y2K issue in Sweden
Dahlin, G.; Ek, P.; Isaksson, S.; Ericsson, A. M.; Jaernry, C.; Dec. 31, 1999; 6p; In English; Year 2000 (Y2K): Progress and Cooperation
Report No.(s): DE99-637238; IAEA-SR-208/6; No Copyright; Avail: Department of Energy Information Bridge, Microfiche
The paper overviews the work performed in Sweden on the Y2K issue. It describes in summary how the work is done at the utilities, some lessons learned and the work performed by the regulatory body, the Swedish Power Inspectorate. It discusses as well, how the reporting and accountancy has been changed to meet the Y2K problem at the Swedish State Authority as well as at the Swedish nuclear facilities. There is a section describing the Physical Protection issues.
NTIS
Planning; Nuclear Power Plants; Numerical Control

20000116161 International Atomic Energy Agency, Vienna Austria
Y2K - Microsoft
Alonso, V.; Dec. 31, 1999; 20p; In English; Year 2000 (Y2K): Progress and Cooperation
Report No.(s): DE99-637235; IAEA-SR-208/38; No Copyright; Avail: Department of Energy Information Bridge, Microfiche
Presentation describes the position of Microsoft, its compliance statement, its Year 2000 approach and its modified rapid replacement strategy. The Microsoft Year 2000 process as planned is based on the following solution: 'fix, replace, outsource, retire'
NTIS
Information Systems; Planning; Computers; Computer Programs

20000116163 International Atomic Energy Agency, Vienna Austria
Status of Y2K issues in MINT
Musa, A.; Abdul Rahman, A. M.; Dec. 31, 1999; 2p; In English
Report No.(s): DE99-637223; IAEA-SR-208/27; No Copyright; Avail: Department of Energy Information Bridge, Microfiche
In preparing MINT towards a hassle-free computing environment in the year 2000, new challenges are faced. The process of solving and overcoming these problems is in the course, with the hope that these experiences will help coping with other unprecedented problems upon arrival of year 2000. However, it is nor enough to solve local problem in isolation, in MINT, there still exists a risk from other systems and from anyone who shares data.
NTIS
Computer Programs; Numerical Control

20000116211 MRJ Technology Solutions, Moffett Field, CA USA
The FTIO Benchmark
Fagerstrom, Frederick C., NASA Ames Research Center, USA; Kuszmaul, Christopher L., NASA Ames Research Center, USA; Dec. 27, 1999; 14p; In English
Contract(s)/Grant(s): RTOP 509-10-61; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
We introduce a new benchmark for measuring the performance of parallel input/ouput. This benchmark has flexible initialization. size. and scaling properties that allows it to satisfy seven criteria for practical parallel I/O benchmarks. We obtained performance results while running on the a SGI Origin2OOO computer with various numbers of processors: with 4 processors. the performance was 68.9 Mflop/s with 0.52 of the time spent on I/O, with 8 processors the performance was 139.3 Mflop/s with 0.50

of the time spent on I/O, with 16 processors the performance was 173.6 Mflop/s with 0.43 of the time spent on I/O. and with 32 processors the performance was 259.1 Mflop/s with 0.47 of the time spent on I/O.
Author
Input/Output Routines; Measuring Instruments

20000116286 National Inst. of Standards and Technology, Manufacturing Systems Integration Div., Gaithersburg, MD USA
Use of XML for Describing Functions and Taxonomies in Computer-Based Design
Szykman, S.; Senfaute, J.; Sriram, R. D.; 1999; 16p; In English; Design Engineering Technical Conferences, 12-15 Sep. 1999, Las Vegas, NV, USA; Sponsored by American Society of Mechanical Engineers, USA
Report No.(s): PB2000-108197; DETC99/CIE-9025; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

A standardized representation of engineering function has been developed, consisting of schemata for functions and associated flows along with taxonomies of generic functions and flows. This paper presents a mapping of this representation into the Extensible Markup Language (XML), a language similar in appearance to HTML but which allows the development of user-defined tags, various kinds of references, and other mechanisms. The formal representation provides the means for representing functions that have multiple input and output flows, properties and parameters associated with these flows, and the decomposition of functions into sub-functions each potentially having its own distinct flows. This mapping has been developed in order to support representation of artifact function models in software systems, as well as to provide a neutral format for exchange of function-based information among software systems.
NTIS
Software Engineering; Computer Aided Design; Document Markup Languages

20000116287 Universite de Corse, Corte, France
Proceedings of the Annual Advance Technology Workshop
Jun. 06, 2000; 81p; In English, 10-11 Jun. 1999, Corte, France
Contract(s)/Grant(s): F61775-99-W-F065
Report No.(s): AD-A381880; No Copyright; Avail: CASI; A01, Microfiche; A05, Hardcopy

The Final Proceedings for ATW - Advanced Technology Workshop, 10 June 1999 - 11 June 1999 This is a multidisciplinary conference. The topics to be covered are communications, new technologies, and economic development. The new technologies to be discussed in this conference are modeling and simulation, distance-based learning, collaborative engineering, software engineering, and telematic applications.
DTIC
Conferences; Technological Forecasting; Economic Development; Communication Networks

20000116296 Army Research Lab., Sensors Directorate, Adelphi, MD USA
API Design for a MicroTouch Touch Screen Input Controller ***Final Report, Jan.-Mar. 2000***
Choy, Steven; Jul. 2000; 34p; In English
Report No.(s): AD-A382635; ARL-TR-2164; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

TSLIB is a C application programming interface (API) for a flat-panel, touch screen in manufactured by MicroTouch. Unlike most software drivers for this device, the TSL is not designed to be a transparent replacement for a mouse input pointer. The TSLIB supports not only single-point input, but also continuous-point input to facilitate support for gesture-type input data in a multimodal, interactive environment. Also, unlike most drivers for this device, the TSLIB software runtime support does not reside in the kernel/driver space of the operating system. The intent of the TSLIB design is to place the software driver in the user application space and connect to the physical device via the operating system-supplied APIs for serial devices. Because the TSLIB API does not operate at the device driver level of the operating system, the interface source code can be easily ported across multiple hardware platforms and multiple software operating systems. The source code is designed for use on various UNIX platforms, including IRIX, Solaris, and LINUX, as well as under MS-DOS and Windows NT. A description of all API functions, data structures, algorithms is presented.
DTIC
Computer Programs; Human-Computer Interface; Software Engineering

20000116300 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
On Equivalence and Canonical Forms in the LF Type Theory
Harper, Robert; Pfenning, Frank; Jul. 10, 2000; 41p; In English
Contract(s)/Grant(s): NSF-CCR96-19584
Report No.(s): AD-A382686; CMU-CS-00-148; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Decidability of definitional equality and conversion of terms into canonical form play a central role in the meta-theory of a type-theoretic logical framework. Most studies of definitional equality are based on a confluent, strongly-normalizing notion of reduction. Coquand has considered a different approach, directly proving the correctness of a practical equivalence algorithm based on the shape of terms. Neither approach appears to scale well to richer languages with unit types or subtyping, and neither directly addresses the problem of conversion to canonical form. In this paper we present a new, type-directed equivalence algorithm for the LF type theory that overcomes the weaknesses of previous approaches. The algorithm is practical, scales to more expressive languages, and yields a new notion of canonical form sufficient for adequate encodings of logical systems. The algorithm is proved complete by a Kripke-style logical relations argument similar to that suggested by Coquand. Crucially, both the algorithm itself and the logical relations rely only on the shapes of types, ignoring dependencies on terms.
DTIC
Canonical Forms; Mathematical Logic; Computer Programming

20000116301 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
The Hardness of Approximating Minima in OBDDs, FBDDs and Boolean Functions
Seshia, S. A.; Bryant, R. E.; Aug. 2000; 10p; In English
Contract(s)/Grant(s): NSF-CCR98-05366
Report No.(s): AD-A382687; CMU-CS-00-156; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This paper presents approximation hardness results for three equivalent problems in Boolean function complexity. Consider a Boolean function f on n variables. The first problem is to minimize the level i in the Ordered Binary Decision Diagram (OBDD) for f at which the number of nodes is less than 2(i-1). We show that this problem is not approximable to within the factor 2(exp log(1-E)n), for any E is greater than 0, unless NP is contained in RQP, the class of all problems solvable in random quasi-polynomial time. This minimization problem is shown to be equivalent to the problem of finding the minimum size subset S of variables so that f has two equivalent cofactors with respect to the variables in S. Both problems are proved equivalent to the analogous problem for Free BDDs and hence the approximation hardness result holds for all three.
DTIC
Mathematical Logic; Boolean Algebra; Computer Aided Design; Minima

20000116303 Mississippi State Univ., Mississippi State, MS USA
Studies in Computer-Based Learning of Math: Using Self-Explanations and Animated Pedagogical Agents ***Final Report, 26 Aug.-31 Dec. 1999***
Atkinson, Robert K.; Aug. 2000; 31p; In English
Contract(s)/Grant(s): N00014-99-1-1032
Report No.(s): AD-A382435; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This study was designed to examine ways of structuring a computer-based learning environment to enhance learning from worked-out examples. In particular, two types of structural manipulations were considered: (1) incorporating an instructional format consisting of instructional explanations and/or self-explanations prompts, a structural manipulation that may have implications for the way in which students study examples; and (2) the use of an animated pedagogical agent, a manipulation that appears to have the same potential of optimizing computer-based learning.
DTIC
Mathematics; Computer Assisted Instruction; Education

20000116369 State Univ. of New York, Dept. of Computer Science, Stony Brook, NY USA
Heuristic Approaches to Optimization With Applications ***Progress Report***
Skiena, Steven S.; Aug. 02, 2000; 8p; In English
Contract(s)/Grant(s): N00014-97-1-0589
Report No.(s): AD-A382413; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This progress report covers the twelve months of funding on this grant since my previous progress report (August 1999). This grant covers two distinct lines of work: (1) the development of algorithms and implementations of heuristic search with applications, and (2) theoretical research on combinatorial algorithms and optimization. As detailed, substantial progress has been made

in both areas since my last progress report. The renewal grant began on January 1, 2000. This grant is supporting four PhD students starting September 1, meeting the scheduled expenditure for this fiscal year. Our work has proven interesting to a large number of Navy personnel.
DTIC
Algorithms; Heuristic Methods; Pattern Recognition; Combinatorial Analysis

20000116375 Wisconsin Univ., Madison, WI USA
Machine Learning via Mathematical Programming ***Final Report, 01 Aug. 1997-01 Nov. 1999***
Mamgasarian, Olivi L.; Nov. 01, 1999; 9p; In English
Contract(s)/Grant(s): F49620-97-1-0326
Report No.(s): AD-A382583; AFRL-SR-BL-TR-00-0492; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Mathematical programming approaches were applied to a variety of problems in machine learning in order to gain deeper understanding of the problems and to come up with new and more efficient computational algorithms. Theoretical and/or computational contributions were made to Data Envelopment Analysis wherein one seeks efficient decision making units, Neural Networks with as few hidden units as possible, optimization problems subject to constraints that in turn require the solution of further optimization problems, classification algorithms that suppress unnecessary or redundant features, algorithms that ”chunk” massive data sets in order to classify them, clustering data based on the novel concept of nearness to cluster planes rather than cluster centroids, a new implementable general theory for Support Vector Machines that does away with the restrictive Mercer positive definite kernel condition that had hitherto been universally assumed, a very effective Successive Over Relaxation (SOR) algorithm for solving very large linear and nonlinear kernel classification problems, applying support vector machines to breast cancer diagnosis and prognosis, smoothing algorithms for solving large and complex classification problems, nonlinear data fitting using support vector machines and a robust loss function, and classifying data that is partly labeled and partly unlabeled.
DTIC
Mathematical Programming; Machine Learning; Algorithms; Cluster Analysis; Neural Nets; Prognosis

20000116376 Carnegie-Mellon Univ., Software Engineering Inst., Pittsburgh, PA USA
Spiral Development-Building the Culture; A Report on the CSE-SEI Workshop, February, 2000 ***Final Report***
Hansen, W. J.; Foreman, J. T.; Carney, D. J.; Forrester, E. C.; Graettinger, C. P.; Jul. 2000; 73p; In English
Contract(s)/Grant(s): F19628-95-C-0003
Report No.(s): AD-A382585; CMU/SEI-2000-SR-006; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A number of organizations are successfully applying the Spiral Development Model (SDM) and finding it valuable in addressing such challenges as rapid development, COTS (commercial-off-the-shelf) software integration, new technologies, and product line management. However, other organizations have experienced difficulties with spiral development due to over-relaxed controls, underestimated risks, existing sequential development policies, inflexible financing mechanisms, ingrained cultures, and confusion about what spiral development is and how to apply it. to attack these problems, a workshop was held February 9-11, 2000, at the University of Southern California under the sponsorship of its Center for Software Engineering (CSE) and the Software Engineering Institute (SEI) of Carnegie Mellon University. Work groups at the workshop recommended specific actions aimed at building and spreading a culture for the SDM community. These can be described as defining, improving, promoting, and studying SDM, educating about SDM, adapting to SDM, and enhancing teamwork. This report summarizes the workshop and presents its recommendations.
DTIC
Software Engineering; Project Management; Mathematical Models; Computer Programming; Computer Programs

20000116378 Carnegie-Mellon Univ., Software Engineering Inst., Pittsburgh, PA USA
ARC, V1.0 Assessment Requirements for CMMI, Version 1.0 ***Final Report***
Aug. 2000; 43p; In English
Contract(s)/Grant(s): F19628-00-C-0003
Report No.(s): AD-A382587; CMU/SEI-2000-TR-011; ESC/MA-TR-2000-011; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Assessment Requirements for CMMI (ARC) V1.0 defines the requirements considered essential to assessment methods intended for use with CMMI models. In addition, a set of assessment classes is defined based on assessment usage scenarios. These classes are intended primarily for developers of assessment methods to use with CMMI capability models in the context of the CMMI Product Suite. Additional audiences for the document include lead accessors. and other individuals who are involved in or may be interested in process assessment or improvement. The approach employed to provide guidance to assessment method

developers is to define a class of assessment method usage scenarios (which are based on years of experience in the process improvement community) called assessment classes. Requirements are then allocated to each class as appropriate based on the attributes associated with that class. Thus, a particular assessment method may declare itself to be an ARC class A, B, or C assessment method. This designation implies the sets of ARC requirements which the method developer has considered when designing the method. Assessment methods which satisfy all of the ARC requirements are called class A methods; in addition to being used to render ratings for benchmarking purposes, class A assessment methods can be used to conduct 15504-conformant assessments.
DTIC
Software Engineering; Programmers; Systems Analysis

20000116379 Carnegie-Mellon Univ., Software Engineering Inst., Pittsburgh, PA USA
Spiral Development: Experience, Principles, and Refinements ***Final Report***
Boehm, Barry; Hansen, Wilfred J.; Jul. 2000; 47p; In English
Contract(s)/Grant(s): F19628-95-C-0003
Report No.(s): AD-A382590; CMU/SEI-2000-SR-008; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Spiral development is a family of software development processes characterized by repeatedly iterating a set of elemental development processes and managing risk so it is actively being reduced. This paper characterizes spiral development by enumerating a few ”invariant” properties that any such process must exhibit. For each, a set of ”variants” is also presented, demonstrating a range of process definitions in the spiral development family. Each invariant excludes one or more ”hazardous spiral look-alike” models, which are also outlined. This report also shows how the spiral model can be used for a more cost-effective incremental commitment of funds, via an analogy of the spiral model to stud poker. An important and relatively recent innovation to the spiral model has been the introduction of anchor point milestones. The latter part of the paper describes and discusses these.
DTIC
Software Engineering; Computer Programming; Project Management

20000116383 Oregon Graduate Inst. of Science and Technology, Pacific Software Research Center, Portland, OR USA
Training Materials for Language Design
Mar. 28, 2000; 3p; In English
Contract(s)/Grant(s): F19628-96-C-0161
Report No.(s): AD-A375733; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Domain specific languages (DSLs) have been proposed as a medium to capture the similarities and differences that occur in a family of software products. They are a mechanism for the representation, optimization, and analysis of such families.
Derived from text
High Level Languages; Computer Programs

20000116420 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
Boolean Satisfiability with Transitivity Constraints
Bryan, Randal E.; Velev, Miroslav N.; Jun. 2000; 23p; In English
Report No.(s): AD-A382689; CMU-CS-00-101; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We consider a variant of the Boolean satisfiability problem where a subset E of the propositional variables appearing in formula Fsat encode a symmetric, transitive, binary relation over N elements. Each of these relational variables, Ei,j for 1
DTIC

Program Verification (Computers); Boolean Algebra; Decision Theory; Mathematical Logic

20000116421 National Inst. of Standards and Technology, Manufacturing Systems Integration Div., Gaithersburg, MD USA
Information Modeling: From Design to Implementation
Lee, Y. T.; 2000; 12p; In English
Report No.(s): PB2000-108201; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Today’s manufacturing industry greatly relies on computer technology to support activities throughout a product’s life cycle. Effective and efficient information sharing and exchange among computer systems have been critical issues. Formal information modeling languages that describe information requirements unambiguously is an enabling technology that facilitates the development of a large scale, networked, computer environment that behaves consistently and correctly. This paper describes an information modeling process. Emphasis is placed on the need for the implementation of ’quality’ information models to facilitate an integrated manufacturing environment. How information models are used to define data requirements and how, in a practical

application, information models enable information sharing and exchange are described. Several information modeling methodologies, modeling languages, and implementation methods are reviewed. In addition, recommendations on building practical information models are presented.
NTIS
Computer Systems Design; Computer Aided Manufacturing; Computers

20000116422 National Inst. of Standards and Technology, Gaithersburg, MD USA
Supporting Manufacturing Progress Analysis and Trouble Shooting with ACTS
Steves, M. P.; Chang, W.; Knutilla, A.; 2000; 10p; In English
Report No.(s): PB2000-108205; No Copyright; Avail: CASI; A01, Microfiche; A02, Hardcopy

This paper presents a National Institute of Standards and Technology (NIST) prototype tool called ACTS (Annotation Collaboration Tool via SMIL - Synchronized Multimedia Integrated Language), which was designed to meet the user requirements of a distributed, collaborative team performing remote analysis of robotic welds. Based on open standards such as W3C (World Wide Web Consortium) SMIL, ACTS provides a framework of temporal and spatial synchronization for multimedia data streams. An annotation facility provides for asynchronous collaboration among colleagues. ACTS uses the NIST-developed S2M2 (2) Java applet-based SMIL player that implements and extends the SMIL 1.0 specification. Future work is also discussed.
NTIS
Applications Programs (Computers); Data Flow Analysis; Computer Aided Manufacturing; Software Engineering

20000116423 National Inst. of Standards and Technology, Manufacturing Systems Integration Div., Gaithersburg, MD USA
Standards-Based Software Testing in a Net-Centric World
Morris, K. C.; 2000; 12p; In English
Report No.(s): PB2000-108206; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Automation for product development and manufacturing is changing to take advantage of the recent expansion of the Internet and the computing technologies supporting it. These processes are becoming more software dependent, and the software used is becoming more modularized, allowing for the creation of customized systems consisting in large part of pre-existing components distributed across a network. This combination of factors leads to considerable flexibility for manufacturing systems, but not without a cost. The reliability of those systems is uncertain given the lack of experience in how to test such systems. to address this need, the National Institute of Standards and Technology's Manufacturing Systems Integration Division has undertaken a study of how to test 'interaction-driven manufacturing systems.' This paper presents the results of a study of the problems involved in testing these new systems, reports on factors which influence the testability of the systems, and outlines approaches to testing.
NTIS
Program Verification (Computers); Product Development; Computer Aided Manufacturing; Computer Programs

20000116484 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
The Performance of FoxNet 2.0
Derby, Herb; Jun. 1999; 12p; In English
Contract(s)/Grant(s): ARPA ORDER-5404
Report No.(s): AD-A382622; CMU-CS-99-137; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The goal of the FoxNet project is to explore the advantages (and drawbacks) of implementing networking software using an extended version of the SML language. In this report, we document the performance of the FoxNet. Using the performance results as a guide, we compare small function overhead and memory access performance of the extended SML to the dominate systems programming language C.
DTIC
Local Area Networks; Program Verification (Computers); Programming Languages; Applications Programs (Computers)

20000116488 Carnegie-Mellon Univ., Software Engineering Inst., Pittsburgh, PA USA
ATAM: Method for Architecture Evaluation *Final Report*
Kazman, Rick; Klein, Mark; Clements, Paul; Aug. 2000; 81p; In English
Contract(s)/Grant(s): F19628-95-C-0003
Report No.(s): AD-A382629; CMU/SEI-2000-TR-004; ESC*-TR-2000-004; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

If a software architecture is a key business asset for an organization, then architectural analysis must also be a key practice for that organization. Why? Because architectures are complex and involve many design tradeoffs. Without undertaking a formal

analysis process, the organization cannot ensure that the architectural decisions made-particularly those which affect the achievement of quality attribute such as performance, availability, security, and modifiability are advisable ones that appropriately mitigate risks. In this report, some of the technical and organizational foundations for performing architectural analysis are discussed, the Architecture Tradeoff Analysis Method (ATAM), is presented. The ATAM is a technique for analyzing software architectures that has been developed and refined in practice over the past three years.
DTIC
Computer Networks; Software Development Tools; Computer Programs; Architecture (Computers)

20000116609 Department of Defense, Office of the Inspector General, Arlington, VA USA
Controls Over Copyrighted Computer Software at the Defence Technology Security Administration
Sep. 09, 1992; 30p; In English
Report No.(s): AD-A377517; IG/DOD-92-134; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

The Defense Technology Security Administration (DTSA), with an annual operating budget of $8.6 million, administers the DoD Trade Security Program. This mission includes reviewing and processing export license applications and ensuring that the security policy for DoD technology is implemented. DTSA was included in our ongoing audit of Controls Over Copyrighted Computer Software because of a DoD Hotline allegation that DTSA was illegally duplicating and installing software on its computers.
DTIC
Computer Programs; Reproduction (Copying); Copyrights

20000117677 Institute for Computer Applications in Science and Engineering, Hampton, VA USA
Arcade: A Web-Java Based Framework for Distributed Computing ***Final Report***
Chen, Zhikai, Institute for Computer Applications in Science and Engineering, USA; Maly, Kurt, Institute for Computer Applications in Science and Engineering, USA; Mehrotra, Piyush, Institute for Computer Applications in Science and Engineering, USA; Zubair, Mohammad, Institute for Computer Applications in Science and Engineering, USA; October 2000; 14p; In English; Original contains color illustrations
Contract(s)/Grant(s): NAS1-97046; RTOP 505-90-52-01
Report No.(s): NASA/CR-2000-210545; NAS 1.26:210545; ICASE-Rept-2000-39; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Distributed heterogeneous environments are being increasingly used to execute a variety of large size simulations and computational problems. We are developing Arcade, a web-based environment to design, execute, monitor, and control distributed applications. These targeted applications consist of independent heterogeneous modules which can be executed on a distributed heterogeneous environment. In this paper we describe the overall design of the system and discuss the prototype implementation of the core functionalities required to support such a framework.
Author
Applications Programs (Computers); Multiprocessing (Computers); Distributed Processing; Computer Systems Design; Programming Environments; Java (Programming Language)

62
COMPUTER SYSTEMS

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

20000115623 NASA Ames Research Center, Moffett Field, CA USA
Implementation of NAS Parallel Benchmarks in Java
Frumkin, Michael, MRJ Technology Solutions, USA; Schultz, Matthew, MRJ Technology Solutions, USA; Jin, Hao-Qiang, MRJ Technology Solutions, USA; Yan, Jerry, NASA Ames Research Center, USA; [2000]; 13p; In English; Java Grande, 3-4 Jun. 2000, San Francisco, CA, USA
Contract(s)/Grant(s): NAS2-14303; RTOP 519-40-12; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A number of features make Java an attractive but a debatable choice for High Performance Computing (HPC). In order to gauge the applicability of Java to the Computational Fluid Dynamics (CFD) we have implemented NAS Parallel Benchmarks in

Java. The performance and scalability of the benchmarks point out the areas where improvement in Java compiler technology and in Java thread implementation would move Java closer to FORTRAN in the competition for CFD applications.
Author
Computational Fluid Dynamics; Java (Programming Language); Technology Utilization

20000116128 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
Task-Driven Computing
Wang, Zhenyu; Garlan, David; May 2000; 20p; In English
Contract(s)/Grant(s): F30602-97-2-0031; N66001-99-2-8918
Report No.(s): AD-A382314; CMU-CS-00-154; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We are moving towards a world of pervasive computing in which users can access and manipulate information from anywhere at anytime. Computing devices and networks are becoming ubiquitous. In this new world, computing will no longer be tethered to desktops: users will become increasingly mobile. As users move across environments, they will have access to a dynamic range of computing devices and software services. They will want to use the resources to perform computing tasks. Today's computing infrastructure does not support this model of computing very well because computers interact with users in terms of low level abstractions: applications and individual devices. Today, if a mobile user wants to use the computing resources of a new environment, he has to manually figure out how to perform a computing task using local resources and/or to migrate his computing context from another environment. Such manual operation is unacceptable in a pervasive computing world because it does not scale with the increasing amount of software services, user mobility and resource dynamism. It also demands that users spend too much time on non-task related configuration activities. This technical report describes an approach called task-driven computing that can be used to solve this problem. The approach is based on the insight that with appropriate system support it is possible to let users interact with their computing environments in terms of high level tasks and free them from low level configuration activities.
DTIC
Information Retrieval; Computer Networks; Computers

20000116151 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
Resource Signal Prediction and Its Application to Real-Time Scheduling Advisors
Dinda, Peter A.; May 2000; 220p; In English
Report No.(s): AD-A382317; CMU-CS-00-131; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

A distributed interactive application spawns resilient real-time tasks with known resource requirements in response to aperiodic user actions. When running in a shared computing environment that supports neither reservations nor globally-respected priorities, such an application must carefully choose which host runs a task in order to increase the chances that the task's deadline will be met. A real-time scheduling advisor is a middleware service that the application can use to find the most appropriate host for the task. In addition to recommending a host, the advisor also predicts the running time of the task on that host. The application uses this feedback to modify the task's resource requirements or deadline until a host is found where the task will meet its deadline with sufficiently high probability. This dissertation recommends basing real-time scheduling advisors on the explicit prediction of resource signals, which are easily measured, time-varying, scalar quantities that are strongly correlated with resource availability. This resource-oriented approach has numerous advantages over the competing application-oriented approach, which I also studied. It scales well, makes decisions based on up-to-date information, can support other forms of adaptation advisors, and can easily leverage advances in statistical signal prediction techniques. However, resource signal predictions exist at considerable remove from predictions of application performance. to show that this gap can be spanned, this dissertation describes the design, implementation, and performance evaluation of a prototype real-time scheduling advisor that is based on the prediction of host load signals. I have found that, despite its complex properties, which include self-similarity and epochal behavior, host load can be usefully predicted using linear time series models. These models have sufficiently low overhead to be used in practice, and I have developed a toolkit to make it.
DTIC
Data Management; Distributed Processing; Time Series Analysis; Systems Analysis; Prediction Analysis Techniques; Real Time Operation

20000116173 Helsinki Univ. of Technology, Lab. of Telecommunication Technology, Espoo, Finland
Calculation of Blocking Probabilities and Dimensioning of Multicast Networks
Nyberg, Eeva, Helsinki Univ. of Technology, Finland; 1999; ISSN 1456-7199; 96p; In English
Report No.(s): PB2000-102675; RR-5/99; ISBN 951-22-4753-4; No Copyright; Avail: National Technical Information Service (NTIS)

This thesis is a study on mathematical models for calculating blocking probabilities and dimensioning of multicast networks. Multicasting is a bandwidth saving transmission technique designed for group applications such as video conferencing. The transmission reaches many different end-users without a separate connection required for each user. Due to this characteristic, conventional blocking probability analysis of loss networks has to be modified. The study derives a new algorithm for calculating blocking probabilities in dynamic multicast networks. The exact algorithm is based on the well known algorithm for calculating blocking probabilities in hierarchical access networks. The algorithm is modified by introducing a new convolution method, the OR-convolution. The algorithm is applied to an existing infinite user population multicast model, for which until now only a single link solution has been given. The study derives a new finite user population model, which is in accordance with the infinite user population model, and applies the algorithm to this new network model. The algorithm is further extended by taking into account the effect of non-multicast traffic, background traffic, in the network. The dimensioning of the network is studied using the finite population model. An optimum capacity allocation is found for an example network using Moe's principle. Due to the complexity of the exact algorithm, the use of an approximate method, the Reduced Load Approximation (RLA), is studied. The work assumes that the reader has a basic understanding of Probability theory and Stochastic processes. The theory behind Stochastic processes and network protocols are however briefly introduced.
Author
Algorithms; Blocking; Mathematical Models; Populations; Probability Theory; Protocol (Computers); Stochastic Processes

20000116485 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
Systematic Parallel Programming
Dingel, Juergen; May 19, 2000; 291p; In English
Report No.(s): AD-A382625; CMU-CS-99-172; No Copyright; Avail: CASI; A13, Hardcopy; A03, Microfiche

Parallel computers have not yet had the expected impact on mainstream computing. Parallelism adds a level of complexity to the programming task that makes it very error-prone. Moreover, a large variety of very different parallel architectures exists. Porting an implementation from one machine to another may require substantial changes. This thesis addresses some of these problems by developing a formal basis for the design of parallel programs in form of a refinement calculus. The calculus allows the stepwise formal derivation of an abstract, low-level implementation from a trusted, high-level specification. The calculus thus helps structuring and documenting the development process. Portability is increased, because the introduction of a machine-dependent feature can be located in the refinement tree. Development efforts above this point in the tree are independent of that feature and are thus reusable. Moreover, the discovery of new, possibly more efficient solutions is facilitated. Last but not least, programs are correct by construction, which obviates the need for difficult debugging. Our programming/specification notation supports fair parallelism, shared-variable and message-passing concurrency, local variables and channels. It allows the development of reactive systems, that is, possibly non-terminating programs designed to interact persistently with their environment. Moreover the specification of liveness properties such as termination or eventual entry is supported by our methodology. The calculus rests on a compositional trace semantics that treats shared-variable and message-passing concurrency uniformly. The refinement relation combines a context-sensitive notion of trace inclusion and assumption-commitment reasoning to achieve compositionality. Most refinement rules are syntax-directed in the sense that each rule corresponds to a specific language construct. The calculus straddles both concurrency paradigms.
DTIC
Parallel Programming; Program Verification (Computers); Parallel Processing (Computers); Multiprocessing (Computers)

63
CYBERNETICS, ARTIFICIAL INTELLIGENCE AND ROBOTICS

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

20000115563 NASA Ames Research Center, Moffett Field, CA USA
Optical Control of Intersubband Absorption in a Multiple Quantum Well-Embedded Semiconductor Microcravity
Liu, Ansheng, NASA Ames Research Center, USA; Ning, Cun-Zheng, NASA Ames Research Center, USA; [2000]; 11p; In English
Contract(s)/Grant(s): NAS2-14303; RTOP 519-40-12; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Optical intersubband response of a multiple quantum well (MQW)-embedded microcavity driven by a coherent pump field is studied theoretically. The n-type doped MQW structure with three subbands in the conduction band is sandwiched between a semi-infinite medium and a distributed Bragg reflector (DBR). A strong pump field couples the two upper subbands and a weak

field probes the two lower subbands. to describe the optical response of the MQW-embedded microcavity, we adopt a semi-classical nonlocal response theory. Taking into account the pump-probe interaction, we derive the probe-induced current density associated with intersubband transitions from the single-particle density-matrix formalism. By incorporating the current density into the Maxwell equation, we solve the probe local field exactly by means of Green's function technique and the transfer-matrix method. We obtain an exact expression for the probe absorption coefficient of the microcavity. For a GaAs/Al(sub x)Ga(sub 1-x)As MQW structure sandwiched between a GaAs/AlAs DBR and vacuum, we performed numerical calculations of the probe absorption spectra for different parameters such as pump intensity, pump detuning, and cavity length. We find that the probe spectrum is strongly dependent on these parameters. In particular, we find that the combination of the cavity effect and the Autler-Townes effect results in a triplet in the optical spectrum of the MQW system. The optical absorption peak value and its location can be feasibly controlled by varying the pump intensity and detuning.
Author
Cavities; Current Density; Embedding; Optical Control; Quantum Wells; Semiconductors (Materials)

20000115624 NASA Ames Research Center, Moffett Field, CA USA
Back to the Future: Consistency-Based Trajectory Tracking
Kurien, James, NASA Ames Research Center, USA; Nayak, P. Pandurand, Research Inst. for Advanced Computer Science, USA; [2000]; 7p; In English, July 2000, Austin, TX, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Contract(s)/Grant(s): RTOP 632-37-00; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Given a model of a physical process and a sequence of commands and observations received over time, the task of an autonomous controller is to determine the likely states of the process and the actions required to move the process to a desired configuration. We introduce a representation and algorithms for incrementally generating approximate belief states for a restricted but relevant class of partially observable Markov decision processes with very large state spaces. The algorithm presented incrementally generates, rather than revises, an approximate belief state at any point by abstracting and summarizing segments of the likely trajectories of the process. This enables applications to efficiently maintain a partial belief state when it remains consistent with observations and revisit past assumptions about the process' evolution when the belief state is ruled out. The system presented has been implemented and results on examples from the domain of spacecraft control are presented.
Author
Algorithms; Markov Processes; Spacecraft Control; Autonomy

20000115877 NASA Ames Research Center, Moffett Field, CA USA
Bridging the Gap Between Planning and Scheduling
Smith, David E., NASA Ames Research Center, USA; Frank, Jeremy, Caelum Research Corp., USA; Jonsson, Ari K., Research Inst. for Advanced Computer Science, USA; Jan. 12, 2000; 34p; In English; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Planning research in Artificial Intelligence (AI) has often focused on problems where there are cascading levels of action choice and complex interactions between actions. In contrast. Scheduling research has focused on much larger problems where there is little action choice, but the resulting ordering problem is hard. In this paper, we give an overview of M planning and scheduling techniques, focusing on their similarities, differences, and limitations. We also argue that many difficult practical problems lie somewhere between planning and scheduling, and that neither area has the right set of tools for solving these vexing problems.
Author
Scheduling; Planning; Artificial Intelligence

20000116182 Japan Atomic Energy Research Inst., Tokyo, Japan
Obstacle avoidance test using a sensor-based autonomous robotic system
Fujii, Y.; Suzuki, K.; Dec. 31, 1998; 73p; In Japanese; In English
Report No.(s): DE99-725677; JAERI-TECH-98-054; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

From a viewpoint of reducing personnel radiation exposure of plant staffs working in the high radiation area of nuclear facilities, it is often said to be necessary to develop remote robotic systems, which have great potential of performing various tasks in nuclear facilities. Hence, we developed an advanced remote robotic system, consisting of redundant manipulator and environment- sensing systems, which can be applied to complicated handling tasks under unstructured environment. In the robotic system, various types of sensors for environment-sensing are mounted on the redundant manipulator and sensor-based autonomous capabilities are incorporated. This report describes the results of autonomous obstacle avoidance test which was carried out as follows: manipulating valves at the rear-side of wall, through a narrow window of the wall, with the redundant manipulator mounted on

an x-axis driving mechanism. From this test, it is confirmed that the developed robotic system can autonomously achieve handling tasks in limited space as avoiding obstacles, which is supposed to be difficult by a non-redundant manipulator.
NTIS
Robotics; Obstacle Avoidance; Artificial Intelligence; Manipulators; Autonomy; Radiation Protection

20000116204 NASA Ames Research Center, Moffett Field, CA USA
Remote Agent Experiment
Benard, Doug, Jet Propulsion Lab., California Inst. of Tech., USA; Dorais, Gregory A., NASA Ames Research Center, USA; Gamble, Ed, Jet Propulsion Lab., California Inst. of Tech., USA; Kanefsky, Bob, NASA Ames Research Center, USA; Kurien, James, NASA Ames Research Center, USA; Millar, William, NASA Ames Research Center, USA; Muscettola, Nicola, NASA Ames Research Center, USA; Nayak, Pandu, NASA Ames Research Center, USA; Rouquette, Nicolas, Jet Propulsion Lab., California Inst. of Tech., USA; Rajan, Kanna, NASA Ames Research Center, USA; [2000]; 37p; In English; Technology Validation, 8-9 Feb. 2000, Pasadena, CA, USA; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Remote Agent (RA) is a model-based, reusable artificial intelligence (At) software system that enables goal-based spacecraft commanding and robust fault recovery. RA was flight validated during an experiment on board of DS1 between May 17th and May 21th, 1999.
Author
Artificial Intelligence; Applications Programs (Computers); Assembling; Expert Systems; Modules

20000116209 NASA Ames Research Center, Moffett Field, CA USA
A Unified Approach to Model-Based Planning and Execution
Muscettola, Nicola, NASA Ames Research Center, USA; Dorais, Gregory A., Caelum Research Corp., USA; Fry, Chuck, Caelum Research Corp., USA; Levinson, Richard, RECOM Technologies, Inc., USA; Plaunt, Christian, Caelum Research Corp., USA; [2000]; 6p; In English; Intelligent Agent Systems, Jul. 2000, Venice, Italy; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Writing autonomous software is complex, requiring the coordination of functionally and technologically diverse software modules. System and mission engineers must rely on specialists familiar with the different software modules to translate requirements into application software. Also, each module often encodes the same requirement in different forms. The results are high costs and reduced reliability due to the difficulty of tracking discrepancies in these encodings. In this paper we describe a unified approach to planning and execution that we believe provides a unified representational and computational framework for an autonomous agent. We identify the four main components whose interplay provides the basis for the agent's autonomous behavior: the domain model, the plan database, the plan running module, and the planner modules. This representational and problem solving approach can be applied at all levels of the architecture of a complex agent, such as Remote Agent. In the rest of the paper we briefly describe the Remote Agent architecture. The new agent architecture proposed here aims at achieving the full Remote Agent functionality. We then give the fundamental ideas behind the new agent architecture and point out some implication of the structure of the architecture, mainly in the area of reactivity and interaction between reactive and deliberative decision making. We conclude with related work and current status.
Author
Applications Programs (Computers); Computer Systems Programs; Decision Making; Modules; Planning

20000116334 Draper (Charles Stark) Lab., Inc., Houston, TX USA
Space Station Attitude Control During Payload Operations
Bedrossian, Nazareth S., Draper (Charles Stark) Lab., Inc., USA; McCants, Edward, Draper (Charles Stark) Lab., Inc., USA; [1999]; 1p; In English, 1999, Unknown; Sponsored by American Inst. of Aeronautics and Astronautics, USA
Contract(s)/Grant(s): NAS9-19556
Report No.(s): AIAA Paper 99-372; No Copyright; Avail: Issuing Activity; Abstract Only

Evaluating the feasibility of planned robotic operations requires an analysis methodology and tools that can quickly assess proposed attitude control strategies. In this paper, an efficient approach to model the attitude dynamics of the Space Station during payload motion is presented. This approach is used to formulate an alternative numerical solution for torque equilibrium attitudes including the effect of payload velocity. It is also shown that a judicious choice of attitude command during robotic operations can substantially reduce peak attitude control momentum use.
Author
Attitude Control; Space Stations; Payload Transfer; Space Platforms; Mathematical Models

20000116374 Brigham Young Univ., Dept. of Mechanical Engineering, Provo, UT USA

Digital Controller Design for Aliased Sampled-Data Systems

Hansen, David S.; Aug. 2000; 292p; In English

Report No.(s): AD-A382580; No Copyright; Avail: CASI; A13, Hardcopy; A03, Microfiche

Many of the dynamic systems in use today consist of an analog plant controlled by a digital controller. Design of these digital controllers assumes a system with no aliasing, and most, if not all, current design methods employ means to assure no aliasing is present. The drawbacks to these methods are unobservable and/or uncontrollable high frequency modes. This research effort provides a means to design a digital controller for systems with aliased modes. A model is developed in which both continuous and discrete portions of a sampled-data system are included. From this model, the unique digital controller function that will excite the analog plant is found. Moreover, as a result of the discrete-to-continuous manner of the model, the sample period allowing aliasing becomes a design parameter. Sampling frequencies providing improved response are determined and responses at these frequencies are explored. With aliasing allowed in the discrete-to-continuous system, stability for some systems is actually introduced and improved over the same systems in which aliasing is not allowed, as evidenced by increased gain margins and improved time domain responses. A deadbeat response controller is designed using proportional-integral control by placing one pole of a second-order system at the optimal position of the origin in the z-plane. The response of this controller is such that the desired position is obtained within a single sample period. Robustness of this controller is examined with favorable results. In a fourth-order system in which one mode is aliased, control of the aliased mode is accomplished simply by selecting the sample rate correctly. The resulting effects of the aliased mode are negligible, and design of the controller for the non-aliased mode follows traditional theory. Disturbance rejection for the second-order and fourth-orders systems was found to be excellent for disturbances with frequencies below that of the sampler.

DTIC

Digital Systems; Control Theory; Mathematical Models; Design Analysis; Control Systems Design; Controllers; Systems Engineering

20000116412 Lockheed Martin Information Systems, Orlando, FL USA

Advanced Distributed Simulation Technology II (ADST-II) Next Generation Reconnaissance Experimental Unmanned Vehicle (NGRXUV) Experiment II *Final Report*

Sep. 27, 1999; 20p; In English

Contract(s)/Grant(s): N61339-96-D-0002

Report No.(s): AD-A381829; ADST-II-CDRL-NGRXUVII-9900221; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Next Generation Reconnaissance & Experimental Unmanned Vehicle II (NGR&XUV) was an experimental exercise conducted at the Mounted Warfare Test Bed (MWTB) at Fort Knox, KY from July 12 to September 1, 1999. The experiment was performed as Delivery Order (DO) #111 under the Lockheed Martin Advanced Distributed Simulation Technology II (ADST II) Contract administered by the U.S. Army Simulation, Training, and Instrumentation Command (STRICOM) The experiment was sponsored by two Government agencies: the Government's Concerted Technology Thrust (CTT) for the Office of the Secretary of Defense's Robotics Demonstration, and the Mounted Maneuver Battle Lab (MMBL), Fort Knox, KY.

DTIC

Computerized Simulation; Distributed Interactive Simulation; Remotely Piloted Vehicles; Reconnaissance

20000116482 Newcastle-upon-Tyne Univ., Dept. of Computing Science, Newcastle UK

Bayesian and Minimax Solutions to the Run-Time Adaptation of a Plant to a Changing Environment

Merad, S.; April 2000; 24p; In English

Report No.(s): PB2001-100672; CS-TR-685; Copyright; Avail: National Technical Information Service (NTIS), Microfiche

In the paper, we consider the decision problem that an automated control system faces when its plant has to adapt to a changing environment which can be in a finite number of states. The law of transition between states is unknown and we hence adopt the worst case scenario. The controller gathers data at regular intervals and periodically it has to select the best control of the next period. The optimality criterion used in the selection process is the minimum expected loss in utility from not applying the best control. We construct a model and propose solution procedures for both stable and unstable environments. It is shown that when the environment is stable the decision problem is equivalent to a classification problem. When it is unstable we formulate the problem as a two-person zero-sum game. In both cases the minimax principle plays a major role.

NTIS

Bayes Theorem; Minimax Technique; Game Theory; Mathematical Models; Decision Theory

20000116486 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA

Machine Learning in Metrical Task Systems and Other On-Line Problems

Burch, Carl; May 2000; 82p; In English

Report No.(s): AD-A382627; CMU-CS-00-135; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

We establish and explore a new connection between two general on-line scenarios deriving from two historically disjoint communities. Though the problems are inherently similar, the techniques and questions developed for these two scenarios are very different. From competitive analysis comes the problem of metrical task systems, where the algorithm is to decide in which state to process each of several sequential tasks, where each task specifies the processing cost in each state, and the algorithm must pay according to a metric to move between states. and from machine learning comes the problem of predicting from expert advice - that is, of choosing one of several experts for each query in a sequence without doing much worse than the best expert overall. The dissertation includes four results touching on this connection. We begin with the first metrical task system algorithm that can guarantee for every task sequence that the ratio of its expected cost to the cheapest way to process the sequence is only polylogarithmic in the number of states. Then we see how we can use expert-advice results to combine on-line algorithms on-line if there is a fixed cost for changing between the on-line algorithms. The third result establishes new expert-advice algorithms deriving from metrical task system research; in addition to establishing theoretical bounds, we compare the algorithms empirically on a process migration scenario. Finally, we investigate a modified version of paging, where we want to do well against an adversary who is allowed to ignore a paging request cheaply.

DTIC

Machine Learning; On-Line Systems; Distributed Processing; Expert Systems

64
NUMERICAL ANALYSIS

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

20000116102 Helsinki Univ. of Technology, Dept. of Engineering Physics and Mathematics, Espoo, Finland

Smoothness in Fractional Evolution Equations and Conservation Laws

Gripenberg, G., Helsinki Univ. of Technology, Finland; Clement, P., Helsinki Univ. of Technology, Finland; Londen, S.-O., Helsinki Univ. of Technology, Finland; 1999; ISSN 0784-3143; 26p; In English

Report No.(s): PB2000-102618; RR-A419; ISBN 951-22-4661-9; No Copyright; Avail: National Technical Information Service (NTIS)

The regularity of solutions of the equation [D(sup o)(sub t)(u-u(sub o))](t,x) + sigma(u)(sub x)(t,x) = f(t,x), t and x are greater than or equal to zero, where D(sup o)(sub t) denotes the fractional derivative, is studied in the case where sigma(prime) is greater than zero. It is also shown that the solution to the Riemann problem for the fractional Burgers equation (where sigma(r) = (1/2)r(exp 2)) is continuous and has compact support (in the x-direction). A result on the continuity of the interface is established. In order to prove these results it is first shown that if A is an m-accretive operator in a Banach space, k is log-convex with the limit(t down to zero)k(t) = positive infinity, and if u is the solution of (d/dt)integral(zero to t)k(t-s)(u(s)-y)ds + A(u(t)) such that f(t), t is greater than zero and u(0) = y, then A(u(t)) is continuous when t is greater than zero.

Author

Burger Equation; Conservation Laws; Cauchy Problem

20000116116 Center for Mathematics and Computer Science, Amsterdam, Netherlands

Zero and Pole Distribution of Diagonal Pade Approximants to the Exponential Function. Modelling, Analysis and Simulation

Driver, K. A.; Temme, N. M.; Feb. 1997; 20p; In English

Report No.(s): PB2000-104693; MAS-R9701; Copyright; Avail: National Technical Information Service (NTIS)

The polynomials P(sub n) and Q(sub m) having degrees n and m respectively, with P(sub n) monic, that solve approximation problem: P(sub n)(z)e(sup -z) + Q(sub m)(z) = O(z (sup n + m + 1)) will be investigated for their asymptotic behaviour, in particular in connection with the distribution of their zeros. The symbol O means that the left-hand side should vanish at the origin at least to the order n + m + 1. This problem is discussed in great detail in a series of papers by Saff and Varga. In the present paper we show how their results can be obtained by using uniform expansions of integrals in which Airy functions are the main approximations.

NTIS

Polynomials; Integrals; Exponential Functions; Approximation

20000116118 Technische Hogeschool Twente, Faculty of Applied Mathematics, Enschede, Netherlands
Approximation Theory Methods for Solving Elliptic Eigenvalue Problems
Still, G. J.; May 1998; ISSN 0169-2690; 26p; In English
Report No.(s): PB2000-103724; MEMO-1439; No Copyright; Avail: National Technical Information Service (NTIS)

Eigenvalue problems with elliptic operators L on a domain G is contained IR(exp 2) are considered. We discuss approximation properties of some special classes of solutions of L(sub u) = 0 on G. These solutions are used as trial functions in a method for solving the eigenvalue problem which is based on a-posteriori error bounds. Singular trial functions a applied to smooth the problem at corner points of G. IN special situations, this method can produce approximations of eigenvalues and eigenfunctions with extremely high accuracy by only using a low number of trial functions. Some illustrative numerical examples for the eigenvalue problem with the Laplacian are presented. We discuss two problems from plasma physics (”relaxed plasma”, ”MHD-equation”) to which the approach can be applied.
NTIS
Approximation; Eigenvalues; Eigenvectors

20000116477 Institute for Computer Applications in Science and Engineering, Hampton, VA USA
A gas-kinetic BGK scheme for the compressible Navier-Stokes equations ***Final Report***
Xu, Kun, Hong Kong Univ. of Science and Technology, Hong Kong; October 2000; 37p; In English
Contract(s)/Grant(s): NAS1-97046; RTOP 505-90-52-01
Report No.(s): NASA/CR-2000-210544; ICASE-2000-38; NAS 1.26:210544; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This paper presents an improved gas-kinetic scheme based on the Bhatnagar-Gross-Krook (BGK) model for the compressible Navier-Stokes equations. The current method extends the previous gas-kinetic Navier-Stokes solver developed by Xu and Prendergast by implementing a general nonequilibrium state to represent the gas distribution function at the beginning of each time step. As a result, the requirement in the previous scheme, such as the particle collision time being less than the time step for the validity of the BGK Navier-Stokes solution, is removed. Therefore, the applicable regime of the current method is much enlarged and the Navier-Stokes solution can be obtained accurately regardless of the ratio between the collision time and the time step. The gas-kinetic Navier-Stokes solver developed by Chou and Baganoff is the limiting case of the current method, and it is valid only under such a limiting condition. Also, in this paper, the appropriate implementation of boundary condition for the kinetic scheme, different kinetic limiting cases, and the Prandtl number fix are presented. The connection among artificial dissipative central schemes, Godunov-type schemes, and the gas-kinetic BGK method is discussed. Many numerical tests are included to validate the current method.
Author
BGK Model; Navier-Stokes Equation; Kinetic Equations

20000116478 Institute for Computer Applications in Science and Engineering, Hampton, VA USA
Discontinuous dual-primal mixed finite elements for elliptic problems ***Final Report***
Bottasso, Carlo L., Politecnico di Milano, Italy; Micheletti, Stefano, Politecnico di Milano, Italy; Sacco, Riccardo, Politecnico di Milano, Italy; October 2000; 22p; In English; Original contains color illustrations
Contract(s)/Grant(s): NAS1-97046; RTOP 505-90-52-01
Report No.(s): NASA/CR-2000-210543; ICASE-2000-37; NAS 1.26:210543; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We propose a novel discontinuous mixed finite element formulation for the solution of second-order elliptic problems. Fully discontinuous piecewise polynomial finite element spaces are used for the trial and test functions. The discontinuous nature of the test functions at the element interfaces allows to introduce new boundary unknowns that, on the one hand enforce the weak continuity of the trial functions, and on the other avoid the need to define a priori algorithmic fluxes as in standard discontinuous Galerkin methods. Static condensation is performed at the element level, leading to a solution procedure based on the sole interface unknowns. The resulting family of discontinuous dual-primal mixed finite element methods is presented in the one and two-dimensional cases. In the one-dimensional case, we show the equivalence of the method with implicit Runge-Kutta schemes of the collocation type exhibiting optimal behavior. Numerical experiments in one and two dimensions demonstrate the order accuracy of the new method, confirming the results of the analysis.
Author
Discontinuity; Elliptic Differential Equations; Finite Element Method; Problem Solving

65
STATISTICS AND PROBABILITY

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

20000116115 Technische Hogeschool Twente, Centre for Telematics and Information Technology, Enschede, Netherlands
Algebraic Approach to the Specification of Stochastic Systems
DArgenio, P. R.; Katoen, J. P.; Brinksma, E.; 2000; ISSN 1381-3625; 32p; In English
Contract(s)/Grant(s): NWO Proj. 612-33-006
Report No.(s): PB2000-104726; CTIT-TR-98-02; Copyright; Avail: National Technical Information Service (NTIS)

We introduce a framework to study stochastic systems, i.e. systems in which the time of occurrence of activities is a general random variable. We introduce and discuss in depth a stochastic process algebra (named SPADES) adequate to specify and analyse those systems. In order to give semantics to SPADES we also introduce a model that is an extension of traditional automata with clocks which a basically random variables: the stochastic automata model. We show that this model and SPADES are equally expensive. Although stochastic automata are adequate to analyse systems since they are finite objects, they are still too coarse to serve as concrete semantic objects. Therefore, we introduce a type of probabilistic transition system that can deal with arbitrary probability spaces. IN addition, we give a finite axiomatisation for SPADES that is sound for the several semantic notions we deal with, and complete for the finest of them. Moreover, an expansion law is straightforwardly derived.
NTIS
Algebra; Stochastic Processes; Random Variables; Mathematical Models

20000116213 Illinois Univ., Dept. of Natural Resources and Environmental Sciences, Urbana, IL USA
Uncertainty Propagation and Partitioning in Spatial Prediction of Topographical Factor for RUSLE
Gertner, George, Illinois Univ., USA; 20000707; 8p; In English; 4th; Spatial Uncertainty, 14 Jul. 2000, Amsterdam, Netherlands
Report No.(s): AD-A37965; No Copyright; Avail: Defense Technical Information Center (DTIC)

Quantifying effect of slope length and steepness on prediction of soil erosion using the Revised Universal Soil Loss Equation (RUSLE) has become very important. In this paper, sequential indicator simulation successfully provided spatial prediction maps of these two variables based on their spatial variability from a plot data set. Uncertainty from simulation runs and semivariograms was studied to increase prediction precision. Uncertainty propagation from slope length and steepness and model parameters to predicting topographical factor LS in RUSLE was modelled using Fourier Amplitude Sensitivity Test (FAST). Spatial variance partitioning was done and uncertainty sources were identified.
DTIC
Soil Erosion; Computerized Simulation; Fourier Analysis; Slopes

66
SYSTEMS ANALYSIS AND OPERATIONS RESEARCH

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

20000116127 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
Applying Inductive Program Synthesis to Learning Domain-Dependent Control Knowledge - Transforming Plans into Programs
Schmid, Ute; Wysotzki, Fritz; Jun. 2000; 125p; In English
Report No.(s): AD-A382307; CMU-CS-00-143; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

The goal of this paper is to demonstrate that inductive program synthesis can be applied to learning domain-dependent control knowledge from planning experience. We represent control rules as recursive program schemes (RPSs). An RPS represents the complete subgoal structure of a given problem domain with arbitrary complexity (e.g., rocket transportation problem with n objects). That is, if an RPS is provided for a planning domain, search can be omitted by exploiting knowledge of the domain. We propose the following steps for automatical inference of control knowledge: (1) Exploring a problem with small complexity (e.g., rocket with 3 objects) using an universal planning technique, (2) transforming the universal plan into a finite program, and (3) generalizing this program into an RPS. While generalization can be performed purely syntactical, plan transformation is knowledge dependent. Our approach to folding finite programs into RPSs is reported in detail elsewhere. In this report we focus on plan

transformation. We propose that inferring the data type underlying a given plan provides a suitable guideline for plan-to-program transformation.
DTIC
Machine Learning; Problem Solving; Knowledge Based Systems

20000116153 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
Two Case Studies in Using Cognitive Walkthrough for Interface Evaluation
Jacobsen, Niels E.; John, Bonnie E.; May 2000; 61p; In English
Contract(s)/Grant(s): NSF-IRI94-57628
Report No.(s): AD-A382319; CMU-CS-00-132; CMU-HCII-00-100; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Previous HCI-studies have compared usability evaluation methods quantitatively without supplementing these data with detailed qualitative data about how analysts actually learn and use methods. In contrast, we present two diary-based case studies that describe the processes of two novice analysts who learned about and applied the Cognitive Walkthrough (CW; Lewis, et al., 1990) to the specification of a multimedia authoring system. Results show that the two analysts easily learned to use CW but also that they found the technique tedious to use. Moreover, CW was neither reliable when comparing the two analysts' processes and outcomes to each other, nor accurate when comparing the analysts' problem predictions to results from usability tests applied to a running system. We examine these data in detail, searching for possible causes of the observed reliability and accuracy. Based on these analyses, we suggest three changes to CW method to improve its accuracy and two changes to improve its reliability. Further, we recommend developing a tool to reduce the tedium and integrate our suggested improvements to CW.
DTIC
Information Retrieval; Human-Computer Interface; Cognition

20000116305 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Adapting Air Force Practices to Cope with a Vanishing Integrated Circuit Supply Base - Maintaining the Technological Edge
Raines, Christopher R.; Apr. 04, 2000; 82p; In English
Report No.(s): AD-A382459; AFIT-CY-00359; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This Policy Analysis Exercise (PAE) was developed in consultation with RAND Corporation's Project AIR FORCE (PAF) Team. PAF is a Federally Funded Research and Development Center that has been providing analysis to the Air Force for over fifty years. The mission of the Project AIR FORCE Team is "to conduct an integrated program of objective analysis on issues of enduring concern to the leaders of the Air Force."
DTIC
Integrated Circuits; Avionics; Aircraft Engines

67
THEORETICAL MATHEMATICS

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

20000115424 Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
Solution of the Poisson-Boltzmann's equation for self-consistent potential of infinite, random, nonlinear and non-uniform system
Rasulova, M.; Jan. 31, 1998; 9p; In English
Report No.(s): DE98-626904; No Copyright; Avail: Department of Energy Information Bridge

A study has been made of a system of charged particles and inhomogeneities randomly distributed in accordance with the same law in the neighborhoods of corresponding sites of a planar crystal lattice. The existence and uniqueness of the solution of the generalized Poisson-Boltzmann's equation for the average self-consistent potential and average density of surface charges are proved.
NTIS
Poisson Equation; Charged Particles

20000115620 MRJ Technology Solutions, Moffett Field, CA USA

Efficient Merge and Insert Operations for Binary Heaps and Trees

Kuszmaul, Christopher Lee, MRJ Technology Solutions, USA; [2000]; 12p; In English

Contract(s)/Grant(s): RTOP 509-10-61; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Binary heaps and binary search trees merge efficiently. We introduce a new amortized analysis that allows us to prove the cost of merging either binary heaps or balanced binary trees is O(l), in the amortized sense. The standard set of other operations (create, insert, delete, extract minimum, in the case of binary heaps, and balanced binary trees, as well as a search operation for balanced binary trees) remain with a cost of O(log n). For binary heaps implemented as arrays, we show a new merge algorithm that has a single operation cost for merging two heaps, a and b, of O(absolute value of a + min(log absolute value of b log log absolute value of b. log absolute value of a log absolute value of b). This is an improvement over O(absolute value of a + log absolute value of a log absolute value of b). The cost of the new merge is so low that it can be used in a new structure which we call shadow heaps. to implement the insert operation to a tunable efficiency. Shadow heaps support the insert operation for simple priority queues in an amortized time of O(f(n)) and other operations in time O((log n log log n)/f (n)), where 1 less than or equal to f (n) less than or equal to log log n. More generally, the results here show that any data structure with operations that change its size by at most one, with the exception of a merge (aka meld) operation, can efficiently amortize the cost of the merge under conditions that are true for most implementations of binary heaps and search trees.

Author

Algorithms; Binary Data; Trees (Mathematics)

20000115871 NASA Goddard Space Flight Center, Greenbelt, MD USA

The DAO Retrospective Data Assimilation System

Todling, Richardo, NASA Goddard Space Flight Center, USA; Zhu, Yanqiu, NASA Goddard Space Flight Center, USA; [2000]; 10p; In English

Contract(s)/Grant(s): NAS5-32332; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The fixed-lag Kalman smoother of Cohn et al. (1994), or a version of a more computationally feasible approximation of it developed by Todling et al. (1998), is under implementation at the Data Assimilation Office (DAO) to build a retrospective data assimilation system (RDAS). The initial version of the RDAS uses the physical-space statistical analysis system and a modification of the incremental analysis update (IAU) procedure of Bloom et al. (1996); a follow up version of the RDAS Nill require the use of the adjoint of the DAO general circulation model (developed by Y. Yang and M Navon). The retrospective procedure is designed to produce improved analyses as well as improved assimilated fields consequently providing an improved climate representation through data assimilation.

Author

Data Systems; Atmospheric General Circulation Models; Mathematical Models

20000116103 Helsinki Univ. of Technology, Dept. of Engineering Physics and Mathematics, Espoo, Finland

Pole Assignment Problems for Error Bounds for GMRES

Huhtanen, Marko, Helsinki Univ. of Technology, Finland; 1999; ISSN 0784-3143; 20p; In English

Report No.(s): PB2000-102617; RR-A418; ISBN 951-22-4647-3; No Copyright; Avail: National Technical Information Service (NTIS)

We derive a family of new error bounds for solving a linear system Ax = b using the Generalized Minimal Residual (GMRES) method, where A(epsilon)C(exp n*n) and b(epsilon)C(exp n). In the simplest case the estimates are based on 'feedback' in the sense that running GMRES with Ax = b is almost equivalent to running GMRES with (A+bv(sup *))y = b for any vector v(epsilon)C(exp n). Using this we obtain a generalization of the classical estimate min[sub p(epsilon)P(sub j)(0)] absolute value of p(A)b is less than or equal to kappa(X)min[sub p(epsilon)P(sub j)(0)] absolute value of p(lambda) * absolute value of b for diagonalizable matrices A = X(lambda)X(exp -1) by constructing bounds of similar type for every matrix A, regardless of A being diagonalizable or not. For an optimal choice of v there arises a pole assignment problem. Analogously, we obtain another family of error bounds by considering A(I+bv(sup 8))z = b aside from Ax = b. After considering these two particular cases it is straight-forward to generalize the proposed technique to larger rank perturbations of A.

Author

Allocations; Errors; Linear Systems; Mathematical Models

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.

20000115415 Sandia National Labs., Albuquerque, NM USA
In-Plane Magnetic Field Effect on the Transport Properties in a Quasi-3D Quantum Well Structure; Physical Review Letters
Brooks, J.; Clark, R.; Lumpkin, N.; O'Brien, J.; Reno, J.; May 25, 1999; 20p; In English
Report No.(s): DE00-007062; SAND99-1315J; No Copyright; Avail: Department of Energy Information Bridge

The transport properties of a quasi-three-dimensional, 200 layer quantum well structure are investigated at integer filling in the quantum Hall state. We find that the transverse magnetoresistance the Hall resistance and the vertical resistance all follow a similar behavior with both temperature and in-plane magnetic field. A general feature of the influence of increasing in-plane field is that the Hall conductance quantization first improves, but above a characteristic value B(sup)C(/sup)(sub)in(/sub), the quantization is systematically removed. We consider the interplay of the chid edge state transport and the bulk (quantum Hall) transport properties. This mechanism may arise from the competition of the cyclotron energy with the superlattice band structure energies. A comparison of the results with existing theories of the chiral edge state transport with in-plane field is also discussed.
NTIS
Magnetic Effects; Magnetic Fields; Quantum Wells; Magnetoresistivity

20000115416 Sandia National Labs., Albuquerque, NM USA
Magnetic Field Induced Charged Exciton Studies in a GaAs/Al(0.3)Ga(0.7) As Single Heterojunction; Physical Review Letters
Kim, Y.; Munteanu, F. M.; Perry, C. H.; Reno, J. L.; Rickel, D. G.; May 25, 1999; 8p; In English
Report No.(s): DE00-007061; SAND99-1314J; No Copyright; Avail: Department of Energy Information Bridge

The authors observed negatively charged singlet and triplet exciton states that are formed at high magnetic fields beyond the (nu)=l quantum Hall state. The variation of the charged exciton binding energies are in good agreement with theoretical predictions. The MPL transition intensities for these states showed intensity variations (maxima and minima) at the (nu)=l/3 and 1/5 fractional quantum Hall (FQH) state as a consequence of a large reduction of electron-hole screening at these filling factors.
NTIS
Magnetic Fields; Excitons; Heterojunctions

20000115418 Sandia National Labs., Albuquerque, NM USA
Magnetic Semiconductor Quantum Wells in High Fields to 60 Tesla: Photoluminescence Linewidth Annealing at Magnetization Steps; Physical Review B (Rapid Communications)
Awschalom, D. D.; Crooker, S. A.; Lyo, S. K.; Rickel, D. G.; Samarth, N.; May 24, 1999; 15p; In English
Report No.(s): DE00-007058; SAND99-1306J; No Copyright; Avail: Department of Energy Information Bridge

Magnetic semiconductors offer a unique possibility for strongly tuning the intrinsic alloy disorder potential with applied magnetic field. We report the direct observation of a series of step-like reductions in the magnetic alloy disorder potential in single ZnSe/Zn(Cd,Mn)Se quantum wells between 0 and 60 Tesla. This disorder, measured through the linewidth of low temperature photoluminescence spectra drops abruptly at -19, 36, and 53 Tesla, in concert with observed magnetization steps. Conventional models of alloy disorder (developed for nonmagnetic semiconductors) reproduce the general shape of the data, but markedly underestimate the size of the linewidth reduction.
NTIS
Semiconductors (Materials); Magnetic Fields; Quantum Wells; Photoluminescence; Annealing

20000116224 Naval War Coll., Joint Military Operations Dept., Newport, RI USA
Self-Synchronization: Splendid Promise or Dangerous Delusion ***Final Report***
Hatter, Steven D.; May 16, 2000; 28p; In English
Report No.(s): AD-A381665; No Copyright; Avail: Defense Technical Information Center (DTIC)

Joint Vision 2010 is a vision replete with optimism rooted in predictions of dominating American technology and the ability of future commanders and troops to leverage this technology with extraordinary efficiency and precision. Proponents of Network-Centric Warfare build upon the optimism in JV 2010 by offering a war-fighting paradigm that promises "an information superior-

ity enabled concept of operations that generates increased combat power by networking sensors, decision makers, and shooters to achieve shared awareness, increased speed of command, higher tempo operations, greater lethality, increased survivability, and a degree of self-synchronization. of the six combat power-enhancing ingredients achieved by networking sensors, decision-makers, and shooters, self-synchronization emerges as a term new to warfare. Self-synchronization occurs when friendly war-fighting entities seek to exploit the power of networking by acting with initiative in real-time outside of traditional command and control mechanisms-in order to leverage advantage, seize opportunity, or address unanticipated needs or deficiencies, as violent interaction in the battle space unfolds. Is there splendid promise in such an idea, or is it a dangerous delusion that could result in wasted resources or confused future combat operations? Answering this question requires close examination of self-synchronization from the perspective of the coiners of the term. Next, the risks associated with self-synchronization must be articulated and weighed. Finally, possible doctrinal and behavioral answers to these risks such as a reconsideration of commander's intent and emphasis on the application of operational risk management (ORM) must be considered.
DTIC
Real Time Operation; Command and Control; Combat; Technology Assessment

20000117660 Air Force Inst. of Tech., Dept. of Systems and Engineering Management, Wright-Patterson AFB, OH USA
Active Multispectral Bidirectional Distribution Function Measurement System
Proctor, Mark J., Air Force Inst. of Tech., USA; March 2000; 108p; In English
Report No.(s): AD-A380751; AFIT/GEO/ENG/00M-02; No Copyright; Avail: Defense Technical Information Center (DTIC)

Today's highly technical battlefield environment dictates the need for a method of standoff target identification, which reduces risk to personnel and equipment. It is widely known that a given material will react differently to incident radiation than a dissimilar material. Certain materials may respond specularly while others tend to be diffuse. by measuring these responses, materials can be identified by comparison with a known database. One method of building such a database for target recognition is by employing an active multi spectral bidirectional reflectance distribution function (BRDF) measurement system. In the following text, such a system is developed and tested using a 1.5 micrometers - 1.7 micrometers and 2.0 micrometers - 2.4 micrometers tunable source. The system does not yet meet the desired 1.0 micrometers - 5.O micrometers range; however, all major system components with exception to the source are well suited for this entire band. A detailed description of the components used is presented along with recommendations for further research. This particular BRDF measurement system implementation is the direct result of a previous attempt that encountered numerous errors. These errors were primarily attributable to nonlinearities, attenuation, and misalignments in the equipment utilized. Considerable effort was expended in order to reduce these anomalies mainly through component replacement. A comprehensive error analysis is presented for this system along with recommendations for a new system, which should reduce these abnormalities and improve data integrity and collection efficiency.
DTIC
Target Recognition; Data Bases; Distribution Functions; Error Analysis

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.

20000115487 Naval Postgraduate School, Monterey, CA USA
Observations of Quasi-Nonradiating Wave Sources in One Dimension
Miller, Gregg L.; Jun. 2000; 138p; In English
Report No.(s): AD-A381888; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

A nonradiating wave source is one that drives waves over a region of a medium, where no waves propagate outside the region due to complete destructive interference at the boundary. This thesis describes the first observations of an acoustical source of this type. Physical observations are made with a current-carrying wire that is transversely driven by several types of magnetic field distributions. The wire glows as a result of the current, and the wave pattern can be observed due to the cooling caused by the motion of the wire. The predicted standing wave response in the source region is confirmed. Numerical simulations of a one-dimensional mass-and-spring lattice show that dissipation, nonuniformity, and nonlinearity each cause radiation to escape from the source region. The radiation amplitude relative to the standing wave amplitude is substantially reduced for sources that are distrib-

uted over a region rather than lumped over the same region. In addition, it is possible to make adjustments to the drive parameters to substantially minimize the radiation.
DTIC
Acoustics; One Dimensional Flow; Observation; Waves

20000115498 Sensormetrics Ltd., Canterbury, UK
Investigations into Focused Acoustic Transducers Using Domain Inverted Materials ***Final Report***
Gnewuch, Harald, Kent Univ., UK; Humberstone, Liam, Kent Univ., UK; Pannell, Chris N., Sensormetrics Ltd., UK; Mar. 2000; 35p; In English; Prepared in cooperation with Kent Univ., Canterbury, UK.
Contract(s)/Grant(s): F61775-98-C-0007
Report No.(s): AD-A381940; EOARD-SPC-98-4047; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report results from a contract tasking Sensormetrics as follows: The contractor will develop and demonstrate an acoustic transducer, approximately 1 centimeter and 0.5 centimeter wide. The transducer will operate at a frequency between 200 and 400 MHz directing the acoustic beam by means of a technique equivalent to a fresnel zone plate into a line focus at a nominal distance 0.5 cm from the transducer and lying at an angle of 3 degrees to the plane of the transducer. The primary objective is the production and demonstration of a device in which a domain inverted acoustic transducer is bonded to a suitable substrate used to produce an intense acoustic field in the form approximating to a line focus, and to facilitate the attachment of an optical fiber at this position.
DTIC
Fiber Optics; Optical Communication; Electroacoustic Transducers; Acoustics; Sound Transducers

20000115878 NASA Langley Research Center, Hampton, VA USA
Optical Measurement of the Speed of Sound in Air Over the Temperature Range 300-650 K
Hart, Roger C., Institute for Computer Applications in Science and Engineering, USA; Balla, R. Jeffrey, NASA Langley Research Center, USA; Herring, G. C., NASA Langley Research Center, USA; Journal of the Acoustical Society of America; October 2000; ISSN 0001-4966; Volume 108, No. 4, pp. 1946-1948; In English; Copyright; Avail: Issuing Activity

Using laser-induced thermal acoustics (LITA), the speed of sound in room air (1 atm) is measured over the temperature range 300-650 K. Since the LITA apparatus maintains a fixed sound wavelength as temperature is varied, this temperature range simultaneously corresponds to a sound frequency range of 10-15 MHz. The data are compared to a published model and typically agree within 0.1%-0.4% at each of 21 temperatures.
Author
Optical Measurement; Acoustic Velocity

20000116105 Helsinki Univ. of Technology, Lab. of Acoustics and Audio Signal Processing, Espoo, Finland
Virtual Acoustics and 3-D Sound in Multimedia Signal Processing
Huopaniemi, Jyri, Helsinki Univ. of Technology, Finland; 1999; 192p; In English
Report No.(s): PB2000-102540; RR-53; ISBN 951-22-4706-2; No Copyright; Avail: National Technical Information Service (NTIS)

In this work, aspects in real-time modeling and synthesis of three-dimensional sound in the context of digital audio, multimedia, and virtual environments are studied. The concept of virtual acoustics is discussed, which includes models for sound sources, room acoustics, and spatial hearing. Real-time virtual acoustics modeling is carried out using a real-time parametric room impulse response rendering technique proposed by the author. The algorithm uses a well-known time-domain hybrid model, in which the direct sound is modeled using a recursive reverberator. Sound source directivity, and dynamic room acoustical phenomena such as time-varying early reflections from boundary materials and air absorption are incorporated in the image-source model using low-order digital fiber approximations. A novel technique for estimation of source directivity based on the reciprocity method is introduced. Optimization of binaural systems is discussed. Novel methods for head-related transfer function approximation based on frequency warping and balanced model truncation are proposed by the author. Objective and subjective methods for estimating the quality of virtual source generation in headphone listening are introduced. For objective analysis, a binaural auditory model is used, which predicts well the expected performance of different filter designs. Subjective listening tests have been carried out to compare design techniques. The results show that binaural filter design based on auditory criteria results in more efficient and more perceptually relevant processing. This is the main result of the thesis. Crosstalk canceled loudspeaker reproduction of 3-D is reviewed. Stereo widening and virtual loudspeaker algorithms are discussed. An efficient, high-quality design method of virtual surround filters for playback of multichannel audio on two loudspeakers based on a warped shuffler structure is presented. The performance of the method has been verified in subjective listening tests. The methods and results presented

in this thesis are applicable to digital audio signal processing in general, and especially to implementation of virtual acoustic environments in multimedia and virtual reality systems.
Author
Acoustics; Algorithms; Approximation; Binaural Hearing; Hearing; Loudspeakers; Multimedia; Real Time Operation; Signal Processing

20000116643 Virginia Polytechnic Inst. and State Univ., Vibration and Acoustics Labs., Blacksburg, VA USA
Innovative Liner Concepts: Experiments and Impedance Modeling of Liners Including the Effect of Bias Flow ***Final Report, 1 Jul. 1999 - 30 Sep. 2000***
Kelly, Jeff, Virginia Polytechnic Inst. and State Univ., USA; Betts, Juan Fernando, Virginia Polytechnic Inst. and State Univ., USA; Fuller, Chris, Virginia Polytechnic Inst. and State Univ., USA; November 2000; 216p; In English
Contract(s)/Grant(s): NCC1-344
Report No.(s): VPI-462488; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

The study of normal impedance of perforated plate acoustic liners including the effect of bias flow was studied. Two impedance models were developed by modeling the internal flows of perforate orifices as infinite tubes with the inclusion of end corrections to handle finite length effects. These models assumed incompressible and compressible flows, respectively, between the far field and the perforate orifice. The incompressible model was used to predict impedance results for perforated plates with percent open areas ranging from 5% to 15%. The predicted resistance results showed better agreement with experiments for the higher percent open area samples. The agreement also tended to deteriorate as bias flow was increased. For perforated plates with percent open areas ranging from 1% to 5%, the compressible model was used to predict impedance results. The model predictions were closer to the experimental resistance results for the 2% to 3% open area samples. The predictions tended to deteriorate as bias flow was increased. The reactance results were well predicted by the models for the higher percent open area, but deteriorated as the percent open area was lowered (5%) and bias flow was increased. A fit was done on the incompressible model to the experimental database. The fit was performed using an optimization routine that found the optimal set of multiplication coefficients to the non-dimensional groups that minimized the least squares slope error between predictions and experiments. The result of the fit indicated that terms not associated with bias flow required a greater degree of correction than the terms associated with the bias flow. This model improved agreement with experiments by nearly 15% for the low percent open area (5%) samples when compared to the unfitted model. The fitted model and the unfitted model performed equally well for the higher percent open area (10% and 15%).
Author
Bias; Impedance; Internal Flow; Orifices; Perforated Plates; Reactance

20000116644 Allied-Signal Engines and Systems, Phoenix, AZ USA
Small Engine Technology (SET) - Task 13 ANOPP Noise Prediction for Small Engines: Jet Noise Prediction Module, Wing Shielding Module, and System Studies Results ***Final Report***
Lieber, Lysbeth, Allied-Signal Engines and Systems, USA; September 2000; 177p; In English
Contract(s)/Grant(s): NAS3-27483; RTOP 538-03-13-01
Report No.(s): NASA/CR-2000-209706; L-21-10786; NAS 1.26:209706; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

This Final Report has been prepared by AlliedSignal Engines and Systems, Phoenix, Arizona, documenting work performed during the period May 1997 through June 1999, under the Small Engines Technology Program, Contract No. NAS3-27483, Task Order 13, ANOPP Noise Prediction for Small Engines. The report specifically covers the work performed under Subtasks 4, 5 and 6. Subtask 4 describes the application of a semi-empirical procedure for jet noise prediction, subtask 5 describes the development of a procedure to predict the effects of wing shielding, and subtask 6 describes the results of system studies of the benefits of the new noise technology on business and regional aircraft.
Author
Engine Design; Jet Aircraft Noise; Noise Prediction (Aircraft); Aeroacoustics; Engine Noise; Quiet Engine Program; Noise Intensity; Noise Reduction

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.

20000115412 Tri-Univ. Meson Facility, Vancouver, British Columbia Canada
Rho - (omega) mixing via QCD sum rules with finite mesonic widths
Iqbal, M. J.; Jin, X.; Leinweber, D. B.; Jun. 30, 1995; 1p; In English
Report No.(s): DE98-621596; TRI-PP-95-47; No Copyright; Avail: Department of Energy Information Bridge

Based on the analysis of both Borel and Finite-Energy QCD sum rules, the inclusion of finite mesonic widths leads to a dramatic effect on the predictions for the momentum dependence of the(rho) - (omega) mixing matrix element. It is shown that the (rho) - (omega) mixing matrix element in the space-like region has the same sign and similar magnitude as its on-shell value. This provides a possible explanation for the success of the traditional use of the on-shell value of the (rho) - (omega) mixing matrix element to generate the charge symmetry breaking nucleon-nucleon potential.
NTIS
Quantum Chromodynamics; Sum Rules; Mesons; Meson-Meson Interactions

20000115427 Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
Baryogenesis via neutrino oscillations
Akhmedov, E.; Rubakov, V. A.; Smirnov, A.; Mar. 31, 1998; 7p; In English
Report No.(s): DE98-626899; IC-98/22; INR-98-14T; No Copyright; Avail: Department of Energy Information Bridge

We propose a new mechanism of leptogenesis in which the asymmetries in lepton numbers are produced through the CP-violating oscillations of ''sterile'' (electroweak singlet) neutrinos. The asymmetry is communicated from singlet neutrinos to ordinary leptons through their Yukawa couplings. The lepton asymmetry is then reprocessed into baryon asymmetry by electroweak sphalerons. We show that the observed value of baryon asymmetry can be generated in this way, and the masses of ordinary neutrinos induced by the seesaw mechanism are in the astrophysically and cosmologically interesting range. Except for singlet neutrinos, no physics beyond the Standard Model is required.
NTIS
Baryons; Neutrinos; Oscillations

20000115461 Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
Neutrino mass spectrum with (upsilon)(sub (mu)) (yields) (upsilon)(sub s) oscillations of atmospheric neutrinos
Liu, Q. Y.; Smirnov, A.; Feb. 28, 1998; 13p; In English
Report No.(s): DE98-626897; IC-98/14; No Copyright; Avail: Department of Energy Information Bridge

We consider the 'standard' spectrum of the active neutrinos (characterized by strong mass hierarchy and small mixing) with additional sterile, (upsilon)(sub s). The sterile neutrino mixes strongly with the muon neutrino, so that (upsilon)(sub (mu)) (r-reversible) (upsilon)(sub s) oscillations solve the atmospheric neutrino problem. We show that the parametric enhancement of the (upsilon)(sub (mu)) (r-reversible) (upsilon)(sub s) oscillations occurs for the high energy atmospheric neutrinos which cross the core of the Earth. This can be relevant for the anomaly observed by the MACRO experiment. Solar neutrinos are converted both to (upsilon)(sub (mu)) and (upsilon)(sub s). The heaviest neutrino approx. (upsilon)(sub (tau)) may compose the hot dark matter of the Universe. Phenomenology of this scenario is elaborated and crucial experimental signatures are identified. We also discuss properties of the underlying neutrino mass matrix.
NTIS
Mass Spectra; Oscillations; Solar Neutrinos

20000116132 NASA Goddard Space Flight Center, Greenbelt, MD USA
Exchange Forces in Dispersion Relations Investigated Using Circuit Relations
Vrinceanu, D., Clark-Atlanta Univ., USA; Msezane, A. Z., Clark-Atlanta Univ., USA; Bessis, D., Clark-Atlanta Univ., USA; Temkin, A., NASA Goddard Space Flight Center, USA; [2000]; 1p; In English; No Copyright; Avail: Issuing Activity; Abstract Only

We propose a novel method to compute in an exact manner the left-hand cut discontinuity of the electron-Atom partial wave scattering amplitude in the complex energy plane within the static stage approximation. Zero energy dispersion relations for electron-Hydrogen scattering are computed numerically for illustration.
Author
Discontinuity; Electron Scattering; Scattering; Scattering Amplitude; Wave Dispersion; Wave Scattering

20000116183 Japan Atomic Energy Research Inst., Tokyo, Japan

Potential energies for the two lowest 1A' electronic states of H(3+) ***Potential energies for the two lowest***

Ichihara, A.; Yokoyama, K.; Iwamoto, O.; Nov. 30, 1998; 25p; In English

Report No.(s): DE99-725678; JAERI-DATA/CODE-98-031; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

Potential energies for the two lowest 1A' states of H(3+) at 701 different spatial geometries are tabulated. These energies have been calculated by the ab initio full configuration interaction method with a (8s6p2d1f) Gaussian type basis set. Features of avoided crossing of two surfaces as well as the potential well in the ground state can be produced by interpolating calculated energies. These ab initio energies are expressed as a function of three internuclear distances in the range from 0.6 to 10.0 bohr, and they are applicable to the molecular dynamics study for the H(+) + H2 system.

NTIS

Potential Energy; Electronic Structure; Configuration Interaction; Electron States; Hydrogen Ions; Gauss Equation

20000116184 High Energy Accelerator Research Organization, Tsukuba, Japan

The 14th KEK-Tanashi Scientific Computational Programs

Ukai, K., Editor, High Energy Accelerator Research Organization, Japan; June 1998; 50p; In Japanese; See also 20000116185 through 20000116186

Report No.(s): KEK-98-5; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

Seven groups were accepted as the 14th KEK Tanashi(KEK:High Energy Accelerator Research Organization, Tanashi Branch Scientific Computational Programs (SCP) The INS(Institute for Nuclear Study, University of Tokyo) was changed to the KEK on 1997/4/l. This SCP program was performed using the INS computer over 13 times. When the INS organization changed to KEK, the SCP program was continued. The SCP can use full resource of an KEK Tanashi computer system without an operational limitation. The KEK-Tanashi computer system consists of a vector processor(FACOM VP-2100E), a parallel processor(FACOM AP-1000) and some server machines(S-4/1000E with 6 cpus etc.). The 14th SCP started on June 28, 1997 and ended on March 29, 1998. Some results were already published in Journals or were presented in physical meetings. This is a summary of the statistics used by the 14th SCP and reports presented by groups who performed the 14th SCP.

Author

Atomic Physics; Theoretical Physics; Computation; Computer Techniques

20000116185 Tokyo Inst. of Tech., Dept. of Physics, Japan

Electron-Induced Nuclear Double-Beta Transitions

Muto, Kazuo, Tokyo Inst. of Tech., Japan; The 14th KEK-Tanashi Scientific Computational Programs; 19980601, pp. 13-18; In Japanese; See also 20000116184; Copyright Waived; Avail: CASI; A02, Hardcopy; A01, Microfiche

Cross sections are evaluated for electron-induced double-charge exchange reactions, (e-,e+vv), which are equivalent to the two-neutrino double beta decay. It is shown that the sequential electron capture and beta+ decay, via real intermediate nuclear states, gives rise to a large enhancement of the cross section. On the other hand, the largest cross sections of the real second-order weak process through virtual intermediate states are about 10(exp -30) b, which are far below the experimental detection limit.

Author

Charge Exchange; Electron Capture; Particle Decay

20000116186 Tokyo Univ. of Agriculture and Technology, Japan

Scattering Problem for Four-Boson System

Matsui, Yoshiko, Tokyo Univ. of Agriculture and Technology, Japan; The 14th KEK-Tanashi Scientific Computational Programs; 19980601, pp. 29-33; In Japanese; See also 20000116184; Copyright Waived; Avail: CASI; A01, Hardcopy; A01, Microfiche

The s wave phase shift of boson-triboson scattering has been obtained by solving the Faddeev-Osborn equation in the exact approach based on rigorous Faddeev theory. The Schmidt expansion theorem is used to express the 3+1- and 2+2-subamplitudes at energies in the continuous spectrum region as an infinite series of separable terms. Employing the pole term decomposition for these subamplitudes expressed in terms of the Schmidt expansion we can define, in conformity with the Faddeev residue prescription, respective four-nucleon amplitudes that describe elastic/ rearrangement, partial breakup and full breakup scattering processes. Acquired simultaneous equations of these amplitudes take the form of multichannel two-particle Lippmann-Schwinger type, which we call Faddeev -Osborn equation. Assuming as an s-wave spin-independent, rank one separable potential of the Yamaguchi type for the two-particle interaction, are derived the Faddeev-Osborn equation for the boson-triboson elastic scattering. to treat singularities appeared in our equation, the numerical calculation is performed in the framework of the complex-valued analysis by introducing contour rotation method. The boson-triboson elastic scattering amplitude for L=0 state of a four-boson

system is obtained numerically in the incident boson laboratory energy region of 0.01 about equals 24.OMev, including only 1=0 state for the 3+1-subamplitude. The results of the phase shift obtained from the amplitudes are plotted as dots.
Author
Bosons; Elastic Scattering; Faddeev Equations; Particle Interactions; Phase Shift; S Waves

73
NUCLEAR PHYSICS

Includes nuclear particles; and reactor theory. For space radiation see 93 Space Radiation. For atomic and molecular physics see 72 Atomic and Molecular Physics. For elementary particle physics see 77 Physics of Elementary Particles and Fields. For nuclear astrophysics see 90 Astrophysics.

20000115900 Japan Atomic Energy Research Inst., Tokyo, Japan
Proceedings of the 1998 symposium on nuclear data
Yoshida, T.; Fukahori, T.; Mar. 31, 1999; 328p; In English; Nuclear data, 1999
Report No.(s): DE99-760433; JAERI-CONF-99-002; No Copyright; Avail: Department of Energy Information Bridge

The 1998 Symposium on Nuclear Data was held at Tokai Research Establishment, Japan Atomic Energy Research Institute (JAERI), on 19th and 20th of November 1998. Japanese Nuclear Data Committee and Nuclear Data Center, JAERI organized this symposium. In the oral sessions, presented papers were on accelerator facilities, astrophysics and nuclear data, international session, radiation damage study and nuclear data, and integral test of nuclear data. In the poster session, presented papers were concerning experiments, evaluations, benchmark tests and on-line database on nuclear data. Those presented papers are compiled in this proceedings. The 50 of the presented papers are indexed individually.
NTIS
Conferences; Nuclear Physics; Data Bases

20000116172 Deutsches Elektronen-Synchrotron, Hamburg, Germany
TESLA Superconducting Linear Collider, Chapter 3
1997; 116p; In English
Report No.(s): PB2000-102823; No Copyright; Avail: National Technical Information Service (NTIS)

Studying electron-positron collisions at energies well beyond the reach of Low Energy Physics (E(sub em) approx. = 200 GeV) has a high potential for the future development of Particle Physics, in many respects complementary to the Large Hadron Collider (LHC). There is broad agreement in the High Energy Physics community that a linear electron-positron collider with an initial center of mass energy of 350 to 500 GeV and luminosity about 10(exp 33) per sq cm per second should be built as the next accelerator facility. The feasibility of a linear collider has been demonstrated by the successful operation of the Stanford Linear Collider (SLC), the only existing facility of this kind. Nevertheless, meeting the requirements for a next generation linear collider is by no means an easy task. In particular, high beam powers and very small spot sizes at the collision point are needed in order to obtain a sufficiently high luminosity. Several groups worldwide are pursuing different linear collider design efforts. The fundamental difference of the TESLA approach compared to other designs is the choice of superconducting accelerating structures. The challenge of pushing the superconducting linac technology to a high accelerating gradient and at the same time reducing the cost per unit length, both necessary in order to be competitive with conventional approaches, is considerable, but the advantages connected with this technology (as summarized) are significant and we are convinced that the potential for the machine performance is unrivaled by other concepts.
Derived from text
Particle Collisions; High Energy Interactions; Linear Accelerators; Superconducting Magnets; Superconductivity

20000116177 Japan Atomic Energy Research Inst., Tokyo, Japan
Compilation of benchmark results for fusion related Nuclear Data
Maekawa, F.; Wada, M.; Oyama, Y.; Ichihara, C.; Makita, Y.; Nov. 30, 1998; 182p; In English
Report No.(s): DE99-725659; JAERI-DATA/CODE-98-024; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

This report compiles results of benchmark tests for validation of evaluated nuclear data to be used in nuclear designs of fusion reactors. Parts of results were obtained under activities of the Fusion Neutronics Integral Test Working Group organized by the members of both Japan Nuclear Data Committee and the Reactor Physics Committee. The following three benchmark experiments were employed used for the tests: (i) the leakage neutron spectrum measurement experiments from slab assemblies at the

DT neutron source at FNS/JAERI, (ii) in-situ neutron and gamma-ray measurement experiments (so-called clean benchmark experiments) also at FNS, and (iii) the pulsed sphere experiments for leakage neutron and gamma-ray spectra at the D-T neutron source facility of Osaka University, OKTAVIAN. Evaluated nuclear data tested were JENDL-3.2, JENDL Fusion File, FENDL/E-1.0 and newly selected data for FENDL/E-2.0. Comparisons of benchmark calculations with the experiments for twenty-one elements, i.e., Li, Be, C, N, O, F, Al, Si, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zr, Nb, Mo, W and Pb, are summarized.
NTIS
Fusion Reactors; Reactor Materials; Neutron Spectra; Reactor Physics; Nuclear Fusion

20000116180 Japan Atomic Energy Research Inst., Tokyo, Japan
Study of existing experimental data and validation process for evaluated high energy nuclear data. Report of task force on integral test for JENDL High Energy File in Japanese Nuclear Data Committee
Oyama, Y.; Baba, M.; Watanabe, Y.; Nov. 30, 1998; 140p; In Japanese; In English
Report No.(s): DE99-725671; JAERI-REVIEW-98-020; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

JENDL High Energy File (JENDL-HE) is being produced by Japanese Nuclear Data Committee (JNDC) to provide common fundamental nuclear data in the intermediate energy region for many applications concerning a basic research, an accelerator-driven nuclear waste transmutation, a fusion material study, and medical applications like the radiation therapy. The first version of JENDL-HE, which contains the evaluated nuclear data up to 50 MeV, is planned to release in 1998. However, a method of integral test with which we can validate the high-energy nuclear data file has not been established. The validation of evaluated nuclear data through the integral tests is necessary to promote utilization of JENDL-HE. JNDC set up a task force in 1997 to discuss the problems concerning the integral tests of JENDL-HE. The task force members have surveyed and studied the current status of the problems for a year to obtain a guideline for development of the high-energy nuclear database. This report summarizes the results of the survey and study done by the task force for JNDC.
NTIS
Nuclear Reactions; Fission; Data Bases; Research

20000116388 International Atomic Energy Agency, International Nuclear Data Committee, Vienna, Austria
Compilation and evaluation of high energy (gamma)-ray standards from nuclear reactions. Work performed under the coordinated research project 'Update of X- and (gamma)-ray decay data standards for detector calibration'
Marcinkowski, A.; Marianski, B.; Feb. 28, 1999; 42p; In English
Report No.(s): DE99-615263; INDC(POL)-014; No Copyright; Avail: Department of Energy Information Bridge

The report presents the following aspects needed for the compilation and evaluation of high energy (gamma)-ray standards from nuclear reactions: evaluation of emission probabilities of (gamma)-rays with energies 4.44 MeV and 15.11 MeV from (sup 12)C(sub *), preparation of the list of reactions suitable for production of the above mentioned excited radionuclide, and compilation and evaluation of cross sections for these reactions, including inelastic proton scattering on C-12 and radiative capture on B-11.
NTIS
Nuclear Physics; Nuclear Reactions; Gamma Rays

20000116493 Power Reactor and Nuclear Fuel Development Corp., Tokyo, Japan
Measurement of fast neutron induced fission cross section of minor-actinide
Hirakawa, N.; Mar. 31, 1998; 121p; In Japanese; In English
Report No.(s): DE99-725655; PNC-TJ-9601-98-002; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

In fuel cycles with recycled actinide, core characteristics are largely influenced by minor actinide (MA: Np, Am). Accurate nuclear data of MA such as fission cross section are required to estimate the effect of MA with high accuracy. In this study, fast neutron induced fission cross section of MA was measured using Dynamitron Accelerator in Tohoku University. New or improved techniques and tools with high precision and fast timing capability were developed for this study. Those are as follows: (1) Development of a sealed fission chamber, (2) Intensification of Li neutron target, (3) Improvement of time-resolution of Time-of-Flight (TOF) electronic circuit, (4) Introduction of MA (Np237, Am241 and Am243) samples with large sample mass and (5) Introduction of a U235 sample with high purity. Using these improved tools and samples, fission cross section of Np237 was measured

between 10 to 100 keV. On the other hand, averaged fission cross section for Maxwell distribution spectrum with kt = 25.3 keV was measured for Am241 and Am243.
NTIS
Neutron Spectra; Fast Neutrons; Measure and Integration; Temporal Resolution; Neutron Cross Sections

20000116494 Power Reactor and Nuclear Fuel Development Corp., Tokyo, Japan
Measurement of neutron capture cross sections of Np-237
Igashira, M.; Mar. 31, 1998; 68p; In Japanese; In English
Report No.(s): DE99-725654; PNC-TJ-9607-98-001; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

For studies on incineration of minor actinides (MAs) in a fast reactor, detailed characteristics of reactor core such as incineration performance have to be investigated, so accurate neutron cross section data of MAs become necessary. Therefore, the keV-neutron capture cross sections of Np-237, which is one of important MAs, were measured in the present study to obtain the accurate data. The measurement was relative to the standard capture cross sections of Au-197. A neutron time-of-flight method was adopted with a ns- pulsed neutron source by a Pelletron accelerator and a large anti-Compton NaI(Tl) gamma-ray detector. As a result, the capture cross sections of Np-237 were obtained with the error of about 4% in an incident neutron energy region of 10 to 500 keV. The present data are compared with other experimental data and the evaluated values of JENDL-3.2, and it was found that JENDL-3.2 provided good evaluations for Np-237.
NTIS
Measure and Integration; Capture Effect; Neutron Sources; Absorption Cross Sections

20000116520 Joint Inst. for Nuclear Research, Bogolyubov Lab. of Theoretical Physics, Dubna, USSR
Modelling of the Woods-Saxon eikonal function for nuclear elastic scattering
Lukyanov, V. K.; Permyakov, V. P.; Chubov, Y.; Dec. 31, 1998; 16p; In Russian; In English
Report No.(s): DE99-614530; JINR-R-7-98-159; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

The eikonal phase is needed for the analytical calculations for the nuclear scattering in the high energy approximation (E>>U, kR>>1). In this paper we obtain its model expression for scattering on Woods-Saxon potential which with a good accuracy reproduces its behaviour in complex plane which is found numerically. In the case one evaluates explicitly the scattering amplitude using saddle-point method makes the physics more understandable. The numerical amplitudes and cross sections of nucleus-nucleus scattering are compared with exact calculations.
NTIS
Elastic Scattering; Computerized Simulation; Nuclear Scattering; Scattering Cross Sections

20000116521 Joint Inst. for Nuclear Research, Flerov Lab. of Nuclear Reactions, Dubna, USSR
sup 221,223,225,227)Pa compound nuclei produced in the reactions with the heavy ions (sup 20,22)Ne and (sup 24,26)Mg *Formation cross section of the Pa, Th and AC isotopes obtained from decay of the*
Bogdanov, D. D.; Veselsky, M.; Eremin, A. V.; Dec. 31, 1998; 20p; In Russian; In English
Report No.(s): DE99-614529; JINR-R-7-98-149; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

The production cross sections and excitation functions of the neutron deficient isotopes of Pa, Th and AC were measured in the reactions of (sup 20, 22)Ne + (sup 205)Tl and (sup 24,26)Mg + (sup 197)Au. The obtained experimental production cross sections of the Pa, Th and AC isotopes with the neutron numbers 122 (<=) N (<=) 132 were compared with the values calculated using the statistical model of nuclear de-excitation. The semiempirical methods of accounting for the influence of the shell effects in the fission barriers of excited nuclei are considered that reproduce well the cross sections for xn-, pxn- and (alpha)xn-evaporation reactions.
NTIS
Nuclei (Nuclear Physics); Protactinium Isotopes; Heavy Ions; Neon Isotopes; Magnesium Isotopes

74
OPTICS

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

20000115880 NASA Goddard Space Flight Center, Greenbelt, MD USA
Technology Validation of Optical Fiber Cables for Space Flight Environments
Ott, Melanie N., Sigma Research and Engineering Corp., USA; Friedberg, Patricia, NASA Goddard Space Flight Center, USA; [2000]; 12p; In English, Nov. 2000, Boston, MA, USA; Sponsored by International Society for Optical Engineering, Unknown; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Periodically, commercially available (COTS) optical fiber cable assemblies are characterized for space flight usage under the NASA Electronic Parts and Packaging Program (NEPP). The purpose of this is to provide a family of optical fiber cable options to a variety of different harsh environments typical to space flight missions. The optical fiber cables under test are evaluated to bring out known failure mechanisms that are expected to occur during a typical mission. The tests used to characterize COTS cables include: (1) vacuum exposure, (2) thermal cycling, and (3) radiation exposure. Presented here are the results of the testing conducted at NASA Goddard Space Flight Center on COTS optical fiber cables over this past year. Several optical fiber cables were characterized for their thermal stability both during and after thermal cycling. The results show how much preconditioning is necessary for a variety of available cables to remain thermally stable in a space flight environment. Several optical fibers of dimensions 100/140/172 microns were characterized for their radiation effects at -125 C using the dose rate requirements of International Space Station. One optical fiber cable in particular was tested for outgassing to verify whether an acrylate coated fiber could be used in a space flight optical cable configuration.
Author
Fiber Optics; Radiation Effects; Communication Cables; Aerospace Environments; Optical Fibers; Exposure

20000116100 National Inst. of Standards and Technology, Optoelectronics Div., Boulder, CO USA
NIST Measurement Services: Calibration Service for Spectral Responsivity of Laser and Optical-Fiber Power Meters at Wavelengths Between 0.4 Microns and 1.8 Microns
Lehman, John H., National Inst. of Standards and Technology, USA; December 1999; 48p; In English
Report No.(s): PB2000-102878; NIST/SP-250/53; No Copyright; Avail: National Technical Information Service (NTIS)

This document describes a calibration service for absolute spectral-responsivity measurements of laser power meters, optical-fiber power meters, and detectors used with lasers and optical-fiber connectors at wavelengths between 400 nm and 1800 nm. In addition to a summary of the calibration procedure, a theoretical basis is given for the uncertainty assessment, as well as an overview of the measurement system and operating procedures. A sample calibration report is included in this document that is similar to that which is provided to the customer. The calibration report contains absolute responsivity in terms of amps per watt at each wavelength increment and a summary of the uncertainty assessment for the meter.
Author
Calibrating; Laser Outputs; Lasers; Optical Fibers; Spectra

20000116136 Defence Science and Technology Organisation, Salisbury Australia
Measurements of Near Sea Surface Infrared Propagation
Frost, Shaun M.; Oct. 1999; 29p; In English
Report No.(s): AD-A382027; DSTO-TR-0994; DODA-AR-011-492; Copyright; Avail: Defense Technical Information Center (DTIC)

A facility to perform spectral atmospheric transmission measurements has been developed. Measurements have been made of the atmospheric infrared transmission near the sea surface. Spectral transmission profiles were measured for a number of ranges using a fourier transform spectrometer. The results have been compared to the predictions of the MODTRAN atmospheric transmission model.
DTIC
Near Infrared Radiation; Atmospheric Physics; Propagation

20000116309 Army Research Lab., Human Research and Engineering Directorate, Aberdeen Proving Ground, MD USA
Embedded Fiber Optic Sensors for Integral Armor ***Final Report, Jan.-Jul. 1996***
Fink, Bruce K.; Corona-Bittick, Kelli; Sep. 2000; 111p; In English; Prepared in cooperation with Production Products Manufacturing & Sales, Inc., St. Louis, MO.
Contract(s)/Grant(s): DAAL01-97-C-0034
Report No.(s): AD-A382524; ARL-TR-2267; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This report describes the work performed with Production Products Manufacturing & Sales (PPMS), Inc., under the ”Liquid Molded Composite Armor Smart Structures Using Embedded Sensors” Small Business Innovative Research (SBlR) Program sponsored by the U.S. Army Research Laboratory (ARL). In the Phase I effort, fiber optic sensor systems were investigated for in-process cure monitoring and in-service health and dynamic response monitoring of monocoque and hybrid liquid molded composite armor structural parts. Sensor embedding techniques during resin infusion molding were developed, thick panels with varying residual stress characteristics were fabricated, two fiber optic sensor types were utilized and compared, several demodulation techniques were studied, and information processing programs were written for converting the sensor signal to engineering data. Bragg grating and fluorescence optrode fiber optic sensors were selected and embedded in armor panels to monitor the cure of the systems and health of the panels during impact and four-point bend tests. During panel curing, the Bragg gratings detected the change in strain in the material at the onset of cross-linking as well as the strain changes (residual stress) resulting from panel processing. The Bragg gratings, serving a dual purpose, measured the resulting strain from the external loads applied due to impact and bending. The fluorescence optrode was used during the cure process only to measure the changes in the material as it cured (degree of cure). Stitching of thick-section fiberglass preforms was also investigated.
DTIC
Fiber Optics; Composite Materials; Armor; Embedding; Optical Measuring Instruments; Hybrid Composites; Fabrication; Smart Structures

20000116355 National Inst. of Standards and Technology, Boulder, CO USA
Technical Digest, Symposium on Optical Fiber Measurements, 2000
Williams, P. A.; Day, G. W.; September 2000; 204p; In English
Report No.(s): PB2000-107707; NIST/SP-953; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

This digest contains summaries of 44 papers presented at the Symposium on Optical Fiber Measurement, held September 26-28, 2000, at Standards and Technology in Boulder Colorado.
NTIS
Conferences; Optical Fibers; Fiber Optics; Optical Communication; Transmission Lines

75
PLASMA PHYSICS

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

20000115420 Joint Inst. for Nuclear Research, Lab. of Nuclear Problems, Dubna, USSR
Experimental determination of characteristics of nuclear fusion reactions from mu-molecular resonance states
Bystritskij, V. M.; Pen’kov, F. M.; Dec. 31, 1997; 23p; In English
Report No.(s): DE98-627220; JINR-E-15-97-329; No Copyright; Avail: Department of Energy Information Bridge

Charge-nonsymmetrical deuterium-helium muon complexes (d(mu)He) are studied. A method is proposed for experimentally determining the rates of nuclear fusion reactions in d(mu)He molecules in the J=1 and J=0 states (J is the orbital moment of the system) and the partial rates for radiative decay of these complexes in these states. Experiments are supposed to be carried out at meson factories with gaseous and cryogenic targets filled with a mixture of deuterium and helium.
NTIS
Nuclear Fusion; Molecules; Resonance; Muons; Plasma Physics

20000115425 Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
Statistics of structural holes in the one-component classical plasma near freezing
Cardenas, M.; Tosi, M. P.; Mar. 31, 1998; 9p; In English
Report No.(s): DE98-626903; IC-98/32; No Copyright; Avail: Department of Energy Information Bridge

The correlations between structural holes in the fluid phase of the one-component classical plasma near its freezing point at coupling strength (Gamma) = 179 are studied by a statistical method using the Ornstein-Zernike relations for a partly quenched disordered system in combination with the hypernetted chain closure. The method involves inserting in the quenched structure of the plasma variable numbers of point-like charged particles, which on reaching equilibrium probe the holes in the matrix. When the probes carry the same charge as the plasma particles, the results may also be interpreted as describing the evolution of the correlations between annealed particles in a partly quenched disordered plasma upon varying the fraction of quenched particles at constant total density. Doubling the charge carried by the probes sharpens their correlations and improves the resolution that can be obtained in this method of structural analysis.
NTIS
Plasma Physics; Structural Analysis; Plasmas (Physics)

20000115462 Princeton Plasma Physics Lab., Princeton, NJ USA
Confinement of Pure Ion Plasma in a Cylindrical Current Sheet
Phillips, C. K.; Chao, E. H.; Davidson, R. C.; Paul, S. F.; Dec. 10, 1999; 10p; In English
Report No.(s): DE00-015113; PPPL-3403; No Copyright; Avail: Department of Energy Information Bridge

A novel method for containing a pure ion plasma at thermonuclear densities and temperatures has been modeled. The method combines the confinement properties of a Penning-Malmberg trap and some aspects of the magnetic field geometry of a pulsed theta-pinch. A conventional Penning trap can confine a uniform-density plasma of about 5x1011 cm-3 with a 30-Tesla magnetic field. However, if the axial field is ramped, a much higher local ion density can be obtained. Starting with a 107 cm-3 trapped deuterium plasma in a conventional Penning-Malmberg trap at the Brillouin limit (B = 0.6 Tesla), the field is ramped to 30 Tesla. Because the plasma is comprised of particles of only one sign of charge, transport losses are very low, i.e., the conductivity is high. As a result, the ramped field does not penetrate the plasma and a diamagnetic surface current is generated, with the ions being accelerated to relativistic velocities. to counteract the inward j x B forces from this induced current, additional ions are injected into the plasma along the axis to increase the density (and mutual electrostatic repulsion) of the target plasma.In the absence of the higher magnetic field in the center, the injected ions drift outward until a balance is established between the outward driving forces (centrifugal, electrostatic, pressure gradient) and the inward j x B force. An equilibrium calculation using a relativistic, 1-D, cold-fluid model shows that a plasma can be trapped in a hollow, 49-cm diameter, 0.2-cm thick cylinder with a density exceeding 4 x 1014 cm-3.
NTIS
Confinement; Ions; Current Sheets; Plasma Currents; Plasma Physics; Ion Density (Concentration)

20000115463 Princeton Plasma Physics Lab., Princeton, NJ USA
Fast Particle Destabilization of Toroidicity Induced Alfvn Eigenmodes in National Spherical Torus Experiment
Cheng, C. Z.; Fu, G. Y.; Gorelenkova, M. V.; Gorelenkov, N. N.; White, R.; Dec. 10, 1999; 13p; In English
Report No.(s): DE00-015103; PPPL-3402; No Copyright; Avail: Department of Energy Information Bridge

Toroidicity induced Alfvn Eigenmode (TAE) stability in National Spherical Torus Experiment (NSTX) is analyzed using the improved NOVA-K code, which includes finite orbit width and Larmor radius effects and is able to predicts the saturation amplitude for the mode using the quasilinear theory. Broad spectrum of unstable global TAEs with different toroidal mode numbers is predicted. Due to the strong poloidal field and the presence of the magnetic well in NSTX better particle confinement in the presence of TAEs in comparison with tokamaks is illustrated making use of the ORBIT code.
NTIS
Destabilization; Toroidal Plasmas; Magnetohydrodynamic Waves; Plasma Physics

20000115464 Princeton Plasma Physics Lab., Princeton, NJ USA
Visualization of Magnetically Confined Plasmas
Lewandowski, J. L. V.; Dec. 10, 1999; 36p; In English
Report No.(s): DE00-015051; PPPL-3401; No Copyright; Avail: Department of Energy Information Bridge

With the rapid developments in experimental and theoretical fusion energy research towards more geometric details, visualization plays an increasingly important role. In this paper we will give an overview of how visualization can be used to compare and contrast some different configurations for future fusion reactors. Specifically we will focus on the stellarator and tokamak concepts. In order to gain understanding of the underlying fundamental differences and similarities these two competing concepts are compared and contrasted by visualizing some key attributes.
NTIS
Confinement; Plasmas (Physics); Plasma Physics; Energy Technology

20000115465 Princeton Plasma Physics Lab., Princeton, NJ USA
Drift Wave Simulations with Reduced Stellarator Equilibria
Lewandowski, J. L. V.; Dec. 10, 1999; 12p; In English
Report No.(s): DE00-015048; PPPL-3400; No Copyright; Avail: Department of Energy Information Bridge

A three-field model to study drift-resistive, low-frequency waves in low-beta, non-axisymmetric plasmas (J.L.V. Lewandowski, Phys. Plasmas, 4 (11) 4023 (1997)) is used to analyze the effect of the inhomogeneities in the stellarator magnetic field on the fastest (linear) growth rate, gamma.Extensive numerical calculations for a toroidal heliac show that not all Fourier components in the representation of the equilibrium configuration are important as far as gamma is concerned.
NTIS
Plasma Physics; Simulation; Drift

20000115466 Princeton Plasma Physics Lab., Princeton, NJ USA
Development of a Cost-Effective Design for the Fusion Ignition Research Experiment
Heitzenroeder, P. J.; Dec. 01, 1999; 4p; In English
Report No.(s): DE00-015035; PPPL-3399; No Copyright; Avail: Department of Energy Information Bridge

The Fusion Ignition Research Experiment (FIRE) is one of the components of a US Next Step Options (NSO) study which is considering what major experiments might be undertaken in a restructured US Fusion Sciences Program. FIRE is designed for a plasma current of 6.5 MA, a burn time of at least 10 s, and a Q in the range of 5 to 10. FIRE has a major radius of 2.0 m, a minor radius of 0.525 m, and a field on axis of 10T. All of the coils are inertially cooled by liquid nitrogen. FIRE will operate primarily in a double null configuration with an x-point triangularity of 0.8 and an x-point elongation of 2.2. In addition to these technical requirements, a major goal for the FIRE project is for a total project cost of approximately $1B (in FY 99 dollars). This paper describes the process and rationale for the engineering design chosen for FIRE, taking into account both the performance and cost goals.
NTIS
Ignition; Plasma Currents; Plasma Physics; Fusion

20000115467 Princeton Plasma Physics Lab., Princeton, NJ USA
Physics Basis for High-Beta, Low-Aspect-Ratio Stellarator Experiments
Brooks, A.; Reiman, A. H.; Neilson, G. H.; Zarnstorff, M. C.; Nov. 01, 1999; 21p; In English
Report No.(s): DE00-014960; PPPL-3397; No Copyright; Avail: Department of Energy Information Bridge

High-beta, low-aspect-ratio (compact) stellarators are promising solutions to the problem of developing a magnetic plasma configuration for magnetic fusion power plants that can be sustained in steady-state without disrupting. These concepts combine features of stellarators and advanced tokamaks and have aspect ratios similar to those of tokamaks (2-4). They are based on computed plasma configurations that are shaped in three dimensions to provide desired stability and transport properties. Experiments are planned as part of a program to develop this concept. A beta = 4% quasi-axisymmetric plasma configuration has been evaluated for the National Compact Stellarator Experiment (NCSX). It has a substantial bootstrap current and is shaped to stabilize ballooning, external kink, vertical, and neoclassical tearing modes without feedback or close-fitting conductors. Quasi-omnigeneous plasma configurations stable to ballooning modes at beta = 4% have been evaluated for the Quasi-Omnigeneous Stellarator (QOS) experiment. These equilibria have relatively low bootstrap currents and are insensitive to changes in beta.Coil configurations have been calculated that reconstruct these plasma configurations, preserving their important physics properties. Theory- and experiment-based confinement analyses are used to evaluate the technical capabilities needed to reach target plasma conditions. The physics basis for these complementary experiments is described.
NTIS
Plasma Physics; Stellarators

20000115468 Princeton Plasma Physics Lab., Princeton, NJ USA
National Spherical Torus Experiment (NSTX) Torus Design, Fabrication and Assembly
Neumeyer, C.; Barnes, G.; Chrzanowski, J. H.; Heitzenroeder, P.; Nov. 01, 1999; 4p; In English
Report No.(s): DE00-014935; PPPL-3396; No Copyright; Avail: Department of Energy Information Bridge

The National Spherical Torus Experiment (NSTX) is a low aspect ratio spherical torus (ST) located at Princeton Plasma Physics Laboratory (PPPL). Fabrication, assembly, and initial power tests were completed in February of 1999. The majority of the design and construction efforts were constructed on the Torus system components. The Torus system includes the centerstack assembly, external Poloidal and Toroidal coil systems, vacuum vessel, torus support structure and plasma facing components (PFC's). NSTX's low aspect ratio required that the centerstack be made with the smallest radius possible. This, and the need to

bake NSTXs carbon-carbon composite plasma facing components at 350 C, was major drivers in the design of NSTX. The Centerstack Assembly consists of the inner legs of the Toroidal Field (TF) windings, the Ohmic Heating (OH) solenoid and its associated tension cylinder, three inner Poloidal Field (PF) coils, thermal insulation, diagnostics and an Inconel casing which forms the inner wall of the vacuum vessel boundary. It took approximately nine months to complete the assembly of the Centerstack. The tight radial clearances and the extreme length of the major components added complexity to the assembly of the Centerstack components. The vacuum vessel was constructed of 304-stainless steel and required approximately seven months to complete and deliver to the Test Cell. Several of the issues associated with the construction of the vacuum vessel were control of dimensional stability following welding and controlling the permeability of the welds. A great deal of time and effort was devoted to defining the correct weld process and material selection to meet our design requirements. The PFCs will be baked out at 350 C while the vessel is maintained at 150 C. This required care in designing the supports so they can accommodate the high electromagnetic loads resulting from plasma disruptions and the resulting relative thermal expansions between the PFCs and the vacuum vessel on which supports are attached. This paper will provide a brief review of the issues associated with the design, fabrication and assembly of the NSTX Torus system including those outlined above.
NTIS
Toruses; Fabrication; Experiment Design; Plasma Physics

20000115469 Princeton Plasma Physics Lab., Princeton, NJ USA
Decontamination and Decommissioning of the Tokamak Fusion Test Reactor
Perry, E.; Chrzanowski, J.; Rule, K.; Viola, M.; Williams, M.; Nov. 01, 1999; 4p; In English
Report No.(s): DE00-014921; PPPL-3395; No Copyright; Avail: Department of Energy Information Bridge

The Tokamak Fusion Test Reactor (TFTR) is a one-of-a-kind, tritium-fueled fusion research reactor that ceased operation in April 1997. The Decontamination and Decommissioning (D&D) of the TFTR is scheduled to occur over a period of three years beginning in October 1999. This is not a typical Department of Energy D&D Project where a facility is isolated and cleaned up by bulldozing all facility and hardware systems to a greenfield condition. The mission of TFTR D&D is to: (a) surgically remove items which can be re-used within the DOE complex, (b) remove tritium contaminated and activated systems for disposal, (c) clear the test cell of hardware for future reuse, (d) reclassify the D-site complex as a non-nuclear facility as defined in DOE Order 420.1 (Facility Safety) and (e) provide data on the D&D of a large magnetic fusion facility. The 100 cubic meter volume of the donut-shaped reactor makes it the second largest fusion reactor in the world. The record-breaking deuterium-tritium experiments performed on TFTR resulted in contaminating the vacuum vessel with tritium and activating the materials with 14 Mev neutrons. The total tritium content within the vessel is in excess of 7,000 Curies while dose rates approach 75 mRem/hr. These radiological hazards along with the size and shape of the Tokamak present a unique and challenging task for dismantling.
NTIS
Decontamination; Decommissioning; Fusion Reactors; Tokamak Devices; Plasma Physics

20000115470 Princeton Plasma Physics Lab., Princeton, NJ USA
Experimental Investigation of the Neutral sheet Profile During Magnetic Reconnection
Trintchouk, F.; Ji, H.; Yamada, M.; Kulsrud, R.; Hsu, S.; Nov. 01, 1999; 20p; In English
Report No.(s): DE00-014919; PPPL-3394; No Copyright; Avail: Department of Energy Information Bridge

During magnetic reconnection, a neutral sheetcurrent is induced, heating the plasma.The resultant plasma thermal pressure forms a stationary equilibrium with the opposing magnetic fields. The reconnection layer profile holds significant clues about the physical mechanisms which control reconnection. On the Magnetic Reconnection Experiment (M. Yamada et al., Phys. Plasmas 4, 1936 (1997)), a quasi steady-state and axisymmetric neutral sheet profile has been measured precisely using a magnetic probe array with spatial resolution equal to one quarter of the ion gyro-radius. It was found that the reconnecting field profile fits well with a Harris-type profile (E. G. Harris, Il Nuovo Cimento 23, 115 (1962)), B(x) approximately tanh(x/delta). This agreement is remarkable since the Harris theory does not take into account reconnection and associated electric fields and dissipation. An explanation for this agreement is presented. The sheet thickness delta is found to be approximately 0.4 times the ion skin depth, which agrees with a generalized Harris theory incorporating non-isothermal electron and ion temperatures and finite electric field. The detailed study of additional local features of the reconnection region is also presented.
NTIS
Neutral Sheets; Magnetic Field Reconnection; Plasma Physics

20000115499 Old Dominion Univ., Research Foundation, Norfolk, VA USA

Interaction of EM Waves with Atmospheric Pressure Plasmas ***Final Report, 1 Jun 1997-31 May 2000***

Laroussi, Mounir, Old Dominion Univ., USA; May 31, 2000; 73p; In English

Contract(s)/Grant(s): F49620-97-1-0472; AF Proj. 3484

Report No.(s): AD-A381954; AFRL-SR-BL-TR-00-0450; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This document is the final report on the research activities carried out under AFOSR AASERT Grant E49620-97-1-0472. It describes the various research tasks and events which took place in the duration of this grant. The focus of the main activities is the generation of large volume, non-thermal, atmospheric pressure plasmas, their diagnostics, and their interactions with EM waves and with the cells of microorganisms. Abstracts of conference presentations and copies of archival manuscripts authored by the P. I. and the students are included.

DTIC

Glow Discharges; Microorganisms; Plasma Diagnostics; Plasmas (Physics)

20000115901 Japan Atomic Energy Research Inst., Tokyo, Japan

ITER cryostat thermal shield detailed design

Ito, A.; Nakahira, M.; Hamada, K.; Takahashi, H.; Tada, E.; Mar. 31, 1999; 121p; In English

Report No.(s): DE99-760435; JAERI-TECH-99-027; No Copyright; Avail: Department of Energy Information Bridge

The structural design and study on fabrication and assembly of the cryostat thermal shield for International Thermonuclear Experimental Reactor (ITER) has been conducted. The cryostat thermal shield is attached to cover the cryostat inner wall in order to reduce the radiation heat loads applied to the superconducting coils operation at 4 K. The thermal shield consists of low-emissivity foils which are passively cooled and shield plates which are actively cooled with low temperature helium gas. The foils are multi-layered assemblies and are attached on both surfaces of the shield plates. The material of the foils are silver coated 304 stainless steel, polyimide or polyester. The silver coated stainless steel foils should be adopted to the foils at the locations where radiation dose is over 10 MGy. The route of coolant pipes for the shield plates is designed so as to keep the surface temperature of the shield plates below 100 K. This report describes the detailed design of the cryostat thermal shield, and outlines the fabrication and assembly procedures.

NTIS

Cryostats; Structural Design; Thermonuclear Reactions; Heat Shielding; Fusion Reactors; Thermal Insulation

20000116137 Institute of Plasma Physics and Laser Microfusion, Laser Produced Plasma Physics Dept., Warsaw, Poland

Phenomena in Ionized Gases

Journal of Technical Physics; Aug. 11, 2000; ISSN 0324-8313; Volume 41, No. 1, pp. 1-601; In English; 24th, 11-16 Jul. 1999, Warsaw, Poland

Contract(s)/Grant(s): F61775-99-W-F025

Report No.(s): AD-A382034; EOARD-CSP-99-5025; Copyright; Avail: Defense Technical Information Center (DTIC)

The XXIV International Conference on Phenomena in Ionized Gases is a subsequent conference in the series of meetings being organized biennially with participation of 400-500 attendees, the last having been held in Toulouse, France, in 1997. The ICPIG is the only international conference comprising a full range of low-temperature plasma which, produced by various methods, has some common physical properties. For a long time such a plasma has found very broad applications (e.g., in lighting engineering, processing of metals, plasma engines, etc.) which are still being improved thanks to investigations. New sensational possibilities of employment of such a plasma are still emerging (e.g., plasma sources of ions, electrons, and X-rays used in material technology, equipment applied in environment protection, plasma displays, etc.). The scientific program of the ICPIG conferences, selection of the invited lectures and guidance for the Local Organizing Committee (LOC) are the responsibility of the International Scientific Committee (ISC). The ICPIG conferences are an important forum for promotion of investigations and applications of plasma in developing countries. The ICPIG has traditionally been the principal forum for scientific exchange between researchers in plasma physics and technology in Eastern and Western European countries. The XXIVth International Conference on Phenomena in Ionized Gases was held in Warsaw centre at the campus of the Warsaw University, from 11th to 16th July 1999. The local arrangements for the conference were made by the LOC in cooperation with the Institute of Plasma Physics and Laser Microfusion (IPPLM) in Warsaw.

DTIC

Conferences; Ionized Gases; Plasma Physics

20000116158 Japan Atomic Energy Research Inst., Tokyo, Japan
ETC-Rel code: orbit trace code of relativistic electrons in a tokamak
Tokuda, S.; Higuchi, T.; Nov. 30, 1998; 44p; In Japanese; In English
Report No.(s): DE99-725679; JAERI-DATA/CODE-98-032; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

A code ETC-Rel has been developed which traces the orbits of relativistic electrons in a tokamak. The canonical Hamiltonian form for the relativistic guiding center drift motion of an electron has been newly derived for the development of the code. The equations of motion for the guiding center are described using Boozer coordinates. Therefore, a mapping routine has also been developed to visualize the orbits in real space (Cartesian coordinates). Simulations performed using the ETC-Rel code have demonstrated that the magnetic perturbations at disruption cause a collisionless loss of runaway electrons. These predictions agree closely with recent JT-60U experiments on fast plasma shutdown, showing that it is possible to prevent the generation of runaway electrons.
NTIS
Tokamak Devices; Relativistic Particles; High Energy Electrons; Hamilton-Jacobi Equation; Computerized Simulation; Computer Programs

20000116178 Japan Atomic Energy Research Inst., Tokyo, Japan
ITER breeding blanket module design and analysis
Kuroda, T.; Enoeda, M.; Kikuchi, S.; Nov. 30, 1998; 78p; In English
Report No.(s): DE99-725661; JAERI-TECH-98-051; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

The ITER breeding blanket employs a ceramic breeder and Be neutron multiplier both in small spherical pebble form. Radial-poloidal cooling panels are arranged in the blanket box to remove the nuclear heating in these materials and to reinforce the blanket structure. At the first wall, Be armor is bonded onto the stainless steel (SS) structure to provide a low Z plasma-compatible surface and to protect the first wall/blanket structure from the direct contact with the plasma during off-normal events. Thermo-mechanical analyses and investigation of fabrication procedure have been performed for this breeding blanket. to evaluate thermo-mechanical behavior of the pebble beds including the dependency of the effective thermal conductivity on stress, analysis methods have been preliminary established by the use of special calculation option of ABAQUS code, which are briefly summarized in this report. The structural response of the breeding blanket module under internal pressure of 4 MPa (in case of in-blanket LOCA) resulted in rather high stress in the blanket side (toroidal end) wall, thus addition of a stiffening rib or increase of the wall thickness will be needed. Two-dimensional elasto-plastic analyses have been performed for the Be/SS bonded interface at the first wall taking a fabrication process based on HIP bonding and thermal cycle due to pulsed plasma operation into account. The stress-strain hysteresis during these process and operation was clarified, and a procedure to assess and/or confirm the bonding integrity was also proposed. Fabrication sequence of the breeding blanket module was preliminarily developed based on the procedure to fabricate part by part and to assemble them one by one.
NTIS
Tokamak Devices; Blankets (Fusion Reactors); Thermonuclear Reactions; Steel Structures; Ceramics; Stainless Steels; Fusion Reactors; Stress Analysis

20000116179 Japan Atomic Energy Research Inst., Tokyo, Japan
Design of divertor impurity monitoring system for ITER, 2
Sugie, T.; Ogawa, H.; Ebisawa, K.; Ando, T.; Kasai, S.; Nov. 30, 1998; 205p; In English
Report No.(s): DE99-725662; JAERI-TECH-98-047; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

The divertor impurity monitoring system of ITER has been designed. The main functions of this system are to identify impurity species and to measure the two-dimensional distributions of the particle influxes in the divertor plasmas. The wavelength range is 200 nm to 1000 nm. The viewing fans are realized by molybdenum mirrors located in the divertor cassette. With additional viewing fans seeing through the gap between the divertor cassettes, the region approximately from the divertor leg to the x-point will be observed. The light from the divertor region passes through the quartz windows on the divertor port plug and the cryostat, and goes through the dog-leg optics in the biological shield. Three different type of spectrometers: (i) survey spectrometers for impurity species monitoring, (ii) filter spectrometers for the particle influx measurement with the spatial resolution of 10 mm and the time resolution of 1 ms and (iii) high dispersion spectrometers for high resolution wavelength measurements are designed. These spectrometers are installed just behind the biological shield (for lambda less than 450 nm) to prevent the transmission loss in fiber and in the diagnostic room (for lambda greater than or equal 450 nm) from the point of view of accessibility and flexibility.

The optics have been optimized by a ray trace analysis. As a result, 10-15 mm spatial resolution will be achieved in all regions of the divertor. In addition, the measurable limit, the neutron and gamma-ray irradiation effect on windows, a calibration method, an alignment method, a remote handling method and a data acquisition method are considered.
NTIS
Divertors (Fusion Reactors); Tokamak Devices; Thermonuclear Reactions; Neutron Irradiation; Impurities; Fusion Reactors

20000116181 Japan Atomic Energy Research Inst., Tokyo, Japan
Design of Correction Coil for ITER
Kubo, H.; Yoshida, K.; Omine, T.; Nov. 30, 1998; 81p; In Japanese; In English
Report No.(s): DE99-725673; JAERI-TECH-98-050; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

ITER (International Thermonuclear Experimental Reactor) project is under way among EU, Japan, Russia and US. In order to shut plasma, the magnetic field is applied by the superconducting coils in ITER. The coils which are called 'Poloidal field (PF-coil)' are installed to control the location and the cross- section shape for plasma in the vacuum vessel. Incorrect position of Magnetic field (Magnetic error) is occurred by the manufacture tolerance for PF-coil. The coils which are called 'Correction-Coil' are installed in order to correct these magnetic error around the PF-coil. The Correction Coils are consist of the 3-sets of the superconducting coil. The stress analysis for the correction coils is performed and the supporting structure of the coils are designed. The bolts for clamps and the position for clamps are examined from this analysis.
NTIS
Thermonuclear Reactions; Tokamak Devices; Superconducting Magnets; Magnetic Coils; Fusion Reactors; Plasmas (Physics)

20000116228 Japan Atomic Energy Research Inst., Tokyo, Japan
Design and installation of W-shaped divertor in JT-60U
Kodama, K.; Masaki, K.; Sasajima, T.; Nov. 30, 1998; 153p; In Japanese; In English
Report No.(s): DE99-725664; JAERI-TECH-98-049; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

JT-60 divertor was modified to W-shaped divertor to realize good energy confinement and radiative divertor simultaneously, and to improve divertor function. Design activity of the W-shaped divertor was started in 1995. The modification work was completed in May 1997. In this report, the design and the installation of the W-shaped divertor and operation in 1997 are described.
NTIS
Divertors (Fusion Reactors); Tokamak Devices; Fabrication; Installing

20000116298 Naval Research Lab., Washington, DC USA
Hollow-Cathode Development for Use as a CW Plasma Source *Final Report*
Murphy, Donald P.; Meger, Robert A.; Sep. 18, 2000; 13p; In English
Report No.(s): AD-A382651; NRL/MR/6750--00-8476; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

NRL is developing a Large Area Plasma Processing System (LAPPS) for materials processing applications. The goal is to develop a uniform plasma source that is 100 cm by 100 cm in size. The plasma generation technique utilizes a sheet electron beam to ionize a low density, neutral background gas (oxygen, nitrogen, argon, or neon). The beam electrons are generated by a separate cathode located outside the processing region and continued to a narrow channel by a transverse magnetic field of 100-300 Gauss. Plasma production is confined to the beam channel and can be pulsed or continuous. Pulsed beams have been produced at up to 5 keV and 20 mA/cm using a 60 cm long by 1.9 cm diameter cylindrical hollow-cathode. Continuous beams have been produced at up to 6 keV using both cylindrical and rectangular hollow-cathodes operated at low voltage (200-400 V) followed by a high-voltage acceleration stage. These electrons have a propagation range of several hundred cm in the neutral gas background within the 20-200 mTorr operating pressure range of the system. This paper will describe the development work to date on cathodes for the continuous source.
DTIC
Continuous Radiation; Plasma Generators; Electron Beams; Hollow Cathodes; Plasmas (Physics)

20000116394 Idaho National Engineering and Environmental Lab., Idaho Falls, ID USA
Selected component failure rate values from fusion safety assessment tasks
Cadwallader, L. C.; Sep. 01, 1998; 82p; In English
Report No.(s): DE00-752571; INEEL/EXT-98-00892; No Copyright; Avail: Department of Energy Information Bridge

This report is a compilation of component failure rate and repair rate values that can be used in magnetic fusion safety assessment tasks. Several safety systems are examined, such as gas cleanup systems and plasma shutdown systems. Vacuum system component reliability values, including large vacuum chambers, have been reviewed. Values for water cooling system components have also been reported here. The report concludes with the examination of some equipment important to personnel safety, atmospheres, combustible gases, and airborne releases of radioactivity. These data should be useful to system designers to calculate scoping values for the availability and repair intervals for their systems, and for probabilistic safety or risk analysts to assess fusion systems for safety of the public and the workers.
NTIS
Plasma Physics; Component Reliability; Nuclear Fusion; Safety

20000116395 Princeton Plasma Physics Lab., Princeton, NJ USA
Importance of the toroidal magnetic field for the feasibility of a tokamak burning plasma experiment
Mazzucato, E.; Mar. 22, 2000; 9p; In English
Report No.(s): DE00-752525; PPPL-3442; No Copyright; Avail: Department of Energy Information Bridge
The next step in the demonstration of the scientific feasibility of a tokamak fusion reactor is a DT burning plasma experiment for the study and control of self-heated plasmas. In this paper, the authors examine the role of the toroidal magnetic field on the confinement of a tokamak plasma in the ELMy H-mode regime--the operational regime foreseen for ITER.
NTIS
Plasma Physics; Toroidal Plasmas; Magnetic Fields; Tokamak Devices; Thermonuclear Reactions; Fusion Reactors

20000116399 Texas Technological Univ., Pulsed Power Lab., Lubbock, TX USA
High Speed Plasma Diagnostics Instrumentation ***Final Report, 1 Apr. 1999 - 31 May 2000***
Neuber, Andreas; Kristiansen, M.; Aug. 31, 2000; 6p; In English
Contract(s)/Grant(s): F49620-99-1-0146; AF Proj. 8758
Report No.(s): AD-A382033; AFRL-SR-BL-TR-00-0440; No Copyright; Avail: CASI; A01, Microfiche; A02, Hardcopy
Equipment required for the performance of research funded by DoD agencies was purchased and installed in the grantee's laboratories. This included a spectrograph, image intensifiers, CCD detectors, several oscilloscopes, pulse generator and other ancillary equipment. The proposed equipment list and the actual equipment purchased list with prices is presented and changes noted. This equipment has been used on the projects "Tri-University, Multidisciplinary, High Energy, Microwave Device Consortium" (AFOSR/DoD MURI), "Fundamental Limits to Compact, Expendable Pulsed Power and Microwave Source" (AFOSR New World Vistas), High Power Microwaves (AASERT), and AFOSR MURI Explosive-Driven Pulsed Power Generation.
DTIC
Plasma Physics; Plasma Diagnostics

20000116410 Brown Univ., Div. of Applied Mathematics, Providence, RI USA
High-Order Algorithms for 3D Plasma Simulations on Unstructured and Hybrid Meshes ***Final Report, 1 Jun. 1997 - 31 Dec. 1998***
Karniadakis, George E.; Jan. 1999; 5p; In English
Contract(s)/Grant(s): F49620-97-1-0185
Report No.(s): AD-A381671; AFRL-SR-BL-TR-00-0423; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche
The work completed under this project builds on our previous work sponsored by AFOSR on developing a universal spectra basis for formulating algorithms for high-order accurate solutions of arbitrary nonlinear systems of PDEs in complex-geometry domains. to this end, several classes of classical numerical methods (e.g. finite elements and finite volumes) as well as modern methods (e.g. spectral and spectral elements) are simply subcases of the developed new numerical methodology. On of the unique features of the new methods is that its accuracy is insensitive to the mesh quality, which allows simulation in moving and very distorted domains (without re-gridding) at extremely high-efficiencies, not possible with any other method.
DTIC
Magnetohydrodynamics; Algorithms; Three Dimensional Models; Plasmas (Physics); Simulation; Computational Grids

20000116492 Japan Atomic Energy Research Inst., Tokyo, Japan
Irradiation effects on plasma diagnostic components
Nishitani, T.; Iida, T.; Ikeda, Y.; Oct. 31, 1998; 117p; In English
Report No.(s): DE99-725658; JAERI-RESEARCH-98-053; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

One of the most important issues to develop the diagnostics for the experimental thermonuclear reactor such as ITER is the irradiation effects on the diagnostics components. Typical neutron flux and fluence on the first wall are 1 MW/m(sup 2) and 1 MWa/m(sup 2), respectively for ITER. In such radiation condition, most of the present diagnostics could not survive so that those will be planed to be installed far from the vacuum vessel. However, some diagnostics sensors such as bolometers and magnetic probes still have to be install inside vessel. and many transmission components for lights, wave and electric signals are inevitable even inside vessel. As a part of this R and D program of the ITER Engineering Design Activities (EDA), we carried out the irradiation tests on the basic materials of the transmission components and in-vessel diagnostics sensors in order to identify radiation hardened materials that can be used for diagnostic systems.
NTIS
Radiation Effects; Irradiation; Plasmas (Physics); Diagnosis; Neutron Emission; Damage; Research and Development; Fusion Reactors

20000116495 Japan Atomic Energy Research Inst., Tokyo, Japan
Technical development and operation of TV thomson scattering system on JFT- 2M tokamak
Shiina, T.; Yamauchi, T.; Ishige, Y.; Oct. 31, 1998; 56p; In Japanese; In English
Report No.(s): DE99-725651; JAERI-TECH-98-048; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

Six years have passed since the TV Thomson scattering system (TVTS) was completed and the operation was started on the JFT-2M tokamak. TVTS was developed in collaboration with Princeton Plasma Physics Laboratory. Many troubles on the hardware are and the software are were encountered. Improvements of the system were needed in each occasion. Phenomena of troubles were carefully analyzed and they have been solved in operating the system. This paper presents thus obtained know-how necessary for the operation of TVTS as well as methods of operation.
NTIS
Thomson Scattering; Tokamak Devices; Product Development; Operational Problems

76
SOLID-STATE PHYSICS

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

20000115413 Sandia National Labs., Albuquerque, NM USA
Growth of Oriented C11(b) MoSi(2) Bicrystals Using a Modified Czochralski Technique; (505)845-8220
Chu, F.; Garrett, J. D.; McClellan, K. J.; Michael, J. R.; Mitchell, T. E.; Jun. 02, 1999; 20p; In English
Report No.(s): DE00-007227; SAND99-1381J; No Copyright; Avail: Department of Energy Information Bridge

Two single crystal seeds were used to initiate the growth. Each seed had the orientation intended for one of the grains of the bicrystals, which resulted in a 60 twist boundary on the (110) plane. Seeds were attached to a water-cooled seed rod, which was pulled at 120 mm/h with the seed rod rotating at 45 rpm. The water-cooled copper hearth was counter-rotated at 160 rpm. Asymmetric growth ridges associated with each seed crystal were observed during growth and confirmed the existence of a bicrystal. It was also found that careful alignment of the seeds was needed to keep the grain boundary from growing out of the boule. The resulting boundary was characterized by imaging and crystallographic techniques in a scanning electron microscope. The boundary was found to be fairly sharp and the misorientation between the grains remained within 2 deg from the disorientation between the seeds.
NTIS
Molybdenum Compounds; Czochralski Method

20000115417 Sandia National Labs., Albuquerque, NM USA
Charged Local Defects in Extended Systems; Physical Review Letters
Schultz, P. A.; May 25, 1999; 16p; In English
Report No.(s): DE00-007059; SAND99-1312J; No Copyright; Avail: Department of Energy Information Bridge

The conventional approach to treating charged defects in extended systems in first principles calculations is via the supercell approximation using a neutralizing jellium background charge. I explicitly demonstrate shortcomings of this standard approach and discuss the consequences. Errors in the electrostatic potential surface over the volume of a supercell are shown to be comparable to a band gap energy in semiconductor materials, for cell sizes typically used in first principles simulations. I present an alter-

nate method for eliminating the divergence of the Coulomb potential in supercell calculations of charged defects in extended systems that embodies a correct treatment of the electrostatic potential in the local vicinity of the a charged defect, via a mixed boundary condition approach. I present results of first principles calculations of charged vacancies in NaCl that illustrate the importance of polarization effects once an accurate representation of the local potential is obtained. These polarization effects, poorly captured in small supercells, also impact the energetic on the scale of typical band gap energies.
NTIS
Crystal Defects; Electric Charge

20000115421 Joint Inst. for Nuclear Research, Lab. of High Energies, Dubna, USSR
Dechanneling of relativistic protons and nuclei in straight and bent crystals: Rechanneling role
Taratin, A. M.; Dec. 31, 1997; 11p; In English; Radiation of Relativistic Electrons in Periodical Structures, 8-12 Sep. 1997, Tomsk, Russia
Report No.(s): DE98-627216; JINR-E-1-97-320; No Copyright; Avail: Department of Energy Information Bridge

Planar dechanneling of relativistic protons and Pb nuclei with the same momentum per unit charge p(sub z) in straight and bent crystals was investigated by simulation. It was shown that the different probability of the recapture into the channeling regime for protons and Pb nuclei infringes the dechanneling length invariance with respect to p(sub z) in the straight crystals, whereas in the bent crystals the approximate invariance occurs.
NTIS
Protons; Crystal Structure; Channels; Nuclei (Nuclear Physics)

20000116119 Risoe National Lab., Condensed Matter Physics and Chemistry Dept., Roskilde, Denmark
Neutron scattering studies of modulated magnetic structures
Aagaard Soerensen, S.; Aug. 31, 1999; 85p; In English
Report No.(s): DE99-637288; RISO-R-1125(EN); ISBN 87-550-2570-6; No Copyright; Avail: Department of Energy Information Bridge

This report describes investigations of the magnetic systems DyFe4Al8 and MnSi by neutron scattering and in the former case also by X-ray magnetic resonant scattering. The report is divided into three parts: An introduction to the technique of neutron scattering with special emphasis on the relation between the scattering cross section and the correlations between the scattering entities of the sample. The theoretical framework of neutron scattering experiments using polarized beam technique is outlined. The second part describes neutron and X-ray scattering investigation of the magnetic structures of DyFe4Al8. The Fe sublattice of the compound order at 180 K in a cycloidal structure in the basal plane of the bct crystal structure. At 25 K the ordering of the Dy sublattice shows up. by the element specific technique of X-ray resonant magnetic scattering, the basal plane cycloidal structure was also found for the Dy sublattice. The work also includes neutron scattering studies of DyFe4Al8 in magnetic fields up to 5 T applied along a <110> direction. The modulated structure at the Dy sublattice is quenched by a field lower than 1 T, whereas modulation is present at the Fe sublattice even when the 5 T field is applied. In the third part of the report, results from three small angle neutron experiments on MnSi are presented. At ambient pressure, a MnSi is known to form a helical spin density wave at temperature below 29 K. The application of 4.5 kbar pressure intended as hydrostatic decreased the Neel temperature to 25 K and changed the orientation of the modulation vector. To understand this reorientation within the current theoretical framework, anisotropic deformation of the sample crystal must be present. The development of magnetic critical scattering with an isotropic distribution of intensity has been studied at a level of detail higher than that of work found in the literature. Finally the potential of a novel polarization device for small angle neutron scattering is demonstrated by measurements of the magnetic critical scattering from MnSi.
NTIS
Neutron Scattering; Magnetic Field Configurations; Crystal Structure

20000116227 Japan Atomic Energy Research Inst., Tokyo, Japan
Fabrication and characterization of NiC/Ti multilayer supermirror deposited using ion beam sputtering
Soyama, K.; Suzuki, M.; Ebisawa, T.; Oct. 31, 1998; 69p; In Japanese; In English
Report No.(s): DE99-725668; JAERI-RESEARCH-98-067; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

One of the most important problems in case of producing a Ni/Ti multilayer supermirror is the large grained Ni layers which lead to rough interfaces with an increase in the number of bilayers deposited. The purpose of this study is to reduce the interface roughness and increase the reflectivity of Ni/Ti supermirrors by adding carbon atoms into nickel layers. NiC/Ti multilayers were deposited using ion beam sputtering as a function of carbon mixing ratio. These samples were characterized using high angle X-ray

diffraction, X-ray photoelectron spectroscopy, transmission electron microscopy, and neutron reflectometry etc.. It was confirmed that the optimal carbon mixing ratio is about 30%, and Ni grain size was decreased by creating Ni3C compound. An experimental result showed that a NiC/Ti supermirror deposited with a carbon mixing ratio of 29% had the reflectivity of more than 90%.
NTIS
Mirrors; Sputtering; Ion Beams; Surface Roughness; Microstructure; Neutrons; Nickel Compounds; Carbon Compounds; Titanium; Fabrication

20000116370 Army Research Lab., Human Research and Engineering Directorate, Aberdeen Proving Ground, MD USA
A Bond-Order Potential for Atomistic Simulations in Iron ***Final Report, Oct. 1998-Sep. 1999***
Rice, Betsy M.; Krasko, Genrich L.; Yip, Sid; Aug. 2000; 26p; In English; Prepared in collaboration with the Department of Nuclear Engineering, Massachusetts Institute of Technology, Cambridge, MA.
Contract(s)/Grant(s): Proj-622105.H8411
Report No.(s): AD-A382421; ARL-TR-2298; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
A new semi-empirical potential in iron (Fe) has been developed based on the quantum chemistry concept of bond order. The new potential was calibrated using the traditional fitting to the universal scaling and the equilibrium volume and cohesive energy of base-centered cubic (BCC) iron. With a total of 15 fitted parameters, the potential reproduces with only minor deviations to the elastic moduli, the volume-pressure equation of states in the BCC phase, the energies in face-centered cubic (FCC) and hexagonal close packing (HCP) modifications, the BCC-HCP phase transformation under pressure, and the energy of the (III) free surface.
DTIC
Iron; Quantum Chemistry; Phase Transformations; Atoms; Body Centered Cubic Lattices; Face Centered Cubic Lattices; Simulation

20000116389 Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
Kinetic spin-1 Blume-Capel model with competing dynamics
Hontinfinde, F.; Bekhechi, S.; Ferrando, R.; Dec. 31, 1998; 15p; In English
Report No.(s): DE99-615261; IC-98/220; No Copyright; Avail: Department of Energy Information Bridge
We have studied by means of Monte-Carlo simulation and exact finite-size analysis, the spin-1 Blume Capel model with Glauber and Kawasaki dynamics. The Kawasaki spin exchange process flows energy into the system from an external source. Some phase diagrams of the model are presented. For some values of the parameters, the system displays a kind of self organization phenomenon within the disordered phase.
NTIS
Spin Exchange; Kinetic Equations

20000116519 Joint Inst. for Nuclear Research, Lab. of High Energies, Dubna, USSR
About preparation to investigations of crystal deflectors at the Nuclotron
Artemov, A. S.; Afanasev, S. V.; Bojko, V. V.; Dec. 31, 1998; 16p; In Russian; In English
Report No.(s): DE99-614532; JINR-R-9-98-174; No Copyright; Avail: Department of Energy Information Bridge, Microfiche
Preparation status of the investigations of new tungsten crystal deflectors in the experiment on the Nuclotron beam extraction is discussed. The goniometer system to change fast silicon and tungsten crystals for their comparative study during the accelerator run was constructed. Possibility to use the Nuclotron correction magnets to create a local orbit bump for circulating particle guidance onto the crystal was shown. Background conditions for registration of deuterons extracted from the Nuclotron were analyzed.
NTIS
Deflectors; Deuterons; Single Crystals; Metal Crystals; Silicon

77
PHYSICS OF ELEMENTARY PARTICLES AND FIELDS

Includes quantum mechanics; theoretical physics; and statistical mechanics. For related information see also 72 Atomic and Molecular Physics, 73 Nuclear Physics, and 25 Inorganic, Organic and Physical Chemistry.

20000116109 Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette, France

Lessons From Quantum Field Theory: Hopf Algebras and Spacetime Geometries

Connes, A., Institut des Hautes Etudes Scientifiques, France; Kreimer, D., Institut des Hautes Etudes Scientifiques, France; April 1999; 14p; In English

Report No.(s): PB2000-102534; hep/th/9904044; IHES/M/99/22; No Copyright; Avail: National Technical Information Service (NTIS)

We discuss the prominence of Hopf algebras in recent progress in Quantum Field Theory (QFT). In particular, we will consider the Hopf algebra of renormalization, whose antipode turned out to the key to a conceptual understanding of the subtraction procedure. We shall then describe several occurrences of this, or closely related Hopf algebras, in other mathematical domains, such as foliations, Runge-Kutta methods, iterated integrals, and multiple zeta values. We emphasize the unifying role with the Butcher group, discovered in the study of numerical integration of ordinary differential equations, plays in QFT.

Author

Quantum Theory; Algebra; Measure and Integration; Numerical Integration; Progress; Runge-Kutta Method; Space-Time Functions

20000116283 Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro, Brazil

Vacuum energy density near fluctuating boundaries

Ford, L. H.; Svaiter, N.; Apr. 30, 1998; 17p; In English

Report No.(s): DE99-616779; CBPF-NF-007/98; No Copyright; Avail: Department of Energy Information Bridge

The imposition of boundary conditions upon a quantized field can lead to singular energy densities on the boundary. We treat the boundaries as quantum mechanical objects with nonzero position uncertainty, and show that the singular energy density is removed. This treatment also resolves a long standing paradox concerning the total energy of the minimally coupled and conformally coupled scalar fields.

NTIS

Vacuum; Flux Density

80
SOCIAL AND INFORMATION SCIENCES (GENERAL)

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

20000116230 Naval Postgraduate School, Monterey, CA USA

Using IT-21 Tools to Provide Asynchronous Distributed Learning (ADL) to the Fleet

Arguelles, Michael A.; Jun. 2000; 79p; In English

Report No.(s): AD-A379253; No Copyright; Avail: Defense Technical Information Center (DTIC)

Information superiority is the foundation of Joint Vision 2010 battlefield dominance. Network Centric Warfare, robust infrastructure and information dissemination to dispersed forces are key elements in achieving information superiority. IT-21 is a fleet driven reprioritization of C4l programs to accelerate the transition to a PC-based tactical support warfighting network. Historically, cost and bandwidth have impeded distributed wargaming. Furthermore, when distributed wargames are conducted, they rarely present the scenario tactical picture to an individual using the same C4l systems used in actual warfighting. A solution is to use IT-21 tools to conduct distributed war games that are able to generate Gold formafled messages. The messages will simulate real-time track information into the Global Command and Control System (GCCS). These tracks can then be displayed on the same IT-21 systems used to fight. Such architecture will enable distributed training with units at sea. This capability would also enable collaborative planning at low costs. A proof-of-concept was conducted as an initial step in developing such a capability. The initial proof-of-concept showed the feasibility of the architecture. It demonstrated its use outside the Asynchronous Distance Learning (ADL) context to provide new collaborative capabilities to the Fleet, virtually anywhere in the world.

DTIC

Information Transfer; Command and Control; War Games; Information Dissemination; Real Time Operation; Asynchronous Transfer Mode; Education

20000116356 NASA Goddard Space Flight Center, Greenbelt, MD USA

'Hot Topics' in Astrophysics

Maran, Stephen P., NASA Goddard Space Flight Center, USA; The Physics Teacher; Dec. 2000; Volume 38, pp. 32-36; In English; Copyright; Avail: Issuing Activity

Three current topics in astrophysics are described here on the occasion of the joint meeting of the American Association of Physics Teachers and the American Astronomical Society (Jan. 7-11, 2001, San Diego, Calif.). Many equally exciting topics--ranging from the dozens of newly discovered planets of sunlike stars to evidence suggesting that the expansion of the universe is accelerating--could have been chosen. The topics discussed are: (1) the habitability of Mars, (2) black holes, galaxy bulges, and the X-ray background, and (3) the greatest explosions since the Big Bang.

Author

Astronomy; Astrophysics; Background Radiation; Explosions; Galaxies; Mars (Planet); Habitability; Black Holes (Astronomy); Gamma Ray Bursts

81
ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

20000116205 NASA Ames Research Center, Moffett Field, CA USA

How Project Managers Really Manage: An Indepth Look at Some Managers of Large, Complex NASA Projects *Interim Report*

Mulenburg, Gerald M., NASA Ames Research Center, USA; January 2000; 5p; In English; 29th, USA; Sponsored by Western Decision Sciences Inst., USA; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

This paper reports on a research study by the author that examined ten contemporary National Aeronautics and Space Administration (NASA) complex projects. In-depth interviews with the project managers of these projects provided qualitative data about the inner workings of the project and the methodologies used in establishing and managing the projects. The inclusion of a variety of space, aeronautics, and ground based projects from several different NASA research centers helped to reduce potential bias in the findings toward any one type of project, or technical discipline. The findings address the participants and their individual approaches. The discussion includes possible implications for project managers of other large, complex, projects.

Author

Project Management; Management Systems; Mission Planning

20000116220 Naval Postgraduate School, Monterey, CA USA

Guidance for Transitioning to Performance-Based Service Contracting: A Guide for Department of Defense Field Contracting Activities

Renegar, Michael L., Naval Postgraduate School, USA; June 2000; 98p; In English

Report No.(s): AD-A379563; No Copyright; Avail: Defense Technical Information Center (DTIC)

The objective of this thesis is to assess the transition from traditional service contracting to performance-based service contracting at Department of Defense Field Contracting Activities. There has been an increase in spending on services over the past decade that has forced the Federal Government to review its policy on service contracting. In 1991, the Office of Federal Procurement Policy established policy for the acquisition of services using performance-based contracting. Interviews of Government contracting personnel and review of professional literature highlight barriers to performance-based service contracting. These barriers are: management of cultural change, education and training of Government and contractor personnel, adoption of best commercial practices, writing of performance-based statements of work, and the tasks involved in contract administration. This thesis makes recommendations for overcoming these barriers and provides guidance for successful implementation of performance-based service contracting within the Department of Defense.

DTIC

Contracts; Procurement Policy; Contract Management; Contractors

20000116221 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

A Methodology to Develop Interactive Decision Support Systems for Complex USA Air Force Logistics Planning

Kustra, Todd W.; Aug. 22, 2000; 94p; In English

Report No.(s): AD-A381438; No Copyright; Avail: Defense Technical Information Center (DTIC)

Designing effective decision support systems for complex logistics planning is necessarily challenging to accomplish. Only now, with the advent of the Air Expeditionary Force concept of operations and impending advancements in logistics database capabilities, is an effective desktop decision support system for production level supervisors a feasible reality. Several factors including knowledge about resources and requirements, uncertainty, work domain task constraints, and database capabilities influence the decision making process of the logistics professional. to develop effective decision support systems, this research proposed a methodology that incorporates image theoretical constructs, work domain analysis, decision analysis, and knowledge-based heuristical modeling to capture and transform expert mental frameworks into computer-based support systems for supporting daily decision making. Specifically, this research includes knowledge-based model development and implementation. The model development was based on two components. First, it was based on field study observations and interviews with real-world logisticians at two air bases. Second, it was based on decision making activity analysis using observation and semi-structured interviews with production superintendents of operational F-16 maintenance units at Hill AFB, UT. Two modes of decision support were instantiated for the task of aircraft selection under the Air Expeditionary Force scenario. One mode simply presented information for supporting decision making, while the other provided more interactive decision support based on the proposed methodology. These systems were evaluated using maintenance personnel from the 445th Air Force Reserve Squadron and Air Force Material Command familiar with the elements of aircraft selection. Results showed that the interactive decision support system significantly decreased the time to complete the task, but did not conclusively demonstrate performance accuracy improvement or increased confidence in the generated solution. Overall, the results indicated that the methodology developed produced a decision support system that suggests tangible benefit for complex logistics planning in USA Air Force activities.
DTIC
Decision Support Systems; Decision Making; Computer Techniques

20000116285 Federal Reserve System, Board of Governors, Washington, DC USA
Decomposition of Productivity and Unit Costs
Slifman, L.; Corrado, C.; Nov. 18, 1999; 26p; In English
Report No.(s): PB2000-108184; No Copyright; Avail: CASI; A01, Microfiche; A03, Hardcopy

Labor productivity (output per hour) in the private business sector is reported to have been rising at an annual rate of about 1-1/4 percent since 1973. At the same time, output per hour in the nonfinancial corporate sector is estimated to have been increasing at a 1-3/4 percent annual rate. Given that the nonfinancial corporate sector is about two-thirds of the aggregate, these statistics imply that output per hour elsewhere in private business has not increased, on average, for more than two decades. For the past fifteen years, productivity growth in manufacturing has been relatively robust. A BLS study concluded that all of the growth in private business multi-factor productivity in the 1980s could be attributed to manufacturing. Moreover, the published figures for private business and manufacturing labor productivity suggest that since the beginning of the 1990s output per hour in the nonmanufacturing sector of the economy has been disappointing. Because it seems unlikely that major sectors of the economy have, in reality, failed to become more efficient year in and year out, it would be useful to try to identify at a more disaggregated level those segments of the economy with persistently dismal measured productivity performance. Moreover, for purposes of current analysis, one would like to have the data at a quarterly frequency. This paper presents such a disaggregation. The decompositions are by legal form of organization, with gross industry breaks within the corporate sector, and by detailed industry. For expository convenience, we refer to the former as the 'sectoral' decomposition and the latter as the 'industry' decomposition.
NTIS
Decomposition; Productivity; Financial Management; Production Costs

20000116338 NASA Ames Research Center, Moffett Field, CA USA
Ames Research Center FY 2000 Implementation Plan: Leading Technology into the New Millennium
Jan. 2000; 100p; In English
Report No.(s): PB2000-107668; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

This document presents the implementation plan for Ames Research Center (ARC) within the overall framework of the NASA Strategic Plan. It describes how ARC intends to implement its Center of Excellence responsibilities, Agency assigned missions, Agency and Enterprise lead programs, and other roles in support of NASA's vision and mission. All Federal agencies are required by the 1993 Government Performance and Results Act to implement a long-term strategic planning process that includes measurable outcomes and strict accountability. At NASA, this planning process is shaped by the Space Act of 1958, annual appropriations, and other external mandates, as well as by customer requirements. The resulting Strategic Plan sets the overall architecture for what we do, identifies who our customers are, and directs where we are going and why. The Strategic Plan is the basis upon which decisions regarding program implementation and resource deployment are made. Whereas the strategic planning process examines the long-term direction of the organization and identifies a specific set of goals, the implementation plan-

ning process examines the detailed performance of the organization and allocates resources toward meeting these goals. It is the purpose of this implementation document to provide the connection between the NASA Strategic Plan and the specific programs and support functions that ARC employees perform. This connection flows from the NASA Strategic Plan, through the various Strategic Enterprise plans to the ARC Center of Excellence, primary missions, Lead Center programs, program support responsibilities, and ultimately, to the role of the individual ARC employee.
NTIS
Research Facilities; NASA Programs; Management Planning; Aerospace Technology Transfer; Technology Utilization; Technological Forecasting

20000116344 University of North Texas, Denton, TX USA
Impact and Cost-Effectiveness of Outsourcing
Johnson, J. L.; Ponthieu, L. D.; November 1999; 240p; In English
Report No.(s): PB2001-100334; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

This study was concerned with determining and evaluating the long-term impact and cost-effectiveness of outsourcing certain TXDOT functions. A 30-item Functional Outsourcing Assessment Instrument incorporating the evaluation factors was developed and utilized in the research. Nine surveys (1 for each of the nine functions under study) were sent to each of the 25 district offices of TXDOT. In addition, one survey for each function was sent to the appropriate central office for completion. An economic and vendor analysis was also completed for each district and for the state as a whole, and a nine-state survey was completed to benchmark practices by other states relative to the functions selected for study. Completed surveys on each of the nine functions were received from all 25 districts and one completed survey for each appropriate survey from the applicable central office of TXDOT. The findings of the study suggest that TXDOT should: (1) increase outsourcing of the Base-in-Place Repair and Paint-and-Bead Striping functions, (2) Selectively outsource certain subfunctions of the Information Systems/Resources; Facilities Management and Maintenance; and Training, Quality and Development functions, (3) increase outsourcing, under effective contract management procedures, of the Right-of-Way Acquisition, Recruiting, and Partnering/Quality Facilitation functions, and (4) continue to insource the Benefits Processing function.
NTIS
Cost Effectiveness; Budgeting; Economic Analysis

20000116594 Vanderbilt Univ., Faculty Graduate School, Nashville, TN USA
Management and Leadership Skills Among Academic Researchers in the Vanderbilt University, School of Engineering
Krumm, Robert T., Vanderbilt Univ., USA; August 2000; 1p; In English
Report No.(s): AD-A380228; No Copyright; Avail: Defense Technical Information Center (DTIC)

Kathleen Melymuka asserts that project management requires competence in three areas: technology, business, and behavior (Melymuka, 2000). We could assume that the technology component exists in most managers of highly technical projects. The business component we could re-label as ”management”, particularly when we are concerned with the management of not-for-profit organizations, such as are found in an academic environment. The final component in which the successful project manager is required to be competent, is behavior. She equates this with ”leadership.” Therefore, restating her thesis, competent technical project managers in order to be effective must also possess competencies in both management skills and leadership skills.
DTIC
Leadership; Engineering; Project Management; Commerce

20000116595 Space and Naval Warfare Systems Center, San Diego, CA USA
Guidelines for Information Protection under Work for Industry Agreements
Roese, J. A., Space and Naval Warfare Systems Center, USA; Concha, C. L., Space and Naval Warfare Systems Center, USA; Esaias, F. L., Space and Naval Warfare Systems Center, USA; Fox, R. E., Space and Naval Warfare Systems Center, USA; Kneib, C. P., Space and Naval Warfare Systems Center, USA; Mansfield, J., Space and Naval Warfare Systems Center, USA; Miller-Corona, J. L., Space and Naval Warfare Systems Center, USA; Simmons, J. V., Space and Naval Warfare Systems Center, USA; Talley, P., Space and Naval Warfare Systems Center, USA; February 2000; 1p; In English
Report No.(s): AD-A380227; TD-3099; No Copyright; Avail: Defense Technical Information Center (DTIC)

This document is meant to ensure acquisition integrity for the SSC san Diego Work for Industry Agreements established with Industry pursuant to the authority in Title 10 U.S. Code, Section 2553 (Sale of Articles of Services to Industry), 2539b (Availability

of Government Testing Facilities and Sale of Information to Industry), 2371 (Research Projects: Transactions Other Than Contracts and Grants), and Title 15 U.S. Code, Section 3710a (Cooperative Research and Development Agreements).
DTIC
Management Planning; Commerce; Contract Management

20000116615 General Accounting Office, Washington, DC USA
Observations on the National Aeronautics and Space Administration's Fiscal Year 1999 Performance Report and Fiscal Year 2001 Performance Plan
June 2000; 44p; In English
Report No.(s): AD-A380233; No Copyright; Avail: Defense Technical Information Center (DTIC)

As you requested, we have reviewed the 24 Chief Financial Officers (CFO) Act agencies' fiscal year 1999 performance reports and fiscal year 2001 performance plans required by the Government Performance and Results Act of 1993 (GPRA). In essence, under GPRA annual performance plans are to establish performance goals and measures covering a given fiscal year and provide the direct linkage between an agency's longer-term goals and day-to-day activities. Annual performance reports are to subsequently report on the degree to which those performance goals were met. This letter contains two enclosures responding to your request concerning key program outcomes and major management challenges at the National Aeronautics and Space Administration (NASA). Enclosure I to this letter provides our observations on NASA's fiscal year 1999 actual and fiscal year 2001 planned performance for the key outcomes that you identified as important mission areas for the agency. These key outcomes are (1) expand scientific knowledge of the Earth system, (2) deploy and operate the International Space Station safely and cost- effectively, and (3) expand the commercial development of space. Enclosure II lists the major management challenges facing the agency that we and NASA's Inspector General identified, how their fiscal year 1999 performance report discusses the progress the agency made in resolving these challenges, and the applicable goals and measures in the fiscal year 2001 performance plan.
DTIC
NASA Programs; Management Planning; Congressional Reports; Appropriations

20000116619 Department of Defense, Office of the Inspector General, Arlington, VA USA
Defense Data Network
Jul. 05, 1990; 98p; In English
Report No.(s): AD-A382391; IG/DOD-90-097; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

This is our final report on the Audit of the Defense Data Network. The audit was performed from August 1988 to July 1989. Our overall audit objective was to determine whether the development and implementation of the Defense Data Network (the Network) had proceeded on schedule and in a cost-effective manner consistent with guidance established in 1983 by the then Under Secretary of Defense for Research and Engineering (USDtR&El). Specific audit objectives were to determine if increases to original program cost estimates were reasonable and justified, if the Network was responsive to the needs of DOD users, and if applicable internal controls were adequate. Another specific audit objective was to determine if methods used to obtain contractor support were in compliance with applicable acquisition regulations and would produce cost-effective results. This audit objective was deferred to a future audit of Network contract support.
DTIC
Computer Networks; Cost Effectiveness; Communication Networks; Government Procurement

20000117662 Air Command and Staff Coll., Maxwell AFB, AL USA
Internal Barriers to Implementing Diversity Management in the Air Force: Four Conversations We Must Have
Bean, Debra F., Air Command and Staff Coll., USA; April 2000; 50p; In English
Report No.(s): AD-A381765; No Copyright; Avail: Defense Technical Information Center (DTIC)

A number of factors in the Air Force's external environment provide a clear rationale for implementing diversity management. Unfortunately, there is little evidence that the internal environment is well understood, and this lack of knowledge about barriers and facilitators of change is problematic for program developers. This project examined one part of the internal environmental analysis, the likely barriers to implementing diversity, to provide the Air Force planners a set of considerations for effective program development. A review of literature revealed four common reasons for diversity management failure: 1) Failure to understand and articulate the relationship between discrimination and diversity management, 2) The belief that sameness and difference are mutually exclusive, 3) Failure to understand the legacy of fairness programs, and 4) Failure to create and articulate a valid framework for evaluating which differences should be leveraged and which should be rejected. Each barrier to implementation

is presented as a conversation with a typical airman, to introduce the basic issues. Each conversation is followed by an analysis of the issue for planners, which includes decisions that need to be made in the planning process.
Author
Conversation; Personnel Management; Prejudices; Management Analysis

20000117685 General Accounting Office, Washington, DC USA
Major Management Challenges and Program Risks: Department of Commerce. Performance and Accountability Series
Jan. 1999; 60p; In English
Report No.(s): PB2000-106520; GAO/OCG-99-3; No Copyright; Avail: CASI; A01, Microfiche; A04, Hardcopy
This report addresses the major performance and management challenges confronting the Department of Commerce. These challenges are (1) ensuring a successful 2000 Decennial Census, (2) completing the National Weather Service (NWS) technology modernization and associated restructuring, (3) pursuing more cost-effective alternatives to the National Oceanic and Atmospheric Administrations in-house fleet of research and survey ships, and (4) improving financial management systems and processes. The report summarizes GAO's and the Commerce Inspector General's findings on these challenges, the progress Commerce has made in addressing these issues, and what needs to be done to resolve or mitigate them. The Department of Commerce acknowledges these challenges, has taken steps to address them, and said that it has actions under way or planned to successfully resolve them.
NTIS
Financial Management; Management Systems; Congressional Reports; Census; Management Planning

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.

20000115423 Instituto Mexicano de Petroleo, Mexico City, Mexico
Information Integral system for the IIE. - 8. Seminar of the IMP-IIE-ININ on technological specialties. Topic 11: Information services
Dec. 31, 1996; 23p; In Spanish; In English; 11th; Technological Specialies. Topic 8: Instruments and Measurement, 26 Jun. 1996, Cuernavaca, Mexico
Report No.(s): DE98-626907; INIS-MX-067; No Copyright; Avail: Department of Energy Information Bridge
The paper was presented at the 11th Seminar of the IMP-IIE-ININ on Technological Specialties, topic 'Information Services', held on 26 June 1996 in Cuernavaca (Mexico).
NTIS
Information Systems; Integrals

20000115489 General Accounting Office, Accounting and Information Management Div., Washington, DC USA
Information Security: Vulnerabilities in DOE's Systems for Unclassified Civilian Research
Jun. 2000; 44p; In English; Report to the Committee on Science, House of Representatives.
Report No.(s): AD-A381890; GAO/AIMD-00-140; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The Department of Energy (DOE) oversees a multibillion-dollar investment in civilian research and development programs at 15 laboratory facilities nationwide. The unclassified information systems that support these programs were designed to facilitate a broad exchange of data and information among scientists around the world. Although unclassified, some of the information in these systems is nevertheless sensitive and requires protection from inappropriate access. As a result of the growth of the Internet in recent years, these unclassified systems at the DOE laboratories have become increasingly vulnerable to security threats. If exploited, such vulnerabilities could lead to loss or corruption of valuable scientific data, damage to information systems, or disruption of the laboratories' science program operations. According to laboratory officials, such disruptions could cost millions of dollars per day in lost scientific research. Given the importance of these information systems, the General Accounting Office (GAO) was asked to review the security of information systems that support DOE's unclassified civilian research programs. GAO's specific objectives were to determine (1) whether DOE's unclassified systems for civilian research are vulnerable to unau-

thorized access, (2) whether DOE is effectively managing information systems security, and (3) what DOE is doing to address the risk of unauthorized access to unclassified systems for civilian research.
DTIC
Information Systems; Vulnerability; Computer Information Security; Research and Development; Selective Dissemination of Information

20000115496 Army Command and General Staff Coll., School of Advanced Military Studies, Fort Leavenworth, KS USA
Operational Art - Leveraging Information Technology
Wheeler, Tedd A.; May 12, 2000; 61p; In English
Report No.(s): AD-A381922; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The 1999 US National Security Strategy emphasizes the importance of information technology. However, the decisive point of all future military operations will continue to be the men and women of the armed services. Achieving a proper balance between technology and people is critical to our nation's security. The goal of this research was to answer the question: are there Information Technology Leverage Points within Operational Art? The research methodology has two phases. The research first defines a conceptual model using Senge's Systems Thinking theory. Senge has designed a blueprint for an organization where people expand their capacity to create results they truly desire, where new and expansive patterns of thinking are nurtured, and where collective aspiration is set free. Looking at Operational Art as a system provides an opportunity to analyze processes, decision points, and points of data input and output. This systems analysis allowed the researcher to apply his individual and battle staff (group) perspectives during multiple operational and tactical exercises throughout the Command and General Staff College (CGSC) and the School for Advanced Military Studies (SAMS) academic years. The answer to the research question is yes there are information technology leverage points within operational art, but not as many as initially anticipated. Through the use of intuition, mental models, and experience humans are able to sort through reasonable amounts of information to make a decision even with a complex problem. The operable word is reasonable amount of information.
DTIC
Efficiency; Systems Analysis; Decision Support Systems; Armed Forces; Information Transfer

20000115497 Army Command and General Staff Coll., School of Advanced Military Studies, Fort Leavenworth, KS USA
The Friction of Joint Information Operations
Eassa, Charles N.; May 2000; 51p; In English
Report No.(s): AD-A381926; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Joint Publication 3-13, Joint Doctrine for Information Operations was published in 1998 to provide clarity and guidance for conducting joint information operations. This paper seeks to answer if the doctrine proved sufficient at the Joint Task Force Level. Outlining information role throughout the levels of war and the requirement for information at the JTF level, this paper uses the hierarchy established by previous keystone joint publications to determine if the joint information operations doctrine expanded on the established framework. During this process, the friction caused by the focus of Joint Publication 3-13 is contrasted against the hierarchical joint doctrine. Joint Publication 3-13 created a great deal of friction. The publication did not sufficiently clarify the role or the value of information across the spectrum of conflict. It did not link the national instrument of power called information to military information operations to provide unity of effort. There was no discussion expanding the fundamentals of operational art from the joint information operations perspective. Technically oriented, Joint Publication 3-13 did not provide guidance for JTF Commanders to include information operations in their intent statements, concept of operations, or commander's critical information requirements. These omissions contribute to the friction of integrating information operations into JTFs.
DTIC
Information Systems; Information Transfer; Documents; Measure and Integration

20000116066 Naval Postgraduate School, Monterey, CA USA
Distributed Relational Database System of Occasionally Connected Databases
Bielecki, Pavel; Mar. 2000; 195p; In English
Report No.(s): AD-A378092; No Copyright; Avail: CASI; A09, Hardcopy; A03, Microfiche

The Troop Command at the Presidio of Monterey requires an information system that will provide timely and accurate data about all serviced troop activities with students and permanent party stationed at the Defense Language Institute Foreign Language Center. Data sources that could provide required information already exist, but are physically spread over the Presidio, are maintained in diverse formats, and are not interconnected. Some data sources, maintained by other activities located at the Presidio, are available on the Campus Area Network. As new technologies emerged, it became possible to integrate all available data sources into a heterogeneous distributed information system, in which some information will be shared, while other information

will be under some degree of local control. This thesis studies the feasibility of such an information system, and proposes one possible implementation.
DTIC
Information Systems; Relational Data Bases; Armed Forces

20000116067 Air Force Flight Test Center, Edwards AFB, CA USA
Publishing a Multimedia Technical Report in Electronic Format ***Final Report, Jan. 1998-Apr. 1999***
Ames, Lawrence L.; Apr. 2000; 48p; In English
Contract(s)/Grant(s): Proj-998N
Report No.(s): AD-A378071; AFFTC-TIM-99-04; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This technical information memorandum describes the multimedia authoring procedures and lessons learned during the publication of AFFTC-TR-97-49, Evaluation of the AN/AVS-8 (V) Night Vision System, on compact disc-read-only memory (CD-ROM). This memorandum identifies potential benefits of electronic publication, the potential of multimedia to be an integral part of the data collection and analysis process, the specific procedures employed for CD-ROM development, and includes recommendations for future Air Force Flight Test Center publishing.
DTIC
Electronic Publishing; Read-Only Memory Devices; Multimedia

20000116139 NASA Goddard Space Flight Center, Greenbelt, MD USA
Assimilation of IASI and AIRS Data: Information Content and Quality Control
Joiner, J., NASA Goddard Space Flight Center, USA; [2000]; 1p; In English, 2-9 Sep. 2000, Reading, UK; Sponsored by European Centre for Medium-Range Weather Forecasts, UK; No Copyright; Avail: Issuing Activity; Abstract Only
The Infrared Atmospheric Sounding Interferometer (IASI) and Atmospheric Infrared Sounder (AIRS) instruments have two orders of magnitude more channels that the current operational infrared sounder (High Resolution Infra-Red Sounder (HIRS)). This data volume presents a technological challenge for using the data in a data assimilation system. Data reduction will be a necessary for assimilation. It is important to understand the information content of the radiance measurements for data reduction purposes. In this talk, I will discuss issues relating to information content and quality control for assimilation of the AIRS and IASI data.
Author
Assimilation; Information; Quality Control; Infrared Instruments; Interferometers

20000116147 Pennsylvania Univ., Medical Image Processing Group, Philadelphia, PA USA
Design Concepts for Automating Maintenance Instructions ***Final Report, 29 Jan. 1999-29 Feb. 2000***
Badler, Norman; Erignac, Charles; Vincent, Patrick; Sanchez, Edgar; Boyle, Edward S.; Feb. 2000; 80p; In English; Prepared in collaboration with TASC Inc., Fairborn, OH, and Boeing Co., St. Louis, MO.
Contract(s)/Grant(s): F33615-99-D-6001; AF Proj. 1710
Report No.(s): AD-A382162; AFRL-HE-WP-TR-2000-0088; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
This task was performed under the Technology for Readiness and Sustainment (TRS) contract (F33615-99-D-6001) for the Air Force Research Laboratory (AFRL), Sustainment Logistics Branch (HESS) at Wright-Patterson AFB, OH. The period of research covered the time period 29 January 99 through 29 February 00. The primary objective of this task was to design, develop, and demonstrate a conceptual framework to support the automated validation and verification USAF technical orders (TOs), specifically job guide procedures for maintenance tasks. The outcome of this effort was the definition and demonstration of a conceptual framework for an application or system that could be used by TO authors and Air Force personnel to help validate and verify the safety and accuracy of job guide procedures in maintenance TOs. In addition, this task also produced a core set of critical research and development tasks considered essential to overcoming important barriers to the development of an automated TO validation and verification system or application.
DTIC
Data Management; Program Verification (Computers); Manuals; Aircraft Maintenance; Computer Assisted Instruction

20000116162 International Atomic Energy Agency, Vienna Austria
Still 331 days until year 2000
Nonhoff, E.; Woegerbauer, S.; Dec. 31, 1999; 9p; In English; Year 2000 (Y2K): Progress and Cooperation
Report No.(s): DE99-637234; IAEA-SR-208/37; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

Presentation deals with the project experience concerning Y2K issues at IBM. IBM is committed to help customers and has the following customer support approach: perform call center modelling, utilize service planning experience, review previous critical situation experience. General problems and mistakes are listed, strategy established and detailed analysis and planning are described together with remediation and test. Contingency planning work includes: evaluation of the current environment, examination of plausible alternative futures, preparation of contingency plans for critical processes, identification and monitoring of key signposts, action to shape more favourable future.
NTIS
Planning; Information Systems; Computer Programs; IBM Computers

20000116174 Government Printing Office, Library Programs Service, Washington, DC USA
Proceedings of the 8th Annual Federal Depository Library Conference
MacGilvray, Marian W., Editor, Government Printing Office, USA; 1999; 282p; In English; 8th; Federal Depository Library, 12-15 Apr. 1999, Bethesda, MD, USA
Report No.(s): PB2000-103225; No Copyright; Avail: National Technical Information Service (NTIS)

A collection of papers presented at the Eighth Annual Federal Depository Library Conference is compiled. Topics include: (1) how to provide public access to libraries, (2) developing regional web pages, (3) advanced search techniques, (4) how to create and use digitalized documents, (5) resources for and administering selective housing arrangements, (6) planning for libraries, (7) repairing flood damage in libraries, (8) using the Federal Bulletin Board files, and (9) utilizing new technologies and information science.
CASI
Conferences; Digital Systems; Libraries

20000116207 NASA Langley Research Center, Hampton, VA USA
Evaluating the Effectiveness of the 1998-1999 NASA CONNECT Program
Pinelli, Thomas E., NASA Langley Research Center, USA; Frank, Kari Lou, College of William and Mary, USA; House, Patricia L., House and Associates, USA; September 2000; 53p; In English; Original contains color illustrations
Contract(s)/Grant(s): RTOP 332-18-10-01
Report No.(s): NASA/TM-2000-210542; L-18022; NAS 1.15:210542; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

NASA CONNECT is a standards-based, integrated mathematics, science, and technology series of 30-minute instructional distance learning (satellite and television) programs for students in grades 5-8. Each of the five programs in the 1998-1999 NASA CONNECT series included a lesson, an educator guide, a student activity or experiment, and a web-based component. In March 1999, a mail (self-reported) survey (booklet) was sent to a randomly selected sample of 1,000 NASA CONNECT registrants. A total of 401 surveys (351 usable) were received by the established cut-off date. Most survey questions employed a 5-point Likert-type response scale. Survey topics included: (1) instructional technology and teaching, (2) instructional programming and technology in the classroom, (3) the NASA CONNECT program, (4) classroom use of computer technology, and (5) demographics. About 68% of the respondents were female, about 88% identified ”classroom teacher” as their present professional duty, about 75% worked in a public school, and about 67% held a master’s degree or master’s equivalency. Regarding NASA CONNECT, respondents reported that: (1) they used the five programs in the 1998-1999 NASA CONNECT series; (2) the stated objectives for each program were met (4.49); (3) the programs were aligned with the national mathematics, science, and technology standards (4.61); (4) program content was developmentally appropriate for grade level (4.25); and (5) the programs in the 1998-1999 NASA CONNECT series enhanced/enriched the teaching of mathematics, science, and technology (4.45).
Author
Television Systems; Computer Systems Design; Computer Programs; Education

20000116225 Naval War Coll., Joint Military Operations Dept., Newport, RI USA
Information Management: The Joint Task Force’s Key to Achieving Information Superiority *Final Report*
Brandl, Thomas; May 16, 2000; 21p; In English
Report No.(s): AD-A381669; No Copyright; Avail: Defense Technical Information Center (DTIC)

Joint Vision 2010 identifies information superiority as the key enabler for decisive operations and, ultimately, full spectrum dominance. Advances in information and sensor technologies have exponentially increased the quantity of information that a JTF receives. However, simply having access to vast amounts of information does not guarantee that a JTF will achieve information superiority. The information must be properly processed and disseminated. Therefore information management (IM) is one of the most critical challenges that a JTF faces-one that it must successfully surmount in order to achieve information superiority. Despite

great progress in IM training and doctrine in the past few years, IM remains a challenge to JTFs. The key to successful IM in a JTF is to develop a successful information management plan (IMP) and the commander's involvement in all aspects of IM. The IMP should contain comprehensive instructions and procedures for the collection, processing, prioritization and dissemination of information. Clearly, information management (IM) is a challenge and must be resolved in order to realize the full spectrum dominance envisioned in JV 2010.
DTIC
Information Management; Management Planning; Data Retrieval; Information Retrieval

20000116233 Naval Postgraduate School, Monterey, CA USA
Updating an Infrastructure Management Information System Architecture: A Guide for Navy Public Works Officers
Bartoe, Kevin; Apr. 03, 2000; 68p; In English
Contract(s)/Grant(s): N62271-97-G-0043
Report No.(s): AD-A379495; No Copyright; Avail: Defense Technical Information Center (DTIC)

The rapid advance of computer technology has been both a bane and a boon for public works organizations. Computers have allowed for enhanced communication, faster information processing, and detailed graphical imaging. They have also led to the formation of "islands of data" on unconnected networks, proprietary software systems that do not communicate with each other, and challenges in retaining skilled personnel in information technology. Civil Engineer Corps Officers in the USA Navy are responsible for managing the force's base infrastructure and public works organizations. The US Navy operates more than 140 bases worldwide with a plant value over $140 billion. Public works operations have seen improvements in their infrastructure information management over the past two decades. Computers and network systems play a large roll in the success of collecting, managing and using facilities data to make better infrastructure decisions. Information technology (IT) continues to improve at a torrid pace. Public works organizations that operate unaware of the potential successes and failures in the IT field will not benefit from its advances. This report is intended to be a guide for Navy Public Works Officers to the current trends in updating an IT system architecture within a facilities management organization. The concept of Asset Management is introduced as a strategy for selecting project alternatives using IT tools. The basics of internet and internet operations are discussed including internet operations, new database technology, and the current IT initiatives underway within the federal government and the US Navy. Geospatial Information Systems are discussed in detail and how they form the foundation for an improved facilities information system. A hypothetical example is developed to demonstrate concepts using a fictitious base and its efforts to improve its system architecture. Finally, real work example of facilities system models are presented.
DTIC
Management Information Systems; Handbooks; Architecture (Computers); Data Processing; Software Engineering; Structural Engineering

20000116299 Carnegie-Mellon Univ., School of Computer Science, Pittsburgh, PA USA
FALCON: Feedback Adaptive Loop for Content-Based Retrieval
Wu, Leejay; Faloutsos, Christos; Sycara, Katia; Payne, Terry R.; Jun. 2000; 27p; In English
Contract(s)/Grant(s): N00014-96-1-1222; N66001-97-C-851
Report No.(s): AD-A382655; CMU-CS-00-142; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Several methods currently exist that can perform relatively simple queries driven by relevance feedback on large multimedia, databases. However, all these methods work only for vector spaces; that is, they require that objects be represented as vectors within feat tire spaces. Moreover, their implied query regions are typically convex. This research paper explains our solution. We propose a novel method that is designed to handle disjunctive queries within metric spaces. The user provides weights for positive examples; our system learns the implied concept and returns similar objects. Our method differs from existing relevance-feedback methods that base themselves upon Euclidean or Mahalanobis metrics, as it facilitates learning even disjunctive, concave models within vector spaces, as well as arbitrary metric spaces. Our main contributions are two-fold. Not only do we present a novel way to estimate the dissimilarity of an object to a set of desirable objects, but we support it with an algorithm that shows how to exploit metric indexing structures that support range queries to accelerate the search without incurring false dismissals. Our empirical results demonstrate that our method converges rapidly to excellent precision/recall, while outperforming sequential scanning by up to 200%.
DTIC
Data Bases; Information Retrieval; Algorithms; Computer Programs

20000116612 National Inst. of Standards and Technology, Computer Security Div., Gaithersburg, MD USA
Guidelines to Federal Organizations on Security Assurance and Acquisition/Use of Tested/Evaluated Products: Recommendations of the National Institute of Standards and Technology
Roback, E. A.; Aug. 2000; 26p; In English
Report No.(s): PB2001-100173; NIST/SP-800-23; No Copyright; Avail: National Technical Information Service (NTIS)

Computer security assurance provides a basis for one to have confidence that security measures, both technical and operational, work as intended. Use of products with an appropriate degree of assurance contributes to security and assurance of the system as a whole and thus should be an important factor in IT procurement decisions. Two Government programs are of particular interest - the National Information Assurance Partnership (NIAP)'s Common Criteria Evaluation and Validation Program and NIST's Cryptographic Module Validation Program (CMVP). The NIAP program focuses on evaluations of products (e.g., a firewall or operating system) against a set of security specifications. The CMVP program focuses on security conformance testing of a cryptographic modules against Federal Information Processing Standard 140-1, Security Requirements for Cryptographic Modules and related federal cryptographic algorithm standards.
NTIS
Computer Information Security; Data Processing; Recommendations

20000116628 Army Medical Dept. Center and School, Dept. of Academic Support, Fort Sam Houston, TX USA
US Army Medical Department Journal, April-June 1999 ***Quarterly Report, Apr. - Jun. 1999***
Nelson, Bruce, Editor, Army Medical Dept. Center and School, USA; April - June 1999; ISSN 1524-0436; 46p; In English
Report No.(s): AD-A381198; No Copyright; Avail: Defense Technical Information Center (DTIC)

Clinical and nonclinical professional information designed to keep U. S. Army Medical Department personnel informed of healthcare, research, and combat and doctrine development information. The Army Medical Department Journal is prepared bimonthly for the Army Surgeon General by the U.S. Army Medical Department Center & School, Fort Sam Houston, Texas.
DTIC
Medical Services; Armed Forces; Research; Military Operations; Health

20000117658 Naval Postgraduate School, Monterey, CA USA
Developing a Core Competency Model for Information Systems Management Officers in the USA Army
Hunt, P. Dwight, Naval Postgraduate School, USA; Willhelm, Stephen T., Naval Postgraduate School, USA; June 2000; 90p; In English
Report No.(s): AD-A380792; No Copyright; Avail: Defense Technical Information Center (DTIC)

As DoD and the Army move into the 21st Century, the technologies that abound are increasing not only volume but also in complexity. In order to manage and leverage these technologies, a clear vision needs to be articulated starting at the very top of DoD. With this vision, it will then become the responsibility of the Army's System Automation Officers (FA 53) to implement that vision. The challenge then becomes, what exactly are the core competencies, or more plainly put, what knowledge, skills and attributes must these officers possess, in order to be successful in carrying out the Army's overarching plans. Once these competencies are identified, how do we ensure our officers' success by training them in these competencies in Army and civilian institutions? This thesis examines these questions and, through use of core competency modeling (specifically, the Customized Generic Model Method), will identify the core competencies of a systems automation officer and explore avenues to improve the efficiency of the FA 53 education.
DTIC
Systems Management; Management Information Systems; Armed Forces (USA); Education

84
LAW, POLITICAL SCIENCE AND SPACE POLICY

Includes: aviation law; space law and policy; international law; international cooperation; and patent policy

20000115476 Lembaga Penerbangan dan Antariksa Nasional, Peneliti Bidang Analisis Sistem Dan Hukum, Jakarta, Indonesia
Effects of Technology Implementation Development and Space Law on the Interests of Developing Countries ***Pengaruh Perkembangan Pemanfaatan Teknologi Dan Hukum Antariksa Terhadap Kepentingan Negara-Negara Berkembang***
Supriadhie, Anjar, Lembaga Penerbangan dan Antariksa Nasional, Indonesia; Warta LAPAN; April - June 2000; ISSN 0126-9754; Volume 2, No. 2, pp. 82-92; In Malay-Indonesian; Copyright; Avail: Issuing Activity

Owing to the operations of space vehicles such as satellites in accordance with their own missions or functions, various applications of space technology have been taking place significantly in telecommunication services, natural resources management, weather forecasting and others. Even, it is also recognized that at present progress of space technology is making great strides in commercialization. But, it is ironical that most of developing countries have not yet reached and utilized such the progress of space technology, although appeals for ”technology transfer” increasing the capability of developing countries in space technology have been voiced at related international fora as well as stipulated in United Nations Resolutions. The fact remains that most of developing countries have not yet played important roles in space activities.
Author
Aerospace Technology Transfer; Technology Utilization; Technological Forecasting

89
ASTRONOMY

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

20000115872 NASA Ames Research Center, Moffett Field, CA USA
A Search for Planetary Transits of the Star HD 187123 by Spot Filter CCD Differential Photometry
Castellano, T., NASA Ames Research Center, USA; Jan. 26, 2000; 20p; In English
Contract(s)/Grant(s): RTOP 274-52-0028; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A novel method for performing high precision, time series CCD differential photometry of bright stars using a spot filter, is demonstrated. Results for several nights of observing of the 51 Pegasi b-type planet bearing star HD 187123 are presented. Photometric precision of 0.0015 - 0.0023 magnitudes is achieved. No transits are observed at the epochs predicted from the radial velocity observation. If the planet orbiting HD 187123 at 0.0415 AU is an inflated Jupiter similar in radius to HD 209458b it would have been detected at the greater than 6(sigma), level if the orbital inclination is near 90 degrees and at the greater than 3(sigma), level if the orbital inclination is as small as 82.7 degrees.
Author
Astronomical Photometry; Photometry; Precision; Time Measurement; Time Series Analysis

20000116357 NASA Goddard Space Flight Center, Greenbelt, MD USA
The Kronos Hardware and Software
Polidan, Ronald S., NASA Goddard Space Flight Center, USA; [2000]; 1p; In English; Kronos for Stars, 13-14 Oct. 2000, TX, USA; No Copyright; Avail: Issuing Activity; Abstract Only

The current status of the Kronos Medium Class Explorer (MIDEX) mission concept is reviewed with particular emphasis on instrument performance and mission design with respect to observations of stellar systems. In addition, key mission and science instrument trades, issues, and concerns will be present for discussion.
Author
Computer Programs; Mission Planning; Stellar Systems; Hardware

20000117681 Massachusetts Inst. of Tech., Center for Space Research, Cambridge, MA USA
Spectral and Timing Investigations of Dwarf Novae Selected in Hard X-Rays *Final Report*
Thorstensen, John, Dartmouth Coll., USA; Remillard, Ronald A., Massachusetts Inst. of Tech., USA; [2000]; 2p; In English
Contract(s)/Grant(s): NAG5-7375
Report No.(s): MIT-OSP-6703800; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

There are 9 dwarf novae (DN) among the 43 cataclysmic variables (accreting white dwarfs in close binary systems) that were detected during the HEAO-1 all-sky X-ray survey (1977-1979). On the other hand, there are roughly one hundred dwarf novae that are closer and/or optically brighter and yet they were not detected as hard X-ray sources. Two of the HEAO-1 DN show evidence for X-ray pulsations that imply strong magnetic fields on the white dwarf surface, and magnetic CVs are known to be strong X-ray sources. However, substantial flux in hard X-rays may be caused by non-magnetic effects, such as an optically thin boundary layer near a massive white dwarf. We proposed RXTE observations to measure plasma temperatures and to search for X-ray pulsations. The observations would distinguish whether these DN belong to one of (rare) magnetic subclasses. For those that do not

show pulsations, the observations support efforts to define empirical relations between X-ray temperature, the accretion rate, and the mass of the white dwarf. The latter is determined via optical studies of the dynamics of the binary constituents.
Derived from text
Dwarf Novae; Cataclysmic Variables; White Dwarf Stars; X Ray Sources

90
ASTROPHYSICS

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

20000115428 Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
Gauge theory description of D-brane black holes: emergence of the effective SCFT and Hawking radiation
Hassan, S. F.; Wadia, S. R.; Feb. 28, 1998; 15p; In English
Report No.(s): DE98-626898; IC-98/15; CERN-TH-97-344; No Copyright; Avail: Department of Energy Information Bridge

We study the hypermultiplet moduli space of an N=4, U(Q(sub 1)) x U(Q(sub 5)) gauge theory in 1 + 1 dimensions to extract the effective SCFT description of near extremal 5-dimensional black holes modelled by a collection D1- and D5-branes. On the moduli space, excitations with fractional momenta arise due to a residual discrete gauge invariance. It is argued that, in the infrared, the lowest energy excitations are described by an effective c = 6, N = 4 SCFT on T(sup 4), also valid in the large black hole regime. The ''effective string tension'' is obtained using T-duality covariance. While at the microscopic level, minimal scalars do not couple to (1,5) strings, in the effective theory a coupling is induced by (1,1) and (5,5) strings, leading to Hawking radiation. These considerations imply that, at least for such black holes, the calculation of the Hawking decay rate for minimal scalars has a sound foundation in string theory and statistical mechanics and, hence, there is no information loss.
NTIS
Gauge Theory; Black Holes (Astronomy)

20000115870 Search for Extraterrestrial Intelligence Inst., Moffett Field, CA USA
Very Precise Orbits of 1998 Leonid Meteors
Betlem, Hans, Dutch Meteor Society, Netherlands; Jenniskens, Peter, Search for Extraterrestrial Intelligence Inst., USA; vantLeven, Jaap, Dutch Meteor Society, Netherlands; terKuile, Casper, Dutch Meteor Society, Netherlands; Johannink, Carl, Dutch Meteor Society, Netherlands; Zhao, Hai-Bin, Academia Sinica, China; Lei, Chen-Ming, Academia Sinica, China; Li, Guan-You, Academia Sinica, China; Zhu, Jin, Academia Sinica, China; Evans, Steve, British Astronomical Association, UK; Meteoritics and Planetary Science; 1999; Volume 34, pp. 979-986; In English
Contract(s)/Grant(s): RTOP 344-50-92; Copyright; Avail: Issuing Activity

Seventy-five orbits of Leonid meteors obtained during the 1998 outburst are presented. Thirty-eight are precise enough to recognize significant dispersion in orbital elements. Results from the nights of 1998 November 16/17 and 17/18 differ, in agreement with the dominant presence of different dust components. The shower rate profile of 1998 November 16/17 was dominated by a broad component, rich in bright meteors. The radiant distribution is compact. The semimajor axis is confined to values close to that of the parent comet, whereas the distribution of inclination has a central condensation in a narrow range. On the other hand, 1998 November 17/18 was dominated by dust responsible for a more narrow secondary peak in the flux curve. The declination of the radiant and the inclination of the orbit are more widely dispersed. The argument of perihelion, inclination, and the perihelion distance are displaced. These data substantiate the hypothesis that trapping in orbital resonances is important for the dynamical evolution of the broad component.
Author
Orbital Elements; Orbit Calculation; Orbital Mechanics; Orbits; Leonid Meteoroids; Meteoroid Showers; Comets

20000115879 NASA Goddard Space Flight Center, Greenbelt, MD USA
The X-Ray Lightcurve of Eta Carinae: Refinement of the Orbit and Evidence for Phase Dependent Mass Loss
Corcoran, M. F., NASA Goddard Space Flight Center, USA; Ishibashi, K., National Academy of Sciences - National Research Council, USA; Swank, J. H., NASA Goddard Space Flight Center, USA; Petre, R., NASA Goddard Space Flight Center, USA; [2000]; 15p; In English
Contract(s)/Grant(s): NAS5-32490; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We solve the RXTE X-ray lightcurve of the extremely luminous and massive star eta Carinae with a colliding wind emission model to refine the ground-based orbital elements. The sharp decline to X-ray minimum at the end of 1997 fixes the date of the last periastron passage at 1997.95 +/- 0.05, not 1998.13 as derived from ground-based radial velocities. This helps resolve a dis-

crepancy between the ground-based radial velocities and spatially-resolved velocity measures obtained by STIS. The X-ray data are consistent with a mass function f(M) approx. = 1.5, lower than the value f(M) approx. = 7.5 previously reported, so that the masses of eta Carinae and the companion are M(sub eta) greater than or = 80 solar mass and M(sub c) approx. 30 solar mass respectively. In addition the X-ray data suggest that the mass loss rate from eta Carinae is generally less than 3 x 10(exp -4) solar mass/yr, about a factor of 5 lower than that derived from some observations in other wavebands. We could not match the duration of the X-ray minimum with any standard colliding wind model in which the wind is spherically symmetric and the mass loss rate is constant. However we show that we can match the variations around X-ray minimum if we include an increase of a factor of approx. 20 in the mass loss rate from eta Carinae for approximately 80 days following periastron. If real, this excess in M would be the first evidence of enhanced mass flow off the primary when the two stars are close (presumably driven by tidal interactions). Our interpretation of the X-ray data suggest that the ASCA and RXTE X-ray spectra near the X-ray minimum are significantly contaminated by unresolved hard emission (E greater than or = 2 keV) from sonic other nearby source, probably associated with scattering of tile colliding wind emission by circumstellar dust. Based on the X-ray fluxes the distance to n Carinae is 2300 pc with formal uncertainties of only approx. 10%.
Author
Mass Flow; Massive Stars; Orbital Elements; Radial Velocity; Stellar Mass; X Ray Spectra

20000116341 Smithsonian Astrophysical Observatory, Cambridge, MA USA
Evolution of Pre-Main Sequence Accretion Disks ***Final Report, 1 May 1997 - 30 Apr. 2000***
Hartmann, Lee W., Smithsonian Astrophysical Observatory, USA; November 2000; 12p; In English
Contract(s)/Grant(s): NAG5-4282; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The aim of this project was 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: (1) Developed detailed calculations of disk structure to study physical conditions and investigate the observational effects of grain growth in T Tauri disks; (2) Studied the dusty emission and accretion rates in older disk systems, with ages closer to the expected epoch of (giant) planet formation at 3-10 Myr, and (3) Began a project to develop much larger samples of 3-10 Myr-old stars to provide better empirical constraints on protoplanetary disk evolution.
Author
Accretion Disks; Evolution (Development); Planetary Evolution; Pre-Main Sequence Stars

91
LUNAR AND PLANETARY SCIENCE AND EXPLORATION

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

20000116384 NASA Goddard Space Flight Center, Greenbelt, MD USA
A Dynamical Model for The Jupiter Thermocline
Allison, Michael, NASA Goddard Space Flight Center, USA; [2000]; 1p; In English; Geophysical Fluid Dynamics Program, 17-21 Jun. 2000, Woods Hole, MA, USA; No Copyright; Avail: Issuing Activity; Abstract Only

A new conceptual model for the observed banded wind structure of the giant outer planets is proposed, assuming a smoothly distributed potential vorticity (PV) atop a layer of deeply seated, latitudinally variable stratification. With a vanishing horizontal entropy contrast presumably enforced at the bottom of the flow layer by the underlying convection, the thermal-wind balance of observed cloud-top motions implies a mapping of constant potential temperature surfaces, nearly vertical at upper tropospheric levels, down to a deeper, flatter, but variably sloped 'thermocline.' For a generally colder-poleward distribution of isentropes consistent with the strong equatorial jets of both Jupiter and Saturn, this kind of mapping would also imply a poleward decreasing static stability. The proposed temperature-stability distribution is just the reverse of the Earth's troposphere, where the strongest latitudinal potential temperature gradients are at the bottom instead of the top, with static stability generally increasing toward the pole. The warmer-stabler correlation for Jupiter would be consistent, however, with a nearly monotonic distribution of PV from low to high latitudes, over planetary scales for which the planetary vorticity dominates the relative vorticity of the jets. In this way efficient PV mixing for the isentropically bounded thermocline can account for the dynamical maintenance of the cyclonic flanks of the equatorial jet. Over latitudinal intervals comparable to the internal deformation scale, however, the gradient of the absolute vorticity is dominated by the flow curvature, with the local latitudinal gradient of the static stability proportional to the local potential temperature gradient and therefore the local variation in geostrophic velocity. The resulting correlation of

velocities and vorticity gradients implies an alternation of the flow over the internal deformation radius set by the vertical entropy contrast.
Author
Gas Giant Planets; Isentrope; Jupiter (Planet); Saturn (Planet); Static Stability; Stratification; Thermoclines; Troposphere; Vorticity

20000116476 Valparaiso Univ., Dept. of Physics and Astronomy, IN USA
2-45 Micron Infrared Spectroscopy of Carbon-Rich Proto-Planetary Nebulae
Hrivnak, Bruce J., Valparaiso Univ., USA; Volk, Kevin, Calgary Univ., Canada; Kwok, Sun, Calgary Univ., Canada; Astrophysical Journal; May 20, 2000; Volume 535, pp. 275-292; In English
Contract(s)/Grant(s): JPL-961534; NAG5-3346; Copyright; Avail: Issuing Activity

Infrared Space Observatory (ISO) 2-45 micron observations of seven proto-planetary nebulae (PPNs) and two other carbon-rich objects are presented. The unidentified emission features at 21 and 30 microns are detected in six sources, including four new detections of the 30 micron feature. This previously unresolved 30 micron feature is now resolved and found to consist of a broad feature peaking at 27.2 microns (the '30 micron' feature) and a narrower feature at 25.5 microns (the '26 micron' feature). This new 26 micron feature is detected in eight sources and is particularly strong in IRAS Z02229 + 6208 and 16594-4656. The unidentified infrared (UIR) emission features at 3.3, 6.2, 7.7, and 11.3 microns which are commonly observed in planetary nebulae and H II regions, are also seen in these PPNs. However, their strengths relative to the continuum plateaus at 8 and 12 microns are weaker than in planetary nebulae. The 6.9 micron feature, seen almost exclusively in PPNs, is strong. New millimeter CO and HCN observations were made; they support the carbon-rich nature of the objects and yield the expansion velocities of the gaseous envelopes. The spectral energy distributions of these PPNs were fitted with a radiative-transfer model, taking into account the emission features at 21, 26, and 30 microns. A significant fraction of the total energy output is emitted in these features: as high as 20% in the 30 micron feature and 8% in the 21 micron feature. The fact that so much energy is carried in these features suggests that the material responsible for these features must be made of abundant elements and most likely involves carbon. SiS, appears to be ruled out as the emitter of the 21 micron feature due to the absence of a predicted companion feature.
Author
Carbon; Energy Distribution; Infrared Radiation; Infrared Spectroscopy; Millimeter Waves; Planetary Nebulae

92
SOLAR PHYSICS

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

20000115479 Lembaga Penerbangan dan Antariksa Nasional, Peneliti pada Stasmatgan, Jakarta, Indonesia
Predictions of Class D, E and F Sunspot Productive Age Based on Flare Activity Frequency ***Prakiraan Umur Produktif Sunspot Kelas D, E, dan F Berdasarkan Frekuensi Aktivitas Flare***
Widodo, Nanang, Lembaga Penerbangan dan Antariksa Nasional, Indonesia; Setiahadi, Bambang, Lembaga Penerbangan dan Antariksa Nasional, Indonesia; Kambry, Maspul Aini, Lembaga Penerbangan dan Antariksa Nasional, Indonesia; Warta LAPAN; April - June 2000; ISSN 0126-9754; Volume 2, No. 2, pp. 45-52; In Malay-Indonesian; Copyright; Avail: Issuing Activity

The evolution of sunspot group is divided into three phases: when it begin to appear on the solar surface (photosphere), when it reach its peak activity, and when if disappears. In the second phase, the sunspot group shows its activity as flares (there is reconnection between two magnetic fields) called productive phase. by observing the average daily motion of a sunspot group due to the solar rotation (approximately 13.5 deg/day) and to the activity of nearby flares, the duration of active phase of a sunspot group can be deduced. From the analyses of sunspot groups, the D, E, and F classes show a longer activity compared to other classes, supports the fact that the occurence frequency at the flares mostly produced by these classes. From the analysis we conclude that approximately 4 to 5 days after appearance of sunspot D, E, F it reach productive phase. We also obtain that the flares produced by these classes have a longer active duration compared to other classes. From the estimation of the flare-productive phase we are able to predict when a sunspot group to begin flare productive.
Author
Sunspots; Solar Flares; Photosphere; Sun

20000116104 Helsinki Univ. of Technology, Metsahovi Radio Observatory, Espoo, Finland
CESRA Workshop on Coronal Explosive Events
Pohjolainen, S., Editor, Helsinki Univ. of Technology, Finland; 1998; ISSN 1455-9587; 102p; In English; Coronal Explosive Events, 9-13 Jun. 1998, Espoo, Finland
Report No.(s): PB2000-102563; HUT-MET-27; ISBN 951-22-4097-1; No Copyright; Avail: Issuing Activity

The Community of European Solar Radio Astronomers (CESRA) organizes a series of workshops on investigations of the solar atmosphere using radio and other observations. These workshops are intended to bring together different communities of observers and theoreticians in order to discuss current problems of the structure and dynamics of the solar atmosphere, its impact on, and relationship with the heliosphere. Although special emphasis is given to radio diagnostics, the workshop topics are of interest o a large community of plasma astrophysicists. The workshop lays emphasis on the different spatial scales of coronal restructuring and energy release, ranging from the apparently quiet corona to coronal mass ejections (CMEs). It consists of invited reviews and talks, contributions in the form of posters, and working group discussions. This is a collection of the abstracts from the presentations given at the workshop.
Derived from text
Radio Astronomy; Solar Atmosphere; Stellar Mass Ejection; Coronas; Heliosphere; Solar Activity; Solar Activity Effects; Sun

99
GENERAL

Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs such as Apollo, Gemini, and Mercury spacecraft, Earth Resources Technology Satellite (ERTS), and Skylab; NASA appropriations hearings.

20000116607 General Accounting Office, Washington, DC USA
Observations on the National Science Foundation's Fiscal Year 1999 Performance Report and Fiscal Year 2001 Performance Plan
June 2000; 24p; In English
Report No.(s): AD-A380253; No Copyright; Avail: Defense Technical Information Center (DTIC)

As you the General Accounting Office (GAO) reviewed the 24 Chief Financial Officers (CFO) Act agencies' fiscal year 1999 performance reports and fiscal year 2001 performance plans required by the Government Performance and Results Act (GPRA) of 1993. In essence, under GPRA annual performance plans are to establish performance goals and measures covering a given fiscal year and provide the direct linkage between an agency's longer-term goals and day-to-day activities. Annual performance reports are to subsequently report on the degree to which those performance goals were met. This report contains two enclosures concerning key program outcomes and major management challenges at the National Science Foundation (NSF). Enclosure I provides GAO's observations on NSF's fiscal year 1999 actual and fiscal year 2001 planned performance for the key outcomes that you identified as important mission areas for the agency. These key outcomes are (1) discoveries at and across the frontier of science and engineering and (2) efficient and effective administration of research grants. Enclosure II lists the major management challenges facing the agency that NSF's Inspector General (IG) identified, the progress the agency has made in addressing these challenges as discussed in its fiscal year 1999 performance report, and the applicable goals and measures in the fiscal year 2001 performance plan.
DTIC
Management Planning; Congressional Reports; Governments; Organizations

20000116610 NASA Ames Research Center, Moffett Field, CA USA
Research and Technology 1996
September 1997; 202p; In English; Original contains color illustrations
Report No.(s): NASA/TM-1997-112195; A-976441; NAS 1.15: 112195; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

This report highlights the challenging work accomplished during fiscal year 1996 by Ames research scientists, engineers, and technologists. It discusses research and technologies that enable the Information Age, that expand the frontiers of knowledge for aeronautics and space, and that help to maintain U.S. leadership in aeronautics and space research and technology development. The accomplishments span the range of goals of NASA's four Strategic Enterprises: (1) Aeronautics and Space Transportation Technology, (2) Space Science, (3) Human Exploration and Development of Space, and (4) Mission to Planet Earth. The primary purpose of this report is to communicate knowledge--to inform our stakeholders, customers, and partners, and the people

of the United States about the scope and diversity of Ames' mission, the nature of Ames' research and technology activities, and the stimulating challenges ahead. The accomplishments cited illustrate the contributions that Ames is making to improve the quality of life for our citizens and the economic position of the USA in the world marketplace.
Author
Mission to Planet Earth; Research and Development; Space Transportation; Space Exploration; Technology Utilization

Subject Term Index

A

ABSORBENTS, 27
ABSORPTION CROSS SECTIONS, 152
ABSORPTION SPECTROSCOPY, 17
ACCELERATED LIFE TESTS, 35, 40
ACCESS CONTROL, 47, 123
ACCRETION DISKS, 178
ACOUSTIC EMISSION, 22
ACOUSTIC IMAGING, 48
ACOUSTIC MEASUREMENT, 48, 122
ACOUSTIC SIMULATION, 4
ACOUSTIC VELOCITY, 146
ACOUSTICS, 146, 147
ACQUISITION, 10
ACRYLIC RESINS, 31
ACTIVE CONTROL, 9
ADDITIVES, 19, 36
ADHESION, 107
ADIABATIC CONDITIONS, 39
AERIAL PHOTOGRAPHY, 59, 61
AERIAL RECONNAISSANCE, 61
AEROACOUSTICS, 4, 147
AERODYNAMIC CONFIGURATIONS, 4, 8
AERODYNAMIC DRAG, 2
AERODYNAMIC NOISE, 4, 91
AERODYNAMIC STALLING, 2
AEROELASTICITY, 9
AEROLOGY, 82
AERONAUTICAL ENGINEERING, 2
AEROSOLS, 86, 87
AEROSPACE ENVIRONMENTS, 153
AEROSPACE INDUSTRY, 28
AEROSPACE MEDICINE, 6, 102, 108
AEROSPACE SYSTEMS, 12
AEROSPACE TECHNOLOGY TRANSFER, 168, 176
AGING (MATERIALS), 40
AGRICULTURAL AIRCRAFT, 7
AIR FLOW, 12
AIR LAND INTERACTIONS, 65, 67, 68, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81
AIR MASSES, 17
AIR POLLUTION, 56, 84, 86, 88, 89
AIR QUALITY, 86, 88
AIR TRAFFIC, 8
AIR TRAFFIC CONTROL, 5, 6, 8
AIR TRANSPORTATION, 1, 6
AIR WATER INTERACTIONS, 100
AIRBORNE EQUIPMENT, 68, 72, 82, 85
AIRCRAFT ACCIDENTS, 6
AIRCRAFT CONTROL, 9
AIRCRAFT ENGINES, 142
AIRCRAFT EQUIPMENT, 68, 72
AIRCRAFT INDUSTRY, 1, 7
AIRCRAFT MAINTENANCE, 172
AIRCRAFT NOISE, 85, 91
AIRCRAFT RELIABILITY, 9
AIRCRAFT SAFETY, 6
AIRCRAFT STRUCTURES, 5
AIRFOILS, 2
AIRGLOW, 92
AIRPORTS, 7
ALASKA, 93, 100
ALGEBRA, 141, 165
ALGORITHMS, 2, 45, 99, 124, 130, 135, 136, 143, 147, 161, 174
ALLOCATIONS, 143
ALTIMETRY, 63, 99
ALUMINUM ALLOYS, 30, 36, 55
AMBIENCE, 86
AMINES, 36
AMINO ACIDS, 110, 111
AMMONIUM SULFATES, 103
AMPLITUDE MODULATION, 92
ANALOG CIRCUITS, 51
ANGLE OF ATTACK, 8
ANIMALS, 119
ANISOTROPY, 59, 61
ANNEALING, 144
ANNUAL VARIATIONS, 98
ANTENNA ARRAYS, 45
ANTENNA RADIATION PATTERNS, 46
ANTIBIOTICS, 89, 120
ANTIBODIES, 107, 111
ANTIFREEZES, 103
ANTIGENS, 112, 113
ANTIINFECTIVES AND ANTIBACTERIALS, 89
APPLICATIONS PROGRAMS (COMPUTERS), 132, 133, 137
APPROPRIATIONS, 169
APPROXIMATION, 139, 140, 147
AQUEOUS SOLUTIONS, 36
AQUIFERS, 3, 90
ARCHITECTURE (COMPUTERS), 5, 123, 124, 133, 174
ARCTIC REGIONS, 94
ARMED FORCES, 6, 110, 121, 171, 172, 175
ARMED FORCES (UNITED STATES), 175
ARMOR, 154
ARTIFICIAL INTELLIGENCE, 43, 136, 137
ASPHALT, 21
ASSAYING, 105
ASSEMBLING, 52, 137
ASSIMILATION, 18, 172
ASTRONAUT TRAINING, 16
ASTRONAUTS, 15
ASTRONOMICAL PHOTOMETRY, 176
ASTRONOMY, 166
ASTROPHYSICS, 166
ASYMMETRY, 87
ASYNCHRONOUS TRANSFER MODE, 165
ATLANTIC OCEAN, 100
ATLANTIS (ORBITER), 15
ATMOSPHERIC BOUNDARY LAYER, 71, 81
ATMOSPHERIC CHEMISTRY, 93
ATMOSPHERIC CIRCULATION, 83, 85
ATMOSPHERIC COMPOSITION, 84
ATMOSPHERIC DENSITY, 14
ATMOSPHERIC GENERAL CIRCULATION MODELS, 97, 143
ATMOSPHERIC MODELS, 78, 80, 94, 95
ATMOSPHERIC PHYSICS, 52, 53, 68, 69, 71, 92, 153
ATMOSPHERIC RADIATION, 63, 79
ATMOSPHERIC TEMPERATURE, 70, 85, 94, 96
ATMOSPHERIC TURBULENCE, 96, 97
ATOMIC PHYSICS, 149
ATOMIC RECOMBINATION, 24
ATOMIZING, 12
ATOMS, 26, 104, 164
ATTITUDE (INCLINATION), 14
ATTITUDE CONTROL, 14, 137
AUGMENTATION, 120
AUTOCORRELATION, 99
AUTOMATION, 106
AUTOMOBILES, 56
AUTONOMY, 8, 51, 136, 137
AUTOREGRESSIVE PROCESSES, 91
AVAILABILITY, 7
AVIONICS, 142

B

BACKGROUND RADIATION, 104, 166
BACKSCATTERING, 77
BAFFLES, 18
BALLISTIC MISSILES, 48
BANDWIDTH, 47
BAROCLINITY, 95
BARYONS, 148
BAYES THEOREM, 138
BAYS (TOPOGRAPHIC FEATURES), 99
BENDING, 59
BGK MODEL, 140
BIAS, 147
BIBLIOGRAPHIES, 2
BIDIRECTIONAL REFLECTANCE, 65, 77, 78
BINARY DATA, 143
BINAURAL HEARING, 147
BIOASSAY, 102
BIOASTRONAUTICS, 108, 122
BIOCHEMISTRY, 65
BIOGEOCHEMISTRY, 98
BIOLOGICAL EVOLUTION, 125
BIOMASS BURNING, 17
BIONICS, 104
BIOREACTORS, 103
BLACK HOLES (ASTRONOMY), 166, 177
BLANKETS (FUSION REACTORS), 159
BLOCKING, 135
BLOOD CIRCULATION, 109
BODY CENTERED CUBIC LATTICES, 164
BONE DEMINERALIZATION, 118
BONE MARROW, 115
BONES, 118
BOOLEAN ALGEBRA, 129, 131
BOSONS, 150
BOUNDARY CONDITIONS, 101
BOUNDARY LAYERS, 59, 71, 81, 87
BRAIDED COMPOSITES, 23
BRAIN, 108, 110
BRASSES, 29
BREAKDOWN, 88, 89
BREEDING (REPRODUCTION), 106
BRIDGES (STRUCTURES), 57
BRITTLENESS, 28
BROMINE, 84
BRYOPHYTES, 75
BUBBLES, 39
BUDGETING, 168
BURGER EQUATION, 139
BURNING RATE, 35, 38
BUS CONDUCTORS, 50

C

CADMIUM, 100
CALCIFEROL, 119
CALIBRATING, 50, 153
CANCER, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120
CANONICAL FORMS, 129
CANOPIES (VEGETATION), 78
CAPTURE EFFECT, 152
CARBON, 179
CARBON COMPOUNDS, 164
CARBON DIOXIDE CONCENTRATION, 70
CARBON FIBERS, 22
CARCINOGENS, 105, 106
CATACLYSMIC VARIABLES, 177
CATALYSTS, 32, 56
CATALYTIC ACTIVITY, 36
CAUCHY PROBLEM, 139
CAVITIES, 54, 136
CELL DIVISION, 110, 111, 116
CELLS (BIOLOGY), 42, 105, 107, 109, 111, 117, 118, 120
CENSUS, 170
CERAMIC MATRIX COMPOSITES, 23
CERAMICS, 159
CERTIFICATION, 9, 20
CHANGE DETECTION, 63
CHANNELS, 163
CHARACTER RECOGNITION, 44
CHARACTERIZATION, 22, 41
CHARGE EFFICIENCY, 51
CHARGE EXCHANGE, 149
CHARGED PARTICLES, 142
CHEMICAL ANALYSIS, 10, 88
CHEMICAL COMPOSITION, 3
CHEMICAL COMPOUNDS, 106
CHEMICAL REACTIONS, 43, 93
CHEMOTHERAPY, 117
CHLORIDES, 28
CHLORINATION, 90, 106
CHLOROPHYLLS, 99
CHROMATES, 10
CIRCUITS, 51, 124
CIVIL AVIATION, 1, 6, 7
CLADDING, 82
CLASSIFICATIONS, 34, 73
CLAYS, 10
CLIMATE, 83, 87, 93, 96
CLIMATE CHANGE, 87
CLIMATE MODELS, 87, 94
CLIMATOLOGY, 83, 87, 94, 95, 96, 100, 101
CLINICAL MEDICINE, 109, 113, 115
CLONING (BIOLOGY), 109
CLOUD COVER, 97
CLOUD PHYSICS, 97
CLUSTER ANALYSIS, 130
COASTAL WATER, 99, 100
COASTS, 101
COATING, 29, 32
COATINGS, 21, 29, 31, 35
COGNITION, 110, 142
COLLAPSE, 23
COLLISION AVOIDANCE, 6
COLOR INFRARED PHOTOGRAPHY, 61
COLOR PHOTOGRAPHY, 61
COMBAT, 145
COMBINATORIAL ANALYSIS, 130
COMBUSTION, 10, 19, 25, 34, 41, 43
COMBUSTION CHEMISTRY, 25
COMBUSTION PRODUCTS, 56
COMBUSTION STABILITY, 19, 33
COMETS, 177
COMMAND AND CONTROL, 145, 165
COMMERCE, 127, 168, 169
COMMERCIAL AIRCRAFT, 7
COMMUNICATION, 42
COMMUNICATION CABLES, 153
COMMUNICATION NETWORKS, 45, 47, 128, 169
COMPARISON, 27
COMPLEX SYSTEMS, 12
COMPONENT RELIABILITY, 161
COMPOSITE MATERIALS, 23, 154
COMPOSITE PROPELLANTS, 19, 34
COMPOSITE STRUCTURES, 59
COMPRESSION TESTS, 39
COMPUTATION, 5, 14, 149
COMPUTATIONAL ELECTROMAGNETICS, 45
COMPUTATIONAL FLUID DYNAMICS, 5, 24, 134
COMPUTATIONAL GRIDS, 19, 161
COMPUTER AIDED DESIGN, 3, 128, 129
COMPUTER AIDED MANUFACTURING, 132
COMPUTER ASSISTED INSTRUCTION, 129, 172
COMPUTER INFORMATION SECURITY, 47, 123, 171, 175
COMPUTER NETWORKS, 48, 124, 133, 134, 169
COMPUTER PROGRAMMING, 129, 130, 131

COMPUTER PROGRAMS, 3, 5, 25, 48, 57, 91, 125, 127, 128, 130, 131, 132, 133, 159, 173, 174, 176
COMPUTER SYSTEMS DESIGN, 132, 133, 173
COMPUTER SYSTEMS PROGRAMS, 137
COMPUTER TECHNIQUES, 107, 109, 149, 167
COMPUTERIZED SIMULATION, 53, 121, 124, 138, 141, 152, 159
COMPUTERS, 124, 125, 126, 127, 132, 134
CONCRETES, 21
CONDENSATES, 97
CONFERENCES, 3, 4, 21, 22, 23, 31, 43, 45, 47, 52, 53, 55, 58, 60, 104, 105, 128, 150, 154, 158, 173
CONFIGURATION INTERACTION, 149
CONFINEMENT, 49, 155
CONGRESSIONAL REPORTS, 16, 32, 169, 170, 180
CONJUGATES, 119
CONNECTIVE TISSUE, 107
CONNECTORS, 13
CONSERVATION LAWS, 139
CONSTRICTIONS, 90
CONSTRUCTION, 20
CONTACT LENSES, 6
CONTAMINANTS, 88
CONTAMINATION, 3, 27, 90
CONTINENTAL SHELVES, 101
CONTINUOUS NOISE, 122
CONTINUOUS RADIATION, 160
CONTRACT MANAGEMENT, 166, 169
CONTRACTORS, 166
CONTRACTS, 166
CONTROL SYSTEMS DESIGN, 9, 12, 125, 138
CONTROL THEORY, 48, 138
CONTROLLERS, 51, 138
CONVECTION, 97
CONVERSATION, 170
COPPER COMPOUNDS, 39
COPYRIGHTS, 46, 133
CORONAS, 180
CORRIDORS, 59
CORROSION PREVENTION, 10
COSMIC RAYS, 116
COST ANALYSIS, 88
COST EFFECTIVENESS, 49, 168, 169
COST ESTIMATES, 125
COST REDUCTION, 115
COUNTERFLOW, 24, 43
COUPLINGS, 53
CRACK PROPAGATION, 23, 28
CREEP PROPERTIES, 23
CREW PROCEDURES (PREFLIGHT), 16
CRITICAL FREQUENCIES, 91
CROSS CORRELATION, 98
CROSS FLOW, 12
CROSSLINKING, 40
CRYOSTATS, 158
CRYSTAL DEFECTS, 163
CRYSTAL GROWTH, 21
CRYSTAL STRUCTURE, 163
CRYSTAL SURFACES, 19
CRYSTALLOGRAPHY, 15
CRYSTALS, 15
CULTURE TECHNIQUES, 42, 103, 105
CURRENT DENSITY, 136
CURRENT SHEETS, 155
CYCLONES, 97
CYLINDRICAL ANTENNAS, 46
CYLINDRICAL BODIES, 29
CYLINDRICAL SHELLS, 59
CYTOMETRY, 110
CZOCHRALSKI METHOD, 162

D

DAMAGE, 41, 162
DATA ACQUISITION, 13, 34, 57, 64, 65, 69, 71, 73, 74, 75, 78, 80, 81, 114, 118, 124
DATA BASES, 2, 22, 34, 37, 145, 150, 151, 174
DATA CORRELATION, 99
DATA FLOW ANALYSIS, 132
DATA MANAGEMENT, 123, 126, 134, 172
DATA MINING, 123
DATA PROCESSING, 71, 174, 175
DATA RETRIEVAL, 174
DATA SAMPLING, 65
DATA STORAGE, 123
DATA SYSTEMS, 143
DECAY RATES, 26, 52
DECISION MAKING, 115, 137, 167
DECISION SUPPORT SYSTEMS, 126, 167, 171
DECISION THEORY, 131, 138
DECOMMISSIONING, 157
DECOMPOSITION, 19, 36, 167
DECONTAMINATION, 157
DEFECTS, 116
DEFENSE PROGRAM, 1, 10, 17
DEFLECTORS, 164
DEFORMATION, 30
DEGRADATION, 40
DENSITY MEASUREMENT, 78
DEOXYRIBONUCLEIC ACID, 105, 111, 112, 117
DEPLETION, 39, 40
DEPLOYMENT, 5
DEPTH, 68, 74
DEPTH MEASUREMENT, 69
DERIVATION, 41
DESIGN ANALYSIS, 3, 9, 11, 51, 138
DESORPTION, 19
DESTABILIZATION, 155
DESTRUCTION, 84
DETECTION, 5, 20, 110
DEUTERONS, 164
DIABETES MELLITUS, 103
DIAGNOSIS, 33, 107, 109, 112, 162
DIESEL ENGINES, 31, 55
DIETS, 117
DIFFUSION, 49
DIFFUSION FLAMES, 24
DIGITAL SYSTEMS, 46, 109, 138, 173
DIGITAL TELEVISION, 45
DIMERIZATION, 119
DIODES, 50
DIRECT NUMERICAL SIMULATION, 53
DIRECTIONAL ANTENNAS, 42
DISCONTINUITY, 140, 148
DISCOVERY (ORBITER), 16
DISEASES, 102, 106, 118
DISPLACEMENT, 99
DISPOSAL, 32
DISSOLVED ORGANIC MATTER, 99
DISTRIBUTED INTERACTIVE SIMULATION, 138
DISTRIBUTED PROCESSING, 5, 133, 134, 139
DISTRIBUTION FUNCTIONS, 64, 69, 145
DIURNAL VARIATIONS, 79, 92
DIVERTORS (FUSION REACTORS), 160
DOCUMENT MARKUP LANGUAGES, 128
DOCUMENTS, 6, 171
DOSAGE, 115, 119, 120
DOUBLE BASE PROPELLANTS, 34, 38, 39
DRIFT, 156
DRONE AIRCRAFT, 11
DROP SIZE, 52
DRUGS, 119
DUCTILITY, 28
DWARF NOVAE, 177
DYNAMIC RESPONSE, 4
DYNAMIC STRUCTURAL ANALYSIS, 3, 4

E

EAR PROTECTORS, 122
EARTH (PLANET), 122
EARTH ATMOSPHERE, 18, 92
EARTH MOVEMENTS, 93
EARTH OBSERVING SYSTEM (EOS), 18, 61, 62
EARTH RADIATION BUDGET, 61
EARTH SCIENCES, 62, 93, 95
EARTHQUAKES, 93
ECONOMIC ANALYSIS, 168
ECONOMIC DEVELOPMENT, 128
ECONOMICS, 7
ECOSYSTEMS, 64, 67, 69, 104
EDUCATION, 10, 37, 46, 129, 165, 173, 175
EFFICIENCY, 171
EIGENVALUES, 140
EIGENVECTORS, 140
EL NINO, 83
ELASTIC PROPERTIES, 22
ELASTIC SCATTERING, 150, 152
ELECTRA AIRCRAFT, 72
ELECTRIC BATTERIES, 49
ELECTRIC CHARGE, 163
ELECTRIC CONNECTORS, 13
ELECTRIC POTENTIAL, 49
ELECTROACOUSTIC TRANSDUCERS, 146
ELECTROCATALYSTS, 25
ELECTROCHEMISTRY, 25, 28
ELECTRODE MATERIALS, 25
ELECTRODES, 28, 51
ELECTROLYTES, 25
ELECTROMAGNETIC COMPATIBILITY, 47
ELECTROMAGNETIC SCATTERING, 63
ELECTROMECHANICAL DEVICES, 56
ELECTRON BEAMS, 160
ELECTRON CAPTURE, 149
ELECTRON SCATTERING, 148
ELECTRON STATES, 149
ELECTRONIC EQUIPMENT, 42, 50
ELECTRONIC PUBLISHING, 172
ELECTRONIC STRUCTURE, 149
ELECTRONS, 49
ELEVATION, 75
ELLIPTIC DIFFERENTIAL EQUATIONS, 140
EMBEDDING, 136, 154
EMERGENCIES, 37
EMISSION SPECTRA, 26
EMITTERS, 44
EMOTIONAL FACTORS, 85
EMULSIONS, 21
ENERGY BUDGETS, 72
ENERGY CONSUMPTION, 57
ENERGY DISTRIBUTION, 179
ENERGY TECHNOLOGY, 104, 155
ENERGY TRANSFER, 67
ENGINE DESIGN, 147
ENGINE NOISE, 91, 147
ENGINEERING, 168
ENUMERATION, 126
ENVIRONMENT EFFECTS, 32, 62
ENVIRONMENT MANAGEMENT, 62
ENVIRONMENT MODELS, 94, 104
ENVIRONMENT PROTECTION, 28, 56, 89, 90, 96
ENVIRONMENTAL CONTROL, 122
ENVIRONMENTAL QUALITY, 28
ENZYMES, 111, 112
EOS DATA AND INFORMATION SYSTEM, 61
EPITHELIUM, 110
EQUATIONS OF STATE, 37
ERROR ANALYSIS, 145
ERRORS, 49, 143
ESTIMATES, 96, 99
ESTIMATING, 13, 60, 98
ESTROGENS, 114, 118
ESTUARIES, 101
ETHICS, 7, 102
ETHNIC FACTORS, 118
EVACUATING (TRANSPORTATION), 121
EVALUATION, 20, 121
EVAPORATION, 52
EVOLUTION (DEVELOPMENT), 178
EXCITONS, 144
EXHAUST GASES, 26
EXPERIMENT DESIGN, 157
EXPERIMENTATION, 26, 34
EXPERT SYSTEMS, 43, 137, 139
EXPLOSIONS, 39, 166
EXPLOSIVES, 32, 34, 37, 41
EXPONENTIAL FUNCTIONS, 139
EXPOSURE, 105, 106, 153
EXTRACTION, 24, 36
EXTRATERRESTRIAL LIFE, 122

F

FABRICATION, 55, 154, 157, 160, 164
FACE CENTERED CUBIC LATTICES, 164
FADDEEV EQUATIONS, 150
FAST NEUTRONS, 152
FEEDBACK CONTROL, 48
FEMALES, 105, 114, 115, 118
FIBER COMPOSITES, 22
FIBER OPTICS, 55, 146, 153, 154
FIELD EFFECT TRANSISTORS, 49
FINANCIAL MANAGEMENT, 48, 167, 170
FINITE ELEMENT METHOD, 45, 140
FIRE EXTINGUISHERS, 42, 43
FISSION, 151
FLAMES, 34
FLAMMABILITY, 26
FLAT PLATES, 4
FLIGHT CLOTHING, 121
FLIGHT CREWS, 6, 116
FLIGHT SIMULATION, 120
FLIGHT SIMULATORS, 120
FLIGHT TESTS, 11
FLIGHT TRAINING, 120
FLOW CHARACTERISTICS, 54
FLOW DISTRIBUTION, 96
FLOW MEASUREMENT, 78, 96
FLUID DYNAMICS, 4
FLUID MECHANICS, 24, 53
FLUX DENSITY, 78, 165
FOOD, 104
FOOTPRINTS, 63
FORECASTING, 96
FORESTS, 60, 64, 65, 67, 68, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81
FOURIER ANALYSIS, 44, 141
FOURIER TRANSFORMATION, 13
FRACTURE MECHANICS, 28, 31
FREE RADICALS, 26
FREQUENCIES, 47, 48
FREQUENCY DOMAIN ANALYSIS, 13
FREQUENCY MEASUREMENT, 50
FREQUENCY RESPONSE, 42, 50
FRICTION, 25
FUEL CELLS, 25, 51
FUEL CONTAMINATION, 83, 88
FUEL SPRAYS, 12
FUELS, 37, 82
FUSION, 156
FUSION REACTORS, 151, 157, 158, 159, 160, 161, 162
FUZZY SYSTEMS, 107

G

GALAXIES, 166
GALLIUM ANTIMONIDES, 22
GALLIUM ARSENIDES, 22
GALLIUM NITRIDES, 19
GAME THEORY, 138
GAMMA RAY BURSTS, 166
GAMMA RAYS, 151

GAS GIANT PLANETS, 179
GAS INJECTION, 12
GAS TRANSPORT, 84
GAS TUNGSTEN ARC WELDING, 82
GASES, 67
GASOLINE, 55
GAUGE THEORY, 177
GAUSS EQUATION, 149
GENE EXPRESSION, 120
GENES, 105, 111
GENETIC ALGORITHMS, 124, 125
GENETIC ENGINEERING, 109
GENETICS, 108, 115, 119
GEOGRAPHIC INFORMATION SYSTEMS, 59, 62
GEOLOGICAL SURVEYS, 93
GEOPHYSICS, 93, 94
GIRDERS, 57
GLACIERS, 100
GLOBAL POSITIONING SYSTEM, 7, 8
GLOBAL WARMING, 85
GLOW DISCHARGES, 158
GLUTAMIC ACID, 103
GOVERNMENT PROCUREMENT, 169
GOVERNMENTS, 125, 126, 180
GRAIN SIZE, 55
GRAPH THEORY, 124
GRAPHS (CHARTS), 93, 94
GRASSES, 60
GRASSLANDS, 60
GRAVIMETRY, 75
GRAVITATIONAL PHYSIOLOGY, 102, 108
GRAVITY WAVES, 92, 95
GROUND TESTS, 74
GROUND TRUTH, 45
GROUND WATER, 3, 88, 90
GROWTH, 29, 111
GUN PROPELLANTS, 32, 35, 36
GUNS (ORDNANCE), 29

H

HABITABILITY, 122, 166
HAMILTON-JACOBI EQUATION, 159
HANDBOOKS, 174
HARDWARE, 176
HAZARDOUS WASTES, 38
HAZARDS, 5, 28, 37
HEAD (ANATOMY), 121
HEALTH, 89, 106, 113, 118, 175
HEARING, 147
HEAT FLUX, 70
HEAT GENERATION, 22
HEAT RESISTANT ALLOYS, 21
HEAT SHIELDING, 158
HEATING, 32
HEAVY IONS, 152
HELICOPTERS, 9
HELIOSPHERE, 180
HELMETS, 121
HEMATOPOIESIS, 119
HETEROJUNCTIONS, 144
HEURISTIC METHODS, 130
HIGH ENERGY ELECTRONS, 159
HIGH ENERGY INTERACTIONS, 150
HIGH IMPULSE, 122
HIGH LEVEL LANGUAGES, 131
HIGH PASS FILTERS, 33
HIGH POWER LASERS, 55, 105
HIGH SPEED, 13
HISTOLOGY, 109
HMX, 34
HOLLOW CATHODES, 160
HONEYCOMB STRUCTURES, 30
HORIZONTAL ORIENTATION, 14
HORMONES, 120
HUMAN FACTORS ENGINEERING, 120
HUMAN-COMPUTER INTERFACE, 128, 142
HYBRID COMPOSITES, 154
HYDRAZINES, 36, 37, 41
HYDROCARBON FUELS, 83
HYDROCARBONS, 26
HYDROGEN IONS, 149
HYDROGEN PEROXIDE, 32
HYDROLOGY, 59, 66, 67, 68, 69, 74, 75, 80
HYDROLYSIS, 111
HYDROPHONES, 99
HYDROXYL RADICALS, 103
HYPERGOLIC ROCKET PROPELLANTS, 37
HYPERVELOCITY IMPACT, 58

I

IBM COMPUTERS, 173
ICE CLOUDS, 94
IDENTIFYING, 48, 107
IGNITION, 25, 26, 41, 156
IMAGE PROCESSING, 107, 109
IMAGERY, 64
IMAGING RADAR, 77
IMAGING SPECTROMETERS, 62
IMAGING TECHNIQUES, 77, 92, 107, 108, 109
IMMUNE SYSTEMS, 102, 108
IMMUNOASSAY, 90
IMMUNOLOGY, 108, 111
IMPEDANCE, 147
IMPINGEMENT, 52
IMPURITIES, 160
IN SITU MEASUREMENT, 98
INDEXES (DOCUMENTATION), 2, 6
INDUCTION HEATING, 22
INDUSTRIAL MANAGEMENT, 127
INDUSTRIAL WASTES, 38
INERTIA, 4
INFECTIOUS DISEASES, 111
INFORMATION, 172
INFORMATION DISSEMINATION, 28, 165
INFORMATION MANAGEMENT, 174
INFORMATION RETRIEVAL, 48, 123, 134, 142, 174
INFORMATION SYSTEMS, 47, 61, 97, 106, 107, 127, 170, 171, 172, 173
INFORMATION TRANSFER, 44, 165, 171
INFRARED DETECTORS, 22, 61
INFRARED INSTRUMENTS, 172
INFRARED LASERS, 54
INFRARED RADIATION, 18, 179
INFRARED SIGNATURES, 18
INFRARED SPECTRA, 64
INFRARED SPECTROMETERS, 65
INFRARED SPECTROSCOPY, 179
INHIBITORS, 24, 107, 119
INPUT/OUTPUT ROUTINES, 128
INSECTS, 103
INSTALLING, 160
INSULIN, 103
INTEGRALS, 139, 170
INTEGRATED CIRCUITS, 50, 142
INTELLIGENCE, 45
INTERCEPTORS, 11
INTERFACES, 23
INTERFACIAL TENSION, 54
INTERFEROMETERS, 172
INTERNAL COMBUSTION ENGINES, 56
INTERNAL ENERGY, 99
INTERNAL FLOW, 147
INTERNATIONAL SPACE STATION, 15, 16
ION BEAMS, 164
ION DENSITY (CONCENTRATION), 155
IONIZED GASES, 158
IONIZING RADIATION, 116
IONS, 155
IRON, 164
IRRADIATION, 114, 162
ISENTROPE, 179
ISOTOPIC LABELING, 100

J

JAVA (PROGRAMMING LANGUAGE), 124, 125, 133, 134
JET AIRCRAFT NOISE, 147
JET STREAMS (METEOROLOGY), 83
JOINTS (JUNCTIONS), 57
JUPITER (PLANET), 179

K

K-EPSILON TURBULENCE MODEL, 24
KALMAN FILTERS, 48
KINETIC EQUATIONS, 140, 164
KNOWLEDGE BASED SYSTEMS, 142

L

LABORATORIES, 27
LAMINATES, 23, 59
LAND SURFACE TEMPERATURE, 70
LANDFILLS, 84
LANDSAT SATELLITES, 62
LARGE EDDY SIMULATION, 2, 4
LARVAE, 103
LASER ALTIMETERS, 63
LASER BEAMS, 63, 105
LASER FUSION, 55
LASER MATERIALS, 54
LASER OUTPUTS, 54, 55, 153
LASER SPECTROMETERS, 88, 89
LASER SPECTROSCOPY, 55
LASERS, 153
LATENT HEAT, 70
LAUNCHING, 11
LAW (JURISPRUDENCE), 49
LAWS, 6
LEADERSHIP, 7, 168
LEONID METEOROIDS, 177
LESIONS, 109
LIBRARIES, 173
LIFE SUPPORT SYSTEMS, 121
LIFTING BODIES, 15
LIGHT (VISIBLE RADIATION), 93
LIGHT SCATTERING, 63
LINEAR ACCELERATORS, 150
LINEAR SYSTEMS, 143
LININGS, 121
LIQUID FUELS, 39
LIQUID ROCKET PROPELLANTS, 32, 39
LITHIUM BATTERIES, 51
LIVER, 42
LOCAL AREA NETWORKS, 132
LOGISTICS, 32
LONG TERM EFFECTS, 87
LONG WAVE RADIATION, 61
LOOPS, 48
LOSSES, 5
LOUDSPEAKERS, 147
LOW DENSITY MATERIALS, 22
LUBRICATING OILS, 31
LUNGS, 109
LYMPHOCYTES, 102, 119

M

MACHINE LEARNING, 130, 139, 142
MAGNESIUM ISOTOPES, 152
MAGNETIC COILS, 160
MAGNETIC EFFECTS, 144
MAGNETIC FIELD CONFIGURATIONS, 163
MAGNETIC FIELD RECONNECTION, 157
MAGNETIC FIELDS, 94, 144, 161
MAGNETIC FLUX, 93
MAGNETOHYDRODYNAMIC WAVES, 155
MAGNETOHYDRODYNAMICS, 161
MAGNETORESISTIVITY, 144
MAINTAINABILITY, 14
MAINTENANCE, 9, 50, 52
MALES, 105
MAMMALS, 106
MAMMARY GLANDS, 105, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120
MANAGEMENT ANALYSIS, 170
MANAGEMENT INFORMATION SYSTEMS, 174, 175
MANAGEMENT PLANNING, 16, 168, 169, 170, 174, 180
MANAGEMENT SYSTEMS, 166, 170
MANEUVERABILITY, 2
MANIPULATORS, 137
MANUALS, 172
MANUFACTURING, 9, 30, 37, 43
MAPPING, 73, 79
MARINE BIOLOGY, 100, 104
MARINE ENVIRONMENTS, 104
MARKOV PROCESSES, 136
MARS (PLANET), 166
MASS DISTRIBUTION, 88
MASS FLOW, 178
MASS SPECTRA, 148
MASSIVE STARS, 178
MATHEMATICAL LOGIC, 129, 131
MATHEMATICAL MODELS, 10, 22, 24, 25, 49, 54, 92, 101, 126, 130, 135, 137, 138, 141, 143
MATHEMATICAL PROGRAMMING, 130
MATHEMATICS, 129
MEASURE AND INTEGRATION, 44, 61, 63, 73, 152, 165, 171
MEASURING INSTRUMENTS, 69, 72, 128
MECHANICAL PROPERTIES, 22, 30, 31, 35, 40
MECHANICAL SHOCK, 39
MEDICAL EQUIPMENT, 121
MEDICAL PERSONNEL, 110
MEDICAL SCIENCE, 115
MEDICAL SERVICES, 106, 110, 121, 175
MEDITERRANEAN SEA, 100
MELTING, 76, 77
MEMBRANES, 105
MEMORY (COMPUTERS), 123
MENTAL PERFORMANCE, 110
MESOMETEOROLOGY, 94
MESON-MESON INTERACTIONS, 148
MESONS, 148
MESOSCALE PHENOMENA, 94, 95, 100
MESOSPHERE, 92
METABOLIC DISEASES, 103
METABOLISM, 105
METAL COATINGS, 29
METAL COMBUSTION, 25
METAL CRYSTALS, 164
METAL FINISHING, 44
METAL PROPELLANTS, 34
METAL SHEETS, 30, 55
METALLIZING, 23
METALS, 25
METASTABLE STATE, 30
METEOROID SHOWERS, 177
METEOROLOGICAL INSTRUMENTS, 68, 71, 72
METEOROLOGICAL PARAMETERS, 66, 67, 70, 71, 72, 80, 81, 82, 85, 96
METEOROLOGICAL RADAR, 63
METEOROLOGY, 68, 96
METHOD OF CHARACTERISTICS, 46
METHYL COMPOUNDS, 36
METROLOGY, 20
MICE, 117
MICROANALYSIS, 21
MICROELECTROMECHANICAL SYSTEMS, 123, 124
MICROGRAVITY, 42, 102, 108
MICROORGANISMS, 158
MICROSTRUCTURE, 20, 21, 55, 164
MICROWAVE ANTENNAS, 51
MICROWAVE CIRCUITS, 49
MICROWAVE FREQUENCIES, 47
MIDAIR COLLISIONS, 5, 6

MILITARY AIR FACILITIES, 90
MILITARY AIRCRAFT, 1
MILITARY OPERATIONS, 175
MILITARY TECHNOLOGY, 45
MILITARY VEHICLES, 56
MILLIMETER WAVES, 179
MINIMA, 129
MINIMAX TECHNIQUE, 138
MIRRORS, 164
MISSILE DEFENSE, 11
MISSILES, 48
MISSION PLANNING, 166, 176
MISSION TO PLANET EARTH, 181
MIST, 52
MIXING, 101
MIXING LENGTH FLOW THEORY, 12
MOBILE COMMUNICATION SYSTEMS, 47
MODELS, 14
MODULATION, 50
MODULATORS, 113
MODULES, 137
MOISTURE, 65, 66, 75
MOISTURE CONTENT, 66, 74, 76, 80
MOLECULAR BEAMS, 84
MOLECULAR BIOLOGY, 105
MOLECULAR DYNAMICS, 10
MOLECULAR STRUCTURE, 23
MOLECULES, 23, 154
MOLYBDENUM COMPOUNDS, 162
MONITORS, 37, 61
MONOPROPELLANTS, 34, 39, 41
MONTE CARLO METHOD, 53, 91
MORPHOLOGY, 19, 109
MORTALITY, 106
MULTIMEDIA, 147, 172
MULTIPATH TRANSMISSION, 45
MULTIPROCESSING (COMPUTERS), 133, 135
MUONS, 91, 154
MUSCULOSKELETAL SYSTEM, 118
MUTATIONS, 114, 115

N

NASA PROGRAMS, 168, 169
NATIONAL PARKS, 85
NAVIER-STOKES EQUATION, 140
NAVIGATION, 8
NEAR INFRARED RADIATION, 61, 153
NEEDLES, 29
NEON ISOTOPES, 152
NEOPLASMS, 112
NERVOUS SYSTEM, 108
NETWORKS, 69, 124
NEURAL NETS, 43, 130
NEUROPHYSIOLOGY, 108
NEUTRAL SHEETS, 157
NEUTRINOS, 91, 148
NEUTRON COUNTERS, 91
NEUTRON CROSS SECTIONS, 152
NEUTRON EMISSION, 162
NEUTRON IRRADIATION, 160
NEUTRON SCATTERING, 163
NEUTRON SOURCES, 152
NEUTRON SPECTRA, 151, 152
NEUTRONS, 164
NICKEL ALLOYS, 21, 36
NICKEL COMPOUNDS, 164
NIOBIUM ALLOYS, 30
NITRATES, 33
NITRATION, 33
NITROGEN, 39
NOISE INTENSITY, 147
NOISE POLLUTION, 85
NOISE PREDICTION (AIRCRAFT), 147
NOISE REDUCTION, 147
NONLINEAR OPTICS, 25
NONLINEAR SYSTEMS, 48
NONLINEARITY, 49, 57, 92, 101
NUCLEAR FUSION, 151, 154, 161
NUCLEAR PHYSICS, 150, 151
NUCLEAR POWER PLANTS, 126, 127
NUCLEAR REACTIONS, 151
NUCLEAR SCATTERING, 152
NUCLEI (NUCLEAR PHYSICS), 152, 163
NUMERICAL ANALYSIS, 2, 24
NUMERICAL CONTROL, 127
NUMERICAL INTEGRATION, 165
NUTRITIONAL REQUIREMENTS, 110

O

OBSERVATION, 96, 146
OBSTACLE AVOIDANCE, 137
OCEAN CURRENTS, 100, 101
OCEAN DYNAMICS, 98, 101
OCEAN MODELS, 98, 101
OCEAN SURFACE, 18, 101
OCEANOGRAPHY, 98, 100
OCEANS, 62
ON-LINE SYSTEMS, 47, 48, 139
ONE DIMENSIONAL FLOW, 146
OPERATING COSTS, 14
OPERATING SYSTEMS (COMPUTERS), 123
OPERATIONAL PROBLEMS, 162
OPERATIONS RESEARCH, 115
OPTICAL COMMUNICATION, 146, 154
OPTICAL CONTROL, 136
OPTICAL FIBERS, 153, 154
OPTICAL MEASUREMENT, 146
OPTICAL MEASURING INSTRUMENTS, 65, 154
OPTICAL RADAR, 17
OPTIMIZATION, 3
OPTOELECTRONIC DEVICES, 22, 50
ORBIT CALCULATION, 177
ORBITAL ELEMENTS, 14, 177, 178
ORBITAL MECHANICS, 177
ORBITS, 177
ORGANIC CHEMISTRY, 112
ORGANIC MATERIALS, 82
ORGANIZATIONS, 9, 28, 102, 126, 180
ORIFICES, 147
OSCILLATING FLOW, 92
OSCILLATIONS, 92, 148
OSCILLATORS, 92
OSTEOPOROSIS, 118
OXIDATION, 40, 56
OXYGEN, 23, 25, 26
OXYGEN SUPPLY EQUIPMENT, 121
OZONE, 43, 70, 87, 94
OZONE DEPLETION, 84

P

PACKAGING, 45
PAINTS, 31
PALEONTOLOGY, 100
PANELS, 35
PARALLEL PROCESSING (COMPUTERS), 4, 5, 135
PARALLEL PROGRAMMING, 135
PARTICLE COLLISIONS, 93, 150
PARTICLE DECAY, 149
PARTICLE INTERACTIONS, 150
PARTICULATES, 86
PATCH ANTENNAS, 46
PATHOLOGY, 108
PATIENTS, 117
PATTERN RECOGNITION, 130
PAVEMENTS, 21, 31
PAYLOAD TRANSFER, 137
PENTABORANES, 26
PEPTIDES, 112, 116
PERCEPTION, 45
PERFORATED PLATES, 147
PERFORMANCE PREDICTION, 11
PERFORMANCE TESTS, 20, 56, 85
PERSONNEL MANAGEMENT, 16, 48, 170
PERTURBATION, 87
PERTURBATION THEORY, 14
PHARMACOLOGY, 117

PHASE SHIFT, 150
PHASE TRANSFORMATIONS, 30, 164
PHENOMENOLOGY, 58
PHOSPHORIC ACID, 24
PHOTODIODES, 50
PHOTOLUMINESCENCE, 144
PHOTOLYSIS, 113
PHOTOMETERS, 69
PHOTOMETRY, 176
PHOTOSPHERE, 179
PHYSICAL FACTORS, 52
PHYSIOLOGICAL EFFECTS, 104
PHYSIOLOGICAL FACTORS, 121
PHYSIOLOGICAL RESPONSES, 108, 110, 113
PHYTOPLANKTON, 99
PILOTLESS AIRCRAFT, 11
PISTON ENGINES, 56
PITCHING MOMENTS, 2
PIXELS, 98
PLANETARY ATMOSPHERES, 95
PLANETARY BOUNDARY LAYER, 70
PLANETARY ENVIRONMENTS, 95
PLANETARY EVOLUTION, 178
PLANETARY NEBULAE, 179
PLANETARY WAVES, 92, 94
PLANETS, 122
PLANNING, 127, 136, 137, 173
PLASMA CURRENTS, 155, 156
PLASMA DIAGNOSTICS, 158, 161
PLASMA GENERATORS, 160
PLASMA PHYSICS, 154, 155, 156, 157, 158, 161
PLASMA SPRAYING, 21
PLASMAS (PHYSICS), 38, 41, 107, 155, 158, 160, 161, 162
PLATING, 29
POISSON EQUATION, 142
POLAR METEOROLOGY, 94
POLAR REGIONS, 94
POLICE, 7
POLICIES, 7, 102, 115
POLLUTION CONTROL, 44, 84, 86, 89
POLLUTION MONITORING, 44, 84, 86, 88
POLYCHLORINATED BIPHENYLS, 28, 82, 90
POLYCYCLIC AROMATIC HYDROCARBONS, 3
POLYMER CHEMISTRY, 33
POLYNOMIALS, 139
POPULATIONS, 135
POTABLE WATER, 88
POTENTIAL ENERGY, 149
POWER AMPLIFIERS, 49
PRE-MAIN SEQUENCE STARS, 178
PRECIPITATION (METEOROLOGY), 75, 96
PRECISION, 176
PREDICTION ANALYSIS TECHNIQUES, 91, 134
PREGNANCY, 116
PREJUDICES, 170
PRELAUNCH SUMMARIES, 15
PREPOLYMERS, 32
PRESSURE OSCILLATIONS, 33
PREVENTION, 113, 118
PRIORITIES, 20
PROBABILITY THEORY, 135
PROBLEM SOLVING, 140, 142
PROCUREMENT, 50
PROCUREMENT POLICY, 166
PRODUCT DEVELOPMENT, 132, 162
PRODUCTION COSTS, 167
PRODUCTION ENGINEERING, 43
PRODUCTION PLANNING, 52
PRODUCTIVITY, 167
PROGNOSIS, 110, 117, 130
PROGRAM VERIFICATION (COMPUTERS), 131, 132, 135, 172
PROGRAMMERS, 131
PROGRAMMING ENVIRONMENTS, 133
PROGRAMMING LANGUAGES, 132
PROGRAMS, 20
PROGRESS, 165
PROJECT MANAGEMENT, 10, 130, 131, 166, 168
PROJECTILES, 57
PROPAGATION, 153
PROPELLANT ADDITIVES, 34
PROPELLANT GRAINS, 41
PROPELLANTS, 27, 33, 34, 36, 39, 40, 41
PROPORTIONAL NAVIGATION, 48
PROPULSION, 19, 35, 55
PROSTATE GLAND, 110, 112
PROTACTINIUM ISOTOPES, 152
PROTECTION, 17, 125
PROTEIN CRYSTAL GROWTH, 15
PROTEINS, 103, 105, 107, 109, 110, 111, 112, 113, 117
PROTOCOL (COMPUTERS), 135
PROTONS, 163
PROTOTYPES, 125
PSYCHOLOGICAL EFFECTS, 104
PSYCHOPHYSIOLOGY, 104
PUBLIC HEALTH, 114, 115, 117, 118
PULSED LASERS, 63
PUMPING, 31
PURITY, 27
PYROTECHNICS, 37

Q

QUALIFICATIONS, 42
QUALITY CONTROL, 27, 172
QUANTITATIVE ANALYSIS, 63
QUANTUM CHEMISTRY, 164
QUANTUM CHROMODYNAMICS, 148
QUANTUM ELECTRODYNAMICS, 49
QUANTUM THEORY, 165
QUANTUM WELLS, 136, 144
QUATERNIONS, 14
QUIET ENGINE PROGRAM, 147

R

RADAR, 8
RADAR IMAGERY, 78
RADAR MEASUREMENT, 17
RADIAL VELOCITY, 178
RADIANCE, 77, 78, 87
RADIATION DOSAGE, 104, 116
RADIATION EFFECTS, 120, 153, 162
RADIATION PROTECTION, 104, 116, 137
RADIATION THERAPY, 114
RADICALS, 93
RADIO ASTRONOMY, 180
RADIO COMMUNICATION, 42, 47
RADIO FREQUENCIES, 42, 49, 52
RADIOMETERS, 61, 64
RADIOSONDES, 71, 82
RADIOTELEPHONES, 45
RAIN, 63, 69, 73, 76
RAIN GAGES, 76
RANDOM ACCESS MEMORY, 123
RANDOM SAMPLING, 114
RANDOM VARIABLES, 141
RATS, 109
REACTANCE, 147
REACTION KINETICS, 30, 43, 51
REACTION PRODUCTS, 36
REACTIVITY, 19, 84
REACTOR MATERIALS, 151
REACTOR PHYSICS, 151
READ-ONLY MEMORY DEVICES, 172
REAL TIME OPERATION, 8, 10, 13, 108, 134, 145, 147, 165
RECHARGING, 51
RECOMMENDATIONS, 5, 175
RECONNAISSANCE, 138
REFLECTANCE, 65
REGENERATION (PHYSIOLOGY), 117, 118
REGRESSION ANALYSIS, 91
REGULATIONS, 7, 102, 115

RELATIONAL DATA BASES, 126, 172
RELATIVISTIC PARTICLES, 159
RELIABILITY, 14, 20, 40, 91
REMOTE SENSING, 62, 64, 67, 68, 69, 72, 98
REMOTELY PILOTED VEHICLES, 138
RENORMALIZATION GROUP METHODS, 24
REPLACING, 39
REPRODUCTION (BIOLOGY), 106
REPRODUCTION (COPYING), 133
RESEARCH, 20, 84, 102, 110, 151, 175
RESEARCH AIRCRAFT, 1
RESEARCH AND DEVELOPMENT, 27, 35, 41, 44, 95, 162, 171, 181
RESEARCH FACILITIES, 49, 168
RESONANCE, 154
RESONANT TUNNELING, 50
REYNOLDS NUMBER, 24
RISK, 89, 114, 118, 126
ROBOTICS, 51, 137
ROCKET ENGINES, 39
ROCKET SOUNDING, 68
ROTATING DISKS, 51
RUNGE-KUTTA METHOD, 165

S

S WAVES, 150
SAFETY, 2, 5, 28, 37, 38, 49, 161
SAFETY MANAGEMENT, 6, 104
SALINITY, 101
SAMPLING, 110
SATELLITE COMMUNICATION, 47
SATELLITE IMAGERY, 62, 98
SATELLITE INSTRUMENTS, 61
SATELLITE OBSERVATION, 61, 85
SATELLITE ORBITS, 14
SATURN (PLANET), 179
SCATTERING, 148
SCATTERING AMPLITUDE, 148
SCATTERING CROSS SECTIONS, 152
SCAVENGING, 125
SCHEDULING, 136
SCINTILLATION, 26
SEALERS, 21, 89
SEAS, 101
SEASONS, 98
SEDIMENT TRANSPORT, 101
SEDIMENTS, 82
SELECTIVE DISSEMINATION OF INFORMATION, 171
SEMICONDUCTORS (MATERIALS), 22, 136, 144
SENSITIVITY, 19
SEPARATED FLOW, 53
SERVICE LIFE, 35
SERVICE MODULE (ISS), 16
SHALLOW WATER, 3, 45, 99
SHAPES, 63
SHEAR FLOW, 4
SHEAR STRAIN, 30
SHEARING, 30
SHELL THEORY, 59
SIGNAL PROCESSING, 147
SILICON, 164
SIMULATION, 13, 84, 121, 156, 161, 164
SIMULATORS, 35
SINGLE CRYSTALS, 164
SIZE DISTRIBUTION, 69
SLOPES, 141
SMART STRUCTURES, 154
SNOW, 67, 68, 74, 76, 79, 80
SNOW COVER, 74, 79, 80
SOFTWARE DEVELOPMENT TOOLS, 133
SOFTWARE ENGINEERING, 126, 128, 130, 131, 132, 174
SOFTWARE RELIABILITY, 126
SOIL EROSION, 62, 141
SOIL MAPPING, 62
SOIL MOISTURE, 66, 74, 76, 80
SOIL POLLUTION, 83
SOIL SAMPLING, 3, 76
SOIL SCIENCE, 80
SOILS, 66
SOLAR ACTIVITY, 91, 93, 94, 180
SOLAR ACTIVITY EFFECTS, 180
SOLAR ATMOSPHERE, 180
SOLAR FLARES, 93, 94, 179
SOLAR FLUX, 94
SOLAR NEUTRINOS, 148
SOLAR PHYSICS, 93, 94
SOLAR PROMINENCES, 93
SOLAR RADIATION, 61, 93
SOLAR RADIO BURSTS, 93
SOLAR RADIO EMISSION, 94
SOLAR WIND, 93
SOLAR X-RAYS, 93
SOLID CRYOGENS, 23
SOLID PHASES, 24
SOLID PROPELLANT COMBUSTION, 34
SOLID PROPELLANT ROCKET ENGINES, 19
SOLID PROPELLANTS, 37
SOLID STATE LASERS, 54
SOLID WASTES, 84
SOLUBILITY, 54
SOLVENTS, 90, 106
SOLVOLYSIS, 26
SOUND TRANSDUCERS, 146
SOUNDING, 18
SOUNDING ROCKETS, 68
SOUTHERN OSCILLATION, 83
SPACE COMMUNICATION, 47
SPACE EXPLORATION, 181
SPACE PLATFORMS, 137
SPACE STATIONS, 15, 137
SPACE TRANSPORTATION, 181
SPACE-TIME FUNCTIONS, 165
SPACEBORNE EXPERIMENTS, 15, 18
SPACECRAFT CABIN ATMOSPHERES, 122
SPACECRAFT COMPONENTS, 42
SPACECRAFT CONSTRUCTION MATERIALS, 95
SPACECRAFT CONTROL, 136
SPACECRAFT ENVIRONMENTS, 122
SPACECRAFT LANDING, 16
SPACECRAFT LAUNCHING, 15, 16
SPACECRAFT MAINTENANCE, 16
SPACECRAFT POWER SUPPLIES, 51
SPACECREWS, 16
SPATIAL DISTRIBUTION, 65, 66, 67, 68, 75, 76, 79
SPATIAL RESOLUTION, 65
SPECIFICATIONS, 20, 27
SPECTRA, 47, 65, 153
SPECTRAL REFLECTANCE, 62, 64
SPECTRAL SIGNATURES, 64
SPECTROPHOTOMETERS, 20
SPECTROPHOTOMETRY, 20
SPECTRORADIOMETERS, 62
SPECTRUM ANALYSIS, 93, 101
SPHERES, 63
SPIN EXCHANGE, 164
SPONTANEOUS COMBUSTION, 26
SPRAYERS, 24
SPUTTERING, 29, 164
STABILITY, 57
STABILIZERS (AGENTS), 32, 39
STAINLESS STEELS, 159
STANDARDS, 20, 49, 50
STATIC STABILITY, 179
STEADY STATE, 51
STEEL STRUCTURES, 159
STEELS, 29
STELLAR MASS, 178
STELLAR MASS EJECTION, 180
STELLAR SYSTEMS, 176
STELLARATORS, 156
STIFFNESS, 23
STIMULATION, 119
STOCHASTIC PROCESSES, 135, 141
STORAGE BATTERIES, 51

STORAGE STABILITY, 35
STRATIFICATION, 179
STRATOSPHERE, 43, 84, 87, 94
STRESS (BIOLOGY), 108
STRESS (PSYCHOLOGY), 104
STRESS ANALYSIS, 159
STRESS INTENSITY FACTORS, 23
STRUCTURAL ANALYSIS, 59, 155
STRUCTURAL DESIGN, 59, 158
STRUCTURAL ENGINEERING, 174
SUBSTRUCTURES, 57
SULFURIC ACID, 84
SUM RULES, 148
SUN, 179, 180
SUNSPOTS, 94, 179
SUPERCONDUCTING MAGNETS, 150, 160
SUPERCONDUCTIVITY, 150
SUPERSONIC JET FLOW, 93
SURFACE DEFECTS, 29
SURFACE EMITTING LASERS, 54
SURFACE PROPERTIES, 64
SURFACE REACTIONS, 19
SURFACE ROUGHNESS, 164
SURFACE STABILITY, 54
SURFACE TEMPERATURE, 52, 66, 96
SURFACE TREATMENT, 21
SURFACE WATER, 99
SURFACE WAVES, 101
SURVEYS, 93, 118, 126
SUSPENSION SYSTEMS (VEHICLES), 56
SYSTEM FAILURES, 127
SYSTEM IDENTIFICATION, 3
SYSTEMATIC ERRORS, 85
SYSTEMS ANALYSIS, 12, 131, 134, 171
SYSTEMS ENGINEERING, 138
SYSTEMS MANAGEMENT, 175

T

TANKER AIRCRAFT, 9
TANTALUM, 29
TARGET RECOGNITION, 145
TARGETS, 57
TASKS, 49
TECHNOLOGICAL FORECASTING, 128, 168, 176
TECHNOLOGIES, 95
TECHNOLOGY ASSESSMENT, 32, 88, 145
TECHNOLOGY TRANSFER, 28, 44
TECHNOLOGY UTILIZATION, 38, 51, 95, 134, 168, 176, 181
TELEVISION CAMERAS, 18
TELEVISION SYSTEMS, 173
TEMPERATURE EFFECTS, 10, 40
TEMPERATURE PROFILES, 71, 80
TEMPORAL DISTRIBUTION, 76
TEMPORAL RESOLUTION, 65, 66, 93, 152
TERRAIN, 97
TERRAIN ANALYSIS, 62
TEST FACILITIES, 25
TEST STANDS, 44
TEXAS, 114
THEORETICAL PHYSICS, 149
THERAPY, 112, 113, 119, 120
THERMAL ANALYSIS, 10, 30
THERMAL INSULATION, 158
THERMAL RADIATION, 53
THERMAL STABILITY, 10, 32
THERMOCLINES, 179
THERMODYNAMIC PROPERTIES, 22, 43, 100
THERMODYNAMICS, 25, 33, 37
THERMOELECTRIC GENERATORS, 82
THERMONUCLEAR REACTIONS, 158, 159, 160, 161
THERMOSPHERE, 14
THIN WALLED SHELLS, 59
THOMSON SCATTERING, 162
THREE DIMENSIONAL MODELS, 24, 161
TIDES, 99, 101
TIME DEPENDENCE, 35
TIME FUNCTIONS, 26, 45
TIME MEASUREMENT, 176
TIME SERIES ANALYSIS, 57, 74, 134, 176
TIN, 29
TISSUES (BIOLOGY), 105, 108
TITANIUM, 164
TITANIUM ALLOYS, 30, 55
TITANIUM ALUMINIDES, 30
TOKAMAK DEVICES, 157, 159, 160, 161, 162
TOPOGRAPHY, 63, 73, 75
TOROIDAL PLASMAS, 155, 161
TORUSES, 157
TOXICITY, 37, 38, 106, 117, 122
TOXICOLOGY, 117
TOXINS AND ANTITOXINS, 119
TRAILING EDGES, 4
TRANSDUCERS, 33
TRANSMISSION LINES, 154
TRANSMISSIVITY, 67, 68
TRANSMITTANCE, 20
TRANSPORTATION, 50
TRANSPORTER, 82
TREES (MATHEMATICS), 143
TROPOSPHERE, 71, 81, 84, 87, 94, 179
TUMORS, 110, 111, 112, 113, 118, 119
TURBULENCE, 24, 101
TURBULENT BOUNDARY LAYER, 4
TURBULENT FLOW, 4
TYPHOONS, 97
TYROSINE, 110

U

ULTRASONICS, 108
UNDERWATER VEHICLES, 8
UNIVERSITIES, 120
UNSTRUCTURED GRIDS (MATHEMATICS), 3
UPPER ATMOSPHERE, 78
USER MANUALS (COMPUTER PROGRAMS), 91
USER REQUIREMENTS, 9

V

VACCINES, 113
VACUUM, 165
VACUUM CHAMBERS, 13
VANES, 8, 24
VAPOR DEPOSITION, 19, 29
VAPOR PRESSURE, 37
VEGETATION, 73
VEHICLES, 15
VELOCITY DISTRIBUTION, 98
VERTICAL DISTRIBUTION, 63, 70
VERTICAL ORIENTATION, 14
VIDEO SIGNALS, 45
VOLATILE ORGANIC COMPOUNDS, 88
VORTICES, 2
VORTICITY, 95, 179
VULNERABILITY, 57, 171

W

WAKES, 2
WALL FLOW, 4
WAR GAMES, 165
WARFARE, 17
WARNING SYSTEMS, 6
WASTE DISPOSAL, 38
WATER, 24, 80
WATER BALANCE, 60
WATER CONSUMPTION, 78
WATER DEPTH, 101
WATER FLOW, 59, 101
WATER MANAGEMENT, 60
WATER POLLUTION, 83, 88
WATER QUALITY, 59, 60

WATER RESOURCES, 60
WATER TREATMENT, 88
WATER VAPOR, 66, 69, 70
WATERSHEDS, 3
WAVE DISPERSION, 148
WAVE INTERACTION, 92
WAVE PROPAGATION, 42
WAVE SCATTERING, 148
WAVEFORMS, 63
WAVELET ANALYSIS, 93, 95
WAVES, 101, 146
WEAPON SYSTEMS, 10, 11
WEAPONS, 7, 17
WEATHER FORECASTING, 81
WETLANDS, 60
WHARVES, 57
WHITE DWARF STARS, 177
WIDE AREA NETWORKS, 123
WIND DIRECTION, 72
WIND PROFILES, 72
WIND SHEAR, 5
WIND TUNNEL TESTS, 53
WIND VELOCITY, 72
WINTER, 66, 83
WIRELESS COMMUNICATION, 45
WORLD WIDE WEB, 47

X

X RAY SOURCES, 177
X RAY SPECTRA, 178
X RAYS, 94, 109

Z

ZINC, 100
ZONAL FLOW (METEOROLOGY), 92

Personal Author Index

A

Aagaard Soerensen, S., 163
Abdul Rahman, A. M., 127
Abib, Mohammed, 53
Achatz, Robert J., 49
Adler, Robert F., 96
Afanasev, S. V., 164
Agrawal, Govind, 54
Akhmedov, E., 148
Allison, Michael, 95, 178
Alonso, V., 127
Alvarez, Bernabe, 25
Ames, Lawrence L., 172
Ancona, Mario G., 49
Anderson, Grant S., 85
Anderson, I. M., 21
Anderson, W. Kyle, 3
Ando, T., 159
Antman, Melissa D., 84
Arguelles, Michael A., 165
Artemov, A. S., 164
Asano, Y., 26
Assink, Roger, 40
Atkinson, Robert K., 129
Atluri, S. N., 23
Atsatt, Sean, 124
Awschalom, D. D., 144
Aziz, M. J., 19

B

Baba, M., 151
Babalola, I. A., 104
Badie, Sameh S., 57
Badler, Norman, 172
Baker, D. L., 27
Baker, David L., 37
Baldocchi, Dennis, 69
Balla, R. Jeffrey, 146
Band, L. E., 69, 75
Barkstrom, Bruce R., 60
Barnes, G., 156
Barr, Alan, 77, 81
Barragan, Michelle H., 37
Bartoe, Kevin, 174
Bartram, M. E., 19
Baumgartner, Robert M., 85
Bayne, C. K., 28, 90
Bean, Debra F., 169
Beckstead, M. W., 33, 34
Bedrossian, Nazareth S., 137
Beeson, H. D., 27
Behr, Peter M., 84
Bekhechi, S., 164
Benard, Doug, 137
Benner, William, 97
Bennett, Richard L., 9
Beno, J., 56
Berkooz, Gail, 4
Bessis, D., 148
Betlem, Hans, 177
Betts, Alan, 80
Betts, Juan Fernando, 147
Biegel, Bryan A., 49
Bielecki, Pavel, 171
Birk, A., 40
Bivins, D., 86
Bixon, Eric R., 35
Blair, J. Bryan, 62
Blake, Butch O., 121
Blank, K., 6
Blevins, Linda G., 43
Blomshield, F. S., 34
Blomshield, Fred S., 18
Boehm, Barry, 131
Bogdanov, D. D., 152
Bojko, V. V., 164
Borowiec, J. D., 7
Bosart, Lance F., 94
Bottasso, Carlo L., 140
Bousman, William G., 2
Bowen, Donnell, 115
Bowen, Melissa Marie, 101
Bowles, Roland L., 5
Boyle, Edward S., 172
Branda, Richard F., 117
Brandl, Thomas, 173
Brandon, Joseph H., 31
Brar, Berinder, 50
Bresie, D., 56
Breskovic, C., 126
Bridges, J. S., 44
Brinksma, E., 141
Broadhead, Michael K., 44
Brock, John C., 98
Brooks, A., 156
Brooks, J., 144
Brow, Chirstopher, 98
Brown, E., 108
Brown, G., 88
Brown, M. J., 96
Brown, Myles, 120
Brown, Richard W., 14
Brown, W. M., 62
Bryan, Randal E., 131
Bryant, R. E., 129
Bryant, William F., Jr., 31
Buck, K., 122
Burch, Carl, 139
Burdick, Mark D., 121
Bylsma, W., 56
Bystritskij, V. M., 154

C

Cadwallader, L. C., 160
Cardenas, M., 154
Carlton, Gary N., 10
Carney, D. J., 130
Carr, Walter A., 31
Carroll, Thomas, 66, 74
Carson, Matthew W., 112
Cartwright, David E., 99
Carty, Thomas, 97
Castell, Karen D., 51
Castellano, T., 176
Celina, Mathew, 40
Chambers, Joseph R., 1
Chan, K. L., 92
Chang, Alfred T. C., 79
Chang, W., 132
Chao, E. H., 155
Charagundia, S. Rao, 24
Charlock, Thomas P., 60
Chason, E., 19
Chen, Huei-Mei, 111
Chen, Wen-Tien, 112
Chen, Zhikai, 133
Cheng, C. Z., 155
Cheng, Hung-Chi, 109
Chiang, Weiling, 57
Chiarotti, G., 23
Chien, Janeet Y. L., 79
Chin, Robert, 125
Choy, Steven, 128
Chrzanowski, J., 157
Chrzanowski, J. H., 156
Chu, Deryn, 51
Chu, F., 162
Chubov, Y., 152
Chyczewski, Thomas S., 4

Ciecka, Ronald, 8
Clark, R., 144
Clark, Richard M., 11
Clement, P., 139
Clements, Paul, 132
Cliff, Matthew D., 34
Clinton, P. J., 61
Coffey, Helen E., 93, 94
Colombano, Silvano P., 51
Concha, C. L., 168
Connes, A., 165
Cooper, Al, 72
Cooper, D., 102, 108
Copeland, Kyle, 116
Corcoran, M. F., 177
Corona-Bittick, Kelli, 154
Corrado, C., 167
Coulter, C. T., 88
Cramer, R. J., 36
Crawford, Timothy L., 69
Creighton, J., 19
Crooker, S. A., 144
Cuenca, Richard H., 73, 80
Culver, Mary, 98
Cummings, A., 60
Curran, Robert J., 87

D

D, 90
Dahlin, G., 127
Dalberg, E., 91
Dalke, Roger A., 49
Dalu, G., 85
Damon, Craig A., 126
Daniels, W. L., 60
Danishefsky, Samuel J., 112
DArgenio, P. R., 141
Das, Gopal, 29
David Robert E., 66
Davidson, R. C., 155
Davis, Chuck, 26
Davis, Robert E., 67
Day, G. W., 154
DeBruyn, Warren J., 84
Decesaris, Chet, 11
DeCroix, D. S., 96
Dee, P. E., 38
DelGuercio, M., 40
Derby, Herb, 132
Desjardins, Raymond L., 70, 71
Dexter, Richard M., 34
Deyannis, Christos, 42
Di Maio, A., 127
Dinda, Peter A., 134
Dindal, A. B., 28, 90
Dingel, Juergen, 135
Direnzo, James, 120
Domack, Marcia S., 30
Dorais, Gregory A., 137
Dorn, Claudia, 26
Douglass, Anne R., 83
Doyle, Timothy C., 55
Drescher, Eric, 89
Dresser, G. B., 7
Driver, K. A., 139
Duke, Frances E., 116
Duman, John G., 103
Dumas, Ed, 70
Dunlevy, Colleen A., 3
Dye, Dennis G., 79

E

Eassa, Charles N., 171
Ebisawa, K., 159
Ebisawa, T., 163
Einfeld, W., 88
Eirik, Malnes, 44
Ek, P., 127
Eley, F. Joe, 76
Elgar, Steve, 101
Ellenson, W. D., 85
England, Ellen E., 10
Enoeda, M., 159
Eremin, A. V., 152
Ericsson, A. M., 127
Erignac, Charles, 172
Erlebacher, J., 19
Esaias, F. L., 168
Escapule, William R., 32
Evans, Steve, 177
Everson, A., 59

F

Fagerstrom, Frederick C., 127
Falgout, D., 56
Falgut, D., 55
Faloutsos, Christos, 174
Fanjoy, J., 84
Farsund, Bodil Hvesser, 124
Ferguson, N. S., 3, 4
Ferman, M. A., 3
Fernaldi, A., 59
Fernandes, Richard, 65, 74
Ferrando, R., 164
Filius, Krag, 38
Fink, Bruce K., 22, 154
Fleming, G., 90
Floro, J. A., 19
Flynn, John S., 120
Foarde, K. K., 89
Fomchenko, N., 60
Ford, L. H., 165
Foreman, J. T., 130
Forrester, E. C., 130
Forsberg, Flemming, 109
Foster, James L., 79
Fowlkes, Jeffrey B., 107
Fox, R. E., 168
Frame, E. A., 31
Franco-Ferreira, E. A., 82
Frank, Jeremy, 136
Frank, Kari Lou, 173
Freeman, Jean L., 114
Freeman, M. A., 4
Freemantle, Jim, 64, 78
Friedberg, Patricia, 153
Friedberg, Wallace, 116
Frost, Shaun M., 153
Frumkin, Michael, 133
Fry, Chuck, 137
Fu, Chunming, 52
Fu, G. Y., 155
Fujii, Y., 136
Fukahori, T., 150
Fuller, Chris, 147
Furrow, K. W., 39
Furrow, Keith W., 35, 40

G

Gabrielson, Thomas B., 48
Gaines, Donald F., 26
Gamble, Ed, 137
Ganger, Gregory R., 123
Garber, Steven, 115
Garlan, David, 134
Garrett, J. D., 162
Gaughen, C. D., 31
Gavaskar, Arun, 89, 90
Gertner, George, 141
Ghiorse, Linda L., 22
Gillespie, John W., Jr., 22
Gilman, Jeffrey W., 9
Gitzhofer, Francois, 21
Glick, R. L., 33
Globus, Al, 124, 125
Gnewuch, Harald, 146
Goodison, Barry E., 73, 74
Goodman, H. Michael, 96

Goodson, Garth R., 123
Goodwin, John L., 38
Goorjian, Peter M., 54
Gorelenkov, N. N., 155
Gorelenkova, M. V., 155
Gould, Michael N., 104
Graettinger, C. P., 130
Graham, Allyson, 69, 75, 76
Green, Robert O., 65
Greene, Ben, 36
Gregg, Watson W., 97
Griffin, John L., 123
Griffith, Brian D., 96
Gripenberg, G., 139
Groves, J., 125
Grubelich, Mark C., 32
Guenin, A., 56
Gulding, J., 90
Gunter, Laureen, 69
Gunther, Roland, 113
Gupta, Neeraj, 89, 90

H

Habirun, 91
Haimovich, Alexander M., 45
Haith, Gary L., 51
Hale, Paul D., 50
Hall, Carlton R., 3
Hall, Dorothy, 79
Hall, Forrest G., 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81
Hall, Jim, 5
Hamada, K., 158
Han, K. S., 31
Hane, Thomas, 9
Hansen, David S., 138
Hansen, Lise-Lotte, 23
Hansen, W. J., 130
Hansen, Wilfred J., 131
Harding, Richard, 66
Hardy, Janet P., 66, 67
Hargreaves, Margaret K., 118
Harper, J. W., 107
Harper, Robert, 129
Harrand, Vincent J., 4
Harris, Violaine K., 113
Hart, Roger C., 146
Hartle, Richard E., 92
Hartmann, Lee W., 178
Hassan, S. F., 177
Hasselblad, V., 86
Hatter, Steven D., 144
Hawkins, Tom W., 39
Heberlein, Joachim, 21
Heitzenroeder, P., 156
Heitzenroeder, P. J., 156
Hensley, Melissa A., 3
Herbers, T. H. C., 101
Herring, G. C., 146
Hessler, R. O., 33
Hicks, James, 89, 90
Higuchi, T., 159
Hinton, David A., 5
Hirakawa, N., 151
Hofmann, Eileen E., 104
Hofton, Michelle A., 62
Holben, Brent, 79
Hontinfinde, F., 164
Hornung, Steve D., 37
Horonjeff, Richard D., 85
House, Patricia L., 173
Howard, B. D., 82
Hrivnak, Bruce J., 179
Hrynkiw, Charmaine, 77, 81
Hsu, S., 157
Huang, Norden, 93
Huang, Norden E., 57
Huber, Marcia L., 43
Huemmrich, Karl Fred, 66
Huhtanen, Marko, 143
Humberstone, Liam, 146
Hunt, P. Dwight, 175
Hunter, Philip, 27
Huopaniemi, Jyri, 146
Hurt, Morgan P., 120
Hwang, W., 31

I

Iacovazzi, R., 85
Ichihara, A., 149
Ichihara, C., 150
Igashira, M., 152
Iida, T., 161
Ikeda, Y., 161
Iqbal, M. J., 148
Isacsson, M., 28
Isaksson, S., 127
Ishibashi, K., 177
Ishige, Y., 162
Ismail, Ismail M. K., 39
Ito, A., 158
Ito, K., 86
Itoh, H., 26
Iwamoto, O., 149

J

Jackson, Catheryn L., 9
Jacobsen, Niels E., 142
Jaernry, C., 127
Jaffee, Elizabeth M., 113
James, D. D., 20
Janiszewski, J. M., 47
Janosy, Robert, 89, 90
Jenkins, R. A., 28, 90
Jenkinson, Wayne, 69, 75, 76
Jenniskens, Peter, 177
Jervey, David D., 40
Ji, H., 157
Jiang, Rongzhong, 51
Jin, Hao-Qiang, 133
Jin, X., 148
Jing, Tong, 117
Johannink, Carl, 177
John, Bonnie E., 142
Johnson, B. E., 62
Johnson, D. R., 55
Johnson, Harry T., 36
Johnson, J. L., 168
Johnson, James, 17
Johnson, Martin D., 105
Joiner, J., 18, 172
Jonsson, Ari K., 136
Jourdan, M. R., 62
Joy, Michael, 87
Juang, Jer-Nan, 9
Julien, Howard L., 37

K

Kadesch, Jong S., 28
Kagan, Benjamin L., 113
Kalfjos, Helen Therese, 23
Kambry, Maspul Aini, 179
Kanefsky, Bob, 137
Karniadakis, George E., 161
Kasai, S., 159
Kast, W. Martin, 112
Kaste, P., 40
Kaste, Pamela J., 34
Katoen, J. P., 141
Kautz, R. L., 51
Kazman, Rick, 132
Keller, Arturo, 87
Kelley, Karen D., 93
Kelly, Jeff, 147
Kelly, Robert D., 68
Kelly, Shaun, 73
Kelly, Shaun F., 80
Kempster, Kurt A., 45

Keyser, Daniel, 94
Khaoustov, V. I., 41
Kidd, Christopher, 96
Kikuchi, S., 159
Kim, K.-M., 83
Kim, Y., 144
King, Michael D., 61
Kinkennon, A., 40
Kinney, P., 86
Kirk, Michael T., 120
Kirschner, R., 59
Klarstrom, D. L., 21
Klein, Mark, 132
Knapp, David E., 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 79, 80
Kneib, C. P., 168
Knutilla, A., 132
Kodama, K., 160
Kodera, Kunihiko, 86
Koob, George F., 108
Kosowski, Bernard, 32
Kotchmar, D. J., 86
Koutcher, Jason A., 120
Kouwen, Nick, 69, 75, 76
Kram, Mark, 87
Kramer, Gary W., 20
Krasko, Genrich L., 164
Kratz, David P., 60
Krauss, Terry S., 76
Kreimer, D., 165
Krens, Frank, 11
Kristiansen, M., 161
Kroese, D. P., 52
Krumm, Robert T., 168
Kubo, H., 160
Kulsrud, R., 157
Kurien, James, 136, 137
Kuroda, T., 159
Kurten, Richard C., 116
Kustra, Todd W., 166
Kuszmaul, Christopher L., 127
Kuszmaul, Christopher Lee, 143
Kvaternik, Raymond G., 9
Kwok, Sun, 179
Kyaw, Zwa Soe, 125

L

Lacot, Fernando, 31
Landers, D., 59
Langhirt, Eric, 125
Laroussi, Mounir, 158
Lau, K.-M., 83
Lau, Y. C., 21
Lawson, R. E., 96
Lawton, John, 124
Leahy, R. B., 20
LeClair, Steven R., 43
Lee, R. L., 96
Lee, Robert B., 60
Lee, Sabrina L., 29
Lee, Y. T., 131
Lehman, John H., 153
Lei, Chen-Ming, 177
Leidecker, Henning, 28
Leinweber, D. B., 148
Leming, Thomas D., 98
Lenschow, Donald H., 70, 72
Leonard, Keith J., 30
Leong, May Y., 12
Lepsch, Roger A., 14
Leptoukh, Gregory G., 61
Leroy, M., 77
Leroy, Marc, 63, 64
Levinson, Richard, 137
Lewandowski, J. L. V., 155, 156
Lewis, C. W., 88
Li, Guan-You, 177
Lianos, Dimitrios, 47
Lieb, R., 40
Lieber, Lysbeth, 147
Lieberman, Harris R., 109
Likos, W. E., 31
Lin, Shian-Jiann, 87
Lindeman, D. R., 59
Linteris, Gregory T., 24
Lissauer, Jack J., 122
Liu, Ansheng, 135
Liu, C. T., 23
Liu, Jian-Bang, 53
Liu, Q. Y., 148
Liu, Xue-Dong, 118
Livny, Miron, 125
Lo, Yeh, 49
Lohn, Jason D., 51
Londen, S.-O., 139
Long, Lyle N., 4
Lory, Ernest, 87
Loveland, Thomas R., 72
Lukyanov, V. K., 152
Lumb, Christopher R., 123
Lumpkin, N., 144
Lyo, S. K., 144

M

MacConochie, Ian O., 15
MacCrehan, William A., 35
MacGilvray, Marian W., 173
MacPherson, J. Ian, 70, 71
Maekawa, F., 150
Magill, B. T., 39
Makita, Y., 150
Malek, Thomas R., 119
Maly, Kurt, 133
Mamgasarian, Olivi L., 130
Mansfield, J., 168
Manzara, Tony, 41
Maran, Stephen P., 166
Marchitto, Thomas M., Jr., 100
Marcinkowski, A., 151
Marcus, A., 86
Maret, M. D., 55, 56
Marianski, B., 151
Markham, Brian L., 69
Markley, F. Landis, 14
Marshburn, Thomas H., 122
Martiningrum, Dyah Rahayu, 92
Masaki, K., 160
Matawitz, David, 17
Matheson, R. J., 47
Matson, Dean W., 29
Matsui, Yoshiko, 149
Mayr, H. G., 92
Mayr, Hans G., 92
Mazzucato, E., 161
McCants, Edward, 137
McClanahan, Edwin D., 29
McClellan, K. J., 162
McConnell, William T., 31
McCormack, John, 117
McCullough, Roy L., 22
McDonald, Joseph K., 26
McDonald, Kyle, 78
McDonald, Kyle C., 77
McDonell, Vincent G., 12
McGee, Jeffrey K., 7
McGettigan, Starr, 97
McKinley, Kenneth W., 10
McPherson, Terry, 97
Meech, John A., 43
Meger, Robert A., 160
Mehrotra, Piyush, 133
Mehta, Rajeshwari, 119
Meili, Robin, 115
Mendenhall, J. A., 62
Menetrez, M. Y., 89
Mengel, J. G., 92
Merad, S., 138
Meredith, Barry D., 95
Meredith, K. V., 34
Metcalfe, John R., 73, 74
Meyers, Curtis, 32
Michael, J. R., 162
Micheletti, Stefano, 140

Millar, William, 137
Miller, Gregg L., 145
Miller, James C., 120
Miller, John, 64, 78
Miller, John R., 64
Miller, M. K., 21
Miller, Nicholas P., 85
Miller-Corona, J. L., 168
Minamyer, S., 59
Minier, Leanna, 40
Mishchenko, Michael, 63
Mishchenko, Michael I., 87
Mishurda, Joseph C., 30
Mitasova, H., 62
Mitchell, T. E., 162
Mo, Yibo, 25
Moise, D., 50
Monell, Donald W., 11
Moreau, Christian, 21
Morelli, Eugene A., 13
Morgan, Alexander B., 9
Moron, W., 47
Morris, Amy, 35
Morris, John R., 84
Morris, K. C., 132
Morris, Philip J., 4
Morris, W. Douglas, 14
Morrissey, Mark, 96
Moser, T. J., 59
Moss, James N., 53
Mota, Mario, 3
Moyer, M. W., 82
Msezane, A. Z., 148
Mulder, E. J., 36
Mulenburg, Gerald M., 166
Mulkern, Thomas J., 22
Munteanu, F. M., 144
Murphy, Donald P., 160
Murphy, Gerald, 110
Murray, Patrick J., 100
Murry, D. J., 41
Musa, A., 127
Muscettola, Nicola, 137
Muto, Kazuo, 149

N

Nagle, David F., 123
Nakagawara, Van B., 5
Nakahira, M., 158
Narstroem, T., 28
Nash, Eric R., 94
Nathanson, Gilbert M., 84
Nauflett, G. W., 36, 39
Nayak, P. Pandurand, 136
Nayak, Pandu, 137
Neff, Todd, 69, 76
Neilson, G. H., 156
Nelson, Bruce, 110, 175
Nemeth, Michael P., 58
Nesbitt, David J., 93
Neuber, Andreas, 161
Neumeyer, C., 156
Newberry, J., 40
Newcomer, Jeffrey A., 65, 68, 71, 72, 77, 80, 81
Newman, Paul A., 94
Nguyen, Steven P., 22
Nicholas, Joyce S., 116
Nickerson, Jaime, 63, 64, 65, 69
Nickeson, Jaime, 77, 78, 79
Nielsen, Eric J., 3
Nielsen, J. Eric, 83
Ning, C. Z., 54
Ning, Cun-Zheng, 135
Nishitani, T., 161
Nogueira, Juan C., 126
Nonhoff, E., 172
Nyberg, Eeva, 134
Nyden, Marc R., 9

O

O, 144
OBrien, Keran, III, 116
Obringer, John W., 105
Ogawa, H., 159
Olmstead, J., 90
Omine, T., 160
Oncley, Steven P., 70, 72
Opstad, Aase Mari, 23
Osborne, Heather, 71
Osiko, Academician V., 54
Ott, Melanie N., 153
Oyama, Y., 150, 151

P

Painter, C. R., 36
Pannell, Chris N., 146
Parmentier, G., 122
Parthasarathy, Viji, 4
Patrick, R., 44
Paul, S. F., 155
Pawson, Steven, 86, 87
Payne, Terry R., 174
Peck, Eugene L., 66, 74
Peddle, Derek, 64
Pellis, Neal R., 41, 102, 108
Pen, 154
Peniguel, C., 53
Permyakov, V. P., 152
Perry, C. H., 144
Perry, Chris E., 121
Perry, E., 157
Pesce-Rodriguez, R., 40
Petre, R., 177
Petty, Grant, 96
Pfenning, Frank, 129
Pflug, Lisa A., 44
Phillips, C. K., 155
Phipps, Steve, 105
Pierce, Lori, 114
Pike, L. M., 21
Piland, William M., 11
Pinelli, Thomas E., 173
Pitts, William M., 43
Placr, A., 82
Plaunt, Christian, 137
Pleim, J. E., 94
Pohjolainen, S., 180
Polidan, Ronald S., 176
Ponthieu, L. D., 168
Porter, H. S., 92
Powell, Hugh, 79
Pozniak, Boguslaw, 25
Prabhakara, C., 85
Presser, Cary, 24
Pride, M., 108
Priestley, Kory J., 60
Proctor, Fred H., 2, 5
Proctor, Mark J., 145
Pugh, William M., 105

Q

Quinn, Patricia K., 17

R

Rachyany, Sity, 91
Rafferty, Conor S., 49
Raines, Christopher R., 142
Rajan, Kanna, 137
Ramamurthy, Ravishankar, 125
Rapoport, Tom, 105
Rasberry, Stanley D., 20
Rasulova, M., 142
Rathgeber, Kurt A., 37
Rauscher, Frank J., 111
Ray, Richard D., 99
Raymond, M. E., 56
Reardon, Michelle R., 35

Reiman, A. H., 156
Reimus, M. A. H., 82
Remillard, Ronald A., 176
Renegar, Michael L., 166
Reno, J., 144
Reno, J. L., 144
Rice, Betsy M., 164
Rice, Joseph P., 29
Rickel, D. G., 144
Ridgely, M. Susan, 115
Riedel, Erik, 123
Rignot, Eric, 77
Risin, D., 41, 108
Risin, Diane, 102
Ritchie, Steve J., 35
Rivers, Tim, 38
Rizzi, S. A., 3, 4
Roback, E. A., 175
Robitelle, Danielle, 32
Rochford, Peter A., 100
Roen, Bent Tore, 23
Roese, J. A., 168
Rogers, Buck E., 111
Ronney, Paul D., 53
Root, S., 20
Rosenfield, Joan E., 94
Rouquette, Nicolas, 137
Rubakov, V. A., 148
Ruebner, Anja, 32
Rule, K., 157
Rumminger, Marc D., 24
Rupp, I., 53
Ryan-Howard, D. P., 62

S

Sacco, Riccardo, 140
Saed, Mohammad A., 50
Saltzman, Eric S., 84
Samarth, N., 144
Samuelsen, G. Scott, 12
Sanchez, Edgar, 172
Sandagger, Karrie H., 31
Sap, Jan M., 110
Sasajima, T., 160
Sass, Bruce, 89, 90
Saulsberry, Regor L., 37
Scandolo, S., 23
Schafer, Joel, 69
Scheinholtz, Michael L., 123
Schiavone, John J., 50
Schindler, Jiri, 123
Schlosser, Steven W., 123
Schlueter, Jeffrey C., 120
Schmid, Ute, 141
Schmidt, M., 60
Schonberg, William P., 58
Schroeder, M., 40
Schubert, Elizabeth, 115
Schuft, M. J., 59
Schultz, Matthew, 133
Schultz, P. A., 162
Seaford, Matthew L., 22
Sega, W., 47
Senfaute, J., 128
Serra, S., 23
Seshia, S. A., 129
Setiahadi, Bambang, 179
Shanot, Al, 72
Sharp, John G., 119
Shaw, Harry, 42
Sheta, Essam F., 4
Shewchuck, Stan, 71
Shiina, T., 162
Shively, R. Jay, 121
Shmalzer, Paul A., 3
Shoffstall, Michael S., 25
Shulman, Igor, 100
Siahaan, Mabe, 14
Simmons, J. V., 168
Simmons, Ronald L., 34
Sims, B. L., 36
Sinclair, M. B., 19
Sirivithayapakorn, Sanya, 87
Sivathanu, Yudaya R., 52
Skiena, Steven S., 129
Slifman, L., 167
Smeltzer, Stanley S., III, 58
Smirnov, A., 148
Smith, David E., 136
Smith, Ed, 38
Smith, G. Louis, 60
Smith, George B., 44
Smith, Melody V., 20
Smith, Michael H., 43
Soijer, M. W., 8
Sojka, Paul E., 52
Soloman, Marvin, 125
Soni, Bharat, 19
Soriano, H. E., 41
Soules, Craig A., 123
Soulis, Ric, 69, 75, 76
Soyama, K., 163
Specht, D. T., 61
Speiran, G., 60
Splan, Jennifer, 84
Sriram, R. D., 128
Stangel, David E., 73, 80
Stapler, Wendell, 97
Stassinopoulos, Dimitris, 51
Statton, Gary, 32
Stefan, Lonel, 25
Steves, M. P., 132
Stewart, W. F., 27
Steyaert, Lou, 72
Still, G. J., 140
Stinespring, Benjamin M., 8
Stoltzfus, Joel M., 24, 25
Storm, Carlyle B., 105
Strunk, John D., 123
Subramaniam, Ajit, 98
Sud, Yogesh C., 96
Sugie, T., 159
Sundaresan, A., 102
Supriadhie, Anjar, 175
Suzuki, K., 136
Suzuki, M., 163
Svaiter, N., 165
Swank, J. H., 177
Switzer, George F., 2
Swope, Robert H., 13
Syarifudin, 91
Sycara, Katia, 174
Sylvester, James C., 121
Szykman, S., 128

T

Tada, E., 158
Tadros, Maher K., 57
Takahashi, H., 158
Talley, P., 168
Tamura, Richard, 116
Taratin, A. M., 163
Tas, Gerard, 99
Taylor, Roger S., 115
Temkin, A., 148
Temme, N. M., 139
terKuile, Casper, 177
Thompson, Anne, 17
Thompson, Anne M., 87
Thompson, Richard H., 85
Thompson, S. D., 6
Thorn, Willard F., 18
Thorstensen, John, 176
Tinder, Cynthia Viernes, 101
Todling, Richardo, 143
Tokuda, S., 159
Tompa, Albert S., 31
Tornes, John Aasulf, 23
Tosatti, E., 23
Tosi, M. P., 154
Traugott, Steve, 125

Travis, John C., 20
Trintchouk, F., 157
Troeger, Lillianne P., 30
Tropeano, Anne M., 105
Tucker, P., 103

U

Udupa, Jayaram K., 107
Ukai, K., 149
Unal, Resit, 14
Underwood, Mark L., 4
Usuda, S., 26

V

Vaghjiani, Ghanshyam L., 26
VanOsdell, D. W., 89
VanSickle, J., 59
vantLeven, Jaap, 177
Vasudevan, Vijay K., 30
Veiga, Marcello M., 43
Velev, Miroslav N., 131
Veronneau, Stephen J., 5
Veselsky, M., 152
Vincent, Patrick, 172
Viola, M., 157
Viterbo, Pedro, 80
Voie, Oyvind Albert, 82
Volk, Kevin, 179
Voss, Kenneth J., 17
Vrinceanu, D., 148

W

Wactawski, Jean, 118
Wada, M., 150
Wadia, S. R., 177
Wagner, John A., 30
Wagoner, R. A., 88
Walker, Anne, 73, 74
Walker, Charles, 51
Wang, C. M., 50
Wang, L., 23
Wang, Xue-Wen, 65, 69, 75
Wang, Xuewen, 75
Wang, Zhenghao, 25
Wang, Zhenyu, 134
Warner, M. A., 84
Warren, Charles W., 4
Warren, Molly, 11
Warren, S. D., 62
Watanabe, Y., 151
Watson, Philip, 104
Way, JoBea, 77, 78
Wayner, Elizabeth, 116
Weeks, D., 56
Welton, Ellsworth J., 17
Wheeler, Tedd A., 171
White, H. Peter, 64
White, Nancy H., 14
White, R., 155
Widmann, John F., 24
Widodo, Nanang, 179
Wieliski, Bruce A., 60
Wigington, P. J., 59
Wijk, Gunnar, 57
Wilczak, James, 71, 72, 81
Willhelm, Stephen T., 175
Williams, M., 157
Williams, P. A., 154
Willis, R. D., 85
Wilson, D. Bruce, 24, 25, 37
Windover, Donald, 29
Wipke, Todd, 124
Wittrock, Virginia, 71
Woegerbauer, S., 172
Wolfe, H. F., 3, 4
Wolff, Charles L., 92
Woods, S. S., 27
Woods, Stephen S., 37
Wright, Jeffery S., 26
Wu, Leejay, 174
Wurzbach, Roy, 27
Wysotzki, Fritz, 141

X

Xifaras, Dimitrios, 42
Xiu, A., 94
Xu, Kun, 140

Y

Yagi, H., 26
Yamada, M., 157
Yamauchi, T., 162
Yan, Jerry, 133
Yang, Jiann C., 43
Yang, Song, 83
Yatini, Clara Yono, 14
Yip, Sid, 164
Yoffe, B., 41
Yokoyama, K., 149
Yoo, J.-M., 85
Yoon, Woong-Sang, 89
Yoshida, K., 160
Yoshida, T., 150
Young, D. R., 61
Young, Jeffrey L., 46
Young, Kim, 71
Yu, Zhi-Ping, 49

Z

Zaghloul, Hany, 38
Zarchan, Paul, 47
Zarnstorff, M. C., 156
Zhang, Yan, 106
Zhao, Hai-Bin, 177
Zhu, Jin, 177
Zhu, Kangmin, 114
Zhu, Yanqiu, 143
Zimmerman, Reiner, 78
Zubair, Mohammad, 133