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NASA STI Program ... in Profile

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

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  7121 Standard Drive
  Hanover, MD 21076-1320

Introduction

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

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

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

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

The NASA STI Program

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

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

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

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

NASA STI Availability Information

NASA Center for AeroSpace Information (CASI)

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

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

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

National Technical Information Service (NTIS)

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

The Federal Depository Library Program (FDLP)

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

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

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

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Subject Term Index

Personal Author Index

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS

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01
AERONAUTICS (GENERAL)

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

20060011223 Aerospace Industries Association, Arlington, VA, USA
Guidelines to Minimize Manufacturing Induced Anomalies in Critical Rotating Parts
Feb. 2006; 86 pp.; In English
Report No.(s): PB2006-107475; No Copyright; Avail.: CASI: A05, Hardcopy

This report was developed by a partnership of the Aerospace Industries Association (AIA) Rotor Manufacturing Project Team (RoMan) and the Federal Aviation Administration in response to accidents and incidents caused by manufacturing induced anomalies in critical rotating parts. According to a 1997 summary from the AIA Rotor Integrity Sub-Committee, about 25% of recent rotor cracks/events have been caused by post-forging manufacturing induced anomalies. The guidelines contained herein represent an industry consensus on the currently available best practices to minimize manufacturing induced anomalies in critical rotating parts consistent with the AIA RoMan team charter and vision. Recommendations for nominal rotor manufacturing process development and control, including process validation, quality assurance, disposition of suspect parts, process monitoring, human factors and training, and non-destructive evaluation, are included to provide an overall framework for a highly reliable manufacturing process. Because critical rotating part reliability has demonstrated particular sensitivity to hole machining practices, specific recommendations for hole making are included. In addition, a section containing industry lessons learned is included to provide guidance on issues common in the industry.
NTIS
Aerospace Industry; Anomalies; Manufacturing; Rotation

20060011345 NASA Dryden Flight Research Center, Edwards, CA, USA
Photogrammetric Trajectory Estimation of Foam Debris Ejected From an F-15 Aircraft
Smith, Mark S.; April 2006; 29 pp.; In English; Original contains color and black and white illustrations
Report No.(s): NASA/TM-2006-213675; H-2635; No Copyright; Avail.: CASI: A03, Hardcopy

Photogrammetric analysis of high-speed digital video data was performed to estimate trajectories of foam debris ejected from an F-15B aircraft. This work was part of a flight test effort to study the transport properties of insulating foam shed by the Space Shuttle external tank during ascent. The conical frustum-shaped pieces of debris, called 'divots,' were ejected from a flight test fixture mounted underneath the F-15B aircraft. Two onboard cameras gathered digital video data at two thousand frames per second. Time histories of divot positions were determined from the videos post flight using standard photogrammetry techniques. Divot velocities were estimated by differentiating these positions with respect to time. Time histories of divot rotations were estimated using four points on the divot face. Estimated divot position, rotation, and Mach number for selected cases are presented. Uncertainty in the results is discussed.
Author
Photogrammetry; Debris; F-15 Aircraft; High Speed; Cameras; Trajectories; Digital Television; Foams; Flight Tests

20060011579 Research and Technology Organization, Neuilly-sur-Seine, France
Flight Test: Sharing Knowledge and Experience
May 2005; In English; Systems Concepts and Integration Panel (SCI) Symposium, 9-11 May 2005, Warsaw, Poland; See also 20060011580 - 20060011604; Original contains color and black and white illustrations
Report No.(s): RTO-MP-SCI-162; AC/323(SCI-162)TP/83; Copyright; Avail.: CASI: C01, CD-ROM

This broad-scope symposium was jointly sponsored by NATOs Research and Technology Organization s (RTO), Systems Concepts and Integration Panel (SCI), and the Society of Flight Test Engineers, European Chapter (SFTE (EC)). The symposium, hosted by the Polish National Delegates of the RTO at the Ministry of Defense Conference Centre, Warsaw, was the first NATO symposium since the mid 1990s to deal comprehensively with aircraft flight test and evaluation, and the first SCI symposium to be conducted jointly with an organization outside of NATO. The symposium theme was the sharing of flight-test related information between the international community with a purpose of improving flight test practices worldwide. The Technical Programme Committee, chaired by Barbara Wood a former SFTE (EC) President and member of SCI-Flight Test Technologies Task Group (FT3), comprised senior specialists representing the international flight test community. Significantly all were members of the SFTE (EC) Board and/or members of FT3. Three Keynote Addresses and 22 papers, presented by speakers representing many of the primary NATO-country aircraft test and development organizations, addressed up-to-date experience from test program operations, program overviews, test methods, and test facilities and instrumentation. The Technical Evaluation Report summarizes significant developments in aircraft test and evaluation (T&E), considerations for the NATO and flight test communities and lessons learned from recent flight test participants. The Symposium was introduced by Mr. J. Wickes, SCI Panel Chairman, and Mr. K. Karlsson, SFTE (EC) President. Keynote Addresses: Polish Aviation History by A. Witczak, T&E in a Multi-National Programme (Eurofighter) by L. Hilditch and The Joint Strike Fighter An International Enterprise by P. Metz.
Derived from text
Flight Tests; System Effectiveness; Fighter Aircraft; Engineers; Test Facilities

20060011584 Defence Materiel Administration, Linkoping, Sweden
The Flight of Phoenix
Flight Test: Sharing Knowledge and Experience; May 2005, pp. 17-1 - 17-8; In English; See also 20060011579; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

During spring 2000, North European Aerospace Test Range (NEAT) started discussions with EADS Space Transportation at Bremen, Germany on how to carry out flight tests on a functional scaled down model (Phoenix) of a future Reusable launch vehicle (RLV/Hopper). The ultimate goal for EADS ST was to verify the performance of the Phoenix test vehicle including its flight control and navigation systems etc, by auto landing on the runway at the FMV Vidsel test site. The way ahead to perform all necessary design, test qualification activities to guarantee airworthiness, performance, safety, quality etc to perform the task within a flight test organization, earlier reduced in capacity by economic demands, is described. The performance included design and verification of a system including necessary test data instrumentation, capable of carrying the 1200 kg Phoenix test vehicle to the release point at app. 5 km from the runway threshold to auto land. The presentation will also show that collaboration between different organisations within and outside the responsible test organization can be used to fulfill a task and lead to a successfully completed mission. Three flights were performed with the Phoenix test vehicle, all with successful landings with roll out on the runway centre line.
Author
Reusable Launch Vehicles; Test Vehicles; Navigation; Flight Control; Flight Tests

20060011588 Naval Air Systems Command, Patuxent River, MD, USA
Technical Evaluation Report
Detrick, Roger; Flight Test: Sharing Knowledge and Experience; May 2005, pp. T-1 - T-17; In English; See also 20060011579; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This broad-scope, flight-test symposium was jointly sponsored by NATO s Research and Technology Organization (RTO), Systems Concepts and Integration Panel (SCI), and the Society of Flight Test Engineers, European Chapter (SFTE(EC)). The SFTE (www.sfte.org) is a fraternity of engineers and associates, whose principal professional interest is the flight testing of aircraft, fixed and rotary wing, and missiles. The objective of the Society is the advancement of flight test engineering throughout the aircraft industry by providing technical and fraternal communication among individuals, both domestic and international, in the allied engineering fields of test operations, analysis, instrumentation and data systems. The symposium, hosted by the Polish National Delegates of the RTO at the Ministry of Defence Conference Centre, Warsaw, was an unclassified event with participants from 24 countries. This was the first NATO symposium since the formation of RTO to deal comprehensively with aircraft flight test and evaluation (T&E), and the first SCI symposium to be conducted jointly with an organization outside of NATO. Two previous SCI symposiums included significant aspects of flight test: ‘Integration of Simulation With Systems Testing,’ October 01, Toulouse, FR and ‘Aircraft-Stores Certification Testing,’ September 98,

Chester, UK. The last NATO symposium to broadly review international flight testing was conducted by AGARD in Norway in the mid 90's. The symposium was developed and conducted, in partnership with SFTE(EC) and the RTO Research and Technology Agency, by the SCI Panel s Flight Test Technologies task group (SCI-172, FT3). The FT3 mission (which was well matched to the symposium) is to: (1) disseminate information through publication of AGARDographs on flight test technology derived from best practices which support the development of concepts and systems critical to maintaining NATO s technological and operational superiority; (2) enable advancements in flight test technologies to be discussed in open forum within the NATO community by identifying and distributing flight test training opportunities, and through proposing and facilitating symposia, short courses, lecture series, etc., and (3) serve as the focal point for flight test subjects and issues with the SCI Panel while ensuring the vitality and continuity of the network of flight test experts within the NATO community. Derived from text

Flight Tests; Flight Simulation; Data Systems; System Effectiveness; Rotary Wings

20060011589 Military Univ. of Technology, Warsaw, Poland

Polish Aviation Engineering: Past, Present and Future

Trebinski, Radoslaw; Zalewski, Piotr; Flight Test: Sharing Knowledge and Experience; May 2005, pp. KN1-1 - KN1-8; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The paper presents the history and present status of the Polish aviation engineering. The authors discus the development and evaluation of the Polish aviation concept and its impact on the domestic and international industry. Before and after the WWII Polish aviation sector belonged to the leaders of the world market, unfortunately after the fall of the Berlin wall industry experienced a deep crisis. The market of former Warsaw Pact was shrunk significantly, and number of orders for new aircraft have dropped dramatically. However, thanks to proper experience and knowledge of the Polish aviation engineers, new opportunities for the domestic aviation sector have emerged recently.

Author

Aircraft Industry; Poland; Military Operations; Aeronautical Engineering

20060011590 Lockheed Martin Aeronautics Co., Fort Worth, TX, USA

The Joint Strike Fighter: An International Enterprise

Metz, Paul; Flight Test: Sharing Knowledge and Experience; May 2005, pp. KN3-1 - KN3-8; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

From the beginnings of flight to the present, there have been international aircraft programs undertaken by most of the countries represented in this room. Those programs were frequently co-assembly or coproduction efforts in which the purchasing country manufactured an existing aircraft using production tools and techniques from the country of origin. In the last 40 years, we have seen a number of true collaborative efforts to design and develop an entirely new aircraft using the intellectual capital from two or more countries. Europe has been a key leader in these programs with the Jaguar, Tornado and Eurofighter on the military side and the spectacular success of the Airbus consortium on the civil side. While the USA has engaged in numerous co-assembly and co-production dating back to World War II, it has been only recently that we have engaged in co-development efforts similar to the European ventures of the 1960s and 70s. The F-35 Joint Strike Fighter is the largest single multi-company aircraft development program ever attempted in the U.S. and, indeed, in the world. At present, there are nine partner nations actively involved in the design and development of this next-generation fighter. This massive undertaking is not without it challenges a popular euphemism for difficult and perplexing but there are also some very bright spots and reasons for optimism. Let me show you the construct of this program, what we intend to build and, most importantly, what it promises for all of the partner countries sharing in this massive enterprise.

Author

Fighter Aircraft; Aircraft Design; International Cooperation

20060011591 Saab Aerospace, Sweden

Flight Test Verification of a Wake Vortices Model

Lampe, thomas; Sedin, Yngve; Weinerfelt, Per; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 4-1 - 4-16; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

A simulation model for encounters of wake vortices has been developed at Saab in Link ping, Sweden. Distribution of

incremental forces on the aircraft surfaces is calculated for different locations related to the vortices and also for different relative attitudes of the aircraft. Also, the response of the angle-of-attack and angle-of-sideslip vanes is calculated. For simulation, multidimensional tables are created describing the increments in forces, moments and vane angles as function of relative position and attitude. The model, represented by table lookup algorithms for these particular tables as well as some scaling algorithms, was in the year 2000 added to an experimental version of a 6-DOF Gripen simulator. The results seemed promising because the response of the aircraft flying through the vortices was, seen from a pilot s view, realistic. However, it was evident that the model also needed to be verified with and, most likely, adjusted (scaled) to flight test data. The need for accurate estimates of the aircraft s trajectory through the vortices requires special attention. Regardless of the ability to accomplish that accuracy in relative position between two aircraft, we still have to determine, also very accurately, where the vortices are, regarding cores and size. Local wind fluctuations and the self-induced motion of the vortices away from the flight path contribute with uncertainties in the range of a couple of meters. From that standpoint, we have too large uncertainties. Our best solution so far is to use a 'closed-loop' verification of the model where we use a subset of the output parameters to identify a two-dimensional position bias that gives us the most likely trajectory. We use the angle-of-attack and angle-of-sideslip vane signals for that purpose. The result is not only a method for verification of a trailing vortex simulation model but also a tool to map out in detail where we have been in wake vortex penetration tests. With respect to the simplifying assumptions used in the design of the current model, the agreement with flight test data is surprisingly good.
Author
Vortices; Wakes; Flight Tests; Angle of Attack; Attitude (Inclination); Sideslip; Proving; Flight Paths

20060011595 Naval Air Warfare Center, Patuxent River, MD, USA
Ship Suitability Testing: Preparing for the Future
Harney, Ronald J.; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 7-1 - 7-13; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

In support of the USA Navy Sea Power 21 initiative, ship suitability test and evaluation personnel are preparing to support a large number of test and evaluation programs. The pillars of Sea Power 21, which include Sea Basing, Sea Shield, and Sea Strike call for a diverse set of new and modified aircraft and air capable ships. Ship compatibility testing may be required on aircraft ranging from the two variants of the Joint Strike Fighter to the Firescout unmanned helicopter; and from C-130 cargo aircraft to small unmanned seaplanes. Additionally, aircraft compatibility testing will be required on ships ranging from the Littoral Combat Ship to the DDX destroyer, and from a new amphibious assault ship to the latest in nuclear carrier technology, CVN-21, which will incorporate all new electric catapult and arresting gear equipment. The precision approach landing systems group is already testing enabling technologies for a new GPS-based Joint Precision Approach and Landing System, which will significantly change the air traffic control environment, enable all aircraft to have precision approach capability, and provide the means to operate fighter-sized Unmanned Combat Air Vehicles on aircraft carriers. These aircraft/ship test and evaluation programs will require the development of new methodology. They will also require the testers to research and modify test techniques that have not been used for decades. We are also challenged to seek methods to minimize testing requirements and manpower while still giving the Fleet operator the maximum possible safe operating envelope. From rotary wing to tilt rotor to fixed wing aircraft and from hydroplanes to catamarans to the super carriers, the ship suitability test and evaluation group will be responsible for testing aircraft/ship compatibility in a highly dynamic and challenging environment. This presentation will provide a brief overview of the upcoming programs and discuss the test and evaluation challenges.
Author
Ships; Aircraft Configurations; System Effectiveness; Landing Aids; Global Positioning System; Cargo Aircraft; C-130 Aircraft; Helicopters; Seaplanes

20060011597 European Aeronautic Defence and Space Co., Germany
Introduction of a Workflow Tool in Support of Information Management within a Flight Test Organization
Oelker, Hans-Christoph; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 24-1 - 24-16; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The challenges of changing markets have an impact on a flight test organization typically orientated at military aircraft as well. To cope with these challenges at EADS Military Aircraft Flight Test a workflow tool in support of process enhancements and refinements was introduced. In the present paper an overview about resulting activities at EADS Military Aircraft Flight Test Centre is given. The project was executed in a stepped approach with a process analysis through external consultancies in the beginning, introduction of a workflow tool for the flight test backbone process as second step, and

possibilities to further integrate process elements as future options. Within the backbone process Test Task issue, Fight Test Programme, and Flight Card generation were considered. Flight Test specific aircraft configuration control was established as a necessary supporting process. The tool is realised with state of the art software technology (common data base system with WEB technology user interface) in order to provide maximum flexibility (incorporation of different engineering programmes, maintenance efficiency) and tool support independently of testing location. Overall process experience is positive. Process enhancements are clearly visible and transparency of process know-how will make past experiences easily accessible for future projects. It will be achieved through continuous utilisation of the workflow tool and continuous storing of facts and experience. Thus, powerful means of information management to share knowledge and experience are provided to a Flight Test organization.
Author
Information Management; Configuration Management; Software Engineering; Flight Tests; Data Bases; Aircraft Control

20060012145 NASA Langley Research Center, Hampton, VA, USA
CFL3D Version 6.4-General Usage and Aeroelastic Analysis
Bartels, Robert E.; Rumsey, Christopher L.; Biedron, Robert T.; April 2006; 269 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): 98-47-54
Report No.(s): NASA/TM-2006-214301; L-19247; No Copyright; Avail.: CASI: A12, Hardcopy

This document contains the course notes on the computational fluid dynamics code CFL3D version 6.4. It is intended to provide from basic to advanced users the information necessary to successfully use the code for a broad range of cases. Much of the course covers capability that has been a part of previous versions of the code, with material compiled from a CFL3D v5.0 manual and from the CFL3D v6 web site prior to the current release. This part of the material is presented to users of the code not familiar with computational fluid dynamics. There is new capability in CFL3D version 6.4 presented here that has not previously been published. There are also outdated features no longer used or recommended in recent releases of the code. The information offered here supersedes earlier manuals and updates outdated usage. Where current usage supersedes older versions, notation of that is made. These course notes also provides hints for usage, code installation and examples not found elsewhere.
Author
Aeroelasticity; Computational Fluid Dynamics; User Manuals (Computer Programs)

02
AERODYNAMICS

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

20060011281 Commerce Dept., Washington, DC, USA
Aviation Weather Programs/Projects 2004 Update. (Tier3/4 Baseline Update)
Dec. 2004; 202 pp.; In English
Report No.(s): PB2006-107660; FCM-R21-2004; No Copyright; Avail.: CASI: A10, Hardcopy

This report is the second update to the compilation of aviation weather programs and projects by the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM). The first compilation was released in April 2001 as the National Aviation Weather Initiatives Final Baseline Tier 3/4 Report, with a first update released in December 2003 (OFCM 2001, 2003a).
NTIS
Flight Conditions; Weather; Aviation Meteorology; Meteorological Services

03
AIR TRANSPORTATION AND SAFETY

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

20060011238 USA Centennial of Flight Commission, USA
U.S. Centennial of Flight Commission Final Report for the Centennial of Flight Commemoration
Apr. 2004; 88 pp.; In English
Report No.(s): PB2006-105418; No Copyright; Avail.: CASI: A05, Hardcopy

The U.S. Centennial of Flight Commission was established in 1999 to encourage the broadest national and international participation in the celebration of 100 years of powered flight, while publicizing and encouraging programs, projects and events that would involve, educate and enrich the maximum number of people. The U.S. Centennial of Flight Commission is proud of the events that have taken place, including: the Festival of Flight in Fayetteville, Space Day, Inventing Flight in Dayton, GE Presents Centennial of Flight at Rockefeller Center, EAA's Countdown to Kitty Hawk tour, the opening of The Wright Brothers and the Invention of the Aerial Age at the Smithsonian National Air and Space Museum, the National Air Tours, the American Institute of Aeronautics and Astronautics' Evolution of Flight campaign, Wolf Trap's Face of America, the opening of the Steven F. Udvar Hazy Center at Dulles International Airport, the First Flight Centennial Celebration in North Carolina and the countless others that have occurred across the country and around the globe. Most importantly, the U.S. Centennial of Flight Commission is proud of the educational legacy that has been created. The combined outreach efforts of the U.S. Centennial of Flight Commission and its Partners have reached millions of students. A new generation of inventors has been inspired, igniting a new level of enthusiasm for perseverance and determination in the quest for ingenuity.
NTIS
Flight; Enrichment; Education; Airports

20060011260 National Transportation Safety Board, Washington, DC USA
National Transportation Safety Board Aircraft Accident Report: Collision with Trees and Crash Short of Runway, Corporate Airlines Flight 5966, British Aerospace BAE-J3201, N875JX, Kirksville, Missouri, on October 19, 2004
Jan. 24, 2006; 112 pp.; In English
Report No.(s): PB2006-910401; NTSB/AAR-06/01; No Copyright; Avail.: CASI: A06, Hardcopy

This report explains the accident involving Corporate Airlines flight 5966, a BAE Systems BAE-J3201, N875JX, that crashed short of the runway on approach to land at Kirksville Regional Airport, Kirksville, Missouri. Safety issues in this report focus on operational and human factors issues, including the pilots' professional and sterile cockpit procedures, non-precision instrument approach procedures, flight and duty time regulations, fatigue, and flight data/image recorder requirements.
NTIS
Accident Investigation; Airline Operations; Civil Aviation; Collisions; Commercial Aircraft; Crashes; Organizations; Runways; Safety; Safety Management; Transportation; United Kingdom

20060011270 Commerce Dept., Washington, DC, USA
Proceedings of the Aviation Weather User Forum. Aviation Weather: Opportunities for Implementation. Held in Bethesda, Maryland on July 25-26, 2000
January 2000; 114 pp.; In English; Aviation Weather User Forum. Aviation Weather: Opportunities for Implementation., July 25 - 26, 2000, Bethesda, Maryland
Report No.(s): PB2006-107688; No Copyright; Avail.: National Technical Information Service (NTIS)

Each of us has a stake in the safety and efficiency of our national aviation operations. Our National Airspace System (NAS) touches nearly every American in one way or another and is vital to our daily activities. We're all familiar with the needs to save lives, avoid injuries, and save money and time. Further, we're aware of the aggressive White House Commission goal of reducing the rate of fatal aviation accidents 80% by the year 2007. Improving aviation weather products and services and getting them to the user in a timely and mission tailored manner, improving provider and user training, and implementing sound weather decision making processes are all critical components in the effort to achieve this goal. Not even counting corporate flight operations or the small business person's beneficial use of general aviation, the aviation sector of our economy is well over 100 billion dollars. That's just in operating revenues - the collateral impact on our economy is staggering. The

four objectives of the forum are 1. To highlight programs/processes which have been implemented recently, or are ready now ready for implementation. To identify ongoing programs which show promising results, and must be supported with continuing resources to reach fruition. To determine gaps where no work is ongoing or planned. To identify overlaps and assess them.
NTIS
Conferences; Flight Conditions; Forecasting

20060011587 Military Univ. of Technology, Warsaw, Poland
Simulations and Reconstructions of Aircraft Flights and Accidents
Kowaleczko, Grzegorz; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 22-1 - 22-21; In English; See also 20060011579; Original contains color illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The paper presents exemplary results of numerical simulations focused on numerical simulations and reconstructions of aircraft flights and accidents. These works were carried out for both fixed-wing and rotary-wing aircraft during last seven years at the Institute of Aviation Technology. These investigations were mainly theoretical but some of them were verified on the basis of data recorded during flight tests. All investigations were founded on the classic model of an aircraft, which was treated as a rigid body [1]. Spatial maneuvers of aircraft were modelled by making use of inverse simulations /[1], [2], [3]/. This method allows to determine control necessary to perform an assumed maneuver. Some main results are presented for both normal flight and aircraft crash.
Author
Aircraft Models; Aircraft Accidents; Flight Tests; Fixed Wings; Rotary Wing Aircraft

20060011654 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series
Collins, William E.; Wade, Katherine; March 2005; 111 pp.; In English; See also 20060011655 - 20060011666; Original contains color and black and white illustrations
Report No.(s): DOT/FAA/AM-05/3; Copyright; Avail.: CASI: A06, Hardcopy

A historical, largely photographic retrospective is presented in recognition of the 1000th published report emanating from the FAA aeromedical research center officially established as the Civil Aeromedical Research Institute (CARI) in August 1960. The publications include 57 CARI reports (1961-1963), 1 CARI technical publication (1963), and 942 reports (1964-present) under the aegis of the (now) Office of Aerospace Medicine (OAM). The retrospective includes an historical section on the early development of civil aeromedical research. Additional, theme-related sections provide an indication of some of the varied research contributions and safety achievements of the Institute and cite some of the many individuals who contributed to the Institute's accomplishments.
Author
Aerospace Medicine; Human Factors Engineering; Civil Aviation; Research Aircraft

20060011655 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
Forensics: Fatal Accidents. ..Their Toxicology and Biochemistry
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series; March 2005, pp. 52-55; In English; See also 20060011654; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

An initial focus of CARI's aviation toxicology laboratory centered on exposure to pesticides and safety concerns for crop duster pilots. Strong support was provided by the aviation physiology laboratory through a number of studies documenting the bodily effects of exposure to those pesticides in major use. Paul W. Smith, Ph.D., original head of the toxicology laboratory, took the lead in defining the hazards of various substances used by such pilots and in promoting guidelines and providing lectures to groups of agricultural pilots. A later, more enduring research focus was a shift to an emphasis on assessing aircraft cabin and cockpit materials (e.g., panel or seat coverings), for the potential toxic effects of thermal degradation of the materials due to fire. The inhalation toxicity of flame-retardant materials when subjected to fire and heat was an early research thrust led by Charles R. Crane, Ph.D.; with new materials being generated quite regularly, that line of research has continued to date. The subsequent work by Arvind K. Chaturvedi, Ph.D., and Donald Sanders has involved experiments with recently developed, unique sets of combustion assemblies and exposure chambers to determine the combustion toxicity of the newer polymeric

materials now used in some aircraft and of other materials proposed for such use.
Author
Aeronautical Engineering; Aerospace Medicine; Biochemistry; Exposure; Thermal Degradation; Toxicity; Toxicology; Hazards

20060011658 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
The Swearingen Legacy... Continuity and Direct Applications
Swearingen, John J.; A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series; March 2005, pp. 15-17; In English; See also 20060011654; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

While officially the second CARI report (the first in 1962), the study of sitting areas and pressures by John J. Swearingen et al. represented one aspect of a line of safety research that Swearingen had been conducting for 15 years with a small total st& of 1 to 4 associates (and an occasional collaborator) in his underfunded (and variously named) Civil Aeronautics Medical Research Laboratory. Some of that work from the late 40s to the late 50s was captured in a black-and-white motion picture film that was donated in year 2000 to the Smithsonian Air and Space Museum; a CD copy of the film is available from the CAM1 library (52). The new CARI structure incorporating his protection and survival laboratory provided Swearingen with greater opportunities, funding, and support to pursue his research programs - a part of which came to be termed 'cockpit delethalization'. In addition to formally published reports, Swearingen, his team, and their successors conducted numerous unpublished studies at the request of agency representatives and safety groups. They interacted closely with industry and the agency to define safety shortcomings and support safety improvements.
Author
Medical Science; Protection; Industries; Libraries; Safety

20060011659 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
CARI's First Report ... an Enduring Direction
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series; March 2005, pp. 18-20; In English; See also 20060011654; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

CARI's first report - the only one published in 1961 - involved close cooperation with the FAA Academy and its entrants into the air traffic control specialist (ATCS) training program, That report began the Institute s research programs, initiated by David K. Trites, Ph.D., on developing and validating tests for selecting ATCS trainees and on assessing Academy training and its measures as predictors of trainee success - an involvement that continues to date. Training-performance criteria for ATC students in the tower, center, and flight service options were also the subject of one of the first two CARI research contracts (the other was a vestibular investigation) with organizational elements of the University of Oklahoma; both contracts were completed in 1964 (6,39). Note that CARI/CAMI tests comprised the official Office of Personnel Management selection battery (and later also included a MI-developed Occupational Knowledge Test). Passing that battery was required for eligibility to be considered for an ATC trainee slot; the ranking of successful candidates depended upon their test scores, education, and experience. During most of the first two decades of CARI/CAMI s selection and training research, Bart B. Cobb was a driving force. He was frequently consulted by Washington Headquarters groups in the offices of air traffic and personnel for the information and special analyses of pertinent data that he provided by numerous letters and memoranda as well as his formal CARI/OAM reports.
Author
Air Traffic Control; Air Traffic Controllers (Personnel); Predictions; Personnel Management; Education

20060011661 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
Protection and Survival ... Saving Lives
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series; March 2005, pp. 24-42; In English; See also 20060011654; Original contains black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

With the establishment of the Protection and Survival Laboratory in CARI, John Swearingen's small team from CAA days was increased and its capabilities expanded. The driving forces during the 1960s and 70s for areas other than the research by Swearingen were Richard E Chandler, who became laboratory chief and CAMI's researcher for crash injury protection, J. D. Garner, who specialized in emergency evacuation issues, and Ernest B. McFadden, whose forte became oxygen equipment and

flotation devices. It would be difficult to overestimate the significance of the contributions of all these men. Chandler significantly extended the testing of child seats including the development and use of scientifically adequate child dummies (until then, even automobile crash studies used dolls). He also evaluated a number of seat restraint systems for general aviation aircraft as well as an energy absorbing steering column technology for possible application to aircraft controls. Garner and McFadden, in addition to their specialty areas, had regularly worked together as a team in addressing survival of flight crews and passengers in commercial aircraft. They had tested smoke hoods and had begun assessing computer simulation of emergency evacuations as early as 1970. Later, they conducted escape studies with blind travelers using canes and with passengers who had mobility handicaps; they conducted studies evaluating the needs and effectiveness of infant and child flotation devices. After their retirements, research on oxygen needs and equipment was continued by physiologist E. Arnold Higgins, Ph.D., while studies of passenger emergency evacuation for the past decade-plus have been led by G.A. McLean, Ph.D. (including a Type I11 overwing exit study that used 2,544 subjects).
Author
Protection; Constraints; Flotation; Computerized Simulation; Crash Injuries; Energy Technology; Emergencies

20060011662 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
Air Traffic Controllers: Stress ... and Sleep
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series; March 2005, pp. 43-45; In English; See also 20060011654; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

During the OS, concerns regarding passenger safety, perceived work stress associated with the air traffic control occupation, and controllers' mental states became a media focus ('Sweaty Palms in the Control Tower' was the title of one such article during that time) and a major labor issue (11, 36). A team of CAM1 physiologists, led by Carlton E. Melton, Ph.D., and a CAM1 psychologist, Roger C. Smith, Ph.D., combined to perform an array of on-site studies that ultimately included a total of 402 air traffic control specialists (ATCSs). The studies embraced different types of air traffic facilities and permitted comparisons between them and between different shift schedules, different traffic volumes, and the effects of introducing ARTS-III. Physiological tests were extensive and complemented by psychological assessments of job attitudes and of perceived stress. Data obtained included ambulatory electrocardiograms (ECGs), urine samples analyzed for 17-ketogenic steroids, epinephrine, norepinephrin, and creatinine, fatigue check lists, and questionnaires regarding medication usage, physical complaints, and sleep reports. Physiological results showed clear stress effects related to periods of increased traffic volume (i.e. increased workload) both within and between facilities, but no pervasive or unacceptable levels of general 'stressinduced outcomes. The psychological tests resulted in profiles that showed controllers to be particularly well-suited to their occupation; their work preferences tended to be for moderate- to-heavy traffic rather than for lighter levels.
Author
Air Traffic Control; Physiological Tests; Stress (Physiology); Air Traffic Controllers (Personnel); Workloads (Psychophysiology)

20060011663 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
An Agency Crisis: Recovery ... and CAMI Shines
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series; March 2005, pp. 46-49; In English; See also 20060011654; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy

In 1981, an historic labor-management and labor law crisis hit the agency - the illegal strike by more than 11,000 air traffic controllers, who were subsequently fired by U.S. President Ronald Reagan. 'Strike recovery' imposed immediate, severe, operational requirements (despite curtailment in the amount of traffic) that included the very demanding daily handling of air traffic by a much smaller than needed contingent of controllers supplemented with supervisory and managerial air traffic personnel who went back to the 'boards' ... and by some military controllers. It also required major infrastructure changes under intensive time pressures - viz., selecting, training, and hiring thousands of new controllers at a significantly faster pace than ever before while maintaining aviation safety. And CAMI played a key role by increasing its existing partnership with the FAA Academy via the selection and training research psychologists who had succeeded Bart Cobb. One of those researchers, James O. Boone, Ed.D., was recognized as pre-eminent by the FAA Administrator, was assigned to his staff (as FAA-1B), and moved to Washington, D.C., where he participated in the hiring plans and provided statistical projections for decision-making regarding ATC applicants and their training; he later became involved in new agency approaches to

management training and ultimately participated in a variety of other high level agency policy groups.
Author
Air Traffic Controllers (Personnel); Flight Safety; Labor; Policies; Air Traffic Control

20060011665 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
Sharing Knowledge ... and Resources
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series; March 2005, pp. 69-72; In English; See also 20060011654; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

CAMI's research outcomes and their by-products have immediate conduits to the FAA, the National Transportation Safety Board, NASA, the National Highway Traffic Safety Administration, the military, and the aviation and aerospace industries. And there are regularly scheduled exchanges with scientific and professional groups. All of these conduits tend to involve regular, intensive, and largely formal interactions.. .many of which are evident in the preceding sections of this report. But CAMI's contributions and free sharing of knowledge and resources extend to other entities and involve the development and modification of formats at CAMI for providing special opportunities for special groups. For example, many local junior college, college, and university students have gained research experience as summer aides or part-time aides through special student programs or via the participation of CAMI researchers on university faculties. Some other types of opportunities are depicted in this section. They comprise important elements in the conduct, scope, and meaningfulness of CAMI s scientific enterprise.. .all in support of improving aviation and aerospace safety.
Author
Aerospace Industry; Aerospace Safety; Aircraft Safety; Safety Management

20060011666 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
The Flight Environment: Altitude, Temperature, Ozone ... and Radiation
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series; March 2005, pp. 56-58; In English; See also 20060011654; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Altitude: Studies on altitude and oxygen masks were undertaken by John Swearingen and his small team prior to the opening of CARI. They were continued by Ernest McFadden and, later, by E. Arnold Higgins, Ph.D. The continuation of that important line of work resides in the periodic development of new oxygen masks and types of delivery systems. The work comprises evaluating any safety issues in accessing and using those devices, assessing the effects of their use on emergency evacuation times, and testing the integrity of the masks in the aviation environment. The latter includes research regarding the fit of masks on bearded men and on the smaller face structure of women and children. Temperature: Research on temperature as an aviation stressor was conducted primarily by P. F. Iampietro, Ph.D., (original head of the physiology laboratory) and by Carlton E. Melton, Ph.D., (who later succeeded Iampietro), in the '60s and early '70s. Melton's work was closely associated with his studies on assessing stress issues in the training of general aviation pilots. In those studies, the effects of high cockpit temperatures on flight simulator performance and pilot physiology were studied for their training implications and for application to crop duster pilots. In 1968, during the developmental stages of the supersonic transport (SST), Higgins examined complex performance in temperatures up to 140 F over a time period required to get an SST down from cruising flight altitudes in the event of an in-flight air compressor failure. (Other CAMI studies assessed emergency passenger evacuation in an SST model.) Ozone: Higgins and Melton, along with Michael T. Lategola, Ph.D., also led the work on ozone assessments. Ozone level exposures had been raised as a subject of concern by aviation industry employees in the late '70s (and again in the late OS, stimulated as an off-shoot of concerns over urban environments). CAMI's research was conducted with an emphasis on pulmonary function. That work assured that no harmful ozone effects were present in the aviation environment. An updated review of ozone findings was provided in a 1989 CAMI report by Melton.
Author
Flight Altitude; Temperature Effects; Ozone; High Temperature; Flight Simulators; Cockpit Simulators

20060012047 National Transportation Safety Board, Washington, DC USA
Controlled Flight Into Terrain Beech King Air 200, N501RH, Stuart, Virginia, on October 24, 2004. Aircraft Accident Brief
Feb. 07, 2006; 28 pp.; In English
Report No.(s): PB2006-104812; NTSB/AAB-06/01; No Copyright; Avail.: National Technical Information Service (NTIS)

On October 24, 2004, about 1235 eastern daylight time, a Beech King Air 200, N501RH, operated by Hendrick Motorsports, Inc., crashed into mountainous terrain in Stuart, Virginia, during a missed approach to Martinsville/Blue Ridge Airport (MTV), Martinsville, Virginia. The flight was transporting Hendrick Motorsports employees and others to an automobile race in Martinsville, Virginia. The two flight crewmembers and eight passengers were killed, and the airplane was destroyed by impact forces and postcrash fire. The flight was operating under the provisions of 14 Code of Federal Regulations (CFR) Part 91 on an instrument flight rules (IFR) flight plan. Instrument meteorological conditions (IMC) prevailed at the time of the accident.
NTIS
Accident Investigation; Aircraft Accidents; Flight Control; Terrain

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.

20060011264 Hughes Technical Center, Atlantic City International Airport, NJ, USA
Results of Intermediate-Scale Flammability Tests Performed on Hypalon(Trade Name) RB71 Aircraft Duct Insulation
Cahill, P.; Marker, T.; Reinhardt, J.; Feb. 2006; 30 pp.; In English
Report No.(s): PB2006-107476; No Copyright; Avail.: National Technical Information Service (NTIS)

Intermediate-scale flammability testing of Hypalon RB71, a thermal acoustical insulation primarily used to insulate ducts, was conducted in a section of a wide-body aircraft. The aircraft section was configured to represent the attic area of a transport category aircraft. Baseline tests were also conducted using metallized Tedlar film cover over fiberglass to wrap the ducts. Temperature versus time and the relative energy release rate versus time were evaluated and are presented in this report.
NTIS
Ducts; Elastomers; Flammability; Insulation

20060011580 BAE Systems, UK
Flight Testing the Nimrod MRA4
Gill, Andrew; Bellamy, Alex; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 9-1 - 91-17; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The Nimrod MRA4 has been designed to replace the Nimrod MR2 maritime patrol aircraft currently used by the Royal Air Force. Whilst drawing on the airframe configuration of the existing Nimrod, the MRA4 is essentially a new aircraft comprising 95% new design and a new fully integrated mission system. It is undoubtedly the most complex aircraft built by BAE SYSTEMS, with the most challenging flight test programme in terms of time scale. The flight trials are being conducted as a Joint Trials Team in conjunction with, the Defence Procurement Agency, the RAF and Qinetiq. Such trials support can be provided both on board (using flight test observers) and/or via a telemetry down link to the Warton flight test ground station. This paper is to give an overview on the progress of the Nimrod MRA4 flight trials and highlight the innovative methods being used to deliver an efficient and affordable flight test programme.
Author
Airframes; Systems Integration; Flight Tests; Aircraft Configurations

20060011581 Aermacchi S.p.A., Venegono Superiore, Italy
Early Flights Achievement with the Aermacchi M-346 Advanced Trainer
Chimetto, Paolo; Carabelli, Rodolfo; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 13-1 - 13-12; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The M-346 advanced trainer, designed and built by Aermacchi, has made its first flight on mid July 2004 and completed a first set of 54 flights in March 2005. The aircraft, on the leading edge of its class of flying vehicles in terms of performance, technology applied and mission capability, has confirmed the soundness of its design. As expected, the initial envelope explored has been found trouble-free, confirming the satisfactory level of reliability of the modelling used for predictions. Next stage of development tests will take the aircraft off the feathers bed of the initial envelope to identify the margins existing

against the flutter domain while developing the Flight Control System control laws to be implemented aiming at the carefree handling as final target to achieve.
Author
Training Devices; Training Aircraft; Reliability Analysis; Flight Control; Control Theory; Leading Edges

20060011582 Flight Test Squadron (0419th), Edwards AFB, CA, USA
A Year of Bomber Test: Legacy and Lessons Learned
Salasovich, Richard; Harmer, Paul; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 8-1 - 8-10; In English; See also 20060011579; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The 419th Flight Test Squadron (419 FLTS), located at Edwards Air Force Base, California, is responsible for developmental testing of the B-1B, B-2A, and B-52H aircraft for the US Air Force. The Operations Engineering Flight at the 419 FLTS is comprised of operations engineers, test conductors, and test directors who are responsible for coordinating the efforts of the entire flight test team. The operations engineer begins the flight test mission planning process by translating engineering requirements into cogent test cards. They assign specific test points to a mission objective summary and assemble a notional outline of a prospective test mission. They schedule and deconflict resources and mission requirements. The test conductor then appropriates mission planning activities and acts as the absolute focal point of the mission, ensuring overall quality of the test planning process in the final days leading up to a mission. They conduct the mission readiness review, control the execution of the mission from the control room, and draft the 'quicklook report' documenting that particular flight test in detail. The test director (as opposed to the test conductor) acts as the squadron commander s representative during a mission and has absolute authority to cancel a mission at any time at his discretion whenever anything fails to meet standard test criteria, proper test discipline, or violates test safety. Several flight test programs took place on all three airframes over the past year. The B-1B integrated the Joint Standoff Weapon and Joint Air-to-Surface Standoff Missile to the platform. The B-2A completed regression testing to validate the newest software drop and added a new tactical Link-16 terminal that promises to improve pilot situational awareness during combat. The focus of B-52H testing has been upgrading the offensive avionics system to carry the platform to 2037. Lessons learned were documented throughout the three test programs in a never-ending effort to improve flight test safety and efficiency. Communications procedures were standardized between the mission control room, the aircrew, and the range. Ground test planning procedures were adopted to mirror, as much as possible, the rigorous planning required of flight test. Finally, configuration control procedures were implemented to preclude the incorrect integration of test hardware.
Author
Bomber Aircraft; B-52 Aircraft; Mission Planning; Flight Tests; Ground Based Control; Configuration Management; Schedules; Situational Awareness; Integrated Mission Control Center

20060011585 Aeronautical Development Establishment, Bangalore, India
Tejas Flight Test: Lessons Learned So Far
Raveendran, S. C.; Prabhu, Malteesh; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 14-1 - 14-6; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The Indian Light Combat Aircraft (Tejas) programme has successfully completed the Full Scale Engineering Development (FSED) phase and is presently in the Initial Operational Capability (IOC) clearance phase. Tejas programme is the country s finest example of national effort in pursuit of technological excellence in the field of military aviation. Accordingly, the programme has been a great learning experience for all groups and individuals involved. The paper focuses on some of the lessons learned from this challenging programme.
Author
Fighter Aircraft; Flight Tests; Product Development; Flight Envelopes

20060011598 Military Univ. of Technology, Warsaw, Poland
Transient Temperature Measurements During In-Flight and Wind Tunnel Investigations of Icing Phenomena
Panas, Andrzej J.; Terpilowski, Janusz; Waslicki, Piotr; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 25-1 - 25-9; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The paper deals with a problem of transient temperature measurements performed on the airfoil exposed to icing

conditions. Two types of investigations are discussed: in-flight tests and laboratory icing experiments in a wind tunnel. In the first case measurements were performed during test flights of the Polish TS-11 'Iskra' jet plane. A specially designed on board temperature measurement system was utilized to record the temperature changes in five selected points at the wing. Experiments of the second kind were performed on the NACA0012 model airfoil in a small scale icing research tunnel. In this case a multichannel temperature measurement laboratory system was applied. The experiments were focused on the icing phenomena investigations. The obtained results were analysed in view of the supercooled fuel effect on the heat transfer and on temperature distribution.
Author
Wind Tunnel Tests; Ice Formation; Flight Tests; Airfoils; Temperature Distribution; Temperature Measurement; Ts-11 Aircraft

20060011599 Naval Air Systems Command, Patuxent River, MD, USA
Separation Flight Tests of a Small Unmanned Air Vehicle from a C-130 Transport Aircraft
Roberts, David W.; Judy, Aaron D.; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 19-1 - 19-12; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Unmanned Air Vehicles (UAVs) are increasingly being considered for various roles in the civilian and military communities. Various launch methods have been explored and have been mostly ground based. The desire to investigate the feasibility of launching a UAV from a larger surrogate air platform existed, but had not been explored. As part of a concept demonstration program, NAVAIR s Test and Evaluation Flight Test Department was requested to conduct flight tests to determine a flight envelope and launch system configuration for which a small (maximum gross weight of 80 lbs), unpowered UAV glider could be safely launched from the cargo ramp of a C-130 transport aircraft. A secondary goal was to demonstrate that the UAV would remain stable enough for the wings to deploy and be flyable via a pre-programmed profile or remotely located pilot. A roll-on/roll-off pneumatic launch system was devised to eject the UAV into the airstream in a controlled and consistent manner, and a test program was executed to incrementally expand the UAV safe launch envelope by building down to a minimum gross weight. Flight tests were conducted in September 2003. Safe separation from the C-130 aircraft was demonstrated, as well as UAV stability for successful wings deployment and fly-out. The success of these flight tests opens the door for development of similar air launched systems that could be used for a myriad of applications.
Author
Pilotless Aircraft; Flight Tests; C-130 Aircraft; Stability; Deployment; Systems Engineering

20060011600 Air Force Flight Test Center, Edwards AFB, CA, USA
The USA Air Force Flight Test Center Experiment in Experimental Design
Kailiwai, George, III; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 21-1 - 21-20; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Keeping true to US Air Force Flight Test Center (AFFTC) motto of Toward the Unexplored and mission of conducting and supporting the research, development, test and evaluation of aerospace systems from concept to combat, senior AFFTC technical leaders are conducting an experiment on the applicability of design of experiments (DOE) as a possible test strategy for developmental test and evaluation (DT&E) flight test programs. To this end, AFFTC engineers have completed DOE orientation courses and a three-week course in basic statistics and DOE. The AFFTC then identified specific engineer technical experts as members of the AFFTC initial DOE cadre. Members of this initial cadre have implemented DOE as a test strategy to three USAF Test Pilot School (TPS) Test Management Projects (TMPs). Although these TMPs are still on-going, preliminary results show strong applicability to two of the three TMPs Project HAVE NOT and Project START. The third TMP, Project LOST WINGMAN, is a classical DT&E flight test program with a gradual build-up approach in which the test team has chosen to use One Factor At a Time (OFAT), in which the number of factors and levels is kept to an absolute minimum, as the test strategy. Nonetheless, the Project LOST WINGMAN test team has created two DOE test matrices as secondary test objectives to acquire data on the applicability of DOE to these types of gradual build-up DT&E flight test programs. Since DOE as a test strategy continues to show promise, the AFFTC is continuing with training a second DOE cadre in the fall of 2005, and will use DOE for the next round of USAF TPS TMPs.
Author
Experiment Design; System Effectiveness; Test Pilots; Project Management; Flight Tests; Aerospace Systems

20060011603 Defence Materiel Administration, Stockholm, Sweden

Swedish Evaluation of a MALE UAV-System in Civil and Military Airspace from a Civilian Airport

Danielsson, Claes; Hylander, Thomas; Olsson, Bengt; Anersso, Rolf; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 15-1 - 15-9; In English; See also 20060011579; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

During may-june 2002 the Swedish Defence Material Administration and the Swedish Space Cooperation evaluated a MALE UAV-system operated from Kiruna Airport in the northern part of Sweden. The project was carried out in cooperation with the Swedish Defence forces, the Meteorological Institute of Stockholm University, the Swedish Civil Aviation Administration and with European Aeronautic Defence and Space Company and Israeli Aircraft Industry Ltd as contractors for the UAV-system (IAI/Malat EAGLE). The test flights were performed in both civilian and military airspace, within the North European Airspace Test range (NEAT), with the UAV taking off and landing at Kiruna Airport. The evaluation was a predemonstration of a MALE UAV for the planned System Demonstration 2005, a demonstration of the new Swedish NBF, 'Network Centric Warfare'. The purpose of the evaluation was also to evaluate a MALE UAV-system for both civil and military use and, in cooperation with military and civilian airworthiness authorities, establish a feasible airworthiness process for Flight Test Permits. As Kiruna airport is the second airport in Sweden to receive the new VDL mode 4, GPS-based, transponder system, the UAV was equipped with this system. The results from the evaluation performed show that it is possible, within the current rules and regulations, to perform flights with UAV s from a civil airport within civil and military airspace. The results also show that NEAT is a proper space to perform this type of flights, as the area is very vast. It also showed that MALE UAV-system would be of use in System Demonstration 2005 as well as for other civilian and military purposes.

Author

Civil Aviation; Test Ranges; Aircraft Reliability; Flight Tests; Pilotless Aircraft; Airspace

20060012139 NASA Langley Research Center, Hampton, VA, USA

Power Budget Analysis for High Altitude Airships

Choi, Sang H.; Elliott, James R.; King, Glen C.; [2006]; 12 pp.; In English; SPIE Defense and Security Symposium 2006, 17-21 Apr. 2006, Orlando, FL, USA; Original contains color illustrations

Contract(s)/Grant(s): 581.02.08

Report No.(s): SPIE Paper 6219-12; No Copyright; Avail.: CASI: A03, Hardcopy

The High Altitude Airship (HAA) has various potential applications and mission scenarios that require onboard energy harvesting and power distribution systems. The energy source considered for the HAA s power budget is solar photon energy that allows the use of either photovoltaic (PV) cells or advanced thermoelectric (ATE) converters. Both PV cells and an ATE system utilizing high performance thermoelectric materials were briefly compared to identify the advantages of ATE for HAA applications in this study. The ATE can generate a higher quantity of harvested energy than PV cells by utilizing the cascaded efficiency of a three-staged ATE in a tandem mode configuration. Assuming that each stage of ATE material has the figure of merit of 5, the cascaded efficiency of a three-staged ATE system approaches the overall conversion efficiency greater than 60%. Based on this estimated efficiency, the configuration of a HAA and the power utility modules are defined.

Author

Airships; High Altitude; Energy Conversion Efficiency; Thermoelectric Generators; Thermoelectric Materials; Photovoltaic Cells

06
AVIONICS AND AIRCRAFT INSTRUMENTATION

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

20060011583 Airbus Industrie, Toulouse, France

Conduct of Flight Tests and On-Board Computing for the A380

Lafourcade, Denis; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 10-1 - 10-11; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The Airbus way of management of the flight tests activity limits the flight test crew to two pilots, one flight engineer and

one (or two) flight test engineer (FTE). The latter is in charge of the flight test program and has to conduct the tests sequences during the flight, in order to validate them, on both qualitative and quantitative aspects. To perform theses tasks, a dedicated station is installed on board the aircraft, first fitted with classical electro-mechanical instruments on Concorde or A300, then becoming entirely computer-oriented on the A380. As a consequence of the reduced flight test crew, Airbus developed the telemetry techniques, allowing dynamic message adaptation to the test sequence, as well as deferred data transmission when the aircraft is outside the coverage area. In order to minimize the flight test data reduction time, a dedicated set of computers has also been installed on board to execute automatically a lot of pre-processing tasks. Since the first A300 up to the A380 and A400M, Airbus acquired a broad knowledge of on-board computing, using now standard computers hardware, software and network techniques to provide tests teams with powerful tools.
Author
Flight Tests; European Airbus; Electromechanical Devices; Computer Programs; Computer Techniques; Concorde Aircraft; Telemetry; Software Engineering

20060011602 Naval Air Systems Command, Patuxent River, MD, USA
Adding New Instrumentation to Aircraft Platforms
Jordan, Mark; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 12-1 - 12-12; In English; See also 20060011579; Original contains color illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Legacy aircraft platforms face many hurdles; when it comes to testing these include but are not limited to: shrinking budgets, low priority, and lack of instrumentation. These hindrances to test programs are not likely to change in the near future. New low cost interchangeable instrumentation systems are needed to fill the gap between current test capabilities and future requirements. In recent years, advances in technology have allowed instrumentation systems to greatly shrink both in size and cost. Some of these new instrumentation systems are designed to fit inside of a MK 80 series fuze well and are designed to look like existing bomb components. One of these is a small form factor instrumentation system nicknamed 6 DoF, because it transmits six degree of freedom information to a ground station. The 6 DoF is a completely self-contained instrumentation system that requires no aircraft interface to operate. The 6 DoF has provided a low cost data collection device for weapon separation test programs for the last couple of years. With the success of the 6 DoF instrumentation systems in weapon separation test programs, the question was raised if a similar system could be used for captive carriage loads and flying qualities test programs. To meet this need a new low cost, under $30,000, instrumentation system has been developed. This system is designed to receive data from external strain gauges and accelerometers. This new system is a block upgrade of the 6 DoF instrumentation system that has had the internal sensors removed, and has had plugs installed, to take inputs from external sensors. Now instead of having to instrument a specific aircraft for a test program, a store could be instrumented to collect the same data. This system is designed to not only allow the instrumentation to be moved from one type of aircraft to another, but also to allow the instrumentation to be moved from one type of store to another. Legacy platforms through the use of these low cost reusable instrumentation systems will be able to continue to provide new capabilities to the fleet even under reduced funds.
Author
Data Acquisition; Instruments; Strain Gages; Flight Characteristics; Degrees of Freedom; Accelerometers

20060011604 NASA Dryden Flight Research Center, Edwards, CA, USA
Optical Air Flow Measurements for Flight Tests and Flight Testing Optical Air Flow Meters
Jentink, Henk W.; Bogue, Rodney K.; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 11-1 - 11-14; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Optical air flow measurements can support the testing of aircraft and can be instrumental to in-flight investigations of the atmosphere or atmospheric phenomena. Furthermore, optical air flow meters potentially contribute as avionics systems to flight safety and as air data systems. The qualification of these instruments for the flight environment is where we encounter the systems in flight testing. An overview is presented of different optical air flow measurement techniques applied in flight and what can be achieved with the techniques for flight test purposes is reviewed. All in-flight optical airflow velocity measurements use light scattering. Light is scattered on both air molecules and aerosols entrained in the air. Basic principles of making optical measurements in flight, some basic optical concepts, electronic concepts, optoelectronic interfaces, and some atmospheric processes associated with natural aerosols are reviewed. Safety aspects in applying the technique are shortly addressed. The different applications of the technique are listed and some typical examples are presented. Recently NASA acquired new data on mountain rotors, mountain induced turbulence, with the ACLAIM system. Rotor position was identified

using the lidar system and the potentially hazardous air flow profile was monitored by the ACLAIM system.
Author
Flowmeters; Air Flow; Air Data Systems; Flight Tests; Light Scattering; Turbulence; Velocity Measurement; Optical Measurement; Avionics

07
AIRCRAFT PROPULSION AND POWER

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

20060011322 Alzeta Corp., Santa Clara, CA, USA
Development and Demonstration of an Ultra-Low NOx Combustor for Gas Turbine Engines
Apr. 2005; 92 pp.; In English
Report No.(s): DE2006-840382; No Copyright; Avail.: National Technical Information Service (NTIS)

Alzeta Corporation has developed surface-stabilized fuel injectors for use with lean premixed combustors which provide extended turndown and ultra-low NOx emission performance. These injectors use a patented technique to form interacting radiant and blue-flame zones immediately above a selectively-perforated porous metal surface. This allows stable operation at low reaction temperatures. This technology is being commercialized under the product name nanoSTAR. Initial tests demonstrated low NOx emissions but, were limited by flashback failure of the injectors. The weld seams required to form cylindrical injectors from flat sheet material were identified as the cause of the failures. The approach for this project was to first develop new fabrication methods to produce injectors without weld seams, verify similar emissions performance to the original flat sheet material and then develop products for microturbines and small gas turbines along parallel development paths. A 37 month project was completed to develop and test a surface stabilized combustion system for gas turbine applications. New fabrication techniques developed removed a technological barrier to the success of the product by elimination of conductive weld seams from the injector surface. The injectors demonstrated ultra low emissions in rig tests conducted under gas turbine operating conditions. The ability for injectors to share a common combustion chamber allowing for deployment in annular combustion liner was also demonstrated. Some further development is required to resolve integration issues related to specific engine constraints, but the nanoSTAR technology has clearly demonstrated its low emissions potential.
NTIS
Combustion Chambers; Gas Turbine Engines; Nitrogen Oxides

20060011596 Test Wing (0412th), Edwards AFB, CA, USA
Knowledge Gained from F/A-22/F119 Propulsion System Ground and Flight Test Analysis
Web, Allan T.; Kidman, David S.; Malloy, Donald J.; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 23-2 - 23-14; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This paper describes the teaming strategy between the Air Force s two major propulsion test centers, the Arnold Engineering Development Center (AEDC), and the Air Force Flight Test Center (AFFTC) to evolve new paradigms and approaches for cost sharing and sharing knowledge for risk management in the development of new aero-propulsion systems. The AEDC is responsible for the ground-based altitude development of current and future propulsion systems, and the AFFTC is responsible for in-flight development testing of installed propulsion systems. I m Allan Webb, Chief of the Propulsion Integration Branch at the Air Force Flight Test Center at Edwards Air Force Base, CA and I will be presenting the introductory and summary slides addressing knowledge gained from F/A-22/F119 propulsion system ground and flight test analysis. Dr. Donald Malloy from the Arnold Engineering Development Center in Tennessee will discuss propulsion system ground and flight test analysis procedures for the F119 powered F/A-22 aircraft.
Author
Propulsion System Configurations; Propulsion System Performance; Aircraft Engines; Flight Tests; Ground Tests; Product Development

20060012147 Pratt and Whitney Aircraft, East Hartford, CT, USA
Engine Company Evaluation of Feasibility of Aircraft Retrofit Water-Injected Turbomachines
Becker, Arthur; April 2006; 35 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): NNC04QB58P
Report No.(s): NASA/CR-2006-213871; E-15241; No Copyright; Avail.: CASI: A03, Hardcopy

This study supports the NASA Glenn Research Center and the U.S. Air Force Research Laboratory in their efforts to evaluate the effect of water injection on aircraft engine performance and emissions. In this study, water is only injected during the takeoff and initial climb phase of a flight. There is no water injection during engine start or ground operations, nor during climb, cruise, descent, or landing. This study determined the maintenance benefit of water injection during takeoff and initial climb and evaluated the feasibility of retrofitting a current production engine, the PW4062 (Pratt & Whitney, East Hartford, CT), with a water injection system. Predicted NO(x) emissions based on a 1:1 water-tofuel ratio are likely to be reduced between 30 to 60 percent in Environmental Protection Agency parameter (EPAP). The maintenance cost benefit for an idealized combustor water injection system installed on a PW4062 engine in a Boeing 747-400ER aircraft (The Boeing Company, Chicago, IL) is computed to be $22 per engine flight hour (EFH). Adding water injection as a retrofit kit would cost up to $375,000 per engine because of the required modifications to the fuel system and addition of the water supply system. There would also be significant nonrecurring costs associated with the development and certification of the system that may drive the system price beyond affordability.
Author
Water Injection; Turbomachinery; Retrofitting; Cost Effectiveness; Combustion Products; Exhaust Gases; Exhaust Emission; Fuel Systems

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.

20060011586 Saab Aerospace, Sweden
Flight Test of the Autonomous Take Off and Landing Functions of the SHARC Technology Demonstrator
Duranti, SImone; Malmfors, Viktor; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 18-1 - 18-18; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The Saab s unmanned technology demonstrator SHARC has completed in August 2004 a third flight test campaign, at the NEAT test range, in northern Sweden. For the first time the SHARC conducted fully autonomous missions, including Autonomous Take Off and Landing (ATOL). The focus of the test campaign has been in verifying the newly developed ATOL functionalities. Simulator and Hardware-In-the-Loop test sessions paved the way to flight testing. The importance of reliable dynamic models has been once more highlighted. Ground roll dynamic and ground effect aerodynamic models had been refined ad-hoc in order to predict the behaviour of the aircraft during the critical phases of rotation and touch down. In preparation to the flight test campaign, ground rolls have for the first time been performed at the Saab's flight test centre in Link ping. The flight test campaign has been fully successful. The autonomous landing functionality is operationally invaluable, since it lowers the risks embedded in manual remote piloting during high-gain tasks. A number of specific functionalities had been designed into the avionics to allow safe and effective flight testing of the new capabilities; most of them regarded the possibility of the UAV operator to condition the behaviour of the aircraft in order to limit the authority of the onboard autonomy.
Author
Flight Tests; Aerodynamic Characteristics; Autonomy; Simulators; Rotation; Roll; Pilotless Aircraft; Takeoff; Landing

20060011592 Test Wing (0412th), Edwards AFB, CA, USA
Unmanned Air Vehicles: A New Age in Human Factors Evaluations
Moisio, Deborah A.; Spravka, John J.; Payton, Mary G.; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 5A1 - 5A16; In English; See also 20060011579; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

As the role of the aircraft pilot transitioned from a nearly total manual controller in early manned aircraft to one of supervisory control and/or cooperative functioning in unmanned aircraft, the human factors flight test approach and the

associated test methodologies have necessarily changed. Piloting air vehicles evolved from using cockpit instruments and manual controls to fly the aircraft, to monitoring the cockpit instruments which fly the aircraft nearly automatically, to using ground station instruments to fly the aircraft remotely. While most, if not all, of the physical stressors of the cockpit are absent from the typical ground control station, many of the cockpit stimuli that provide invaluable aircraft health and status information are also absent. Increased levels of automation have induced new types of failures. These include failure to monitor, vigilance decrement, over reliance on standard values, automation-induced complacency, and increased latency in detecting problems. Consequently, these failures often lead to reduced operator performance due to information shortfall. As the pilot-aircraft relationship evolve, the focus of human factors evaluations moves from what the pilot physically perceives and processes in the cockpit, to what the pilot mentally perceives and processes on the ground. Physical information from the aircraft, such as vibration and sound cues, must be transformed into usable information on the ground station displays. This includes keeping the level of automation appropriate so the pilot on the ground can be aware of and adequately handle emergency situations. Since pilot workload for an Unmanned Air Vehicle (UAV) is mostly mental, maintaining situation awareness is paramount. This paper identifies some critical components of new human factors approaches for evaluating UAV human-system interfaces and compares them with approaches traditionally used to evaluate manned air vehicles.
Author
Pilotless Aircraft; Human Factors Engineering; Flight Tests; Ground Based Control; Ground Stations; Aircraft Control

20060011593 Ministry of Defence Boscombe Down, Salisbury, UK
Assessing Human Factors in UK Military UAVs
Greenbank, Chris; Ayliffe, Alec; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 5B-1 - 5B-12; In English; See also 20060011579; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Automation is a key attribute of modern UAV systems. In the UK, for example, one of the most common user requirements is for launch and recovery to be completely automatic, which is the case with QinetiQ's Observer UAV. But the Human has an important role that varies in detail according to the type of UAV. The level of detail and the assessment philosophy must be adapted to the size and role of the UAV. Clearly, a 5 kg mini- UAV will present different challenges than a large, High Altitude Long Endurance UAV. The assessment will need to take into account the complexity of the system but the underlying principles of the assessment of different UAVs will be similar. Some of the common human roles that are likely to be essential to safety include: a) Planning; b) Managing Failure/Emergency states and other non-nominal situations; and c) Supervision/control. The design of the UAV system impacts on the ability of the Human to fulfill the required role without undue error and is often the main focus of any assessment, but operational and maintenance issues cannot be ignored
Derived from text
Human Factors Engineering; Errors; Emergencies; Safety; User Requirements; Failure; Pilotless Aircraft

20060011601 Murphy (Ryan), Patuxent River, MD, USA
T-45 Stability Augmented Steering System
Murphy, Ryan; Wiseman, Reid; Stack, Christina; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 1-1 - 1-5; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A04, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The ground handling characteristics of the T-45 Goshawk (a U.S. trainer variant of the Hawk aircraft) were identified as problematic since the early days of flight testing. deficiency report SA-162 addressed the overly sensitive directional control characteristics of the T-45 during landing rollout. This Part IK deficiency was not corrected during initial developmental testing and has presented itself in over 12 runway departures or loss of controls within the last two years. The runway departures typically occur when students who are not familiar with the landing characteristics, make large corrective inputs for aircraft heading during the landing rollout. The lowest region of directional stability has been observed in the 60-85 kt range. A variety of potential solutions were attempted to remedy the deficiency over the years. Initially, full time nose wheel steering (NWS) was added to the aircraft. Although some improvement was noted, directional control during landing rollout remained an issue. Following the incorporation of full time NWS, several iterations of pulse width modulation NWS and active yaw damping during landing rollout were evaluated. None of these solutions provided sufficient improvement for fleet incorporation. Following these unsuccessful attempts to finding a ground handling solution, NAVAIR and Boeing initiated a ground handling study. This study resulted in a proposal to provide yaw rate feedback to the NWS to improve ground handling during landing rollout. This system became the Stability Augmented Steering System (SASS). An engineering company that primarily investigates the handling qualities of racecars, Systems Technology, Inc., completed the study. Study results determined the geometry of the landing gear on the small airframe, combined with the material composition of the tires,

created the unstable ground handling characteristics of the aircraft. Unable to practically redesign the geometry of the landing gear and the lack of suitable tire material to remake the tires, it was necessary to design a new system that could limit the departure characteristics by trying to limit the yaw that may be experienced during the landing rollout. This system had to operate in both the T-45A and the T-45C aircraft, and therefore designed as an independent system requiring limited information from the aircraft.
Derived from text
Systems Engineering; Directional Control; Directional Stability; Aerodynamic Characteristics; Flight Tests; Steering; Damping; Controllability

17
SPACE COMMUNICATIONS, SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

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

20060012155 NASA Glenn Research Center, Cleveland, OH, USA
Design and Testing of Space Telemetry SCA Waveform
Mortensen, Dale J.; Handler, Louis M.; Quinn, Todd M.; April 2006; 13 pp.; In English; 2005 Software Defined Radio Technical Conference and Product Exposition, 14-18 Nov. 2005, Orange County, CA, USA; Original contains color illustrations
Contract(s)/Grant(s): WS 22-041-20-06
Report No.(s): NASA/TM-2006-214245; SDR-05-4.6-02; E-15490; Copyright; Avail.: CASI: A03, Hardcopy

A Software Communications Architecture (SCA) Waveform for space telemetry is being developed at the NASA Glenn Research Center (GRC). The space telemetry waveform is implemented in a laboratory testbed consisting of general purpose processors, field programmable gate arrays (FPGAs), analog-to-digital converters (ADCs), and digital-to-analog converters (DACs). The radio hardware is integrated with an SCA Core Framework and other software development tools. The waveform design is described from both the bottom-up signal processing and top-down software component perspectives. Simulations and model-based design techniques used for signal processing subsystems are presented. Testing with legacy hardware-based modems verifies proper design implementation and dynamic waveform operations. The waveform development is part of an effort by NASA to define an open architecture for space based reconfigurable transceivers. Use of the SCA as a reference has increased understanding of software defined radio architectures. However, since space requirements put a premium on size, mass, and power, the SCA may be impractical for today s space ready technology. Specific requirements for an SCA waveform and other lessons learned from this development are discussed.
Author
Software Development Tools; Signal Processing; Analog to Digital Converters; Transmitter Receivers; Field-Programmable Gate Arrays; Computer Programs; Aerospace Engineering

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*.

20060012088 NASA Langley Research Center, Hampton, VA, USA
Aerocapture Systems Analysis for a Neptune Mission
Lockwood, Mary Kae; Edquist, Karl T.; Starr, Brett R.; Hollis, Brian R.; Hrinda, Glenn A.; Bailey, Robert W.; Hall, Jeffery L.; Spilker, Thomas R.; Noca, Muriel A.; O'Kongo, N., et al.; April 2006; 148 pp.; In English; See also 20060012089 - 20060012100; Original contains color and black and white illustrations
Contract(s)/Grant(s): 620.02.01.01.07.02
Report No.(s): NASA/TM-2006-214300; L-19236; Copyright; Avail.: CASI: A07, Hardcopy

A Systems Analysis was completed to determine the feasibility, benefit and risk of an aeroshell aerocapture system for Neptune and to identify technology gaps and technology performance goals. The systems analysis includes the following disciplines: science; mission design; aeroshell configuration; interplanetary navigation analyses; atmosphere modeling;

computational fluid dynamics for aerodynamic performance and aeroheating environment; stability analyses; guidance development; atmospheric flight simulation; thermal protection system design; mass properties; structures; spacecraft design and packaging; and mass sensitivities. Results show that aerocapture is feasible and performance is adequate for the Neptune mission. Aerocapture can deliver 1.4 times more mass to Neptune orbit than an all-propulsive system for the same launch vehicle and results in a 3-4 year reduction in trip time compared to all-propulsive systems. Enabling technologies for this mission include TPS manufacturing; and aerothermodynamic methods for determining coupled 3-D convection, radiation and ablation aeroheating rates and loads.
Author
Systems Analysis; Aeroshells; Aerocapture; Atmospheric Models; Computational Fluid Dynamics; Neptune (Planet); Spacecraft Design; Systems Engineering

20060012089 NASA Johnson Space Center, Houston, TX, USA
Aerocapture Guidance Performance for the Neptune Orbiter
Masciarelli, James P.; Westhelle, Carlos H.; Graves, Claude A.; Aerocapture Systems Analysis for a Neptune Mission; April 2006, pp. 98-106; In English; See also 20060012088; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy

A performance evaluation of the Hybrid Predictor-corrector Aerocapture Scheme (HYPAS) guidance algorithm for aerocapture at Neptune is presented in this paper for a Mission to Neptune and the Neptune moon Triton. This mission has several challenges not experienced in previous aerocapture guidance assessments. These challengers are a very high Neptune arrival speed, atmospheric exit into a high energy orbit about Neptune, and a very high ballistic coefficient that results in a low altitude acceleration capability when combined with the aeroshell L/D. The evaluation includes a definition of the entry corridor, a comparison to the theoretical optimum performance, and guidance responses to variations in atmospheric density, aerodynamic coefficients and flight path angle for various vehicle configurations (ballistic numbers). The benefits of utilizing angle-of-attack modulation in addition to bank angle modulation to improve flight performance is also discussed. The results show that despite large sensitivities in apoapsis targeting, the algorithm performs within the allocated (Delta)V budget for the Neptune mission using only bank angle modulation. The addition of angle-of-attack modulation with as little as +/-5 degrees of amplitude significantly improves the accuracy in final orbit apoapsis. Although angle-of-attack modulation complicates the vehicle design its performance enhancement reduces aerocapture risk and reduces the propellant consumption needed to reach the high energy target orbit.
Author
Flight Characteristics; Performance Tests; Predictor-Corrector Methods; Flight Paths; Aerodynamic Coefficients; Aerocapture; Aeroshells; Angle of Attack; Atmospheric Density

20060012090 NASA Langley Research Center, Hampton, VA, USA
Preliminary Convective-Radiative Heating Environments for a Neptune Aerocapture Mission
Hollis, Brian R.; Wright, Michael J.; Olejniczak, Joseph; Takashima, Naruhisa; Sutton, Kenneth; Prabhu, Dinesh; Aerocapture Systems Analysis for a Neptune Mission; April 2006, pp. 107-118; In English; See also 20060012088; Original contains color illustrations
Contract(s)/Grant(s): NAS2-99092; NAS1-00135; NCC1-02043; Copyright; Avail.: CASI: A03, Hardcopy

Convective and radiative heating environments have been computed for a three-dimensional ellipsled configuration which would perform an aerocapture maneuver at Neptune. This work was performed as part of a one-year Neptune aerocapture spacecraft systems study that also included analyses of trajectories, atmospheric modeling, aerodynamics, structural design, and other disciplines. Complementary heating analyses were conducted by separate teams using independent sets of aerothermodynamic modeling tools (i.e. Navier-Stokes and radiation transport codes). Environments were generated for a large 5.50 m length ellipsled and a small 2.88 m length ellipsled. Radiative heating was found to contribute up to 80% of the total heating rate at the ellipsled nose depending on the trajectory point. Good agreement between convective heating predictions from the two Navier-Stokes solvers was obtained. However, the radiation analysis revealed several uncertainties in the computational models employed in both sets of codes, as well as large differences between the predicted radiative heating rates.
Author
Aerocapture; Convective Heat Transfer; Navier-Stokes Equation; Radiation Transport; Aerothermodynamics; Aerodynamics; Atmospheric Models

20060012091 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Aerocapture Navigation at Neptune

Haw, Robert J.; Aerocapture Systems Analysis for a Neptune Mission; April 2006, pp. 57-73; In English; See also 20060012088; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

A proposed Neptune Orbiter Aerocapture mission will use solar electric propulsion to send an orbiter to Neptune. Navigation feasibility of direct-entry aerocapture for orbit insertion at Neptune is shown. The navigation strategy baselines optical imaging and VLBI measurements in order to satisfy the flight system s atmosphere entry flight path angle, which is targeted to enter Neptune with an entry flight path angle of 11.6 degrees. Error bars on the entry flight path angle of plus or minus 0.55 (3) are proposed. This requirement can be satisfied with a data cutoff 3.2 days prior to arrival. There is some margin in the arrival template to tighten (i.e. reduce) the entry corridor either by scheduling a data cutoff closer to Neptune or alternatively, reducing uncertainties by increasing the fidelity of the optical navigation camera.

Author

Aerocapture; Navigation; Neptune (Planet); Space Missions; NASA Space Programs

20060012092 NASA Langley Research Center, Hampton, VA, USA

Neptune Aerocapture Systems Analysis

Lockwood, Mary Kae; Aerocapture Systems Analysis for a Neptune Mission; April 2006, pp. 1-16; In English; See also 20060012088; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

A Neptune Aerocapture Systems Analysis is completed to determine the feasibility, benefit and risk of an aeroshell aerocapture system for Neptune and to identify technology gaps and technology performance goals. The high fidelity systems analysis is completed by a five center NASA team and includes the following disciplines and analyses: science; mission design; aeroshell configuration screening and definition; interplanetary navigation analyses; atmosphere modeling; computational fluid dynamics for aerodynamic performance and database definition; initial stability analyses; guidance development; atmospheric flight simulation; computational fluid dynamics and radiation analyses for aeroheating environment definition; thermal protection system design, concepts and sizing; mass properties; structures; spacecraft design and packaging; and mass sensitivities. Results show that aerocapture can deliver 1.4 times more mass to Neptune orbit than an all-propulsive system for the same launch vehicle. In addition aerocapture results in a 3-4 year reduction in trip time compared to all-propulsive systems. Aerocapture is feasible and performance is adequate for the Neptune aerocapture mission. Monte Carlo simulation results show 100% successful capture for all cases including conservative assumptions on atmosphere and navigation. Enabling technologies for this mission include TPS manufacturing; and aerothermodynamic methods and validation for determining coupled 3-D convection, radiation and ablation aeroheating rates and loads, and the effects on surface recession.

Author

Aerocapture; Aerothermodynamics; Computational Fluid Dynamics; Interplanetary Navigation; Navigation; Mission Planning; Neptune (Planet); Aeroshells

20060012093 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA

Neptune Aerocapture Mission and Spacecraft Design Overview

Bailey, R. W.; Hall, J. L.; Spilker, T. R.; O'Kongo, N.; Aerocapture Systems Analysis for a Neptune Mission; April 2006, pp. 17-28; In English; See also 20060012088; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

A detailed Neptune aerocapture systems analysis and spacecraft design study was performed as part of NASA s In-Space Propulsion Program. The primary objective was to assess the feasibility of a spacecraft point design for a Neptune/Triton science mission that uses aerocapture as the Neptune orbit insertion mechanism. This paper provides an overview of the science, mission and spacecraft design resulting from that study. The estimated delivered wet mass allocation to Neptune orbit was approximately 928 kg. The aerocapture entry system, comprised of aeroshell and post-aerocapture orbit correction propellant, was approximately 1252 kg, for a total atmospheric entry mass allocation of approximately 2239 kg. The aeroshell used was a 2.88 m long flattened ellipsled with a lift to drag ratio of 0.8. A Delta-IV Heavy launch vehicle combined with a 30kW solar electric propulsion (SEP) stage and a Venus/Jupiter gravity assist were used to get the spacecraft to Neptune in 10.25 years. The SEP stage and Orbiter both have 35% dry mass margins ((allocation CBE)/allocation) and the overall launch stack has an additional approximately 8% unallocated reserve. The feasibility of the mission requires the solution of two key technical challenges: improvement in aerothermodynamic computational tools for Neptune; and development of thermal protection material manufacturing processes for the increased thickness needed for aerocapture. Several other component technologies were identified as being able to provide significant performance improvements including: radioiostopic power

generation, solar cells and array structure, low mass/power science instruments, and small stowed volume/large aperture deployable Ka-Band antennas.
Author
Aerocapture; Neptune (Planet); Spacecraft Design; General Overviews; Space Missions; Systems Analysis

20060012094 Jet Propulsion Lab., California Inst. of Tech., Pasadena, CA, USA
Mission Trades for Aerocapture at Neptune
Noca, Muriel A.; Bailey, Robert W.; Aerocapture Systems Analysis for a Neptune Mission; April 2006, pp. 29-44; In English; See also 20060012088; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

A detailed Neptune aerocapture systems analysis and spacecraft design study was performed to improve our understanding of the technology requirement for such a hard mission. The primary objective was to engineer a point design based on blunt body aeroshell technology and quantitatively assess feasibility and performance. This paper reviews the launch vehicle, propulsion, and trajectory options to reach Neptune in the 2015-2020 time frame using aerocapture and all-propulsive vehicles. It establishes the range of entry conditions that would be consistent with delivering a approx. 1900 kg total entry vehicle maximum expected mass to Neptune including a approx. 790 kg orbiter maximum expected mass to the science orbit. Two Neptune probes would be also be delivered prior to the aerocapture maneuver. Results show that inertial entry velocities in the range of 28 to 30 km/s are to be expected for chemical and solar electric propulsion options with several gravity assists (combinations of Venus, Earth and Jupiter gravity assists). Trip times range from approximately 10-11 years for aerocapture orbiters to 15 years for all-propulsive vehicles. This paper shows that the use of aerocapture enables this mission given the payload to deliver around Neptune compared to an all-propulsive orbit insertion approach. However, an all-propulsive chemical insertion option is possible for lower payload masses than the one needed for this science mission. Both approaches require a Delta IV heavy class launch vehicle.
Author
Aerocapture; Aeroshells; Systems Analysis; Spacecraft Design; Blunt Bodies; Launch Vehicles; Propulsion; Trajectories

20060012095 NASA Langley Research Center, Hampton, VA, USA
Configuration, Aerodynamics, and Stability Analysis for a Neptune Aerocapture Orbiter
Edquist, Karl T.; Prabhu, Ramadas K.; Hoffman, David A.; Rea, Jeremy R.; Aerocapture Systems Analysis for a Neptune Mission; April 2006, pp. 45-56; In English; See also 20060012088; Original contains color illustrations; Copyright; Avail.: CASI: A03, Hardcopy

A multi-center NASA team conducted a systems analysis study of a Neptune aerocapture orbiter mission in order to demonstrate feasibility and identify technology gaps. The aerocapture maneuver utilizes aerodynamic drag to decelerate the vehicle, rather than chemical propulsion, for orbit insertion around Neptune and allows a flyby of the Triton moon. This paper presents the analysis used to select an orbiter shape, and the aerodynamics and stability characteristics of the reference vehicle. Several shape classes were screened for aerodynamic performance using modified Newtonian theory. A lift-to-drag ratio requirement of 0.6 to 0.8 was derived from an estimate of the theoretical corridor width to give margin beyond 3-sigma dispersions. A flat-bottomed ellipsled was selected as the reference orbiter shape based on various metrics, including lift-to-drag ratio, ballistic coefficient, and effective volume. High-fidelity computational solutions for the reference orbiter shape predict a lift-to-drag ratio of 0.806 and ballistic coefficient of 895 kg/sq m at a trim angle-of-attack of 40 deg. Stable pitch behavior is predicted with a 6.2% static margin for an axial center of gravity at 51% of the vehicle length from the nose. Both the longitudinal short-period and lateral Dutch-roll frequencies are shown to be within acceptable limits based on piloted vehicle specifications. Aerodynamics uncertainties were estimated to result in a lift-to-drag ratio uncertainty of +13.4%/-14.5% using RSS values and +26.1%/-22.2% using stacked worst-case values.
Author
Aerocapture; Feasibility; Systems Analysis; Flyby Missions; Aerodynamic Characteristics; Aerodynamic Configurations; Aerodynamic Stability; Angle of Attack

20060012096 NASA Marshall Space Flight Center, Huntsville, AL, USA
Atmospheric Models for Aerocapture
Justus, C. G.; Duvall, Aleta L.; Keller, Vernon W.; Aerocapture Systems Analysis for a Neptune Mission; April 2006, pp. 74-79; In English; See also 20060012088; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hardcopy

There are eight destinations in the Solar System with sufficient atmosphere for aerocapture to be a viable aeroassist option: Venus, Earth, Mars, Jupiter, Saturn and its moon Titan, Uranus, and Neptune. Engineering-level atmospheric models for four of these targets - Earth, Mars, Titan, and Neptune - have been developed for NASA to support systems analysis studies of potential future aerocapture missions. Development of a similar atmospheric model for Venus has recently commenced. An important capability of all of these models is their ability to simulate quasi-random density perturbations for Monte Carlo analysis in developing guidance, navigation and control algorithms, and for thermal systems design. Similarities and differences among these atmospheric models are presented, with emphasis on the recently developed Neptune model and on planned characteristics of the Venus model. Example applications for aerocapture are also presented and illustrated. Recent updates to the Titan atmospheric model are discussed, in anticipation of application to trajectory and atmospheric reconstruct for the Huygens Probe entry at Titan.
Author
Aerocapture; Atmospheric Models; Solar System; Systems Analysis

20060012097 NASA Marshall Space Flight Center, Huntsville, AL, USA
Atmospheric Models for Aerocapture Systems Studies
Justus, C. G.; Duvall, Aleta L.; Keller, Vernon W.; Aerocapture Systems Analysis for a Neptune Mission; April 2006, pp. 80-86; In English; See also 20060012088; Original contains color illustrations; Copyright; Avail.: CASI: A02, Hard-copy

Aerocapture uses atmospheric drag to decelerate into captured orbit from interplanetary transfer orbit. This includes capture into Earth orbit from, for example, Lunar-return or Mars-return orbit. Eight Solar System destinations have sufficient atmosphere for aerocapture to be applicable three of the rocky planets (Venus, Earth, and Mars), four gas giants (Jupiter, Saturn, Uranus, and Neptune), and Saturn s moon Titan. These destinations fall into two general groups: (1) The rocky planets, which have warm surface temperatures (about 200 K to 750 K) and rapid decrease of density with altitude, and (2) the gas giants and Titan, which have cold temperatures (about 70 K to 170 K) at the surface or 1-bar pressure level, and slow rate of decrease of density with altitude. Aerocapture altitudes at the gas giants typically range from about 150 km to 300 km above the 1-bar pressure reference. Aerocapture at the rocky planets would occur at altitudes of about 50 km to 100 km. In contrast, aerobraking (circularizing a highly elliptical capture orbit, using multiple atmospheric passes) would occur at widely varying altitudes ranging from about 125 km out to 700 km for Titan. In addition to aerocapture altitude, aerocapture corridor width is also determined by details of the atmospheric density profile. Corridor width is the range of atmospheric entry angles allowable for successful aerocapture, i.e., achieving capture orbit without skip-out or burn-up . Corridor width is significantly affected by rate of change of density, as measured by the density scale height, at aerocapture periapsis altitude. Density scale height is the vertical distance over which density changes by a factor of e, (i.e., logarithmically). Larger scale height values mean slower density variation with height and larger corridor width; smaller scale height leads to smaller corridor width. For the rocky planets, the overall rapid fall-off of density with height leads to relatively low density scale heights at aerocapture altitudes and small aerocapture corridor widths for these destinations. Larger density scale heights, with consequently larger corridor widths, result from the slower density fall-of with height for Titan and the gas giant planets. Density scale height values at periapsis for the rocky planets vary from about 4 km to 8 km; for the gas giant planets and Titan this range is about 25 km to 50 km. Engineering-level atmospheric models for Earth, Mars, Titan, and Neptune have been developed for NASA systems analysis studies of potential future aerocapture missions. Development of a similar atmospheric model for Venus has recently commenced. These models are collectively referred to as Global Reference Atmosphere Models, or GRAMs. An important capability of all of the GRAM models is their ability to simulate quasi-random density perturbations for Monte Carlo analyses in developing guidance, navigation, and control algorithms, and for thermal systems design. Small-scale root-mean-square (rms) density perturbations observed for Earth may be compared with those modeled for Mars, Titan, and Neptune. Monte-Carlo simulations of density variations for Neptune atmospheric conditions yield minimum, average, and maximum density profiles due to expected variations with season, latitude, time-of-day, etc. Details of these comparisons and simulations are discussed.
Author
Aerocapture; Atmospheric Density; Interplanetary Transfer Orbits; Atmospheric Entry; Systems Analysis; Surface Temperature; Elliptical Orbits; Corridors; Atmospheric Models; Aerobraking

20060012098 NASA Langley Research Center, Hampton, VA, USA
Aerocapture Performance Analysis for a Neptune-Triton Exploration Mission
Starr, Brett R.; Westhelle, Carlos H.; Masciarelli, James P.; Aerocapture Systems Analysis for a Neptune Mission; April 2006,

pp. 87-97; In English; See also 20060012088; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

A systems analysis has been conducted for a Neptune-Triton Exploration Mission in which aerocapture is used to capture a spacecraft at Neptune. Aerocapture uses aerodynamic drag instead of propulsion to decelerate from the interplanetary approach trajectory to a captured orbit during a single pass through the atmosphere. After capture, propulsion is used to move the spacecraft from the initial captured orbit to the desired science orbit. A preliminary assessment identified that a spacecraft with a lift to drag ratio of 0.8 was required for aerocapture. Performance analyses of the 0.8 L/D vehicle were performed using a high fidelity flight simulation within a Monte Carlo executive to determine mission success statistics. The simulation was the Program to Optimize Simulated Trajectories (POST) modified to include Neptune specific atmospheric and planet models, spacecraft aerodynamic characteristics, and interplanetary trajectory models. To these were added autonomous guidance and pseudo flight controller models. The Monte Carlo analyses incorporated approach trajectory delivery errors, aerodynamic characteristics uncertainties, and atmospheric density variations. Monte Carlo analyses were performed for a reference set of uncertainties and sets of uncertainties modified to produce increased and reduced atmospheric variability. For the reference uncertainties, the 0.8 L/D flatbottom ellipsled vehicle achieves 100% successful capture and has a 99.87 probability of attaining the science orbit with a 360 m/s DelatV budget for apoapsis and periapsis adjustment. Monte Carlo analyses were also performed for a guidance system that modulates both bank angle and angle of attack with the reference set of uncertainties. An alpha and bank modulation guidance system reduces the 99.87 percentile DeltaV 173 m/s (48%) to 187 m/s for the reference set of uncertainties.

Author

Aerocapture; Neptune (Planet); Triton; Space Exploration; Systems Analysis; Space Missions

20060012099 NASA Ames Research Center, Moffett Field, CA, USA

TPS Challenges for Neptune Aerocapture

Laub, B.; Chen, Y. K.; Aerocapture Systems Analysis for a Neptune Mission; April 2006, pp. 119-129; In English; See also 20060012088; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

A study to develop a conceptual design for an aerocapture mission at Neptune was conducted by a NASA systems analysis team comprised of technical experts from several NASA centers. Multidisciplinary analyses demonstrated that aerocapture could be accomplished at Neptune with a rigid aeroshell with a flattened ellipsled geometry flying at a nominal angle-of-attack of 40 degrees entering the Neptune atmosphere at an inertial entry velocity of approx. equals 29 km/s. Aerothermal analyses demonstrated that both the peak convective and radiative heating rates in the stagnation region are very severe. Furthermore, due to the duration of the aerocapture trajectory, the total integrated heat loads are extremely large. TPS sizing analyses were conducted for a limited range of candidate TPS materials since such high peak heat fluxes limit candidate materials to dense, carbonaceous ablators. On the windward side, in regions away from the stagnation region, lower density ablators may suffice. Low-density ablators also are viable candidates on the lee side. However, there are significant uncertainties associated with the turbulent and radiative heating rates. TPS mass requirements for this mission are very large, and the ablator thickness requirements may be beyond current manufacturing capabilities.

Author

Aerocapture; Systems Analysis; Aeroshells; Atmospheric Entry; Angle of Attack; Neptune Atmosphere; Neptune (Planet); Stagnation Point; Convective Heat Transfer

20060012100 NASA Langley Research Center, Hampton, VA, USA

Structural Design for a Neptune Aerocapture Mission

Dyke, R. Eric; Hrinda, Glenn A.; Aerocapture Systems Analysis for a Neptune Mission; April 2006, pp. 130-142; In English; See also 20060012088; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy

A multi-center study was conducted in 2003 to assess the feasibility of and technology requirements for using aerocapture to insert a scientific platform into orbit around Neptune. The aerocapture technique offers a potential method of greatly reducing orbiter mass and thus total spacecraft launch mass by minimizing the required propulsion system mass. This study involved the collaborative efforts of personnel from Langley Research Center (LaRC), Johnson Space Flight Center (JSFC), Marshall Space Flight Center (MSFC), Ames Research Center (ARC), and the Jet Propulsion Laboratory (JPL). One aspect of this effort was the structural design of the full spacecraft configuration, including the ellipsled aerocapture orbiter and the in-space solar electric propulsion (SEP) module/cruise stage. This paper will discuss the functional and structural requirements for each of these components, some of the design trades leading to the final configuration, the loading environments, and the analysis methods used to ensure structural integrity. It will also highlight the design and structural challenges faced while

trying to integrate all the mission requirements. Component sizes, materials, construction methods and analytical results, including masses and natural frequencies, will be presented, showing the feasibility of the resulting design for use in a Neptune aerocapture mission. Lastly, results of a post-study structural mass optimization effort on the ellipsled will be discussed, showing potential mass savings and their influence on structural strength and stiffness
Author
Structural Design; Spacecraft Configurations; Aerocapture; Functional Design Specifications; Solar Electric Propulsion

20060012130 NASA Johnson Space Center, Houston, TX, USA
ESTIMATION of THE SPACE SHUTTLE ROLLOUT FORCING FUNCTION
James, George H., III; Carne, Thomas; Elliott, Kenny; Wilson, Bruce; [2005]; 11 pp.; In English; 23rd International Modal Analysis Conference and Expedition, 31 Jan. -3 Feb. 2005, Orlando, FL, USA; Copyright; Avail.: CASI: A03, Hardcopy

The Space Shuttle Vehicle is assembled in the Vertical Assembly Building (VAB) at Kennedy Space Flight Center in Florida. The Vehicle is stacked on a Mobile Launch Platform (MLP) that weighs eight million pounds. A Crawler Transporter (CT) then carries the MLP and the stacked vehicle (12 million pounds total weight) to the launch complex located 5 miles away. This operation is performed at 0.9 mph resulting in a 4.5-hour transport. A recent test was performed to monitor the dynamic environment that was produced during rollout. It was found that the rollout is a harmonic-rich dynamic environment that was previously not understood. This paper will describe work that has been performed to estimate the forcing function that is produced in the transportation process. The rollout analysis team has determined that there are two families of harmonics of the drive train, which excite the system as a function of CT speed. There are also excitation sources, which are random or narrow-band in frequency and are not a function of CT speed. This presentation will discuss the application of the Sum of Weighted Accelerations Technique (SWAT) to further refine this understanding by estimating the forces and moments at the center-of-mass.
Author
Space Shuttles; Launching Pads; Launch Vehicle Configurations; Force Distribution

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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*.

20060011233 NASA Glenn Research Center, Cleveland, OH, USA
Calculation of Thermally-Induced Displacements in Spherically Domed Ion Engine Grids
Soulas, George C.; March 2006; 27 pp.; In English; 29th International Electric Propulsion Conference, 31 Oct. - 4 Nov. 2005, Princeton, NJ, USA; Original contains black and white illustrations
Contract(s)/Grant(s): WBS 22-512-50-04-19
Report No.(s): NASA/TM-2006-214046; IEPC-2005-248; E-15403; No Copyright; Avail.: CASI: A03, Hardcopy

An analytical method for predicting the thermally-induced normal and tangential displacements of spherically domed ion optics grids under an axisymmetric thermal loading is presented. A fixed edge support that could be thermally expanded is used for this analysis. Equations for the displacements both normal and tangential to the surface of the spherical shell are derived. A simplified equation for the displacement at the center of the spherical dome is also derived. The effects of plate perforation on displacements and stresses are determined by modeling the perforated plate as an equivalent solid plate with modified, or effective, material properties. Analytical model results are compared to the results from a finite element model. For the solid shell, comparisons showed that the analytical model produces results that closely match the finite element model results. The simplified equation for the normal displacement of the spherical dome center is also found to accurately predict this displacement. For the perforated shells, the analytical solution and simplified equation produce accurate results for materials with low thermal expansion coefficients.
Author
Ion Engines; Thermal Expansion; Ion Optics; Spherical Shells; Finite Element Method; Temperature Effects

20060011236 NASA Glenn Research Center, Cleveland, OH, USA

A Comparison of Fission Power System Options for Lunar and Mars Surface Applications

Mason, Lee S.; February 2006; 21 pp.; In English; Space Technology and Applications International Forum (STAIF-2006), 12-16 Feb. 2006, Albuquerque, NM, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 22-982-10-30

Report No.(s): NASA/TM-2006-214120; E-15455; No Copyright; Avail.: CASI: A03, Hardcopy

This paper presents a comparison of reactor and power conversion design options for 50 kWe class lunar and Mars surface power applications with scaling from 25 to 200 kWe. Design concepts and integration approaches are provided for three reactor-converter combinations: gas-cooled Brayton, liquid-metal Stirling, and liquid-metal thermoelectric. The study examines the mass and performance of low temperature, stainless steel based reactors and higher temperature refractory reactors. The preferred system implementation approach uses crew-assisted assembly and in-situ radiation shielding via installation of the reactor in an excavated hole. As an alternative, self-deployable system concepts that use earth-delivered, on-board radiation shielding are evaluated. The analyses indicate that among the 50 kWe stainless steel reactor options, the liquid-metal Stirling system provides the lowest mass at about 5300 kg followed by the gas-cooled Brayton at 5700 kg and the liquid-metal thermoelectric at 8400 kg. The use of a higher temperature, refractory reactor favors the gas-cooled Brayton option with a system mass of about 4200 kg as compared to the Stirling and thermoelectric options at 4700 and 5600 kg, respectively. The self-deployed concepts with on-board shielding result in a factor of two system mass increase as compared to the in-situ shielded concepts.

Author

Fission; Mars Surface; Lunar Surface; Brayton Cycle; Thermoelectricity; Reactor Design; Liquid Metals; Stainless Steels

20060012148 NASA Glenn Research Center, Cleveland, OH, USA

Stirling Convertor Fasteners Reliability Quantification

Shah, Ashwin R.; Korovaichuk, Igor; Kovacevich, Tiodor; Schreiber, Jeffrey G.; April 2006; 18 pp.; In English; Third International Energy Conversion Engineering Conference, 15-18 Aug. 2005, San Francisco, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): NAS3-03064; WBS 22-972-20-01

Report No.(s): NASA/TM-2006-213992; AIAA Paper 2005-5507; E-15316; No Copyright; Avail.: CASI: A03, Hardcopy

Onboard Radioisotope Power Systems (RPS) being developed for NASA s deep-space science and exploration missions require reliable operation for up to 14 years and beyond. Stirling power conversion is a candidate for use in an RPS because it offers a multifold increase in the conversion efficiency of heat to electric power and reduced inventory of radioactive material. Structural fasteners are responsible to maintain structural integrity of the Stirling power convertor, which is critical to ensure reliable performance during the entire mission. Design of fasteners involve variables related to the fabrication, manufacturing, behavior of fasteners and joining parts material, structural geometry of the joining components, size and spacing of fasteners, mission loads, boundary conditions, etc. These variables have inherent uncertainties, which need to be accounted for in the reliability assessment. This paper describes these uncertainties along with a methodology to quantify the reliability, and provides results of the analysis in terms of quantified reliability and sensitivity of Stirling power conversion reliability to the design variables. Quantification of the reliability includes both structural and functional aspects of the joining components. Based on the results, the paper also describes guidelines to improve the reliability and verification testing.

Author

Stirling Cycle; Energy Conversion Efficiency; Reliability Analysis; Design Analysis

20060012149 NASA Glenn Research Center, Cleveland, OH, USA

Single Phase Passive Rectification Versus Active Rectification Applied to High Power Stirling Engines

Santiago, Walter; Birchenough, Arthur G.; March 2006; 19 pp.; In English; Third International Energy Conversion Engineering Conference, 15-18 Aug. 2005, San Francisco, CA, USA; Original contains color illustrations

Contract(s)/Grant(s): WBS 22-319-20-M1

Report No.(s): NASA/TM-2006-214045; AIAA Paper 2005-5687; E-15402; No Copyright; Avail.: CASI: A03, Hardcopy

Stirling engine converters are being considered as potential candidates for high power energy conversion systems required by future NASA explorations missions. These types of engines typically contain two major moving parts, the displacer and the piston, in which a linear alternator is attached to the piston to produce a single phase sinusoidal waveform at a specific electric frequency. Since all Stirling engines perform at low electrical frequencies (less or equal to 100 Hz), space explorations missions that will employ these engines will be required to use DC power management and distribution (PMAD) system instead of an AC PMAD system to save on space and weight. Therefore, to supply such DC power an AC to DC converter

is connected to the Stirling engine. There are two types of AC to DC converters that can be employed, a passive full bridge diode rectifier and an active switching full bridge rectifier. Due to the inherent line inductance of the Stirling Engine-Linear Alternator (SE-LA), their sinusoidal voltage and current will be phase shifted producing a power factor below 1. In order to keep power the factor close to unity, both AC to DC converters topologies will implement power factor correction. This paper discusses these power factor correction methods as well as their impact on overall mass for exploration applications. Simulation results on both AC to DC converters topologies with power factor correction as a function of output power and SE-LA line inductance impedance are presented and compared.
Author
Rectifiers; Stirling Engines; NASA Programs; Spacecraft Power Supplies

20060012152 NASA Glenn Research Center, Cleveland, OH, USA
Grid Gap Measurement for an NSTAR Ion Thruster
Diaz, Esther M.; Soulas, George C.; April 2006; 18 pp.; In English; 29th International Electric Propulsion Conference, 31 Oct. - 4 Nov. 2005, Princeton, NJ, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 22-800-92-71
Report No.(s): NASA/TM-2006-214249; E-15494; IEPC-2005-244; No Copyright; Avail.: CASI: A03, Hardcopy

The change in gap between the screen and accelerator grids of an engineering model NSTAR ion optics assembly was measured during thruster operation with beam extraction. The molybdenum ion optics assembly was mounted onto an engineering model NSTAR ion thruster. The measurement technique consisted of measuring the difference in height of an alumina pin relative to the downstream accelerator grid surface. The alumina pin was mechanically attached to the center aperture of the screen grid and protruded through the center aperture of the accelerator grid. The change in pin height was monitored using a long distance microscope coupled to a digital imaging system. Transient and steady-state hot grid gaps were measured at three power levels: 0.5, 1.5 and 2.3 kW. Also, the change in grid gap was measured during the transition between power levels, and during the startup with high voltage applied just prior to discharge ignition. Performance measurements, such as perveance, electron backstreaming limit and screen grid ion transparency, were also made to confirm that this ion optics assembly performed similarly to past testing. Results are compared to a prior test of 30 cm titanium ion optics.
Author
Extraction; Ion Optics; Ion Propulsion; Metal Ions; Molybdenum; Rocket Engines

23
CHEMISTRY AND MATERIALS (GENERAL)

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

20060011226 Environmental Protection Agency, Cincinnati, OH USA
Treatment Technologies for Arsenic Removal
Nov. 2005; 16 pp.; In English
Report No.(s): PB2006-106703; EPA/600/5-05/006; No Copyright; Avail.: National Technical Information Service (NTIS)

On January 18, 2001, the USA Environmental Protection Agency (EPA) finalized the maximum contaminant level (MCL) for arsenic at 0.01 mg/L. The EPA subsequently revised the rule text to express the MCL as 0.010 mg/L. The final rule requires all community and non-transient, non-community water systems to comply with the new standard by February 2006. Motivation to reduce the arsenic MCL was driven by the findings of health effects research. Over the past several years, numerous toxicological and epidemiological studies have been conducted to ascertain the health risks associated with low-level exposure to arsenic ingestion. Fundamental knowledge of arsenic chemistry and processes is important when a community is either looking to install a new treatment system or modify an old system to comply with the new arsenic rule. The purpose of this booklet is to provide engineering firms, utilities, and communities with information about treatment technologies for arsenic removal and design considerations for choosing treatment technologies.
NTIS
Arsenic; Environment Protection

20060011235 Geological Survey, Spokane, WA, USA
Chemical Composition of Samples Collected from Waste Rock Dumps and Other Mining-Related Features at Selected Phosphate Mines in Southeastern Idaho, Western Wyoming, and Northern Utah
Moyle, P. R.; Causey, J. D.; January 2001; 50 pp.; In English
Report No.(s): PB2006-105468; USGS/OFR-01-411; No Copyright; Avail.: National Technical Information Service (NTIS)

This report provides chemical analyses for 31 samples collected from various phosphate mine sites in southeastern Idaho (25), northern Utah (2), and western Wyoming (4). The sampling effort was undertaken as a reconnaissance and does not constitute a characterization of mine wastes. Twenty-five samples were collected from waste rock dumps, 2 from stockpiles, and 1 each from slag, tailings, mill shale, and an outcrop. All samples were analyzed for a suite of major, minor, and trace elements. Although the analytical data set for the 31 samples is too small for detailed statistical analysis, a summary of general observations is made. Element concentrations vary considerably because of the differing rock types collected over a wide geographic area. For the 25 waste rock dump samples, concentrations of arsenic, antimony, thallium, chromium, copper, nickel, and vanadium are moderately elevated, ranging from 1.5 to 5.6 times those of average world-wide shale, the average concentrations of four elements are significantly elevated compared to their average abundance in average world-wide shale - selenium (x 77), cadmium (x 172), molybdenum (x 19), and zinc (x 12).
NTIS
Chemical Composition; Geochemistry; Idaho; Mining; Phosphates; Rocks; Utah; Wyoming

20060011247 Iowa State Univ. of Science and Technology, Ames, IA USA
Coordination of Dibenzothiophehes and Corannulenes to Organometallic Ruthenium (II) Fragments
Vecchi, P. A.; January 2005; 172 pp.; In English
Report No.(s): DE2006-850049; No Copyright; Avail.: Department of Energy Information Bridge

This dissertation contains five papers in the format required for journal publication which describe (in part) my research accomplishments as a graduate student at Iowa State University. This work can be broadly categorized as the binding of weakly-coordinating ligands to cationic organometallic ruthenium fragments, and consists of two main areas of study. Chapters 2-4 are investigations into factors that influence the binding of dibenzothiophenes to (l(underline)brace)Cp'Ru(CO)(sub 2)(r(underline)brace)(sup +) fragments, where Cp' = (eta)(sup 5)-C(sub 5)H(sub 5) (Cp) and (eta)(sup 5)-C(sub 5)Me(sub 5) (Cp*). Chapters 5 and6 present the synthesis and structural characterization of complexes containing corannulene buckybowls that are (eta)(sup 6)-coordinated to (l(underline)brace) Cp*Ru(r(underline)brace)(sup +) fragments. The first chapter contains a brief description of the difficulty in lowering sulfur levels in diesel fuel along with a review of corannulene derivatives and their metal complexes. After the final paper is a short summary of the work herein. Each chapter is independent, and all equations, schemes, figures, tables, references, and appendices in this dissertation pertain only to the chapter in which they appear.
NTIS
Coordination; Fragments; Organometallic Compounds; Ruthenium

20060011250 Iowa State Univ. of Science and Technology, Ames, IA USA
Selective Catalysis Utilizing Bifunctionalized MCM-41 Mesoporous Materials
January 2005; 48 pp.; In English
Report No.(s): DE2006-850044; No Copyright; Avail.: Department of Energy Information Bridge

Selective catalysis is a field that has been under intense investigation for the last 100 years. The most widely used method involves catalysts with stereochemical selectivity. In this type of catalysis, the catalyst controls which reactants will be transformed into the desired product. The secret to employing this type of catalysis, though, is to design the proper catalyst, which can be difficult. One may spend as much time developing the catalyst as spent separating the various products achieved. Another method of selective catalysis is now being explored. The method involves utilizing a multifunctional mesoporous silica catalyst with a gate-keeping capability.
NTIS
Catalysis; Catalysts

20060011251 Iowa State Univ. of Science and Technology, Ames, IA USA
Theory for Dynamical Self Arrest and Gelation in Microemulsions and the Block Copolymer Systems
Wu, S.; January 2005; 138 pp.; In English
Report No.(s): DE2006-850055; No Copyright; Avail.: National Technical Information Service (NTIS)

The main purpose of this work is to investigate the glassy behavior of microemulsions and block copolymers. The origin of glassy behavior in microemulsions and block copolymers is frustration due to a competition between short-range interaction and long range interaction. According to the charge frustrated Ising model, the competition between ferromagnetic interaction and antiferromagnetic interaction is the origin of frustration in microemulsions. The competition between entropic effects and stoichiometric constraints responsible for the formation of micelles in microemulsions can lead to the emergence of a self generated glassy behavior in these systems. In the block copolymer, the competition between the repulsive short range interaction between monomers in polymer chains and the long range interaction by chemical bonds can lead to the emergence of a self generated glassy behavior. The criteria for the fluctuation induced first order transition and our microemulsion and block copolymer glasses are essentially the same. Both are a consequence of the large phase space of low energy excitations (14) (62) (all states with momenta q which fulfill (vertical bar)q(vertical bar) = q(sub m)) and are of at the most a moderate supercooling of the liquid state is required. This is strongly supported by the observation in Ref. (14) that the metastable states which are first to appear at a fluctuation induced first order transition are the ones build by a superposition of large amplitude waves of wavenumber q(sub m), but with random orientations and phases, i.e. just the ones which form the metastable states of our microemulsion and block copolymer glass.
NTIS
Block Copolymers; Copolymers; Emulsions; Gelation

20060011252 Iowa State Univ. of Science and Technology, Ames, IA USA
Breakdown of de Gennes Scaling in TbxEr1-xNi2B2C and Its Mean Field Theory Explanation
Gao, C.; January 2004; 28 pp.; In English
Report No.(s): DE2006-850042; No Copyright; Avail.: Department of Energy Information Bridge

The Neel temperatures, T(sub N), of Tb(of Tb(sub x)Er(sub 1-x)Ni(sub 2)B(sub 2)C) samples have been determined from the temperature dependence of magnetization measurements. A breakdown of the de Gennes scaling of T(sub N) with a clear turning point around x=0.45 has been observed. The T(sub N) values of Tb(sub x)Er(sub 1-x)Ni(sub 2)B(sub 2)C do not change much within the range of O\hx\h0.45 and then, for larger x they increase almost linearly with concentration until T(sub N)=14.9K is reached for x=l, TbNi(sub 2)B(sub 2)C. The clear change in the x-dependence of T(sub N) around x=0.45 can be linked to a change in the local moment ordering direction from transverse to longitudinal, a change which is consistent with recent resonant X-ray scattering data. These features in T(sub N)(x) can be explained using a mean field model.
NTIS
Neel Temperature; Magnetization; Temperature Dependence

20060011288 Iowa State Univ. of Science and Technology, Ames, IA USA
High-resolution Fluorescence Spectroscopy in Immunoanalysis
Grubor, N. M.; January 2005; 160 pp.; In English
Report No.(s): DE2006-850039; No Copyright; Avail.: Department of Energy Information Bridge

The work presented in this dissertation combines highly sensitive and selective fluorescence line-narrowing spectroscopy (FLNS) detection with various modes of immunoanatytical techniques. It has been shown that FLNS is capable of directly probing molecules immunocomplexed with antibodies, eliminating analytical ambiguities that may arise from interferences that accompany traditional immunochemical techniques. Moreover, the utilization of highly cross-reactive antibodies for highly specific analyte determination has been demonstrated. Finally, we demonstrate the first example of the spectral resolution of diastereomeric analytes based on their interaction with a crossreactive antibody.
NTIS
Fluorescence; High Resolution; Spectroscopy

20060011292 Sandia National Labs., Albuquerque, NM USA, Lawrence Livermore National Lab., Livermore, CA USA
Evaluation of the Corrosivity of Dust Deposited on Waste Packages at Yucca Mountain, Nevada
January 2005; 6 pp.; In English
Report No.(s): DE2005-840169; No Copyright; Avail.: Department of Energy Information Bridge

In this paper, we evaluate the potential for brines formed by dust deliquescence to inititate and sustain localized corrosion that results in failure of the waste package outer barrier and early failure of the waste package. These arguments have been used to show that dust deliquescence-induced localized or crevice corrosion of the waste package outer barrier (Alloy 22) is of low consequence with respect to repository performance.
NTIS
Brines; Corrosion; Dust; Mountains; Radioactive Wastes

20060011295 Case Western Reserve Univ., Cleveland, OH USA
Proposed Yucca Mountain Repository from a Corrosion Perspective
Payer, J. H.; January 2005; 8 pp.; In English
Report No.(s): DE2005-840155; No Copyright; Avail.: Department of Energy Information Bridge

Corrosion is a primary determinant of waste package performance at the proposed Yucca Mountain Repository and will control the delay time for radionuclide transport from the waste package. Corrosion is the most probable and most likely degradation process that will determine when packages will be penetrated and the shape size and distribution of those penetrations. The general issues in corrosion science, materials science and electrochemistry are well defined, and the knowledge base is substantial for understanding corrosion processes. In this paper, the Yucca Mountain Repository is viewed from a corrosion perspective.
NTIS
Corrosion; Mountains; Radioactive Wastes

20060011321 California Univ., Davis, CA, USA, Brigham Young Univ., Provo, UT, USA
Energetics of Nanomaterials
January 2006; 18 pp.; In English
Report No.(s): DE2006-836441; DOE/ER/15237-1; No Copyright; Avail.: Department of Energy Information Bridge

No abstract available
Nanotechnology; Thermodynamics; Specific Heat; Free Energy

20060011324 Michigan Univ., Ann Arbor, MI, USA
Effect of Ionizing Radiation on U(6+) Phases
Utsunomiya, S.; Ewing, R. C.; Oct. 19, 2005; 16 pp.; In English
Report No.(s): DE2006-808054; No Copyright; Avail.: National Technical Information Service (NTIS)

U(sup 6+)-minerals commonly form during the alteration of uraninite and spent nuclear fuel under oxidizing conditions. By the incorporation of actinides and fissiogenic elements into their structures, U(sup 6+)-minerals maybe important in retarding the migration of radionuclides released during corrosion of spent nuclear fuel. Thus, the stability and the structural transformation of the U(sup 6+)minerals in radiation fields are of great interest. In this study, in order to examine the effects of ionizing radiation on U(sup 6)nerals, electron irradiation (approx 8-33x10(sup 17) (e-/cm(sup 2)/sec) at the room temperature) experiments were completed on: boltwoodite, K((UO(sub 2))(SiO(sub 3)OH))(H(sub 2)O)(sub 1.5) kasolite, Pb((UO(sub 2))(SiO(sub 4)))(H(sub 2)O) saleeite, Mg((UO(sub 2))(PO(sub 4)))(sub 2)(H(sub 2)O)(sub 10) carnotite, K(sub 2)(UO(sub 2))(sub 2)(V(sub 2)O(sub 8))(H(sub 2)O)(sub 3) liebigite, Ca(sub 2)((UO(sub 2))(CO(sub 3))(sub 3))(H(sub 2)O)(sub 11) schoepite, ((UO(sub 2))(sub 8)O(sub 2)(OH)(sub 12))(H(sub 2)O)(sub 12). During the irradiation, boltwoodite, saleeite, and carnotite became amorphous at doses of 1-4x10(sup 10) Gray (Gy), while the amorphization dose (D(sub c)) of kasolite, 50x10(sup 10) Gy, was about an order of magnitude higher than that of boltwoodite. This high D(sub c) for kasolite is consistent with the hypothesis that the D(sub c) increases as the mass of the inter-layer cation increases. Only amorphization, rather than chemical decomposition, occurred in boltwoodite, saleeite and carnotite, even at doses as high as 80x10(sup 10) Gy. In contrast, uraninite nanocrystallites began to form with a random orientation at approx 43x10(sup 10) Gy in liebigite which had already become amorphous prior to irradiation in the vacuum of the TEM. For schoepite, the D(sub c) was only 0.51x10(sup 10) Gy, and randomly oriented uraninite nanocrystallites formed at 7.8x10(sup 10) Gy which is approximately the same dose as compared with the D(sub c)s for the other U(sup 6+)-phases. Because the predicted cumulative dose by the ionizing radiation in spent nuclear fuel is approx 10(sup 7)-10(sup 8) Gy during the first 10(sup 2-3) years after discharge, an additional contribution of ionizing radiation dose by alpha-decay events is needed in order to induce amorphization in these U(sup 6+)-phases.
NTIS
Ionizing Radiation; Uranium Compounds

20060011560 BAE Systems, Leicestershire, UK
Defence Applications
El-Fatatry, Ayman; Nanotechnology Aerospace Applications; December 2005, pp. 5-1 - 5-5; In English; See also 20060011559; Copyright; Avail.: CASI: A01, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The potential opportunities promised by nanotechnology for enabling advances in defence technologies are staggering.

Although these opportunities are likely to be realised over a few decades, many advantages are currently being secured, particularly for defence applications. This lecture will provide an insight into the capabilities offered by nanotechnology which will enable new defence capabilities, including; smart materials, harder/lighter platforms, new fuel sources and storage as well as novel medical applications. More specifically, the lecture will address the following topics: a) The vision and the challenges (overview); b) Novel material characteristics, properties and functionalities for enhanced capabilities (mass storage, nano-magnetics, quantum computing etc.); c) Novel platforms (smart dust, self-assembly etc.); d) Medical and biomedical advances (biomimetics etc.).
Author
Nanotechnology; Biomimetics; Smart Materials; Quantum Computation; Magnetic Materials; Dust

20060011562 enablingMNT, Dordrecht, Netherlands
Nanotechnology and Lifestyle
vanHeeren, Henne; Nanotechnology Aerospace Applications; December 2005, pp. 4-1 - 4-3; In English; See also 20060011559; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A04, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Perhaps surprisingly the earliest commercialized applications of nanotechnology are seen in lifestyle applications. Textile and cosmetics are among the first products to use nanomaterials. This overview discusses these and other examples of nanotechnology materials and technologies in lifestyle applications.
Derived from text
Nanotechnology; Textiles; Energy Storage; Hydrocarbons

20060011564 enablingMNT, Dordrecht, Netherlands
Fabrication for Nanotechnology
vanHeeren, Henne; Nanotechnology Aerospace Applications; December 2005, pp. 1-1 - 1-3; In English; See also 20060011559; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A04, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Although many processes are discussed in this article the identified mainstream nanotechnologies are: a) Arc combusting for nanotubes; b) CVD for special nanotubes; c) Molecular self assembly for monolayers; d) Sol-gel process for nanolayers; e) ALD for semiconductor isolating layers; f) Nanoimprinting for thin film production; and g) Plasma processing for coatings and metal particles. Real nanotechnology, the manipulation of atoms and molecules, has only been demonstrated in research environments.
Derived from text
Nanotechnology; Nanotubes; Semiconductors (Materials); Metal Particles; Plasmas (Physics); Sol-Gel Processes

20060011565 enablingMNT, Dordrecht, Netherlands
Nano Materials
van Heeren, Henne; Nanotechnology Aerospace Applications; December 2005, pp. 2-1 - 2-3; In English; See also 20060011559; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A04, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Nanomaterials is a new step in the evolution of understanding and utilization of materials. Material science started with the realization that chemical composition is the main factor in determining what a material is. Hereafter it was discovered that the fabrication and after fabrication steps could influence those properties. Also small additives proved to be able to modify these properties. Finally with the arrival of nanotechnology, it was discovered that the ability to create small particles could expand the capability to create and modify materials. Nanotechnology is as well as evolutionary as revolutionary in nature. Evolutionary are the many applications where the same material is incrementally improved by using nanotechnology. (Examples of this are seen in cosmetics). Revolutionary it can be called where new (enabling) properties originate from nanotechnology like in quantum dots. Those properties can be derived in: a) Properties based on the fact that their surface is large compared to their weight/volume. b) In addition to size, low energy dissipation and high processing speeds are important. c) New properties not found in bulk or micro sized particles.
Derived from text
Nanotechnology; Fabrication; Energy Dissipation; Chemical Composition; Additives

20060011566 BAE Systems, UK

Characterisation

El-Fatatry, Ayman; Nanotechnology Aerospace Applications; December 2005, pp. 3-1 - 3-7; In English; See also 20060011559; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

This lecture will focus on the techniques currently in use or being developed for measuring nano-particles and nanotechnology-based products from all aspects including, geometries, forms and conformity as well as functional characteristics such as absorption, charge or porosity. The lecture will also aim to address the systems/response based measurements of such materials and novel nano-composites. In this context, the lecture s content will be as follows: a) Challenges in Characterisation of nano-materials; b) Tools and equipment for in-process assessment (Scanning Electron Microscopes/Scanning Probe Microscopes etc.); c) Tools and equipment for product characterisation (Optical/laser diffraction etc.); d) Techniques for functional characterisation (chemical analysis, surface assessment/mapping etc) e) Future directions. Author

Nanotechnology; Scanning Electron Microscopy; Functional Analysis; Characterization; Chemical Analysis; Diffraction

20060011567 MM Associates, Moffett Field, CA, USA

Nanotechnology in Aerospace Applications

Meyyappan, Meyya; Nanotechnology Aerospace Applications; December 2005, pp. 6-1 - 6-2; In English; See also 20060011559; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

The aerospace applications for nanotechnology include high strength, low weight composites, improved electronics and displays with low power consumption, variety of physical sensors, multifunctional materials with embedded sensors, large surface area materials and novel filters and membranes for air purification, nanomaterials in tires and brakes and numerous others. This lecture will introduce nanomaterials particularly carbon nanotubes, and discuss their properties. The status of composite preparation polymer matrix, ceramic matrix and metal matrix will be presented. Examples of current developments in the above application areas, particularly physical sensors, actuators, nanoelectromechanical systems etc. will be presented to show what the aerospace industry can expect from the field of nanotechnology. Of all the nanoscale materials, carbon nanotubes (CNTs) have received the most attention across the world. These are configurationally equivalent to a two-dimensional graphene sheet rolled up into a tubular structure. With only one wall in the cylinder, the structure is called a single-walled carbon nanotube (SWCNT). The structure that looks like a concentric set of cylinders with a constant interlayer separation of 0.34 A is called a multiwalled carbon nanotube (MWCNT). The CNT s structure is characterized by a chiral vector (m, n). When m-n/3 is an integer, the resulting structure is metallic; otherwise, it is a semiconducting nanotube. This is a very unique electronic property that has excited the physics and device community leading to numerous possibilities in nanoelectronics. CNTs also exhibit extraordinary mechanical properties. The Young s modulus is over 1 TPa and the tensile strength is about 200 GPa. The thermal conductivity can be as high as 3000 W/mK. With an ideal aspect ratio, small tip radius of curvature and good emission properties, CNTs also have proved to be excellent candidates for field emission. CNTs can be chemically functionalized, i.e. it is possible to attach a variety of atomic and molecular groups to the ends of sidewalls of the nanotubes. The impressive properties alluded above have led to investigations of various applications. The most important aerospace application is high strength, low weight composites. Investigation of metal and ceramic matrix composites with CNTs as a constituent materials is in its infancy. A status update will be provided. CNTs have been shown to provide desirable electrical properties for polymer matrix composites. In many cases, the current problem is the inability to disperse the nanotubes homogeneously across the host matrix. Other applications for CNTs include electronic components, logic and memory chips, sensors, catalyst support, adsorption media, actuators, etc. All early works in nanoelectronics use CNTs as a conducting channel in an otherwise silicon CMOS configuration. This approach may not really have a future as the use of CNTs, while inherently not solving any of the serious problems of CMOS downscaling (such as lithography, heat dissipation, etc.), it doesn't show an order of magnitude performance improvement either. The critical issue now is to develop alternative architectures in addition to novel materials. In contrast, the opportunities for CNTs in sensors, both physical and chemical sensors, are better and near-term. The opportunities for aerospace industry are through thermal barrier and wear resistant coatings, sensors that can perform at high temperature and other physical and chemical sensors, sensors that can perform safety inspection cost effectively, quickly, and efficiently than the present procedures, composites, wear resistant tires, improved avionics, satellite, communication and radar technologies.

Author

Aerospace Engineering; Carbon Nanotubes; Thermal Conductivity; Surface Properties; Protective Coatings; Polymer Matrix Composites; Nanotechnology; Metal Matrix Composites

20060012013 Battelle Columbus Labs., OH USA

Arsenic Removal from Drinking Water by Iron Removal, USEPA Demonstration Project at Climax, MN. Six-Month Evaluation Report

Condit, W. E.; Mar. 2006; 62 pp.; In English

Report No.(s): PB2006-108989; No Copyright; Avail.: National Technical Information Service (NTIS)

This report documents the activities performed and the results obtained from the first six months of the arsenic removal treatment technology demonstration project at the Climax, MN site. The objectives of the project are to evaluate (1) the effectiveness of Kinetico's Macrolite pressure filtration process in removing arsenic to meet the new arsenic maximum contaminant level (MCL) , (2) the reliability of the treatment system, (3) the simplicity of required system operation and maintenance (O&M) and operator's skills, and (4) the cost-effectiveness of the technology. The project also is characterizing water in the distribution system and process residuals produced by the treatment system.

NTIS

Arsenic; Environment Protection; Iron; Potable Water; Water Pollution

20060012039 National Science Foundation, Arlington, VA USA

Toward an International Materials Research Network. Status Report, January 2002

Jan. 2002; 48 pp.; In English

Report No.(s): PB2006-108375; No Copyright; Avail.: CASI: A03, Hardcopy

Materials are more than mere components of modern tools - the basic properties of materials frequently define the capabilities, potential, reliability, and limitations of technology itself. Materials and processes will play an ever increasing role in improving energy efficiency, promoting environmental protection, lowering health-care costs, developing an information infrastructure, providing modern and reliable transportation and civil infrastructure systems, and strengthening security worldwide. Advances in materials science and engineering, therefore, enable progress across a broad range of scientific disciplines and technological areas with dramatic impacts on society. Continued progress in materials science and engineering is increasingly dependent upon collaborative efforts among several different disciplines, as well as closer coordination among funding agencies and effective partnerships involving universities, industry, and national laboratories. Because of the interdependence of countries national priorities, partnerships are not only important at the national level but from an international point of view as well. With this in mind, the National Science Foundation has co-sponsored a series of five international workshops in materials research designed to stimulate enhanced collaboration among materials researchers and create networks linking the participating countries.

NTIS

International Cooperation; Materials; Conferences

20060012077 Hi-Z Technology, Inc., San Diego, CA, USA

Quantum Well Thermoelectrics for Converting Waste Heat to Electricity. Quarterly Technical Progress Report

May 2005; 18 pp.; In English

Report No.(s): DE2005-841300; No Copyright; Avail.: National Technical Information Service (NTIS)

New thermoelectric materials using Quantum Well (QW) technology are expected to increase the energy conversion efficiency to more than 25% from the present 5%, which will allow for the low cost conversion of waste heat into electricity. Hi-Z Technology, Inc. has been developing QW technology over the past six years. It will use Caterpillar, Inc., a leader in the manufacture of large scale industrial equipment, for verification and life testing of the QW films and modules. Other members of the team are Pacific Northwest National Laboratory, who will sputter large area QW films. The Scope of Work is to develop QW materials from their present proof-of-principle technology status to a pre-production level over a proposed three year period. This work will entail fabricating the QW films through a sputtering process of 50 (micro)m thick multi layered films and depositing them on 12 inch diameter, 5 (micro)m thick Si substrates. The goal in this project is to produce the technology for fabricating a basic 10-20 watt module that can be used to build up any size generator such as: a 5-10 kW Auxiliary Power Unit (APU), a multi kW Waste Heat Recovery Generator (WHRG) for a class 8 truck or as small as a 10-20 watt unit that would fit on a daily used wood fired stove and allow some of the estimated 2-3 billion people on earth, who have no electricity, to recharge batteries (such as a cell phone) or directly power radios, TVs, computers and other low powered devices. In this quarter Hi-Z has continued fabrication of the QW films and also continued development of joining techniques for fabricating the N and P legs into a couple. The upper operating temperature limit for these films is unknown and will be determined via the isothermal aging studies that are in progress. We are reporting on these studies in this report. The properties of the QW

films that are being evaluated are Seebeck, thermal conductivity and thermal-to-electricity conversion efficiency.
NTIS
Electricity; Quantum Wells; Sputtering; Thermoelectric Materials; Waste Energy Utilization; Waste Heat

24
COMPOSITE MATERIALS

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

20060011232 NASA Glenn Research Center, Cleveland, OH, USA
Development of Design Analysis Methods for C/SiC Composite Structures
Sullivan, Roy M.; Mital, Subodh K.; Murthy, Pappu L. N.; Palko, Joseph L.; Cueno, Jacques C.; Koenig, John R.; March 2006; 26 pp.; In English; Original contains color illustrations
Report No.(s): NASA/TP-2006-214005; E-15327; Copyright; Avail.: CASI: A03, Hardcopy

The stress-strain behavior at room temperature and at 1100 C (2000 F) was measured for two carbon-fiber-reinforced silicon carbide (C/SiC) composite materials: a two-dimensional plain-weave quasi-isotropic laminate and a three-dimensional angle-interlock woven composite. Micromechanics-based material models were developed for predicting the response properties of these two materials. The micromechanics based material models were calibrated by correlating the predicted material property values with the measured values. Four-point beam bending sub-element specimens were fabricated with these two fiber architectures and four-point bending tests were performed at room temperature and at 1100 C. Displacements and strains were measured at various locations along the beam and recorded as a function of load magnitude. The calibrated material models were used in concert with a nonlinear finite element solution to simulate the structural response of these two materials in the four-point beam bending tests. The structural response predicted by the nonlinear analysis method compares favorably with the measured response for both materials and for both test temperatures. Results show that the material models scale up fairly well from coupon to subcomponent level.
Author
Composite Structures; Micromechanics; Stress-Strain Relationships; Carbon Fibers; Woven Composites; Finite Element Method; Fiber Composites; Design Analysis

20060011267 NASA Langley Research Center, Hampton, VA, USA, National Inst. of Aerospace, Hampton, VA, USA
Analysis of Composite Panel-Stiffener Debonding Using a Shell/3D Modeling Technique
Krueger, Ronald; Minguet, Pierre J.; April 2006; 30 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): NAS1-02117; DAAH10-02-2-0001; WBS 23-063-30-22
Report No.(s): NASA/CR-2006-214299; NIA-Rept-2006-02; Copyright; Avail.: CASI: A03, Hardcopy

Interlaminar fracture mechanics has proven useful for characterizing the onset of delaminations in composites and has been used with limited success primarily to investigate onset in fracture toughness specimens and laboratory size coupon type specimens. Future acceptance of the methodology by industry and certification authorities however, requires the successful demonstration of the methodology on structural level. For this purpose a panel was selected that was reinforced with stringers. Shear loading cases the panel to buckle and the resulting out-of-plane deformations initiate skin/stringer separation at the location of an embedded defect. For finite element analysis, the panel and surrounding load fixture were modeled with shell element. A small section of the stringer foot and the panel in the vicinity of the embedded defect were modeled with a local 3D solid model. A failure index was calculated by correlating computed mixed-mode failure criterion of the graphite/epoxy material.
Author
Finite Element Method; Debonding (Materials); Composite Structures; Fracture Mechanics; Fracture Strength; Graphite-Epoxy Composites; Delaminating

20060011316 Wisconsin Univ., Madison, WI, USA
Nanostructured Shape Memory Alloys. Final Technical Report
Bakke, P.; Crone, W.; Drugan, W.; Ellis, A.; Perepezko, J.; January 2006; 14 pp.; In English
Report No.(s): DE2006-841686; No Copyright; Avail.: Department of Energy Information Bridge

With this grant we explored the properties that result from combining the effects of nanostructuring and shape memory using both experimental and theoretical approaches. We developed new methods to make nanostructured NiTi by melt-spinning and cold rolling fabrication strategies, which elicited significantly different behavior. A template synthesis

method was also used to created nanoparticles. In order to characterize the particles we created, we developed a new magnetically-assisted particle manipulation technique to manipulate and position nanoscale samples for testing. Beyond characterization, this technique has broader implications for assembly of nanoscale devices and we demonstrated promising applications for optical switching through magnetically-controlled scattering and polarization capabilities. Nanoparticles of nickeltitanium (NiTi) shape memory alloy were also produced using thin film deposition technology and nanosphere lithography. Our work revealed the first direct evidence that the thermally-induced martensitic transformation of these films allows for partial indent recovery on the nanoscale. In addition to thoroughly characterizing and modeling the nanoindention behavior in NiTi thin films, we demonstrated the feasibility of using nanoindention on an SMA film for write-read-erase schemes for data storage. This research has resulted in six journal publications, seven conference proceedings, two masters degrees, and two Ph.D. degrees.
NTIS
Nanostructures (Devices); Shape Memory Alloys

25
INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY

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

20060011302 Southern States Energy Board, Norcross, GA, USA
Southeast Regional Carbon Sequestration Partnership (SECARB)
Nemeth, K. J.; Apr. 2005; 80 pp.; In English
Report No.(s): DE2005-840356; No Copyright; Avail.: National Technical Information Service (NTIS)

The Southeast Regional Carbon Sequestration Partnership (SECARB) is on schedule and within budget projections for the work completed during the first 18-months of its two year program. Work during the semiannual period (fifth and sixth project quarters) of the project (October 1, 2004 March 31, 2005) was conducted within a Task Responsibility Matrix. Under Task 1.0 Define Geographic Boundaries of the Region, no changes occurred during the fifth or sixth quarters of the project. Under Task 2.0 Characterize the Region, refinements have been made to the general mapping and screening of sources and sinks. Integration and geographical information systems (GIS) mapping is ongoing. Characterization during this period was focused on smaller areas having high sequestration potential. Under Task 3.0 Identify and Address Issues for Technology Deployment, SECARB continues to expand upon its assessment of safety, regulatory, permitting, and accounting frameworks within the region to allow for wide-scale deployment of promising terrestrial and geologic sequestration approaches. Under Task 4.0 Develop Public Involvement and Education Mechanisms, SECARB has used results of a survey and focus group meeting to refine approaches that are being taken to educate and involve the public. Under Task 5.0 Identify the Most Promising Capture, Sequestration, and Transport Options, SECARB has evaluated findings from work performed during the first 18-months. The focus of the project team has shifted from region-wide mapping and characterization to a more detailed screening approach designed to identify the most promising opportunities. Under Task 6.0 Prepare Action Plans for Implementation and Technology Validation Activity, the SECARB team is developing an integrated approach to implementing the most promising opportunities and in setting up measurement, monitoring and verification (MMV) programs for the most promising opportunities.
NTIS
Carbon; Geographic Information Systems; Refining; Deployment

20060011646 Iowa State Univ. of Science and Technology, Ames, IA USA
Structural Studies of Two Novel La-Sn Compounds: La30Sn30 and La32Ni2Sn35
Yang, A. S.; January 2005; 54 pp.; In English
Report No.(s): DE2006-850066; No Copyright; Avail.: Department of Energy Information Bridge

Two novel intermetallic compounds containing lanthanum and tin have been obtained for the first time. Single crystal structures of these two phases, La30Sn30 and La32Ni2Sn35 have been studied by X-ray crystallography. La30Sn30 is a new 1:1 binary containing La and Sn and has been refined in the Cmmm space group. This phase was made at high temperatures (\g12OO deg C) from a loaded composition of La68Sn70. Unlike the reported 1:l binary, LaSn which crystallizes in the Cmcm space group (only powder X-ray diffraction studies reported), La30Sn30 forms good crystals for structural determination. The crystal structure of La3oSn30 show Sn-Sn dimers and Sn-centered, face-sharing biaugmented triangular prisms composed of

La atoms. La30Sn30 does not belong to any known structure -type. La32Ni2Sn35 was obtained in high yields at high temperatures (\g12OO deg C) and refined in the 14/mmm space group. It belongs to the USi structure type in which the Ni/Sn atoms occupy the Si sites, and La/Sn atoms occupy the U sites. The crystal structure of La32Ni2Sn35 consists of buckled sheets made from La-centered, comer-shared octahedra of Sn. These sheets are intraconnected through Ni-Sn-Ni bonds along the c-axis. The crystals are not air sensitive, unlike La30Sn30, which can be attributed to the presence of Ni in the crystal structure.
NTIS
Crystal Structure; Intermetallics; Lanthanum

20060012043 Institute of Gas Technology, Des Plaines, IL USA
Novel Membrane Reactor for Direct Hydrogen Production from Coal
Doong, S.; Ong, E.; Atroshenko, M.; Lau, F.; Apr. 28, 2005; 22 pp.; In English
Report No.(s): DE2005-840470; No Copyright; Avail.: National Technical Information Service (NTIS)

Gas Technology Institute is developing a novel concept of membrane reactor coupled with a gasifier for high efficiency, clean and low cost production of hydrogen from coal. The concept incorporates a hydrogen-selective membrane within a gasification reactor for direct extraction of hydrogen from coal-derived synthesis gases. The objective of this project is to determine the technical and economic feasibility of this concept by screening, testing and identifying potential candidate membranes under high temperature, high pressure, and harsh environments of the coal gasification conditions. The best performing membranes will be selected for preliminary reactor design and cost estimates.To evaluate the performances of the candidate membranes under the gasification conditions, a high temperature/high pressure hydrogen permeation unit has been constructed in this project. The unit is designed to operate at temperatures up to 1100(deg.)C and pressures to 60 atm for evaluation of ceramic membranes such as mixed protonic-electronic conducting membrane.
NTIS
Coal; Gasification; Hydrogen; Hydrogen Production; Membranes

26
METALS AND METALLIC MATERIALS

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

20060011245 Iowa State Univ. of Science and Technology, Ames, IA USA
Preparation, Crystallography, Magnetic and Magnetothermal Properties of Ce5SIxGe4-x Alloys
Vijayaraghavan, R.; January 2005; 102 pp.; In English
Report No.(s): DE2006-850051; No Copyright; Avail.: Department of Energy Information Bridge

An investigation of the crystal structure and the phase relationships in the Ce(sub 5)Si(sub 4-x)Ge(sub x) system has been carried out. The crystal structures of the single phase intermetallics were characterized using X-ray powder diffraction and subsequent refinement employing the Rietveld analysis technique was performed. The intermetallic system was found to crystallize in three distinct crystal structures. The Ce(sub 5)Si(sub 4)-based solid solution extends from x = 0 to x = 2.15 and it was found to crystallize in the well-known Zr(sub 5)Si(sub 4)-type tetragonal structure. The germanium rich alloys, where 3.1 (le) x (le) 4, crystallized in the Sm(sub 5)Ge(sub 4)-type orthorhombic structure. The crystal structure of the intermediate phase, when 2.35 (le) x (le) 2.8, was found out to be of the Gd(sub 5)Si(sub 2)Ge(sub 2)-type monoclinic structure. Microhardness tests were conducted on the samples in order to probe the trend in mechanical properties in this alloy system as a function of Ge concentration. The magnetic, thermal and magnetocaloric properties of the Ce(sub 5)Si(sub 4-x)Ge(sub x) alloy system have been investigated for x = 0, 1.0, 1.8, 2.5, 2.8, 3.5, 3.8 and 4.0. The phases with x = 0, 1.0 and 1.8 crystallize in the tetragonal Zr(sub 5)Si(sub 4) structure and those with x = 2.5, 2.8 form in the Gd(sub 5)Si(sub 2)Ge(sub 2)-type monoclinic structure. The alloys with x = 3.5, 3.8 and 4.0 crystallize in the Sm(sub 5)Ge(sub 4)-type orthorhombic structure. The Curie temperature of the tetragonal phases increases with increasing Ge content. The ordering temperatures of the monoclinic and orthorhombic phases remain nearly unaffected by the composition, with the Curie temperatures of the latter slightly higher than those of the former. All the alloys display evidence of antiferromagnetic interactions in the ground state. The orthorhombic and the monoclinic alloys behave as ferromagnets whereas the Si-rich tetragonal phase acts more like an antiferromagnet at high fields (1 T and higher). The maximum isothermal magnetic entropy change occurs at (approx)11 K

in the monoclinic and orthorhombic phases with the highest value being 14.7 J/kg.K for Ce(sub 5)Ge(sub 4) for a field change of 10 T.
NTIS
Crystal Structure; Crystallography; Magnetic Properties

20060011303 Canada Centre for Mineral and Energy Technology, Ottawa, Ontario, Canada
Grain Refinement of Permanent Mold Cast Copper Base Alloys
Sadayappan, M.; Thomson, J. P.; Elboujdaini, M.; Gu, G. P.; Sahoo, M.; Apr. 2004; 128 pp.; In English
Report No.(s): DE2005-840819; No Copyright; Avail.: National Technical Information Service (NTIS)

Grain refinement is a well established process for many cast and wrought alloys. The mechanical properties of various alloys could be enhanced by reducing the grain size. Refinement is also known to improve casting characteristics such as fluidity and hot tearing. Grain refinement of copper-base alloys is not widely used, especially in sand casting process. However, in permanent mold casting of copper alloys it is now common to use grain refinement to counteract the problem of severe hot tearing which also improves the pressure tightness of plumbing components. The mechanism of grain refinement in copper-base alloys is not well understood. The issues to be studied include the effect of minor alloy additions on the microstructure, their interaction with the grain refiner, effect of cooling rate, and loss of grain refinement (fading). In this investigation, efforts were made to explore and understand grain refinement of copper alloys, especially in permanent mold casting conditions.
NTIS
Cast Alloys; Casting; Copper Alloys

20060011327 American Iron and Steel Inst., Pittsburgh, PA, USA
0040-Validation of the Hot Strip Mill Model
Shulkosky, R. A.; Rosburg, D. L.; Chapman, J. D.; Mar. 30, 2005; 52 pp.; In English
Report No.(s): DE2005-841526; No Copyright; Avail.: National Technical Information Service (NTIS)

The Hot Strip Mill Model (HSMM) is an off-line PC based software model originally developed by the University of British Columbia (UBC) and the National Institute of Standards and Technology (NIST) under the AISI/DOE Advanced Process Control Program. The HSMM was developed to predict the temperatures, deformations, microstructure evolution and mechanical properties of steel strip or plate rolled in a hot mill. INTEG process group undertook the current task of enhancing and validating the technology. With the support of 5 North American steel producers, INTEG process group tested and validated the model using actual operating data from the steel plants and enhanced the model to improve prediction results.
NTIS
Computerized Simulation; Microstructure; Steels

20060011344 McDermott Technology, Inc., Alliance, OH, USA, ALSTOM Power, Inc.,, Windsor, CT, USA, Oak Ridge National Lab., TN USA, Electric Power Research Inst., Palo Alto, CA, USA
Boiler Material for Ultrasupercritical Coal Power Plants. Second Quarterly Report for FY 2005 January 1 - March 31, 2005
Viswanathan, R.; Coleman, K.; Shingeldecker, J.; Sarver, J.; Stanko, G.; Apr. 27, 2005; 72 pp.; In English
Report No.(s): DE2005-841002; No Copyright; Avail.: National Technical Information Service (NTIS)

The U.S. Department of Energy (DOE) and the Ohio Coal Development Office (OCDO) have recently initiated a project aimed at identifying, evaluating, and qualifying the materials needed for the construction of the critical components of coal-fired boilers capable of operating at much higher efficiencies than current generation of supercritical plants. This increased efficiency is expected to be achieved principally through the use of ultrasupercritical steam conditions (USC). The project goal initially was to assess/develop materials technology that will enable achieving turbine throttle steam conditions of 760 C (1400 F)/35 MPa (5000 psi), although this goal for the main steam temperature had to be revised down to 732 C (1350 F), based on a preliminary assessment of material capabilities. The project is intended to build further upon the alloy development and evaluation programs that have been carried out in Europe and Japan. Those programs have identified ferritic steels capable of meeting the strength requirements of USC plants up to approximately 620 C (1150 F) and nickel-based alloys suitable up to 700 C (1300 F). In this project, the maximum temperature capabilities of these and other available high-temperature alloys are being assessed to provide a basis for materials selection and application under a range of

conditions prevailing in the boiler. This report provides a quarterly status report for the period of July 1 to September 30, 2004.
NTIS
Boilers; Coal; Nickel Alloys; Construction Materials

20060011346 Mesabi Nugget, LLC, Silver Bay, MN, USA
Mesabi Nugget Research Project
Lehtinen, L.; January 2005; 1 pp.; In English
Report No.(s): DE2005-840922; No Copyright; Avail.: Department of Energy Information Bridge

The Mesabi Nugget Project is a large pilot-scale program completed to demonstrate the ITmk3(reg-sign) Process developed and owned by Kobe Steel, Ltd of Japan. The ITmk3(reg-sign) Process is a new ironmaking technology that uses a rotary hearth furnace to turn iron ore fines and pulverized coal into iron nuggets of similar quality as blast furnace pig iron. The Mesabi Nugget Research Project is a part of this larger program to design/permit/construct a pilot plant, operate the pilot plant, design and permit a first of its kind commercial plant, and then construct ktatt operate such a commercial plant. The pilot plant operation step is the subject of this award. A pilot demonstration plant has been assembled at a site in Silver Bay, MN. The Mesabi Nugget Research Project (this award) consisted of the operation of the pilot plant to demonstrate and optimize the new ironmaking technology to confirm the benefits of the process. This was a two-year project with the award recipient, Mesabi Nugget, LLC. The objectives of the Mesabi Nugget Research Project were to: (1) Demonstrate the commercial readiness of the ITmk(reg-sign) Process; (2) Measure the environmental emissions and impacts of the iron nugget process and determine related control solutions; (3) Qualify and test the iron nugget product in a modern EAF steel making melt shop; and (4) Assess a variety of raw materials and process conditions to determine optimal conditions for operation of the iron nugget process with respect to future commercial operations.
NTIS
Coal; Furnaces; Iron

20060011347 Iowa State Univ. of Science and Technology, Ames, IA, USA, Heath Consultants, Inc., Houston, TX, USA
Final Report: Reduction in Energy Consumption and Variability in Steel Foundry Operations
Peters, F.; May 24, 2005; 80 pp.; In English
Report No.(s): DE2005-840822; No Copyright; Avail.: National Technical Information Service (NTIS)

This project worked to improve the efficiency of the steel casting industry by reducing the variability that occurs because of process and product variation. The project focused on the post shakeout operations since roughly half of the production costs are in this area. These improvements will reduce the amount of variability, making it easier to manage the operation and improve the competitiveness. The reduction in variability will also reduce the need for many rework operations, which will result in a direct reduction of energy usage, particularly by the reduction of repeated heat treatment operations. Further energy savings will be realized from the reduction of scrap and reduced handling. Field studies were conducted at ten steel foundries that represented the U.S. steel casting industry, for a total of over 100 weeks of production observation. These studies quantified the amount of variability, and looked toward determining the source. A focus of the data collected was the grinding operations since this is a major effort in the cleaning room, and it represents the overall casting quality. The grinding was divided into two categories, expected and unexpected. Expected grinding is that in which the location of the effort is known prior to making the casting, such as smoothing parting lines, gates, and riser contacts. Unexpected grinding, which was approximately 80% of the effort, was done to improve the surfaces at weld repair locations, to rectify burnt on sand, and other surface anomalies at random locations.
NTIS
Casting; Energy Conservation; Energy Consumption; Foundries; Steels; Variability

20060011645 Iowa State Univ. of Science and Technology, Ames, IA USA
Microstructural Investigation of Mixed Rare Earth Iron Boron Processed Via Melt-Spinning and High Pressure Gas-Atmoization for Isotropic Bonded Permanent Magnets
Buelow, N. L.; January 2005; 120 pp.; In English
Report No.(s): DE2006-850076; No Copyright; Avail.: Department of Energy Information Bridge

A solid solution of three rare earths (RE) in the RE(sub 2)Fe(sub 14)B structure have been combined to create the novel mixed rare earth iron boron (MRE(sub 2)Fe(sub 14)B) alloy family. MRE(sub 2)Fe(sub 14)B exhibits reduced temperature dependent magnetic properties; remanence and coercivity. The desired form of MRE(sub 2)Fe(sub 14)B is a powder that can be blended with a polymer binder and compression or injection molded to form an isotropic polymer bonded permanent

magnet (PBM). Commercially, Nd(sub 2)Fe(sub 14)B is the alloy of choice for PBMs. Powders of Nd(sub 2)Fe(sub 14)B are made via melt-spinning as can be MRE(sub 2)Fe(sub 14)B which allows for direct comparisons. MRE(sub 2)Fe(sub 14)B made using melt-spinning at high wheel speeds is overquenched and must be annealed to an optimal hard magnetic state. Due to the rare earth content in the MRE(sub 2)Fe(sub 14)B powders, they must be protected from the environment in which they operate. This protection is accomplished by using a modified fluidized bed process to grow a protective fluoride coating nominally 15nm thick, to reduce air oxidation. MRE(sub 2)Fe(sub 14)B has demonstrated reduced temperature dependent magnetic properties in ribbon and PBM form. The real challenge has been modifying alloy designs that were successfully melt-spun to be compatible with high-pressure gas-atomization (HPGA). The cooling rates in HPGA are lower than melt-spinning, as the powders are quenched via convective cooling, compared to melt-spinning, which quenches initially by conductive cooling. Early alloy designs, in gas atomized and melt-spun form, did not have similar phase compositions or microstructures. Alloy additions, such as the addition of zirconium as a nucleation catalyst, were successful in creating similar phases and microstructures in the HPGA powders and melt-spun ribbon of the same MRE(sub 2)Fe(sub 14)B composition.
NTIS
Boron; Compressed Gas; Iron; Iron Alloys; Isotropy; Magnets; Melt Spinning; Microstructure; Permanent Magnets

20060012074 Colorado School of Mines, Golden, CO, USA
AISI/DOE Technology Roadmap Program Constitutive Behavior of High Strength Multiphase Sheet Steels Under High Strain Rate Deformation TRP 9904
January 2005; 90 pp.; In English
Report No.(s): DE2005-841358; No Copyright; Avail.: Department of Energy Information Bridge

The focus of the research project was to systematically assess the strain rate dependence of strengthening mechanisms in new advanced high strength sheet steels. Data were obtained on specially designed and produced Duel Phase and TRIP steels and compared to the properties of automotive steels currently in use.
NTIS
Deformation; High Strength Steels; Metal Sheets; Steels; Strain Rate

20060012083 Southwest Research Inst., San Antonio, TX USA, Colorado School of Mines, Golden, CO USA
Cost-Effective Method for Producing Self Supported Palladium Alloy Membranes for Use in Efficient Production of Coal Derived Hydrogen
Lanning, B.; Arps, A.; January 2005; 14 pp.; In English
Report No.(s): DE2005-840474; No Copyright; Avail.: Department of Energy Information Bridge

Over the last quarter, we continued to optimize procedures for producing free-standing, defect free films using rigid silicon and glass substrates. A strong correlation was observed between sputter power and formation of defects (pinholes) in the film; i.e., lower power, and correspondingly lower deposition rate, results in a lower defect density. Films less than 1 micron-thick have been successfully released from both silicon and glass substrates although the minimum thickness for pinhole-free films over a 4-inch diameter disc is still on the order of 3-4microns. Results from hydrogen permeation testing over the last quarter have shown a marked increase in membrane performance primarily due to proper alloy composition and pre-treatment procedures.
NTIS
Coal; Cost Effectiveness; Hydrogen; Hydrogen Production; Membranes; Palladium Alloys

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*.

20060011341 Institute of Gas Technology, Des Plaines, IL USA
Development of Permanent Mechanical Repair Sleeve for Plastic Pipe. Semi-Annual Report
Patadia, H.; Apr. 29, 2005; 20 pp.; In English
Report No.(s): DE2005-841004; No Copyright; Avail.: National Technical Information Service (NTIS)

The report presents a comprehensive summary of the prototype development process utilized towards the development of a permanent mechanical repair fitting intended to be installed on damaged PE mains under blowing gas conditions.

Specifically, the step by step construction approach is presented and the experimental data to support the mitigation of ensuing slow crack growth (SCG) of the damage area.
NTIS
Pipes (Tubes); Sleeves

20060011628 National Renewable Energy Lab., Golden, CO USA
Development and Testing of High-Temperature Solar Selective Coatings
Kennedy, C.; Price, H.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860487; NREL/CP-520-36581; No Copyright; Avail.: Department of Energy Information Bridge

The Solar Energy Technologies Program is working to reduce the cost of parabolic trough solar power technology. System studies show that increasing the operating temperature of the solar field from 390 to \g450 C will result in improved performance and cost reductions. This requires the development of new more-efficient selective coatings that have both high solar absorptance (\g0.96) and low thermal emittance (\h0.07) and are thermally stable above 450 C, ideally in air. Potential selective coatings were modeled, identified for laboratory prototyping, and manufactured at NREL. Optimization of the samples and high-temperature durability testing will be performed. Development of spectrally selective materials depends on reliable characterization of their optical properties. Protocols for testing the thermal/optical properties of selective coatings were developed and a round-robin experiment was conducted to verify and document the reflectance and high-temperature emittance measurements. The development, performance, and durability of these materials and future work will be described.
NTIS
High Temperature; Selective Surfaces; Solar Energy Absorbers; Thermal Energy

20060012025 Massachusetts Dept. of Public Health, Boston, MA, USA
Massachusetts Strategic Plan to End Lead Poisoning by 2010
Aug. 2004; 32 pp.; In English
Report No.(s): PB2006-108318; No Copyright; Avail.: CASI: A03, Hardcopy

For the past year, the Massachusetts Childhood Lead Poisoning Prevention Program (MACLPPP) has been building a foundation for the creation of a strategic elimination plan to end lead poisoning by 2010. MACLPPP hired a consultant, gathered data, developed methodologies and set the framework for strategic planning. One of our main focuses was the convening of a working group to generate ideas, set priorities, and to make recommendations for policy and programmatic changes as needed. The diversity of individuals representing themselves and varied agencies have greatly improved our strategic planning process. We are grateful for their contributions, patience and interest in the process. The outcomes of our strategic planning efforts will be incorporated into our day-to-day activities over the next several years. Holding advisory committee meetings and organizing focus groups will continue to be part of the implementation and evaluation process. We will also continue to analyze surveillance and environmental databases for changes in incidence and prevalence rates attributable to our elimination plan. We look forward to publicizing the elimination plan, its intended outcomes, and its progress as we continue on our journey to end childhood lead poisoning.
NTIS
Children; Lead Poisoning; Prevention

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*.

20060012151 NASA Glenn Research Center, Cleveland, OH, USA
Pattern Formation in Diffusion Flames Embedded in von Karman Swirling Flows
Nayagam, Vedha; April 2006; 13 pp.; In English; Original contains black and white illustrations
Contract(s)/Grant(s): NCC3-975; WBS 22-101-12-46
Report No.(s): NASA/CR-2006-214057; E-15414; No Copyright; Avail.: CASI: A03, Hardcopy

Pattern formation is observed in nature in many so-called excitable systems that can support wave propagation. It is well-known in the field of combustion that premixed flames can exhibit patterns through differential diffusion mechanism between heat and mass. However, in the case of diffusion flames where fuel and oxidizer are separated initially there have been

only a few observations of pattern formation. It is generally perceived that since diffusion flames do not possess an inherent propagation speed they are static and do not form patterns. But in diffusion flames close to their extinction local quenching can occur and produce flame edges which can propagate along stoichiometric surfaces. Recently, we reported experimental observations of rotating spiral flame edges during near-limit combustion of a downward-facing polymethylmethacrylate disk spinning in quiescent air. These spiral flames, though short-lived, exhibited many similarities to patterns commonly found in quiescent excitable media including compound tip meandering motion. Flame disks that grow or shrink with time depending on the rotational speed and in-depth heat loss history of the fuel disk have also been reported. One of the limitations of studying flame patterns with solid fuels is that steady-state conditions cannot be achieved in air at normal atmospheric pressure for experimentally reasonable fuel thickness. As a means to reproduce the flame patterns observed earlier with solid fuels, but under steady-state conditions, we have designed and built a rotating, porous-disk burner through which gaseous fuels can be injected and burned as diffusion flames. The rotating porous disk generates a flow of air toward the disk by a viscous pumping action, generating what is called the von K rm n boundary layer which is of constant thickness over the entire burner disk. In this note we present a map of the various dynamic flame patterns observed during the combustion of methane in air as a function of fuel flow rate and the burner rotational speed.
Author
Diffusion Flames; Wave Propagation; Combustion; Premixed Flames; Oxidizers; Fuels; Flow Velocity; Stoichiometry

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*.

20060011246 Swedish Defence Research Establishment, Linkoeping, Sweden
Intrusion Detection System and Response for Mobile ad hoc Networks (Intrangsdetektering och Svar foer Mobila ad Hoc Naetverk)
Nordqvist, D.; Westerdahl, L.; Hansson, A.; Jul. 2005; 38 pp.; In English
Report No.(s): PB2006-101691; FOI-R-1683-SE; No Copyright; Avail.: CASI: A03, Hardcopy

The research area of mobile ad hoc intrusion detection systems (IDS) is still under development. Existing IDS'es are mainly for wired or wireless networks. In a previous report it was concluded that existing products for wireless IDS'es are not suitable for tactical mobile ad hoc networks. The IDS architecture of the tested tools neither has support for the autonomous and self-organized property nor the ability needed for detecting relevant attacks. In this report an architecture for a mobile ad hoc network IDS is presented. The IDS is based on requirements from a general perspective, some special requirements for the ad hoc environment and finally military requirements. The result is a network IDS located on each node within the network.
NTIS
Detection; Warning Systems; Autonomy

20060011261 Coast Guard, Washington, DC USA
Aids to Navigation Manual: Structures
Nov. 2005; 152 pp.; In English
Report No.(s): PB2006-108267; COMDTINST-M16500.25A; No Copyright; Avail.: National Technical Information Service (NTIS)

1. PURPOSE. This Manual establishes policies, procedures, and criteria for the design and inspection of Short Range Aids to Navigation (ATON) structures. 2. ACTION. Area and district commanders, commanders of maintenance and logistics commands, and commanding officers of headquarters units shall ensure that the provisions of this Manual are followed. Recommendations for changes to this Manual should be directed to Commandant (CG-432). 3. DIRECTIVES AFFECTED. The Aids to Navigation Manual - Structures, COMDTINST M16500.25, is canceled. 4. DISCUSSION. This revision of Aids to Navigation Manual - Structures, COMDTINST M16500.25 reflects the constructive comments that have been provided by the field since the Manual was first published in September 2004. The primary changes are in Chapter 2 (requirements for platforms, guardrails, ladders, and fall arrest systems) and Chapter 4 (requirements for fall protection and operational risk management). Several of the data sheets have also been revised to more clearly reflect the guidance in the Manual. 5. ENVIRONMENTAL ASPECT and IMPACT CONSIDERATIONS. Environmental considerations were examined in

developingthis Manual and are incorporated herein. 6. FORMS/REPORTS. Form CG-4094,Shore Station Maintenance Record, and Form CG-6042, ATON Structure Inspection Form, are available in USCG Electronic Forms on Standard Workstation III, and on the Internet at \hhttp://www.uscg. mil/ccs/cit/cim/ forms1/welcome.htm\g
NTIS
Navigation Aids; Shoran

20060011477 Rome Univ., Rome, Italy
ASPECTS of DIGITAL SIGNAL PROCESSING IN RADIOMETRIC REMOTE SENSING of GEOPHYSICAL VARIABLES
Ciotti, Piero; Solimini, Domenico; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1874-1877; In English; See also 20060011369; Copyright; Avail.: Other Sources

When geophysical variables are estimated from remotely sensed electromagnetic data, severe difficulties are often encountered because of the ill-posed nature of the problem, so that the use of effective processing becomes essential. The inversion of radiometric data in the retrieval of atmospheric temperature profiles is considered and the use of the Kalman filter algorithm is analyzer to assess its performance from the point of view of accuracy of estimates end spatial resolution. The sensitivity to experimental errors is pointed out and the use of adaptive filtering to reduce the inaccuracy of data is examined. With regard to spectra of radiometric fluctuations, the performance of recently proposed spectral estimation techniques, amenable to the originally proposed maximum entropy method, are considered. The estimate of line parameters to identify and follow the temporal evolution of atmospheric internal oscillations is discussed, as well as the accuracy of retrieval of the slopes of radiometric turbulent spectra.
Author
Geophysics; Radiometers; Remote Sensing; Signal Processing; Digital Systems

20060011594 GVM Consulting, Germany
Telemetry Band Augmentation: An Agenda Item at the Next World Radio Communication Council
Mayer, Gerhard K. L.; Lyons, Steve W.; Chalfant, timothy A.; Flight Test: Sharing Knowledge and Experience; May 2005, pp. 6-1 - 6-9; In English; See also 20060011579; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

One of the significant factors affecting combined operations is the planning, scheduling, and utilisation of telemetry and telecommand spectrum to support next generation platform development and to support operational tests conducted in combined environments (air, land, sea and space). Due to commercial spectrum encroachment and the resultant reallocation legislation, the increasing (flight test) need for real-time data display and analysis is quickly becoming unsupportable in the existing bands. Several research efforts have increased telemetry efficiency by decreasing the amount of spectrum needed to transmit information. These techniques, promising a two to three fold increase, still can't address the need for future wide-band telemetry, which is growing exponentially. This has generated a call to look for additional radio frequency spectrum allocations to augment the existing telemetry bands. This need is shared by the international community and has generated an agenda item for the next meeting of the World Radio-communication Conference (WRC). Due to the international impact of spectrum encroachment on telemetry users, the International Foundation for Telemetering established an information interchange forum, called the International Consortium for Telemetry Spectrum (ICTS), to support this critical requirement. It is necessary that all telemetry users support a positive response to this WRC agenda item to meet the needs of future test programmes.
Author
Telemetry; Radio Communication; Radio Frequencies; Command and Control; Real Time Operation; Flight Tests

20060012030 Connecticut Univ., Hartford, CT, USA
Telehealth Support in Cardiovascular Disease
LaCoursiere, S.; Chinn, P. L.; Polifroni, C.; Neafsey, P.; Burns, K.; Sep. 2003; 20 pp.; In English
Contract(s)/Grant(s): 1R03HS1193701
Report No.(s): PB2006-107544; No Copyright; Avail.: CASI: A03, Hardcopy

The purpose of this research was to determine if the availability of web-based telehealth nurse support had an effect on psychological and physiological outcomes, support, satisfaction, usage, and communication in persons with cardiovascular (CV) disease who use the Internet.
NTIS
Cardiovascular System; Heart Diseases; Support Systems; Telemedicine

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*.

20060011239 Geological Survey, Tucson, AZ, USA
Processed Thematic Mapper Satellite Imagery for Selected Areas within the U.S.-Mexico Borderlands
Dohrenwend, J. C.; Gray, F.; Miller, R. J.; January 2001; 52 pp.; In English
Report No.(s): PB2006-105392; USGS/OFR-00-309; No Copyright; Avail.: National Technical Information Service (NTIS)

Landsat Thematic Mapper (TM) satellite full-scene images have been selected and processed for a large portion of the USA-Mexico transborder region. The Landsat TM images included on these CD-ROMs are digital color composites of middle, near infrared and visible light derived from TM bands 7, 4 and 2. The characteristics of the images were selected to facilitate coregistration with standard UTM projected map data and facilitate usage in a broad range of GIS and other graphical platforms.
NTIS
Landsat Satellites; Satellite Imagery; Thematic Mappers (Landsat)

20060011249 Iowa State Univ. of Science and Technology, Ames, IA USA
Electromagnetic Methods for Measuring Material Properties of Cylindrical Rods and Array Probes for Rapid Flaw Inspection
Sun, H.; January 2005; 148 pp.; In English
Report No.(s): DE2006-850045; No Copyright; Avail.: Department of Energy Information Bridge

The case-hardening process modifies the near-surface permeability and conductivity of steel, as can be observed through changes in alternating current potential drop (ACPD) along a rod. In order to evaluate case depth of case hardened steel rods, analytical expressions are derived for the alternating current potential drop on the surface of a homogeneous rod, a two-layered and a three-layered rod. The case-hardened rod is first modeled by a two-layer rod that has a homogeneous substrate with a single, uniformly thick, homogeneous surface layer, in which the conductivity and permeability values differ from those in the substrate. By fitting model results to multi-frequency ACPD experimental data, estimates of conductivity, permeability and case depth are found. Although the estimated case depth by the two-layer model is in reasonable agreement with the effective case depth from the hardness profile, it is consistently higher than the effective case depth. This led to the development of the three-layer model. It is anticipated that the new three-layered model will improve the results and thus makes the ACPD method a novel technique in nondestructive measurement of case depth. Another way to evaluate case depth of a case hardened steel rod is to use induction coils. Integral form solutions for an infinite rod encircled by a coaxial coil are well known, but for a finite length conductor, additional boundary conditions must be satisfied at the ends. In this work, calculations of eddy currents are performed for a two-layer conducting rod of finite length excited by a coaxial circular coil carrying an alternating current. The solution is found using the truncated region eigenfunction expansion (TREE) method. By truncating the solution region to a finite length in the axial direction, the magnetic vector potential can be expressed as a series expansion of orthogonal eigenfunctions instead of as a Fourier integral. Closed-form expressions are derived for the electromagnetic field in the presence of a finite a two-layer rod and a conductive tube. The results are in very good agreement with those obtained by using a 2D finite element code. In the third part, a new probe technology with enhanced flaw detection capability is described. The new probe can reduce inspection time through the use of multiple Hall sensors. A prototype Hall array probe has been built and tested with eight individual Hall sensor ICs and a racetrack coil. Electronic hardware was developed to interface the probes to an oscilloscope or an eddy current instrument. To achieve high spatial resolution and to limit the overall probe size, high-sensitivity Hall sensor arrays were fabricated directly on a wafer using photolithographic techniques and then mounted in their unencapsulated form. The electronic hardware was then updated to interface the new probes to a laptop computer.
NTIS
Cylindrical Bodies; Defects; Inspection; Rods

20060011370 Centro de Analise e Processamento de Sinais, Lisbon, Portugal
Harmonic Coding: A Low Bit-Rate, Good-Quality Speech Coding Technique
Almeida, Luis B.; Tribolet, Jose M.; International Conference on Acoustics, Speech and Signal Processing (ICASSP ‘82); Volume 3; [1982], pp. 1664-1667; In English; See also 20060011369; Copyright; Avail.: Other Sources

Low bit-rate, good-quality speech coding is one of the fundamental goals of today’s speech processing research.

Present-day coding techniques, like APC and ATC, are able to achieve good-quality transmission only down to about 12 kb/s. Below this rate, their quality degrades rapidly. On the other hand, the various kinds of vocoders, which operate up to about 5 kb/s, have inherent quality limitations which cannot be overcome by an increase of the bit rate. In this paper, a new coding scheme is presented, which is based on a recently developed spectral model for nonstationary voiced speech, and it forms the basis of a waveform coder and a vocoder which are introduced in this paper, and which share the same basic structure. Experimental results are presented, which show that both systems yield significant bit-rate reductions relative to present-day schemes of equivalent quality.
Author
Vocoders; Voice Data Processing; Spectral Theory

20060011371 Bell Telephone Labs., Inc., Holmdel, NJ, USA
Subjective Quality of Several 9.6-32 Kb/s Speech Coders
Daumer, W. R.; Sullivan, J. L.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1708-1712; In English; See also 20060011369; Copyright; Avail.: Other Sources

Ratings obtained from subjective tests indicate that for single encodings of speech, near equivalence to 64 kb/s PCM is obtained at 32 kb/s with ADPCM/AP and SDC, and at 2a kb/s with APC and ATC/VD. Tandem encodings of 32 kb/s ADPCM/AP are significantly better than 16 kb/s APC and SLC. Eight synchronous encodings of 52 kb/s ADPCM/AP are rated about the same as eight asynchronous encodings of 64 kb/s PCM. The subjective test results are used to develop preliminary coder performance functions in terms of Q (subjective ratio of speech power and speech-dependent noise power) in terms consistent with a previously reported quantization distortion opinion model. These relations, in conjunction with a proposed CCITT planning rule, indicate that a 32 kb/s ADPCM/AP coder can be allowed in each of the national extensions of an international connection. Reported results apply only to coder quantization effects on speech quality; other signals (e.g., voiceband data, signaling tones) and impact of coder delay on echo performance are not covered.
Author
Coders; Speech Recognition; Voice Communication; Synchronism; Distortion

20060011372 Northeastern Univ., Boston, MA, USA
GENERALIZED LEAST SQUARES LATTICE ALGORITHM and ITS APPLICATION to DECISION FEEDBACK EQUALIZATION
Ling, Fuyun; Proakis, John G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1764-1768; In English; See also 20060011369; Copyright; Avail.: Other Sources

A generalized least squares lattice algorithm (GLSLA),which is appropriate for multi-channel adaptive filtering and estimation, is presented. This algorithm has all the advantages of a conventional least-squares (LS) lattice algorithm, such as computational efficiency, numerical stability, and the property that successive stages are decoupled. Besides these advantages, it also has the flexibility that the number of stages in each channel may be different. This property does not exist in the conventional LS lattice algorithms. As an application, a decision feedback equalizer (DFE) with different numbers of feedforward and feedback stages is proposed and implemented using the GLSLA. Some results obtained from a computer simulation of the algorithm are also presented.
Author
Adaptive Filters; Lattices (Mathematics); Least Squares Method; Feedforward Control; Algorithms

20060011373 California Univ., Santa Barbara, CA, USA
EFFECTS of HYBRID NONLINEARITY ON A FULL DUPLEX TELEPHONE NETWORK WITH VOCODER
Mansour, David; Gray, Augustine H., Jr.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1797-1800; In English; See also 20060011369; Copyright; Avail.: Other Sources

In most applications of adaptive filtering algorithms to the telephone echo cancellation problem, a linear model is assumed for the hybrid. In this paper,a nonlinear model based on a Volterra series representation is adopted. By using a new and efficient nonlinear frequency domain adaptive algorithm,a nonlinear model for a hybrid in an actual connection has been identified. The nonlinear model is found to be 8 db more accurate than the linear model. The problem of automatic gain control in the design of a full-duplex telephone network with LPC vocoder in the loop,and its interaction with the echo canceller and the hybrid nonlinearity is also discussed.
Author
Telephones; Vocoders; Duplexers; Automatic Gain Control; Adaptive Filters; Algorithms

20060011375 University of Southern California, Los Angeles, CA, USA

MINIMUM-VARIANCE and MAXIMUM-LIKELIHOOD RECURSIVE WAVESHAPING

Mendel, Jerry M.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1898-1901; In English; See also 20060011369; Copyright; Avail.: Other Sources

In this paper we develop optimal recursive waveshaping filters in the framework of estimation theory and state-variable models. We develop a linear minimum-variance waveshaper and a nonlinear maximum-likelihood waveshaper. Both waveshapers are comprised of two components:(1) stochastic inversion and (2) waveshaping. The former is performed by means of minimum-variance deconvolution. Simulation results are given which illustrate results that can be obtained by both waveshapers. In retrospect, we view the minimum-variance results of this paper as the recursive counterparts to those presented by Treitel and Robinson (13), which are for finite-impulse response waveshaping.

Author

Maximum Likelihood Estimates; IIR Filters; Estimating; Stochastic Processes; Inversions

20060011376 Colorado State Univ., Fort Collins, CO, USA

IMAGE SEGMENTATION USING SIMPLE MARKOV FIELD MODELS

Elliott, H.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1912-1915; In English; See also 20060011369

Contract(s)/Grant(s): N00014-82-K-0076; Copyright; Avail.: Other Sources

By modelling a picture as a two-state Markov field, MAP estimation techniques are used to develop suboptimal but computationally tractable binary segmentation algorithms.

Author

Segments; Imaging Techniques; Estimating; Algorithms; Markov Processes

20060011378 Bell Telephone Labs., Inc., Murray Hill, NJ, USA

Speaker Trained Recognition of Large Vocabularies of Isolated Words

Rosenberg, A. E.; Rabiner, L. R.; Wilpon, J. G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2018-2021; In English; See also 20060011369; Copyright; Avail.: Other Sources

It has long been known that one of the key factors in determining the accuracy of isolated word recognition systems is the size and/or complexity of the vocabulary. Although most practical isolated word recognizers use small vocabularies (on the order of 10 to 50 words), there are many applications which require medium to large size vocabularies (e.g. airlines reservation and information, data retrieval etc). It is the purpose of this paper to discuss the problems associated with speaker-trained recognition of a large vocabulary (1109 words) of words. It is shown that the practicability of using large vocabularies for isolated word vocabularies is doubtful, both because of the problems in training the system, and because of the difficulty for the user to learn and remember the vocabulary words for any significant size vocabulary. The importance of studying large word vocabularies for recognition lies in the flexibility it provides for understanding the effects of vocabulary size and complexity on recognition accuracy for both small and medium size vocabularies. By constructing subsets of the total vocabulary for recognition, we show that a judicious choice of words can lead to significantly better recognition accuracy than by poor choice of the words in the subset. We show that for each doubling of the size of the vocabulary, the recognition accuracy tends to decrease by a fixed amount, which is different for each talker.

Author

Words (Language); Data Retrieval; Information Retrieval; Accuracy

20060011379 Colorado Univ., Boulder, CO, USA

A Multifactors Algorithm for Two Dimensional Convolution

El-Fallah, A.; Roberts, R. A.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2071; In English; See also 20060011369; Copyright; Avail.: Other Sources

This work describes a multifactor algorithm for two-dimensional, noncyclic, convolution of two finite sequences. This type of processing occurs in such applications as image enhancement and in the processing of data from radar and sonar arrays.

Author

Sequencing; Image Enhancement; Fast Fourier Transformations; Algorithms

20060011380 Institut za Nuklearne Nauke Boris Kidric, Belgrade, Macedonia

AN APPROACH to RECURSIVE ESTIMATION of TIME-VARYING SPECTRA

Dragosevic, Marina; Stankovic, Srdjan; Carapic, Miodrag; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2080-2083; In English; See also 20060011369; Copyright; Avail.: Other Sources

The paper presents an analysis of several recursive stochastic gradient-type methods applied to the tracking of rapidly time varying spectra of sinusoidal (or narrow-band) signals in additive white noise. A special emphasis is laid on a modified version of the recursive generalized least-squares method. Experimental results illustrate both asymptotic properties and tracking capabilities of the analysed methods.

Author

Time Functions; Least Squares Method; Asymptotic Properties; Sine Waves; White Noise

20060011381 Ecole Nationale Superieure des Telecommunications, Paris, France

WHITENESS of THE MEASUREMENT NOISE AS A CRITERION FOR ARMA MODELIZATION of SPEECH

Leroux, J.; Giannella, F.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1353-1356; In English; See also 20060011369; Copyright; Avail.: Other Sources

One pitch period of voiced speech is considered as the response of an all pole system to initial conditions (these initial conditions give the zeros of the model) to which is added a white measurement noise. According to these assumptions, the AR part of the model is obtained by computing the eigenvector associated to the the smallest eigenvalue of the covariance matrix of the signal (it is a generalization of the method of Pisarenko). Then, the MA part is deduced by the minimization of the error between the measured signal and the output of the model with respect to the parameters representing the initial conditions. Comparisons are done and show that both the spectrum and the impulse response obtained by the present method are much more similar to the original speech signal than the ones deduced by the usual covariance method.

Author

White Noise; Optimization; Matrices (Mathematics); Covariance; Eigenvectors

20060011389 Technische Univ., Munich, Germany

SPEAKER ADAPTATION BY A LINEAR TRANSFORMATION WITH OPTIMIZED PARAMETERS

Jaschul, Johannes; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1657-1660; In English; See also 20060011369; Copyright; Avail.: Other Sources

Speaker dependence of automatic speech recognition systems can be reduced by applying speaker-specific transformations to adapt the speech signal of a new speaker to that of the reference speaker. Initial investigations showed that speaker adaptation can be performed by transformations using spectral weighting and spectral warping. These heuristic methods can be substituted by a general linear matrix transformation, the parameters of which are determined by mean square error optimisation. The improvement of the recognition rate achievable by this matrix transformation is very high, but the method needs a large learning set. This can be reduced by restriction of the matrix to a band including the main diagonal in the middle. This banded matrix yields results close to those of the general matrix. Adaptation can be performed speaker-specifically as well as speaker- and class-specifically. As the cost of phoneme class-specific adaptation is very high, a grouping of phonemes is proposed so that one adaptation parameter set is used for all phonemes that belong to any one group.

Author

Linear Transformations; Speech Recognition; Phonemes; Mean Square Values; Optimization

20060011392 Electronics Research Lab., Trondheim, Norway

QUALITY MEASUREMENTS ON SPEECH CODERS FOR MOBILE RADIO

Svean, Jarle; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1700-1703; In English; See also 20060011369; Copyright; Avail.: Other Sources

Subjective quality measurements on speech coders for mobile radio were performed by the 'Mean Opinion Score Method'. Tested coders were adaptive transform coder (ATC), adaptive predictive coder (APC), sub-band coder (SBC), and residue excited linear predictive coder (RELP) with transmission rates below 16 kbit/s. Promising results were obtained for RELP, SBC, and APC, while the tested versions of ATC got disappointingly low scores.

Author

Coders; Predictions; Residues; Mobile Communication Systems

20060011394 Technische Hogeschool, Delft, Netherlands

HOW to APPROXIMATE A SPECTRUM RECURSIVELY USING ARMA MODELS

Dewilde, P.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1736-1739; In English; See also 20060011369; Copyright; Avail.: Other Sources

Given the power spectrum of a signal, we wish to approximate it using a recursive procedure. The resulting transfer function must be stable and we shall moreover request that it be stably invertible. We wish also to have a good measure of the approximation error. The approximating transfer function will be implemented by means of an orthogonal filter which contains a cascade of filter-sections derived from the recursive approximation procedure.

Author

Autoregressive Moving Average; Approximation; Inversions; Transfer Functions; Power Spectra

20060011395 Athens Univ., Greece

ON BLOCK MATRICES WITH ELEMENTS of SPECIAL STRUCTURE

Kalouptsidis, N.; Carayannis, G.; Manolakis, D.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1744-1747; In English; See also 20060011369; Copyright; Avail.: Other Sources

In various signal processing applications one is often confronted with aspects such as linear system solution, triangularization or inversion of matrices with special block structure as well as entries of particular form. Toeplitz, Banded Toeplitz, circular and Hankel matrices provide typical examples often encountered in such diverse fields as image processing, computerized tomography and other array processing applica_ons. The purpose of this paper is to algorithmically examine the issues of triangularization,inversion and linear system solution when the above particular structures are imposed at either the block level or the entry level. It is shown that the various resulting combinations of block and entry structure considerably reduce the computational complexity of the above problems.

Author

Signal Processing; Linear Systems; Image Processing; Matrices (Mathematics)

20060011396 Hewlett-Packard Co., Palo Alto, CA, USA

GENERALIZED CORDIC FOR DIGITAL SIGNAL PROCESSING

Lee, Daniel T. L.; Morf, Martin; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1748-1751; In English; See also 20060011369

Contract(s)/Grant(s): MDA903-80-C-0331; MDA903-79-C-0880; Copyright; Avail.: Other Sources

Many fast signal processing algorithms are based on a geometric framework and efficient implementations of these algorithms often require the computation of elementary functions involving such operations as vector rotations and exponentials. The CORDIC (COordinate Rotation Digital Computer) algorithms are the natural candidates for these elementary operations and they lead to novel realizations in many promising algorithms such as the square-root normalized ladder algorithm. FFT and several well-known matrix algorithms for signal processing. The development of algorithms involving nonstationary processes and the limiting constraints of VLSI motivate the extension of the CORDIC concept in other directions. It can be applied not only to one-parameter groups but to other Lie groups as well, i.e., higher dimensional manifolds, leading to generalized CORDIC algorithms. The computation of special functions is one of the potential benefits. Several such generalizations will be discussed.

Author

Digital Computers; Signal Processing; Fast Fourier Transformations; Algorithms; Lie Groups; Manifolds (Mathematics); Matrices (Mathematics)

20060011397 Institut National de Recherche d'Informatique et d'Automatique, Rennes, France

FIXED POINT ERROR ANALYSIS of THE NORMALIZED LADDER ALGORITHM

Samson, Claude; Reddy, V. Umapathi; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1752-1755; In English; See also 20060011369

Contract(s)/Grant(s): DAAG29-81-K-0057; DAAG-29-79-C-0215; Copyright; Avail.: Other Sources

In this paper, an attempt is made to analyze the fixed point error performance of the normalized ladder algorithm for autoregressive system identification, assuming rounding arithmetic. The paper contains two main results; i) A simplified theoretical expression for predicting the average bias in the estimated reflection coefficients at any stage, and ii) a recursive relation for the average error, arising from finite precision arithmetic, in the squared residuals. The second result illustrates

how the errors made in one stage affect the errors in the succeeding stages. Simulations are performed to check the theoretical predictions.
Author
Algorithms; Error Analysis; Estimating; Arithmetic; System Identification; Reflectance

20060011398 Mons Univ., Belgium
FAST MEASUREMENTS of THE ATTENUATION and DELAY CHARACTERISTICS of DATA CHANNELS
Boite, R.; Leich, H.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1770-1772; See also 20060011369; Copyright; Avail.: Other Sources

A procedure for the fast measurement of the attenuation and delay of data channels in the frequency band of interest (100 to 3400 Hz) is described. The method is based upon the analysis of the steady-state response to a special periodic input sequence; that sequence is pseudo-random and such that the Discrete FOURIER Transform of one period has strict constant amplitude; moreover its length can be chosen equal to a power of 2, in order to facilitate the computation of the D.F.T. by a F.F.T. algorithm. The complete procedure is described; it has been simulated on a computer and the influence of various parameters is reported.
Author
Channels (Data Transmission); Fourier Transformation; Steady State; Algorithms

20060011399 Philips Research Labs., Redhill, UK
DIGITAL LOCAL NETWORK SYSTEMS : the IMPACT of SIGNAL PROCESSING
Vry, M. G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1785-1888; In English; See also 20060011369; Copyright; Avail.: Other Sources

There is an increasing need for digital transmission systems which can operate over existing subscriber lines in the telephone local network. The design of a digital 1+1 system is described and the importance of signal processing to the design and realisation of systems is discussed. Some examples of signal processing in the 1+1 system are given; in particular an echo-canceller with sign-bit adaptation of its coefficients is described.
Author
Digital Systems; Signal Processing; Telephones; Coefficients

20060011400 CIT-ALCATEL Compagnie Industrielle des Telecommunications, France
SIGNAL PROCESSING IN the E10 DIGITAL SWITCHING SYSTEM
Delpit, Ph.; Lavanant, P.; Morin, B.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1793-1796; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper outlines some of the signal processing principles and methods used in the E13 digital telephone switching system.
Author
Signal Processing; Digital Systems; Telephones

20060011401 Bell Telephone Labs., Inc., Holmdel, NJ, USA
EMBEDDING DATA IN SPEECH USING SCRAMBLING TECHNIQUES
Steele, R.; Vitello, D.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1801-1804; In English; See also 20060011369; Copyright; Avail.: Other Sources

method of embedding data into speech signals is proposed. The speech signal is scrambled using the data as the scrambling key, while the receiver adopts the role of a code breaker. By judicious choice of scrambling algorithm the receiver can be made to break the code at every attempt. We found that 126 b/s can be transmitted without error over a channel whose additive noise is only 10 dB below the mean square value of the speech signal.
Author
Embedding; Mean Square Values; Speech; Errors; Algorithms

20060011402 Philips Research Labs., Brussels, Belgium
OPTIMAL DESIGN of MINIMUM PHASE FIR FILTERS
Kamp, Y.; Wellekens, C. J.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1817-1820; In English; See also 20060011369; Copyright; Avail.: Other Sources

The paper presents a new method for the optimal design of minimum phase FIR filters. First, a constrained approximation procedure is used to obtain the magnitude function and the transmission zeros in the stopband(s). Next, the zeros of the transfer function inside the unit circle are calculated via a low-degree polynomial factorization. For lowpass filters, a straightforward exchange algorithm is presented which achieves the constrained approximation step and which can be implemented via a simple modification of the Parks-McClellan program. The efficacy of the method is illustrated by a numerical example. Attention is drawn on the fact that bandpass filters may in principle require more sophisticated means.
Author
Fir Filters; Bandpass Filters; Transfer Functions; Algorithms

20060011403 Florence Univ., Italy
A MINIMUM-PHASE FIR COMPLEX FILTER DESIGN FOR TRANSMULTIPLEXER IMPLEMENTATION
DelRe E.; Emiliani, P. L.; Maffucci, D. F.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1821-1824; In English; See also 20060011369; Copyright; Avail.: Other Sources

A digital per-channel transmultiplexer system, based on the generation of a baseband analytic signal and on its successive interpolation and filtering, is considered. The method employs complex filters. To meet the CCITT specifications on the conversion system group delay, minimum-phase FIR complex filters are required. Their design is described in this paper. The system design also includes the evaluation of the wordlengths of the filter coefficients and the arithmetic operations. Computer simulations show that a 16 bit arithmetics is suitable throughout the whole conversion system. These characteristics suggest convenient hardware implementations with low-cost arithmetic
Author
Coefficients; Interpolation; Systems Engineering; Fir Filters

20060011404 Massachusetts Inst. of Tech., Cambridge, MA, USA
EFFECTS of NOISE ON SIGNAL RECONSTRUCTION FROM FOURIER TRANSFORM PHASE
Espy, Carol; Lim, Jae S.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1833-1836; In English; See also 20060011369
Contract(s)/Grant(s): NSF ECS-80-07102; Copyright; Avail.: Other Sources

The effects of noise in the given phase on signal reconstruction from the Fourier transform phase are studied. Specifically, the effects of different methods of sampling the degraded phase, of the number of non-zero points in the sequence, and of the noise level on the sequence reconstruction are examined. A sampling method is developed to significantly reduce the error in the reconstructed sequence, and the error is found to increase as the number of non-zero points in the sequence increases and as the noise level increases. In addition, an averaging technique is developed which reduces the effects of noise when the continuous phase function is known. Finally, as an illustration of how the results in this paper maybe applied in practice, Fourier transform signal coding is considered. Coding only the Fourier transform phase and reconstructing the signal from the coded phase is found to be considerably less efficient (i.e. a higher bit rate is required for the same mean square error) than reconstructing from both the coded phase and magnitude.
Author
Fourier Transformation; Mean Square Values; Sampling; Signal Encoding; Signal Processing; Noise Intensity

20060011408 Royal Inst. of Tech., Stockholm, Sweden
SIGNAL PROCESSING FOR EVENT DETECTION
Ahlbom, L. Gunnar; Forsen, Anders; Zetterberg, Lars H.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1890-1893; In English; See also 20060011369; Copyright; Avail.: Other Sources

A recursively updated lattice filter has been used for detection of non- stationarities in stochastic processes. Detection of these may be based either on the residual or the filter-coefficients. A decision variable defined from the filter-coefficients has been found promising in application of the algorithm to seismic signals and to electroencephalograms.
Author
Signal Processing; Stochastic Processes; Coefficients; Algorithms

20060011409 Uppsala Univ., Uppsala, Sweden
AUTOMATIC EVENT DETECTION APPLIED to SINGLE CHANNEL SEISMIC RECORDS
vanEck, T.; Ahlbom, L. G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1894-1897; In English; See also 20060011369; Copyright; Avail.: Other Sources

Three adaptive filters and one band-pass filter have been applied on one-channel seismic signals to detect and identify seismic wave arrivals, e.g. onsets. The adaptive filters are to be preferred, when noise and signal characteristics are varying. Also, the updated filter parameters provide additional interesting detection variables.
Author
Noise Measurement; Bandpass Filters; Adaptive Filters; Detection; Seismic Waves

20060011410 Ben Gurion Univ. of the Negev, Beersheva, Israel
GENERALIZED PHASE PLANES FOR FEATURE EXTRACTION
Dinstein, I.; Plotkin, E.; Zayezdny, A.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1916-1919; In English; See also 20060011369; Copyright; Avail.: Other Sources

The concept of phase plane is generalized to planes spanned by various nonlinear combinations of signal derivatives. Such combinations, based on the relative first and second derivatives of signals, are defined and illustrated. A method for feature extraction is proposed and applied to a simple example of handwritten numeral recognition.
Author
Alphanumeric Characters; Pattern Recognition; Derivation; Nonlinearity

20060011411 Clermont-Ferrand Univ., France
AN ALGORITHM FOR ISOLATED OBJECT LOCATION IN DIGITAL IMAGES
Rives, G.; Derutin, J. P.; Richetin, M.; Alizon. J.; Gallice, J.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1924-1927; In English; See also 20060011369; Copyright; Avail.: Other Sources

For real-time location, a new algorithm is proposed which uses a simple but efficient description of the image of any isolated object. This description is a small set of points, one being the barycenter of the contour of the image object, and the others being the intersection points of the contour and of a circle centered at the barycenter . Two characteristic vectors are calculated and used for the determination of the object orientation and of the face of a flat object. Several methods are given to obtain the intersection points. Some details of the implementation of the algorithm and realtime experimental results are also mentioned.
Author
Algorithms; Position (Location); Real Time Operation; Circles (Geometry); Contours

20060011412 Technische Univ., Hanover, Germany
NEW PERFORMANCE CRITERIA of EDGE DETECTION ALGORITHMS
Gruen, W.; Preuth, H.-G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1936-1939; In English; See also 20060011369; Copyright; Avail.: Other Sources

A method of evaluating edge detection algorithms is presented, in which a contour picture is segmented into lines. These lines are classified and used for feature extraction. The procedure can be applied either in connection with a reference contour picture for comparing binary pictures or by evaluating the output of edge detectors applied to test pictures with unknown edges. This evaluating method combines two possibilities: One is to determine thresholds for given properties and the other is the comparison of the performance of various edge detection algorithms.
Author
Algorithms; Pattern Recognition; Edge Detection; Contours

20060011415 University of South Florida, Tampa, FL, USA
FORMANT ESTIMATION BY LPC WITH A NEW ERROR CRITERION
Jain, V. K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1968-1971; In English; See also 20060011369; Copyright; Avail.: Other Sources

In autoregressive coding of speech, it is essential that the LPC model contain accurate information about the first three formants; specifically, that the LPC spectrum should reproduce the correct formant frequencies and the corresponding bandwidths. We shall demonstrate that the modified linear predictive coder (MLPC) is superior to the widely used linear predictive coder (LPC) when the data frames are short. MLPC uses a new error criterion. Indeed, prediction is sought in terms of certain filtered signals obtained by passing the speech into a cascade of first order digital filters. The normal equations for

this modified linear predictor are derived and a reversible window, suitable for this new formulation, is proposed. Application to speech is demonstrated.
Author
Speech Recognition; Coding; Predictions; Digital Filters

20060011417 Paris XI Univ., Orsay, France
SEGMENTATION of CONTINUOUS SPEECH BY USING MULTIDIMENSIONAL SCALING TECHNIQUES
Charbonneau, Gerard R.; Moussa, Tarek; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2012-2014; In English; See also 20060011369; Copyright; Avail.: Other Sources

Continuous speech is digitized at the rate of 20480 Hz. Power spectra are taken on 1024 blocks shifted from 256 to 256 samples. These spectra are divided into 25 channels chosen to discriminate at best peaks and valleys. For each spectrum i, and each channel j, the sum Pij of the components is computed. A multidimensional scaling analysis is done on the matrix Pij. This gives a 7-dimension space in which variations of the spectra versus time are represented by a moving spot. The main result is that a transition between two spoken sounds induces a significant variation on, at least one, and generally several axes. This can be used for segmenting and recognizing the continuous speech at the acoustical level. The first attempts have given modest results, but great improvements are expected soon.
Author
Segments; Speech Recognition; Spectrum Analysis; Signal Processing; Power Spectra

20060011418 CIT-ALCATEL Compagnie Industrielle des Telecommunications, Saint Denis, France
ON the EVALUATION of SPEECH RECOGNIZERS and DATA BASES USING A REFERENCE SYSTEM
Chollet, Gerard F.; Gagnoulet, Christian; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2026-2029; In English; See also 20060011369; Copyright; Avail.: Other Sources

The most straightforward way to compare the performance of speech recognizers is to test them with an identical data base. An agreement on such data base to be used as a standard could be difficult to reach. An alternative is to agree on a set of algorithms (a reference system) and compare each system to this reference. Furthermore, the reference is used to quantify the difficulty of the test sets. Differences in performance between the system under test and the reference will be meaningful to the speech community if the reference system is made widely available. The complete specifications (in FORTRAN) of a set of speech analysis and pattern discrimination algorithms are proposed here for this purpose. This recognizer uses dynamic time warping to optimize the match between unknown and reference utterances. Every utterance is coded as a sequence of vectors of cepstral coefficients. These coefficients are obtained from a short time power spectrum expressed on a mel frequency scale.
Author
Speech Recognition; Algorithms; Coefficients; Frequencies; Power Spectra; Coding

20060011419 Ruhr Univ., Bochum, Germany
PROCESSING SCHEMES FOR SAMPLED MULTI-DIMENSIONAL SIGNALS
Linnenberg, Gerhard; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2034-2037; In English; See also 20060011369; Copyright; Avail.: Other Sources

In addition to filtering also other operations like insertion of zeros etc. can be employed for the processing of multi-dimensional data arrays. A list of these operations and some examples will be presented. The mathematical description will be given by means of appropriate impulse fields and their Fourier transforms rather than by means of the z-transform.
Author
Fourier Transformation; Mathematical Models; Signal Processing

20060011420 Windsor Univ., Ontario, Canada
DESIGN OF 2-D RECURSIVE DIGITAL FILTERS WITH SPECIFIED MAGNITUDE and CONSTANT GROUP-DELAY RESPONSES BY SPECTRAL FACTORIZATION
Nagamuthu, N.; Sid-Ahmed, . A.; Shridhar, M.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2050-2054; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper discusses the development of an efficient, general method for the design of 2-D recursive digital filters. It effectively uses the 1-D filter theory. The technique employs the McClellan Transformation (MT). Methods are suggested for the design of McClellan Transformation Coefficients (MTC). A stability error criteria is formed on tile basis of Complex

Cepstrum (CC) and it guarantees the stability of the filter. Group delay and magnitude characteristics are further refined using nonlinear optimization. The method can also be used for stabilizing unstable filters. Numerical implementation and results are presented with an example.
Author
Digital Filters; IIR Filters; Nonlinearity; Coefficients; Stabilization; Refining

20060011421 Ecole Nationale Superieure des Mines, Fontainebleau, France
M-FILTERS
Lantuejoul, Ch.; Serra, J.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2063-2066; In English; See also 20060011369; Copyright; Avail.: Other Sources

Mathematical Morphology provides an alternative to classical filtering methods, such as convolution. To replace linearity by the increasing condition leads to the class of the M-filters. Although they are not invertible, they remove very accurately specific features from the images (peaks but not holes for ex.). The particular case of the opening is discussed and illustrated by an example drawn from astronomy.
Author
Bandpass Filters; Signal Processing; Morphology; Image Analysis; Iteration

20060011423 Stanford Univ., Stanford, CA, USA
A Comparison of Some Spectral Estimation Techniques for Short Data Lengths
Citron, T. K.; Kailath, T.; Reddy, V. U.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2094-2097; In English; See also 20060011369
Contract(s)/Grant(s): DAA29-81-K-0057; Copyright; Avail.: Other Sources

This short paper presents a performance comparison of several recently proposed spectral estimation methods for short data lengths. The performance measures used are bias and variance of the estimate as obtained in simulations. The results show that the forward and backward prediction method is better than the forward prediction method, and Ulrych and Clayton's method [1] appears to perform better than Cadzow's ARMA technique [2]. A modified form of Ulrych and Clayton's method, which exploits the symmetry in the AR coefficients that exists in the special case of sinusoids, is proposed and its performance is evaluated.
Author
Coefficients; Estimating; Prediction Analysis Techniques; Sine Waves; Spectral Methods

20060011424 Bell Telephone Labs., Inc., Holmdel, NJ, USA
TIME VARYING LATTICES and AUTOREGRESSIVE MODELS : PARAMETER ESTIMATION
Huang, Nian-Chyi; Aggarwal, J. K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1337-1340; In English; See also 20060011369; Copyright; Avail.: Other Sources

Modeling of non-stationary signals can be achieved through time-dependent lattices and autoregressive models. This method leads to an extension of several well-known techniques of stationary spectral estimation to the non-stationary case. Time varying AR models are identified by means of a fast Levinson algorithm, while the time-dependent reflexion coefficients of the lattice are estimated through an algorithm which is similar to Burg's. The context of these methods is off-line (blockwise) estimation.
Author
Parameter Identification; Estimating; Time Dependence; Algorithms; Coefficients

20060011425 Bell Telephone Labs., Inc., Holmdel, NJ, USA
A COMPARISON BETWEEN TIME and FREQUENCY-DOMAIN TECHNIQUES FOR TIME-VARYING SIGNAL PROCESSING
Huang, Nian-Chyi; Aggarwal, J. K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1341-1344; In English; See also 20060011369
Contract(s)/Grant(s): F49620-77-0101; Copyright; Avail.: Other Sources

This paper compares the performances of time-varying digital filters designed by time- and frequency-domain techniques. The filter performances are compared based on the mean-square difference between the actual and the desired output sequences. Theoretically, such a comparison would favor the conventional time-domain technique which, however, requires much more computation time. In this paper, numerical examples are presented to illustrate the tradeoffs between the

computation time and the filter performance. We show that the frequency-domain technique is efficient but yields suboptimal results.
Author
Frequency Domain Analysis; Time Domain Analysis; Signal Processing; Sequencing; Mean Square Values; Digital Filters

20060011426 Rhode Island Univ., Kingston, RI, USA
ACCURATE PARAMETER ESTIMATION of NOISY SPEECH-LIKE SIGNALS
Kumaresan, Ramdas; Tufts, Donald W.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1357-1361; In English; See also 20060011369
Contract(s)/Grant(s): N0014-81-K-0144; Copyright; Avail.: Other Sources

Assuming that a short segment of observed speech signal can be modeled as the noisy impulse response of a linear system we obtain the pole locations of the system from the zeros of a polynomial. The coefficients of the polynomial are accurately determined by two methods using eigenvalue-eigenvector decomposition of an estimated correlation matrix. The speech-like signal is used in the reversed time direction to identify the signal related zeros of the polynomial from the rest. Experimental results comparing the accuracy of the pole parameters obtained by different methods are given.
Author
Estimating; Accuracy; Speech; Eigenvalues; Parameter Identification; Polynomials; Eigenvectors; Decomposition; Coefficients

20060011427 Stanford Univ., Stanford, CA, USA
ON the HIGH RESOLUTION and UNBIASED FREQUENCY ESTIMATES of SINUSOIDS IN WHITE NOISE -- A NEW ADAPTIVE APPROACH
Soong, Frank K.; Peterson, Allen M.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1362-1366; In English; See also 20060011369; Copyright; Avail.: Other Sources

A new adaptive algorithm is proposed to give an unbiased and high resolution frequency estimate of sinusoids in white noise. Base on the normalized Least-Squares (LS) lattice algorithm and the inverse power iteration method, the eigenvector associated with the minimum eigenvalue of the signal covariance matrix is estimated in the algorithm. The zeros of the 'eigenvector polynomial' thus obtained are all on the unit circle and at the angles of the sinusoid frequencies. It is an adaptive realization of the Pisarneko's 'harmonic retrieval' method. But differing from the adaptive method proposed by Thompson where the eigenvector is obtained through a gradient search in a constrained optimization formulation, in the new method the eigenvector is computed by an inverse power iteration. It enjoys all the advantages of the normalized LS lattice such as fast computations, low round-off noise and an easy stability check, etc. as well as fast convergence rate of the inverse power iteration method. Computer simulation results are shown.
Author
Algorithms; High Resolution; Sine Waves; Least Squares Method; Iteration; Eigenvectors; Eigenvalues; Covariance; White Noise

20060011428 Ecole Nationale Superieure des Telecommunications, Paris, France
THE SINGULAR CASE and ROBUST LINEAR PREDICTION
Gueguen, C.; Sidahmed, M.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1371-1374; In English; See also 20060011369; Copyright; Avail.: Other Sources

Linear Prediction (LP) and the well known fast algorithms of the Levinson type have already widely proven their efficiency in various fields. But these algorithms fail to be applicable when one of the principal minors of the signal covariance matrix happens to be singular (or close to singularity). This paper investigates this singular case both for scalar and vector (multichannel) time series. It is shown that the standard lattice may be replaced by a convenient lossless lattice. Various techniques are proposed to leap over the singular case. They are analysed in terms of generalized choleski factors. The paper then deals with the multichannel case which is attached by a reduction of redundant outputs leading back to the scalar singular case. The results are applicable to the design of robust LPC algorithms and to the use of ARMA models in antenna array processing.
Author
Linear Prediction; Time Series Analysis; Algorithms; Covariance; Lattices (Mathematics); Matrices (Mathematics); Scalars

20060011429 Bell Telephone Labs., Inc., Holmdel, NJ, USA

AN ALGORITHM FOR the STABLE OPERATION of A DIGITALLY-IMPLEMENTED FRACTIONALLY-SPACED ADAPTIVE EQUALIZER

Gitlin, R. D.; Meadors, H. C.; Weinstein, S. B.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1379-1383; In English; See also 20060011369; Copyright; Avail.: Other Sources

A digitally-implemented fractionally-spaced equalizer will generally exhibit long-term instability when the conventional tap-adjustment algorithm is used. This occurs because, in contrast to the synchronous equalizer, a fractionally-spaced equalizer will generally have many sets of tap values which result in nearly equal values of mean-squared error. Some of these tap settings are large enough to cause register overflows and consequent performance deterioration. In this paper we report how a simple modification in the tap-adjustment algorithm provides a solution to the above problem.

Author

Adaptive Filters; Mean Square Values; Equalizers (Circuits); Bias; Errors

20060011430 Mettler-Toledo A.G., Greifensee, Switzerland

Adaptive Echo Cancellation with Dispersion and Delay in the Adjustment Loop

Mueller, M. S.; Werner, J. J.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1384; In English; See also 20060011369; Copyright; Avail.: Other Sources

We analyze an echo canceler structure which has dispersion and/or delay in the tap adjustment loop. Such a structure has the potential of providing a saving in the analog filtering requirements, when the cancellation is performed in the sampled-data domain. We derive the optimal coefficient vector, in the mean-square error sense, and we derive conditions for a unique solution. It is observed that this problem is somewhat similar, but not equivalent, to the mean-square equalizer problem. Similarities and differences between the two are discussed. We also propose an adaptive algorithm which is well suited for this canceler structure. It is shown that the computational complexity of this algorithm is significantly greater than that of the conventional updating algorithm.

Author

Mean Square Values; Cancellation; Algorithms; Errors; Sampled Data Systems

20060011445 Windsor Univ., Ontario, Canada

A COMPOSITE SCHEME FOR TEXT-INDEPENDENT SPEAKER RECOGNITION

Mohankrishnan, N.; Shridhar, M.; Sid-Ahmed, M. A.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1653-1656; In English; See also 20060011369; Copyright; Avail.: Other Sources

This work addresses the development of a reliable, high accuracy text-independent speaker recognition system for a small population, with the reference parameters characterizing each speaker obtained from short segments of speech. Initially the potential for speaker discrimination of several different vocal parameter sets was investigated. These included the LPC, Reflection, Cepstrum and Log Area Ratio coefficients, speech Dower spectrum parameters and the inverse filter spectral coefficients. It was then decided to use any two parameter sets in a composite decisionmaking scheme. A 'repeat feature' was incorporated into the speaker recognition system, whereby a speaker was asked to read a fresh test speech segment if the decisions made by using the two different parameter sets individually were not coincident. Test results indicate that a significant improvement in accuracy is realizable.

Author

Speech Recognition; Decision Making; Coefficients

20060011446 Goettingen Univ., Germany

SPEECH CODING USING EFFICIENT BLOCK CODES

Schroeder, Manfred R.; Atal, Bishnu S.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1668-1671; In English; See also 20060011369; Copyright; Avail.: Other Sources

Digital coders invariably introduce errors into analog signals such as speech. The importance of adjusting the spectrum of the error so as to minimize the subjective distortion is now well recognized. The optimum noise spectrum for minimum subjective distortion is in general non-flat. Predictive coders use instantaneous quantizers with feedback around the quantizer to shape the quantizing noise spectrum. However, for non-flat spectra, instantaneous quantizers are suboptimal. We have therefore considered and reported on non-instantaneous digital speech coders using tree-search procedures to determine the optimal innovation sequence. In this paper, we describe tree-search procedures to determine optimal block codes. We discuss

both random and special block codes based on optimum packing of Voronoi regions on unit spheres in multi-dimensional spaces.
Author
Coders; Voice Data Processing; Noise Spectra; Distortion; Feedback; Analog Data

20060011447 Nippon Telegraph and Telephone Public Corp., Tokyo, Japan
ADAPTIVE BIT ALLOCATION SCHEME IN PREDICTIVE CODING of SPEECH
Hond, Masaaki; Kitawaki, Nobuhiko; Itakura, Fumitada; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1672-1675; In English; See also 20060011369; Copyright; Avail.: Other Sources

An adaptive predictive coding with adaptive bit allocation(APC-AB) is presented for speech encoding at low to medium bit rates(6.4kb/s-24kb/s). In this system, a split-band predictive coding scheme and a bit allocation scheme are employed in order to remove the redundancies due to a periodic concentration of the prediction residual energy as well as nonuniform nature of the speech spectrum. Quantization bits are dynamically allocated both over the sub-bands(frequency domain) and over the sub-intervals(time domain) in accordance with the distribution of the residual energies in the time-frequency domain. Optimum bit allocation is derived based on the mean square error criterion on the speech waveform, and the SNR gain is presented in relation to the prediction gain of the full-band signal. This system is evaluated in terms of the segmental SNR and speech quality. The result shows that the APC-AB system has advantage over the conventional full-band APC system in the segmental SNR and the stability of the prediction loop. It was also shown that this system can provide speech quality subjectively equivalent to 7 bit Log-PCM at 16 kb/s, and to 6 bit Log-PCM at 9.6 kb/s.
Author
Voice Data Processing; Coding; Speech Recognition; Frequencies; Mean Square Values

20060011448 Loughborough Univ. of Technology, UK
A COMPARATIVE STUDY of DPCM-AQF SPEECH CODERS FOR BIT RATES OF 16-32 kb/s
Xydeas, Costas S.; Evci, C. Cengiz; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1680-1683; In English; See also 20060011369; Copyright; Avail.: Other Sources

A comparative study of DPCM-AQF speech digitizers employing various second order prediction algorithms is presented. A new prediction scheme called Correlation Switched Prediction is also discussed. Computer simulation results for the range of 16 to 32 kbits/sec, indicate an improved segmented signal-to-noise ratio (SNRSEG) performance when using Forward Block Adaptive (FBA) instead of Backward Sequentially Adaptive Prediction. The introduction, in DPCM-AQF, of the relatively simple Correlation Switched Predictor produces SNRSEG values comparable to those obtained from DPCM-AQF-FBA. A more complex prediction scheme which combines Correlation Switched and Backward Sequential Adaptive Prediction (CSP-SGEP) is also considered. DPCM-AQF using the latter prediction is shown to provide the best overall SNRSEG performance.
Author
Signal to Noise Ratios; Bit Error Rate; Analog to Digital Converters; Differential Pulse Code Modulation; Algorithms; Coders; Switching

20060011449 Centre National d'Etudes des Telecommunications, Lannion, France
APPLICATION of AN OPTIMIZATION TECHNIQUE to THE INVERSION of AN ARTICULATORY SPEECH PRODUCTION MODEL
Charpentier, F.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1984-1987; In English; See also 20060011369; Copyright; Avail.: Other Sources

A procedure is proposed to identify parameters specifying the vocal-tract area function. Conventional optimization techniques fall to perform such a task because the articulatory-to-acoustic transformation contains severe non-linearities. So the problem is inevitably complicated by a set of local minima of the matching criterion. This paper describes a technique combining a well-adapted least-square algorithm and a table-lookup procedure which takes into account the non-linearities of the model function. Preliminary results on synthetic vowels are presented.
Author
Nonlinearity; Vowels; Inversions; Algorithms; Speech

20060011450 International Business Machines Corp., La Gaude, France
16 KBPS SUB-BAND CODER INCORPORATING VARIABLE OVERHEAD INFORMATION
Galand, C.; Esteban, D.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1684-1687; In English; See also 20060011369; Copyright; Avail.: Other Sources

In this paper, a new block compounded quantization method involving a variable rate strategy for transmission of the overhead information is proposed and applied to 16 kbps sub-band coding. In the first part of the paper, the basic sub-band coding technique with fixed rate for transmission of the block quantizer overhead information is reminded. Then, two algorithms for variable rate strategy are described, which are based on a classification of processed blocks into stationary and transient ones. These algorithms are incorporated into three sub-band coders operating at 16 kbps: a 16 sub-band and an 8 sub-band coders based on a uniform analysis, and an 8 sub-band coder based on a non-uniform analysis according to the articulatory index. The evaluation of the coders is based on comparative listening tests, and shows the efficiency of the variable rate strategy.
Author
Classifications; Data Transmission; Coders; Algorithms

20060011451 Communications Satellite Corp., Clarksburg, MD, USA
PERFORMANCE EVALUATION of ADAPTIVE QUANTIZERS FOR A 16-KBIT/S SUB-BAND CODER
Gupta, Vaikunth; Virupaksha, Krishna; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1688-1691; In English; See also 20060011369; Copyright; Avail.: Other Sources

Objective and subjective measures were obtained for a 4-band, 16-kbit/s sub-band coder utilizing adaptive quantizers with fixed and dynamic bit allocations. Objective measures indicated that block quantization (block compounded PCM with a Gaussian probability density function, BCPCM-G) with dynamic bit allocation is slightly better than an adaptive differential PCM with a variable predictor (ADPCM-V) and fixed bit allocation, but outperforms ADPCM with a fixed predictor and fixed bit allocation (ADPCM-F) by 4-5 dB. Subjective measures, however, indicated that ADPCM-V has about 6-dB advantage over BCPCM-G. A comparison between ADPCM-V and ADPCM-F indicated that adaptive prediction provides a 4-5 dB objective gain and 16-dB subjective gain over fixed prediction. Further, all listeners preferred ADPCM-V over BCPCM-G and ADPCM-F, and 85% preferred BCPCM-G over ADPCM-F.
Author
Coders; Probability Theory; Superhigh Frequencies; Ultrahigh Frequencies; Evaluation

20060011452 Bell Telephone Labs., Inc., Murray Hill, NJ, USA
A 9.6 KB/S SPEECH CODER USING the BELL LABORATORIES DSP INTEGRATED CIRCUIT
Crochiere, R. E.; Cox, R. V.; Johnston, J. D.; Seltzer, L. A.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1692-1695; In English; See also 20060011369; Copyright; Avail.: Other Sources

A digital speech coder has been designed for real-time operation for a data rate of 9.6 kb/s. The design is based on a combination of two speech compression techniques: Time-Domain Harmonic Scaling (TDHS) and Sub-Band Coding (SBC). It is a highly modularized hardware implementation using five Bell Laboratories Digital Signal Processor (DSP) integrated circuits as the key processing elements. Three DSPs are used in the encoder for pitch detection, TDHS compression and sub-band encoding. Another two DSPs are used in the receiver for sub-band decoding and TDHS expansion.
Author
Coders; Voice Data Processing; Speech; Digital Systems; Integrated Circuits; Rates (Per Time); Decoding; Signal Processing

20060011453 Linkoeping Univ., Sweden
AN ADAPTIVE TRANSFORM CODING SYSTEM WITH SHORT PRIMARY BLOCKLENGTHS and FREQUENCY DOMAIN QUANTIZATION USING FEEDBACK ADAPTATION
Annamalai, K.; Fjaellbrant, Tore; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1696-1699; In English; See also 20060011369; Copyright; Avail.: Other Sources

An adaptive transform coding system with very short primary blocklengths is briefly described, The applicability of feedback adaptive quantization of transform coefficients in this system is studied. The results show that the system has a speech quality comparable to that of other more complex systems, for the same bit-rate, as both objective measurements and informal listening tests show at a bit-rate of 14.3 kb/s (including 300 b/s side information). The system is very suited for simple hardware implementation. Future scope for data reduction using short blocks in ATC systems is summarized,
Author
Bit Error Rate; Coding; Frequencies; Complex Systems; Coefficients

20060011454 Bogazici Univ., Istanbul, Turkey

SIGNAL CODING PROPERTIES of ASYNCHRONOUS DELTA MODULATOR

Sankur, Bulent; Gungen, Hilmi; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1704-1708; In English; See also 20060011369; Copyright; Avail.: Other Sources

Various asynchronous delta modulation algorithms are considered. The statistical distribution of interbit intervals is analyzed and the signal-to-noise ratio behaviour is compared vis-a-vis linear and adaptive delta modulation algorithms. The problem of transmission of nonuniform samples through synchronous channels has also been treated. Quantization and runlength encoding characteristics of interbit intervals are studied. The optimal size and _he statistical properties of buffer memory are determined and trade-offs between various system parameters such as runlength constraint, overflow and underflow probabilities and synchronization words are investigated.

Author

Signal to Noise Ratios; Coding; Delta Modulation; Synchronism; Statistical Distributions; Signal Encoding; Algorithms

20060011455 Qinghua Univ., China

ADAPTIVE QUANTIZATION and PREDICTION IN SPEECH CODING

Feng, Chong-Xi; Yao, Hui-Juan; Yang, Wei-Li; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1713-1716; In English; See also 20060011369; Copyright; Avail.: Other Sources

The problems of adaptive quantization and prediction in a DPCM system are analyzed. It is shown that while quantizing speech signal with an adaptive algorithm, the probability distribution of P associated with the quantization intervals is not uniquely determined by the PDF of speech, but can be controlled by the adaptive parameters (G(sub i)) and algorithm of adaptation. Thus, speech signal can be quantized by an optimum quantization characteristic (OGC) designed to watch a specific power-limited PDF in order to meet certain SNR and entropy requirements. This paper derives a PDF with the maximum SNR which is greater than that of Gaussian PDF in 0.5dB. Moreover, the calculation of SNR in an adaptive quantizer and the method for searching adaptive parameters (G(sub i)) are discussed. Finally, a constant-increment sequential adaptive prediction algorithm is developed. It removes multiplier with a prediction gain loss less than 0.5dB.

Author

Differential Pulse Code Modulation; Voice Data Processing; Prediction Analysis Techniques; Probability Theory; Multipliers; Algorithms

20060011457 Stanford Univ., Stanford, CA, USA

FAST CHOLESKY ALGORITHMS and ADAPTIVE FEEDBACK FILTERS

Morf, M.; Muravchik, C. H.; Ang, P. H.; Delosme, J.-M.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1727-1731; In English; See also 20060011369

Contract(s)/Grant(s): MDA903-80-C-0331; MDA903-79-C-0680; Copyright; Avail.: Other Sources

In this paper, the Fast Cholesky algorithms, both by columns and by rows, are reviewed. It is shown that the algorithms lead naturally to a prediction error feedback filter.In addition, if this filter is used as the whitening filter for a moving average process, it is of fixed order but has time-varying coefficients. Simulation results for the case when the data came from the output of a moving average process driven by white Gaussian noise confirms theoretical results on convergence and stability of the triangular factors. In addition, the bandedness of the process being identified is revealed. Finally, from a VLSI implementation standpoint, it is shown that an array of CORDIC processors may be configured and controlled to factor a covariance matrix. In particular, there exists a method of factorization where the partial correlations associated with the given matrix are stored within the processors.

Author

Adaptive Filters; Cholesky Factorization; Matrices (Mathematics); Coefficients; Convergence; Correlation; Covariance; Predictions; Random Noise

20060011458 Stanford Univ., Stanford, CA, USA

Constant-Gain Filters for Finite Shift-Rank Processes

Delosme, J.-M.; Morf, M.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1732-1735; In English; See also 20060011369

Contract(s)/Grant(s): MDA903-80-C-0331; MDA903-79-C-0680; Copyright; Avail.: Other Sources

On-line identification methods for dynamic systems traditionally assume given-order rational models. The class of finite shift-rank processes includes processes with rational models of arbitrary order and, if the observed process is approximated

by a finite shift-rank process, the determination of the model order becomes a natural part of the identification procedure. The Fast Cholesky and Extended Levinson algorithms exploit the finite shift-rank structure in order to compute the time-varying coefficients of the growing-order modeling/whitening filters of finite shift-rank processes. The recursions performed by the algorithms suggest that the growing-order filters may also be implemented in a modular fashion where the modules have constant coefficients, thus displaying the structural invariants. Such a modular filtering structure is presented in this paper.
Author
Cholesky Factorization; On-Line Systems; Coefficients; Modules; Algorithms

20060011459 National Technical Univ., Athens, Greece
NEAR to TOEPLITZ STRUCTURE and EFFICIENT SCHEMES FOR LINEAR MODELING
Protonotarios, E. N.; Carayannis, G.; Milios, E.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1740-1743; In English; See also 20060011369; Copyright; Avail.: Other Sources

The purpose of this paper is to give reduced complexity algorithms in order to compute linear models in situations of non-stationary signals She case of impulse response identification is examined as well as the case of pure AR-modeling. Both problems lead to a linear system which must be solved to give the unknown AR-model or the unknown impulse response. Furthermore the linear systems that occur in both cases have an identical left hand side member characterized by a symmetric matrix having the supplementary property of being the product of two non-symmetric Toeplitz matrices. The 'near to Toeplitz' structure of this matrix permits the fast solution of the system with specially adapted algorithms to this situation. Many properties of the near to Toeplitz matrices are outlined as the key formulas for the derivation of all fast schemes. Order, time and order-time recursive methods are derived using a unified theoretical framework. The methodology used here is similar to that used by Morf et al. The algorithms presented are new and can be converted to efficient and automated computer packages.
Author
Algorithms; Matrices (Mathematics); Linear Systems

20060011460 Centre National de la Recherche Scientifique, Nice, France
IDENTIFICATION of MULTIVARIABLE ARMA MODELS BY USE of FAST ALGORITHMS
Favier, G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1756-1759; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper describes two procedures for identifying the parameters of a multivariable ARMA model by use of the autocorrelation function of the signal. The procedures consist in fitting a pure AR model or a pure MA model to data generated by the ARMA model. The parameters of these AR or MA models are identified by use of now well-known fast algorithms and the ARMA parameters are then computed by solving simple algebraic equations.
Author
Autoregressive Moving Average; Autocorrelation; Algorithms; Identifying

20060011461 National Technical Univ., Athens, Greece
A NEW GENERALIZED RECURSION FOR the FAST COMPUTATION of THE KALMAN GAIN to SOLVE the COVARIANCE EQUATIONS
Halkias, C\g C.; Carayannis, G.; Dologlou, J.; Emmanoulopoulos, D.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1760-1763; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper introduces a sequential fast scheme of the Kalman type to solve the covariance equations of linear prediction. The new algorithn: constitutes a generalization of the scheme introduced recently by D. Falconer and L. Ljung, and applies to a more general situation. The algorithm is characterized by conceptual simplicity and efficiency. Although it is based on matrix partitioning concepts and shifting properties of the signal vector, it does not have the restriction of prewindowing as it is the case with the previously mentioned algorithm, thus it can be used to model small frames of signals as well as to model signals generated by an AR model, giving in this case the exact solution. Finally it must be noted that the algorithm is strictly time recursive and leads to 0(13p) multiplications per recursion only. Thus, this new scheme is the fastest existing method for the sequential solution of the general covariance equations when prewindowing is not desirable.
Author
Covariance; Linear Prediction; Algorithms; Matrices (Mathematics)

20060011462 Tufts Univ., Medford, MA, USA

MINIMAX EQUALIZERS FOR DIGITAL COMMUNICATION

Preis, D.; Bunks, C.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1773-1776; In English; See also 20060011369; Copyright; Avail.: Other Sources

Minimax equalizers are a class of digital filters whose purpose is to improve the time-domain response of a linear system or communication channel. They are designed in the time domain using a procedure known as minimax deconvolution. This is accomplished numerically using the second algorithm of Remez for continuous-time systems and an ascent algorithm for discrete-time systems. The unique advantages of the design procedure are uniform control and minimization of time-domain equalization errors. In digital communications minimax equalizers can be used to compensate for dispersive and dissipative effects of transmission media by pulse slimming and side lobe reduction in the time domain. This, in turn, can increase maximum data rate or transmission range and minimize inter-symbol interference. Several examples are given which illustrate the design and performance of minimax equalizers in the context of engineering applications.

Author

Minimax Technique; Pulse Communication; Digital Filters; Channels (Data Transmission); Algorithms; Equalizers (Circuits)

20060011463 Telecommunications Radioelectriques et Telephoniques, Le Plessis-Robinson, France

DIGITAL SIGNAL PROCESSING IN A LSI 4.8 KBIT/S MODEM

Guidoux, L.; LeRiche, O.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1777-1780; In English; See also 20060011369; Copyright; Avail.: Other Sources

Focusing on a 4.8 Kbit/s modem, the digital signal processing principles used to generate the transmitted signal, to equalize and demodulate the received signal are presented in this paper. They have been selected in order to minimize the amount and speed of computations and to avoid complex arithmetic operations, as divisions for instance. The LSI implementation has been simplified accordingly and carried out with two different approaches followed in the modem transmitter and receiver. In the transmitter, a single dedicated custom LSI integrated circuit is used. In the receiver, the approach is more 'general purpose' oriented in order to cover a range of applications broader than strictly the 4.8 Kbit/s modem ; it is based on a processor with an arithmetic unit, a sequencer and memories which is implemented by a set of 5 custom LSI circuits. The characteristics of all these custom LSI circuits are presented as well as the technology used.

Author

Signal Processing; Circuits; Transmitter Receivers; Modems; Demodulation

20060011464 Centro Studi e Laboratori Telecomunicazioni, Turin, Italy

DIGITS to THE CUSTOMER: HOW to APPROACH the PROBLEM

Pellegrini, Giorgio; Tofanelli, Adler; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1781-1784; In English; See also 20060011369; Copyright; Avail.: Other Sources

The need of extending digital facilities to the subscriber premises implies the solution of several problems connected with the transmission of digital signals on the existing copper pairs. Several solutions for full-duplex transmission can be envisaged, but only a few really interesting. In this paper the most suitable techniques are reviewed together with integration perspectives and experimental results obtained in field trials performed in Italy.

Author

Duplexers; Digits; Commerce; Signal Processing

20060011465 British Telecommunications Research Ltd., Martlesham Heath, UK

Signal Processing Applied to the Subscriber Line Interface

Cook, J. W.; Potter, A. R.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1788-1792; In English; See also 20060011369; Copyright; Avail.: Other Sources

Developments related to the use of digital signal processing techniques for pcm codec circuits have recently yielded a number of IC realizations. Our work in this area, which is a further development of an earlier codec circuit, is described in the paper, together with a discussion of possibilities for further applications of digital signal processing to the subscriber's line interface. Finally the need for an alternative technology partitioning for the line interface is discussed.

Author

Signal Processing; Digital Techniques; Circuits; Coders

20060011466 Philips Research Labs., Eindhoven, Netherlands

GENERALIZED TAMED FREQUENCY MODULATION

Chung, K. S.; Zegers, L. E.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1805-1808; In English; See also 20060011369; Copyright; Avail.: Other Sources

Continued investigation of Tamed FM (TFM) has led to an extension, called Generalized Tamed FM (GTFM). the features of GTFM are based on the possibility to select different combinations of parameters which characterize the process of waveform generation. This still allows for the generation of a constant envelope modulated signal with a spectrum similar to TFM. However, a joint optimization of coherent and noncoherent detection with regard to error performance can be achieved. Attention is given to a low-complexity, noncoherent receiver, comprising a frequency discriminator and a maximum likelihood estimator. The generation of GTFM signals can largely be based on a programmable LSI circuit.

Author

Frequency Modulation; Detection; Maximum Likelihood Estimates; Frequency Discriminators

20060011467 Ecole Nationale Superieure des Telecommunications, Paris, France

ITERATIVE and NON ITERATIVE TECHNIQUES FOR the DESIGN of RECURSIVE DIGITAL FILTERS

Hanafy, A.; LeRoux, J.; Prado, J.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1809-1812; In English; See also 20060011369; Copyright; Avail.: Other Sources

Two algorithms are presented for designing recursive filters to give a desired spectral density characteristic. The first one is non iterative and fits correlation of the desired spectrum for getting pole-coefficients, then decomposes the reciprocal of MA-spectral density for calculating zero-coefficients. Both coefficients are calculated efficiently through the solution of two systems of equations using generalized Levinson algorithm. As this algorithm gives a suboptimal solution we propose the second algorithm which uses a Steiglitz type iterative solution for minimizing a square error criterion in the frequency domain. The steepest descent gradient method is used for getting coefficients of filters. From the point of view of implementation on a machine, the effect of coefficient quantization is considered.

Author

Digital Filters; Iterative Solution; IIR Filters; Coefficients; Algorithms; Gradients

20060011468 Illinois Univ., Urbana, IL, USA

THE USE of MULTIPLE CRITERION OPTIMIZATION FOR the SIMULTANEOUS PHASE and MAGNITUDE DESIGN of IIR DIGITAL FILTERS

Cortelazzo, G.; Lightner, M. R.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1813-1816; In English; See also 20060011369; Copyright; Avail.: Other Sources

In this paper we investigate for the first time the applicability of the concepts and algorithms of Multiple Criterion Optimization to the problem of optimally trading-off magnitude and phase in IIR digital filters design. Particular attention is paid to the mathematical formulation of the simultaneous magnitude and phase design problem. Three different design criteria are introduced. The special modifications of a standard algorithm [9] necessary for filter design are discussed. Examples of what can be expected from magnitude-phase trade-offs are discussed. The results of this work is expected to be practical CAD tools for designing simultaneous magnitude and phase optimal filterS and theoretical information about the optimal trade-offs between magnitude and phase.

Author

Digital Filters; IIR Filters; Design Analysis; Criteria; Algorithms

20060011469 Erlangen-Nuernberg Univ., Erlangen, Germany

LINEAR PHASE RECURSIVE DIGITAL FILTERS FOR SPECIAL APPLICATIONS

Czarnach, R.; Schuessler, H. W.; Roehrlein, G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1825-1828; In English; See also 20060011369; Copyright; Avail.: Other Sources

The paper deals with the design of digital differentiators and Hilbert transformers to be implemented as noncausal recursive systems. For this case suitable design methods will be presented and the resulting filters will be compared to well known equivalent nonrecursive ones.

Author

Digital Filters; Linear Filters; Transformers; IIR Filters

20060011470 Fairchild Camera and Instrument Corp., Palo Alto, CA, USA

DIGITAL PULSE FREQUENCY DEMODULATION USING STATE-SPACE FILTERING

Loewenstein, Paul N.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1829-1832; In English; See also 20060011369; Copyright; Avail.: Other Sources

Independently of the method of demodulation, the time quantisation of a pulse frequency modulated signal causes an error proportional to the demodulator bandwidth, to the time quantisation interval, and to the ratio of the modulation frequency to the modulation frequency range. The necessity of having a very short quantisation interval leads to a very high effective input sampling rate to a digital demodulator. This high effective sampling rate, together with large time constants needed to demodulate the signal, precludes the use of a conventional digital filter. It is possible, however, to take advantage of the special form of the demodulator input signal to design a computationally efficient state-space filter.

Author

Digital Filters; Demodulators; Signal Generators; Frequency Modulation; Frequency Ranges; Bandwidth

20060011479 Grenoble-1 Univ., Saint Martin d'Heres, France

USE of MULTIDIMENSIONAL MEM SPECTRAL ANALYSIS IN GEOPHYSICS

Glangeaud, F.; Gharbi, M.; Martin, N.; Lacoume, J. L.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1886-1889; In English; See also 20060011369; Copyright; Avail.: Other Sources

Auto and cross spectral analysis is the basic tool for geophysicist in order to study resonances of the magnetosphere using natural electromagnetic waves recorded in several places. The comparisons of these records must be made by autoregressive (AR) spectral estimators because the signal duration is short. For this application we show that the presentation of AR autospectrum by the position of the poles of the z transform is interesting. We make a direct comparison of the poles position for signal recorded at different places. Finally we present the influence of the choice of the order and discuss the particularities of the two dimensional autoregressive analysis.

Author

Dimensional Analysis; Spectrum Analysis; Electromagnetic Radiation; Geophysics

20060011480 Centre National de la Recherche Scientifique, Grenoble, France

STUDY of CLIMATIC SERIES BY TIME-FREQUENCY ANALYSIS

Benoist, J. P.; Glangeaud, F.; Martin, N.; Lacoume, J. L.; Lorius, C.; Ouahman, A. Ait; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1902-1905; In English; See also 20060011369; Copyright; Avail.: Other Sources

A climatic record given by isotopic composition of ice from Dome C (Antarctica) is studied using evolutive spectral analysis by AR process. Problems which occur when trends and non periodic accidents are present in the signal are examined. Experimental studies show that filtering with a smooth time limited window is better than the use of filters with abrupt cut-off frequencies. The snow layers, deposited each year on Antarctic ice cap, contain precious informations about the climatic history of the earth. The isotopic composition is related to the atmospheric condensation temperature (1) ; but many other factors may influence this composition and cause a 'noise' which covers the climatic information (2). Among the various problems existing for such data is that of time scale. If isotopic data contains stable frequencies, the evolutive spectral analysis would be a method of checking the datation (3). Evolutive spectral analysis by AR filter was used to determine the periodicities. This paper explains how significant periodicities can be separated from trend and climatic accident effects. During the 1977-78 Antarctic field season a 906 m long core was taken at Dome C (74deg49'S, 124deg10'E) (4). The deuterium values were determined by mass spectrometry (5). This sampling process represents sampling after integration with a variable sampling rate. The original data are given in figure I. For technical reasons, the sampling rate evaluated in meter of ice equivalent is not constant. The relation between depth and time is not perfectly known and depends on the quantity of ice deposited each year. Two main evaluations of accumulation were given for the Dome C core (7 - 9). The first evaluation shows that the accumulation rate could be (3.7 +/- 0.4) cm/yr of ice equivalent for the Holocene and only 75 % of this value during the last glaciation (after 15,000 BP) (7). Therefore the bottom of the core could be 32,000 years old. Microparticles suggest that the accumulation has remained constant (9). With a value of 3.7 cm/yr for the accumulation, the bottom could be 27,300 years old.

Author

Spectrum Analysis; Frequencies; Climatology; Mass Spectroscopy; Atmospheric Temperature

20060011481 Texas Univ., Austin, TX, USA

DETECTION of EDGES USING RANGE INFORMATION

Mitiche, Amar; Aggarwal, J. K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1906-1911; In English; See also 20060011369; Copyright; Avail.: Other Sources

Range data provide an important source of 3-D shape information. This information can be used to extract jump boundaries which correspond to occluding boundaries of objects in a scene and 'edges' which correspond to points lying between significantly different regions on the surface of objects. We are mainly interested in range data obtained from sensors such as lasers. The main problem with this type of range finders is the fact that the accuracy of the measurements depends on the power of the signal that reaches the receiver. This study describes how a range edge detection procedure can be designed that has low sensitivity to noise and imbeds all the knowledge available on the range measurement accuracy.

Author

Rangefinding; Edge Detection; Accuracy; Lasers; Low Noise

20060011482 Etablissement Technique Central de l'Armement, Arcueil, France

ALGORITHMS FOR REGION DESCRIPTION and MODIFICATIONS BASED ON CHAIN CODE TRANSFORMATIONS

Gambotto, J. P.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1920-1923; In English; See also 20060011369; Copyright; Avail.: Other Sources

A new approach to region description and interpretation based on chain code transformation is presented. Chain codes are used to obtain syntactic expressions for concave and convex parts of boundary lines in a picture. Using these syntactic expressions, an algorithm for filling concavities and finding the convex hull of a region is derived. This algorithm is also suited to describe a region in terms of a list of convexities and concavities, and to analyze regions where small gaps and thin bridges are involved. Then, it is shown that expansion and shrinking of 4-connected objects can be performed by means of a chain code transformation.

Author

Coders; Coding; Algorithms; Concavity; Convexity; Images

20060011485 George Washington Univ., Washington, DC, USA

A REAL-TIME AUTOMATIC RANGING ALGORITHM FOR VISION SYSTEMS

Bock, Peter; Basei, Ansel; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1940-1943; In English; See also 20060011369; Copyright; Avail.: Other Sources

high-speed algorithm has been devised to determine the range from a video camera to objects in its field-of-view. As the camera focus control is adjusted, the algorithm will detect each object feature as it comes into sharpest focus. The range from the image plane to the object can then be computed from the corresponding lens-to-image distance, which is known. The level-of-focus (LOF) algorithm is computationally simple, and may be performed in hardware in real-time for reasonable frame rates and pixel densities. The spatial resolution of the ranging information is a function of the lens F-stop, the sensitivity of the video sensors, the S/N ratio of the observed scene, and the range to the object. The LOF algorithm has been validated by simulating a variable parameter camera which views objects whose shapes, S/N ratios, and ranges may be varied.

Author

Algorithms; Field of View; Pixels; Rangefinding; Real Time Operation; Signal to Noise Ratios; Spatial Resolution; Cameras; Lenses

20060011486 James Cook Univ. of North Queensland, Townsville, Australia

DIFFUSE EDGE TRACING USING A PREDICTOR-CORRECTOR PROCEDURE WITH ADAPTIVE SCOPE

Shipman, Anthony L.; Bitmead, Robert R.; Allen, Gregory H.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1948-1951; In English; See also 20060011369; Copyright; Avail.: Other Sources

The detection and tracing of edges of varying diffusion is a problem of importance in image analysis. In particular, it is of interest for the segmentation of meteorological and physiological pictures where the boundaries of objects are possibly not well defined or are obscured to a varying extent by noise. We present an edge detection and line fitting procedure which ascribes a direction, a measure of gradient and quality of fit to the edge within a square segment of a controlled size or 'scope'. To detect and fit edges to diffuse objects the scope, is adaptively altered based on the confidence of fit to permit tracing of the object's boundary. We discuss predictor-corrector procedures for performing this edge tracing where predicted and

calculated lines and confidences are used to generate a better fitting line. The performance of the procedures is demonstrated using both synthetic and satellite meteorological images.
Author
Diffusion; Edge Detection; Predictor-Corrector Methods; Image Analysis; Boundaries; Segments; Adaptation

20060011487 Philips Research Labs., Eindhoven, Netherlands
DFT-Vocoder using Harmonic-Sieve Pitch Extraction
Bosscha, G. J.; Sluyter, R. J.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1952-1955; In English; See also 20060011369; Copyright; Avail.: Other Sources

The DFT-vocoder is based on speech analysis and synthesis using the discrete Fourier transform (DFT). Analysis is done using hopping-DFT and spectral parameters are obtained by a piece-wise constant approximation of the amplitude spectrum. The harmonic-sleeve technique for pitch extraction combines very well with this scheme because it is based on hopping-DFT as well. Synthesis is achieved by convolution of the generated excitation signal with the inverse-DFT of the reconstructed piece-wise constant an_plitude spectrum. In this paper a 2400 bit/s implementation of the DFT-vocoder is discussed.
Author
Vocoders; Spectrum Analysis; Fourier Transformation; Extraction; Discrete Functions

20060011488 Massachusetts Inst. of Tech., Lexington, MA, USA
A COMPACT DIGITAL CHANNEL VOCODER USING COMMERCIAL DEVICES
Feldman, Joel A.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1960-1963; In English; See also 20060011369; Copyright; Avail.: Other Sources

A very, small, high-quality, full-duplex 2.4 kbps channel vocoder based on the JSRU Belgard design has been implemented with commercially available integrated circuits. This fully digital realization is based on a distributed signal processing architecture employing six (6) Nippon Electric Company (N.E.C.) uPD7720 Signal Processing Interface (SPI) single chip microcomputers. Three of the uPD7720s implement a Belgard-type analysis filter bank by dividing the 19 channels into groups of 6, 6, and 7 channels. Similarly, a Belgard synthesizer including excitation generation is realized by two SPI's which process and combine the 10- and 9-channel subbands comprising the output speech. A one-chip implementation of tile Gold pitch and voicing decision algorithm is achieved with the sixth uPD7720. An Intel 808B-based 8-bit microcomputer is used for data transfer, control and multiplexing functions, and communications with the host terminal. Finally, the design features a compact analog subsystem based on a telecommunications industry LSI CODEC-with-filters chip. A total of 26 integrated circuits is required with a power dissipation of 11.5 watts and occupying about 70% of a 7' x 7' wirewrap board (excluding power supply). A very compact, full-duplex 2.4 kbps LPC vocoder has also been designed based on the same architecture as tile channel vocoder but requires only three uPD7720s. A total of 16 integrated circuits are used in the LPC vocoder with a power dissipation of 8.6 watts, occupying one-half of a 7' x 7' wirewrap board.
Author
Vocoders; Signal Processing; Distributed Processing; Multiplexing; Microcomputers; Large Scale Integration; Synthesizers; Integrated Circuits; Algorithms

20060011489 Centro Studi e Laboratori Telecomunicazioni, Turin, Italy
BROADCASTING - QUALITY TRANSMISSION of AUDIO SIGNALS AT 64 KBPS
Bertorello, Luciano; Copperi, Maurizio; Pirani, Giancario; Rusina, Fulvio; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1972-1975; In English; See also 20060011369; Copyright; Avail.: Other Sources

Recently, attention has been paid to the problem of transmitting audio signals whose bandwidth is wider than 3.4 kHz, typically 7 kHz. In this paper, three techniques are examined which allow the transmission rate of 64 kbit/s to be met. Comparisons are carried out in terms of both objective measurements and informal listening tests. Possible application fields are tele- and video-conferencing, commentary channels and broadcasting, and high quality speech and music in the future Integrated Service Digital Network.
Author
Transmission; Video Communication; Audio Signals; Broadcasting

20060011490 ITT Advanced Technology Center, Shelton, CT, USA
SPECIFICATION-BASED DESIGN of SIGMA DELTA MODULATOR FOR A/D and D/A CONVERSION
Agrawal, B. P.; Shenoi, K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1980-1983; In English; See also 20060011369; Copyright; Avail.: Other Sources

The paper establishes a correspondence between performance requirements, mathematical parameters, and circuit parameters of a sigma-delta modulator. The sigma-delta modulator is viewed as a device which distributes the noise power over a much broader band, compared to signal bandwidth, shapes and amplifies it, and allows filtering of the out-of-band noise. The shaping and amplification are quantified by two parameters, F and P, whose product is analogous to the square of step size of a uniform coder. These two parameters are related, on one hand, to the time constants or location of zero and poles. On the other hand, inequalities are set up between performance parameters, like signal-to-noise ratio and dynamic range, and F and P.
Author
Delta Modulation; Signal to Noise Ratios; Dynamic Range; Circuits; Coders

20060011491 Nijmegen Univ., Netherlands
EVALUATION of GLOTTAL INVERSE FILTERING BY MEANS of PHYSIOLOGICAL REGISTRATIONS
Boves, Louis; Cranen, Bert; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1988-1991; In English; See also 20060011369; Copyright; Avail.: Other Sources

Over the years a number of inverse filtering methods for recovering the volume flow at the glottis from the acoustic speech signal have been designed. Formal tests of these methods have, however, been the exception rather than the rule. We describe an attempt to use registrations of the electroglottogram, photo-electroglottogram and the subglottal pressure, recorded at the same time as the speech signals, to establish the instants of opening, closing and maximal width of the glottis. Although the determination of those epochs from the registrations proved to be less straightforward than anticipated we have succeeded in showing their usefulness for evaluating the accuracy of flow pulses reconstructed by means of inverse filtering techniques.
Author
Signal Transmission; Glottis; Time Measurement; Sound Waves

20060011492 Tokyo Univ., Japan
AUTOMATIC RECOGNITION of VOICED STOP CONSONANTS IN CV and VCV UTTERANCES
Fujisaki, Hiroya; Tominaga, Masahiko; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1996-1999; In English; See also 20060011369
Contract(s)/Grant(s): MOE-546199; Copyright; Avail.: Other Sources

A method is described for the accurate extraction of formant trajectories from utterances containing voiced stop consonants, and for the determination of the formant loci from the trajectories. Analysis of CV and VCV utterances revealed that the loci of the second, third and fourth formants are dependent on the vowel following the consonant, but can provide sufficient information for the separation of [b], [d], and [g] in most cases. The rise time constant of the short-time power is found to supplement formant loci information in cases where the latter is not sufficient. It is shown that correct recognition of the three voiced stop consonants from a single speaker is possible by first identifying the following vowel and by using a set of context-dependent linear discriminant functions In a 4-dimensional space of the three formant loc_ and the rise time constant.
Author
Speech Recognition; Discriminant Analysis (Statistics); Consonants (Speech); Vowels; Extraction

20060011493 Centre National d'Etudes des Telecommunications, Lannion, France
AUTOMATIC SEGMENTATION, RECOGNITION of PHONETIC UNITS and TRAINING IN the KEAL SPEECH RECOGNITION SYSTEM
Mercier, G.; Callec, A.; Monne, J.; Querre, M.; Trevarain, O.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2000-2003; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper describes the acoustic-phonetic recognizer which performs the early stages of analysis in the KEAL system. The objective of this module is to transform the continuous speech signal representing the uttered sentence into a string of lower units. Four main linguistic units have been considered : phones, phonemes, syllables and words. The KEAL acoustic-phonetic recognizer consists of components for carrying out three main tasks : acoustic analysis, labelling and training. Syllabic segmentation accuracy of q5 %, an average phonemic recognition rate of 61% and a word recognition accuracy of 93 % are obtained using 26 phonemic classes, isolated words (digits and operators : +,-,...) and continuous speech which different speakers. Preliminary results on number recognition (each number being composed of several digits spoken

without insertion of pauses) give an accuracy of 90% after speaker adaptation.
Author
Signal Analyzers; Acoustic Measurement; Speech Recognition; Words (Language); Phonetics; Segments

20060011494 Waseda Univ., Tokyo, Japan
RECOGNITION of SEMIVOWELS and CONSONANTS IN CONTINUOUS SPEECH USING ARTICULATORY PARAMETERS
Shiraik, K.; Kobayashi, T.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2004-2007; In English; See also 20060011369; Copyright; Avail.: Other Sources

Articulatory parameters estimated from speech waves were used for the recognition of semivowels and consonants in continuous speech. It has been shown that introduction of the articulatory model in speech recognition is one effective method to solve the difficulties of coarticulation phenomena and speaker differences. In this paper, the recognition of semivowels and consonants is discussed. As for semivowels, it is found that the phase difference between the movement of the tongue and that of the Jaw is important to characterize semivowels, and this can be effectively used in the recognition. In the case of consonants, it is possible to find the typical feature of each consonant which corresponds to its place of articulation in the transient parts of the articulatory parameters. A preliminary experiment adopting the DP matching technique in VCV contexts gave fairly hopeful results. And for nasal sounds, it is shown that introduction of the nasal model is useful. The nasal model consists of the nasal cavity and the velum parameter.
Author
Speech Recognition; Estimating; Consonants (Speech); Articulation (Speech)

20060011495 Elettronica San Giorgio S.p.A., Genoa, Italy
CONTINUOUS SPEECH RECOGNITION VIA DIPHONE SPOTTING. A PRELIMINARY IMPLEMENTATION
Scagliola, Carlo; Marmi, Luciano; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2008-2011; In English; See also 20060011369; Copyright; Avail.: Other Sources

The paper describes a preliminary implementation of a continuous speech recognition system based on the concept of diphone spotting. This consists of continuously measuring the similarity of the current portion of signal pattern with a complete set of selected phonetic events, called diphones because the most significant of them are transitions between pairs of phonemes. The entire set of measures feeds a linguistic decoder that operates on a state space representation of the language whose states are the diphones that compose the words of the lexicon. Durational constraints and optional phonological rules are included in the language representation. The linguistic decoder recognizes the sentence as that path through the network which attains the highest cumulative similarity score. Additionally, the decoder has the task of detecting the end of the sentence. A preliminary test on 50 sequences of 3 to 7 connected digits gave recognition rates as high as 99.6% on digits, or 98% on sequences, thus confirming the validity of this approach.
Author
Phonemes; Decoders; Speech Recognition; Sequencing; Phonetics; Linguistics; Digits; Detection

20060011496 Stanislaw Staszic Academy of Mining and Metallurgy, Cracow, Poland
A SYNTAX-CONTROLLED SEGMENTATION of SPEECH SIGNAL ON the BASIS of DYNAMIC SPECTRA
Kot, Leszek; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2015-2017; In English; See also 20060011369; Copyright; Avail.: Other Sources

In this paper an effective algorithm of segmentation of the dynamic spectra of speech signal is presented. The algorithm realizes segmentation into simple elements, very similar to the classic 'phonetic- acoustic segments', which contain the full linguistic information carried by the speech signal. The described algorithm is based on the syntactic theory of pattern recognition and makes use of the similarity relations among the momentary spectra composing the dynamic spectrum of an utterance. The proposed method has been experimentally verified. the final correctness of segmentation exceeding 90%.
Author
Segments; Syntax; Pattern Recognition; Linguistics

20060011498 Speech Science Publications, Santa Barbara, CA, USA
WHAT CAUSES SPEECH RECOGNIZERS to MAKE MISTAKES?
Lea, Wayne A.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2030-2033; In English; See also 20060011369; Copyright; Avail.: Other Sources

Informed selections among the available commercial speech recognizers requires knowledge of their accuracies under representative test conditions, and evidence concerning what causes errors. An organized list of over 80 factors that might affect recognition accuracy included fixed specifications of devices (e.g., type of device, number of frequency filters, bits/word in reference patterns) and controllable variables (e.g., speaking rate, microphone, number of speakers, speaker skill, sex, dialect, physical and psychological state, vocabulary, form of feedback for verification, etc.). Very little evidence has been accumulated regarding the relative impact of these factors related to task constraints, human factors, languages for interaction, channel effects, algorithmic factors, types of errors, or response processes. Controlled tests have been defined for comprehensive assessment of the accuracies of isolated word recognizers operating with various speakers, training methods, vocabularies, database recording procedures, rates of data entry, noise and channel conditions, etc. A statistical pre-test and method of 'response surface methodology' will simplify the tests.
Author
Errors; Human Factors Engineering; Speech Recognition; Channels (Data Transmission); Statistical Analysis; Frequencies; Data Bases; Accumulations

20060011499 Padua Univ., Italy
STATE SPACE APPROACH to TWO DIMENSIONAL FILTERS
Fornasini, E.; Marchensini, G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2038-2041; In English; See also 20060011369; Copyright; Avail.: Other Sources

In this paper state space models of 2-D filters are introduced as a generalization of 2-D recursive difference equations. The dimension of the recursion and of the state representation are compared and related to structural properties of the state models. This paper discusses some aspects of the state space models of 2-D filters (i-3) which are connected with the problem of constructing minimal realizations. In the I-D case, reachability and observability are crucial in this framework, and we shall analyze to what extent the corresponding 2-D properties provide an answer to the problem of reducing, and possibly minimizing the dimension of the state space. Some important aspects of reachability and observability, whose interest is more specific to System Theory (4-6), and other structural properties, as internal stability (7-9), will be omitted in our analysis since their connections with the dimension of the realizations seem to be quite marginal. As in the I-D case, the linear processing of two dimensional data can be represented by a convolutional operation or, when the
Author
Difference Equations; Systems Analysis; Adaptive Filters

20060011500 University of Southern California, Los Angeles, CA, USA
APPROXIMATION OF 2-D SEPARABLE DENOMINATOR RECURSIVE FILTERS
Lashgari, Bijan; Silverman, Leonard M.; Abramatic, Jean-Francois; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2042-2045; In English; See also 20060011369
Contract(s)/Grant(s): DAAG29-79-C-0054; NSF ECS-80-11911; Copyright; Avail.: Other Sources

After introducing a two-dimensional (2-D) model for the class of quarter-plane-causal, recursive and separable in denominator (CRSD) filters, a technique for approximating a given 2-D filter by a CRSD one is presented which also yields a model reduction procedure. Both the stability and minimality properties of the approximate model are explored. An example is also given to illustrate the proposed technique.
Author
Approximation; Signal Processing; Two Dimensional Models; IIR Filters; Stability Tests

20060011501 Institut National de Recherche d'Informatique et d'Automatique, Le Chesnay, France
DESIGN OF 2-D RECURSIVE FILTERS USING SINGULAR VALUE DECOMPOSITION TECHNIQUES
Deriche, R.; Abramatic, J. F.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2046-2048; In English; See also 20060011369; Copyright; Avail.: Other Sources

A new procedure for 2-D Separable Denominator Recursive (SDR) Filter design is introduce. It is based upon the minimization or mean-square error criteria between impulse responses. The algorithm is two fold. First the finite impulse response of the prototype is approximated by a finite sum of separable filters using the Singular Value Decomposition Theorem as described in TREITEL & SHANKS (1) - Second the finite sum is approximated by an SDR filter. In this part we develop a new approach based upon a single input-multi output 1-D filter approximation. In the last part of the paper, we present

experimental results that compare our new algorithm to related previous ones.
Author
IIR Filters; Mean Square Values; Decomposition; Algorithms; Optimization; Joints (Junctions)

20060011502 Tatung Inst. of Tech., Taipei, Taiwan, Province of China
DESIGN of NONSQUARE 2D FIR FILTERS BY TRANSFORMATIONS
Pei, Soo-Chang; Wu, Yu-Chang; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2055-2058; In English; See also 20060011369; Copyright; Avail.: Other Sources

McClellan's transformations for 2D FIR filter design are sliced into several 1D frequency transforms for linear phase variable filters. Each transform maps 1D prototype FIR filter into several one dimensional variable cut-off digital filters in the 2D frequency plane; This approach is equivalent to the conventional McClellan's transformation, however the complicated 2D transformation steps are reduced into the simple 1D forms, the algorithm is much easier to implement and has additional advantage to design the nonsquare 2D FIR filters.
Author
Transformations (Mathematics); Digital Filters; Fir Filters; Linear Filters

20060011503 Centro Studi e Laboratori Telecomunicazioni, Turin, Italy
THREE-DIMENSIONAL RECURSIVE FILTERING
Garibotto, G.; Piretta, G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2059-2064; In English; See also 20060011369; Copyright; Avail.: Other Sources

The problems of stability analysis and design of 30 recursive filters are discussed in the paper. Two different design techniques are proposed in the first case the 3-D filter is required to approximate a given amplitude function; in the second case linear phase specifications are considered ,An example of smoothing of a 3-D binary object is presented with application in computer assisted neurosurgery.
Author
Stability Tests; IIR Filters; Smoothing; Computer Techniques

20060011504 Illinois Univ., Urbana, IL, USA
NONLINEAR FILTERING USING LINEAR COMBINATIONS of ORDER STATISTICS
Bovik, A. C.; Huang, T. S.; Munson, D. C., Jr.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2067-2070; In English; See also 20060011369
Contract(s)/Grant(s): N00014-79-C-0424; Copyright; Avail.: Other Sources

In this paper we consider a nonlinear filter whose output is given by a linear combination of the order statistics of the input sequence. Assuming a constant signal in white background noise, the coefficients in the linear combination are chosen to minimize the output MSE for several noise distributions. This new general filter is superior to the well-known median filter, since the median is just a special case.
Author
Background Noise; Nonlinear Filters; White Noise; Statistical Analysis; Coefficients

20060011505 Pittsburgh Univ., Pittsburgh, PA, USA
ASYMMETRIC HALF-PLANE PLANAR LEAST-SQUARES INVERSES
Chaparro, L. F.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2072-2075; In English; See also 20060011369
Contract(s)/Grant(s): NSF ECS-81-05988; Copyright; Avail.: Other Sources

In this paper we present a procedure to obtain two-dimensional (2-D) Planar Least-Squares Inverses (PLSIs) in the general form of asymmetric half-plane (AHP) filters, and which are bounded input output (BIBO) stable in most cases. These PLSIs are obtained by transforming the problem into a one-dimensional PLSI problem using the slice projection theorem, solving it by means of the Levinson's algorithm and transforming the solution back into an AHP filter. The procedure guarantees a good matching of the autocorrelation data and the BIBO stability of the filter in most cases. We discuss the application of this procedure to the stabilization of 2-D recursive filters and provide examples illustrating this application.
Author
Asymmetry; Least Squares Method; Half Planes; IIR Filters; Algorithms; Autocorrelation

20060011506 Institut za Nuklearne Nauke Boris Kidric, Belgrade, Yugoslavia

THE ARCHITECTURE of A SIGNAL PROCESSOR DEVELOPED THROUGH SIMULATION

Carapic, Miodrag; Jovanovic, Zoran; Mihajlovic, Zorica; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2084-2088; In English; See also 20060011369; Copyright; Avail.: Other Sources

Host machines of signal processors are closely related to algorithm characteristics, and therefore simultaneous development of architecture and microprograms could be successfully done through simulation. In the created simulator, the program modules correspond to hardware components, and they are activated only once during a micro-cycle by using an 'Equivalent generalized pipeline stage' model. The architecture is briefly described, with more significance paid to the address generation.

Author

Signal Analyzers; Simulation; Signal Processing; Microprogramming; Algorithms

20060011507 Warsaw Technical Univ., Poland

ANALYSIS of ERRORS IN MIXED FAST FOURIER TRANSFORM ALGORITHMS WITH DECIMATION IN FREQUENCY FOR FIXED POINT ARITHMETIC

Wolinski, K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2089-2093; In English; See also 20060011369; Copyright; Avail.: Other Sources

The statistical model is assumed to determine errors arising in the computation of discrete Fourier trans form with the use of mixed-radix FFT algorithm with decimation in frequency. The fixed point arithmetic operations on the numbers represented in two's complement code are considered, The formulae for calculating the mean square value of errors in any point of transform output for the operations of rounding with and without scaling, and chopping with and without scaling are given in the paper. Computer simulation was carried out and general conclusions concerning mixed- radix FFT algorithms with decimation in frequency were drawn.

Author

Fast Fourier Transformations; Error Analysis; Fixed Point Arithmetic; Frequencies; Mean Square Values; Algorithms

20060011508 California Univ., Los Angeles, CA, USA

NONLINEAR IMAGE RESTORATION: A VISUAL QUALITY CONSTRAINED APPROACH

Clara, F.; Silverman, L. M.; Abramatic, J. F.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2098-2101; In English; See also 20060011369

Contract(s)/Grant(s): ECS-8011911; Copyright; Avail.: Other Sources

The stochastic modeling aspects of image restoration are considered for 2-D non-stationary processes. We develop a space variant Roesser model for such processes, and derive procedures for stochastic identification and estimation in the context of a visual quality criterion.

Author

Nonlinearity; Two Dimensional Models; IIR Filters; Image Resolution; Restoration; Kalman Filters

20060011509 Warsaw Technical Univ., Poland

THE EXAMINATION of INFLUENCE of GEOPHYSICAL PROPERTY of SOIL ON EQUIPOTENTIAL EARTHED EQUIPMENT BY MEANS of DIGITAL PROCESSING

Wasiluk, Wladyslaw; Lukowski, Grzegorz; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2102-2104; In English; See also 20060011369; Copyright; Avail.: Other Sources

The determination of the related earth potential has basic importance as far as the correct operation of transmission equipment is concerned, especially in highly industrialized areas, in such regions stray currents are common and the lack of information on their influence on earth electrode and the possibilities of equipotentialisation can lead to serious breakdowns. Analytical considerations on equipotentialisation of earth electrode tend to get highly complicated due to heterogeneity of the properties of soil. However, it is possible in may cases to describe the soil by means of horizontal, homogeneous sad isotropic layers. The method of calculation employed in this paper refers to partition of a complex earth electrode into simple elements for which theoretical equations exist.

Author

Equipotentials; Heterogeneity; Soils; Geophysics; Isotropy; Digital Systems; Signal Processing; Image Processing

20060011510 Centre National de la Recherche Scientifique, Gif-sur-Yvette, France

WIGNER-VILLE ANALYSIS of TIME-VARYING SIGNALS

Martin, Wolfgang; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1325-1328; In English; See also 20060011369

Contract(s)/Grant(s): Ma 895/1; Copyright; Avail.: Other Sources

Among the various methods of analysing time-varying signals, one of the most interesting is WIGNER-VILLE's. 1) In the case of signals with a large bandwidth-duration BT product, we recall that their behaviour in the time-frequency domain can be reduced to just two typical cases. The numerical studies performed on different examples are in good agreement with the analytical ones and lead to the possibility of modeling signals in the time-frequency domain. 2) In the case of signals with a BT product of any magnitude, we study in detail, analytically, and numerically the WIGNER-VILLE representation of linearly frequency modulated signals. These results are then compared with those obtained by usual methods such as the 'Moving Window Method' (MWM). The performance of each method is evaluated and ways of optimizing MWM are proposed.

Author

Time Signals; Variations; Bandwidth; Frequency Modulation; Spectrum Analysis; Sonar; Frequencies; Domains

20060011511 Schlumberger-Doll Research, Ridgefield, CT, USA

A Non-Aliased Discrete-Time Wigner Distribution for Time-Frequency Signal Analysis

Chan, David S. K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1333-1336; In English; See also 20060011369; Copyright; Avail.: Other Sources

The Wigner Distribution (WD) is a signal transformation which has its origin in quantum mechanics. It possesses some important properties which make it very attractive for time-frequency signal analysis. The WD was originally defined for continuous-time signals. A discrete-time version of it was proposed recently [6]. Unfortunately, this discrete-time WD suffers from aliasing effects, which prevent several of the properties of the continuous-time WD from carrying over straightforwardly. In this paper, a discrete-time WD which does not suffer from aliasing is introduced. It is essentially an augmentation of the previous version, incorporating new information about the signal not contained in the previous version. It possesses all of the properties of the continuous-time WD which can reasonably be expected to carry over to the discrete-time case.

Author

Time Signals; Frequencies; Signal Analysis; Quantum Mechanics; Discrete Functions

20060011512 California Univ., Livermore, CA, USA

EFFICIENT REALIZATION of ADAPTIVE DIGITAL FILTERS IN the TIME and FREQUENCY DOMAINS

Clark, G. A.; Parker, S. R.; Mitra, S. K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1345-1348; In English; See also 20060011369

Contract(s)/Grant(s): W-7405-ENG-48; Copyright; Avail.: Other Sources

A unified approach to the efficient realization of FIR adaptive digital filters in both the time and frequency domains is presented. It is shown that previously published frequency domain implementations are contained within this unified approach. It is further shown that various combinations of implementations are possible, and that in working with data streams, care must be taken in using overlap-save and overlap-add sectioning procedures for proper frequency domain implementations.

Author

Adaptive Filters; Digital Filters; Fir Filters; Frequencies; Domains

20060011513 Clemson Univ., SC, USA

AN EVALUATION of TIME REDUNDANT DFT PROCESSING of STOCHASTIC SIGNALS WITH TIME VARYING SPECTRA

Baxa, Ernest G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1349-1352; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper addresses the problem of applying an implementation of the DFT to obtain a periodogram estimate of the power spectral density of a stochastic signal which has a time varying power spectral density. For the situation when a sample function of a stationary process is observed over a period such that the time-measurement resolution bandwidth product is greater than unity, processing redundancy can be used to enhance the quality of the resulting spectral measurements. Of particular interest in this presentation is an evaluation of estimate quality associated with time redundant implementations of the DFT when harmonic content of the observation changes in a well-defined way during the processing interval. Simulation

results are given to show that the estimate variance can be predicted on the basis of the effective degrees-of- freedom associated with the observation. Results are related to previous work with stationary signals.
Author
Degrees of Freedom; Time Measurement; Time Functions; Stochastic Processes; Spectrum Analysis; Redundancy; Signal Processing; Time Signals

20060011514 Arcon Corp., Waltham, MA, USA
SIGNAL COMPRESSION MODEL INTERRELATIONSHIPS IN the TIME, FREQUENCY, PRINCIPAL COMPONENT and CANONICAL COORDINATE DOMAINS
Walter, Charlton M.; Tardelli, John D.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1367-1370; In English; See also 20060011369
Contract(s)/Grant(s): F19628-80-091; Copyright; Avail.: Other Sources

This paper describes the use of a canonical signal compression and modelling technique that permits the minimization of certain non-euclidean types of signal resynthesis error criteria. The technique is based on the construction of a non-orthogonal transformation from the original sampled signal representation, in either the time, frequency or spatial domain, to a special canonical coordinate domain. The parameters characterizing this transformation are then chosen to minimize the specified error criterion, for each level of truncation of the canonical coordinate based signal representation. A mechanism for factoring this canonical coordinate transformation into an eigenvector-eigenvalue based correlation simplification process, and an error metric simplification process, is described. This mechanism is shown to involve principal component (or Loeve-Karhunen) analysis as an intermediate step in the complete canonical coordinate determination process, and can lead to a substantial simplification in the computational complexity that is entailed in handling a class of non-euclidean error criteria.
Author
Coordinate Transformations; Correlation; Eigenvalues; Eigenvectors; Frequencies; Domains

20060011515 Analytical Sciences Corp., McLean VA, USA
SPECTRAL LINE ANALYSIS VIA A FAST PRONY ALGORITHM
Marple, S. Lawrence; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1375-1378; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper reports a fast new algorithm for a previously developed spectral estimation technique. A modification of the two-step Prony method permits least-squares estimation of the parameters of a set of pure sinusoids: amplitude, frequency, phase. An algorithm is presented that permits a very efficient computation for the first step least-squares estimate of the frequencies and number of sinusoids, M. The normal least squares algorithm requires O(M(sup 3)) operations if done with conventional methods of solution; the fast algorithm solves the same least squares equations with a total of O(M(sup 2)) operations, providing all lower order solutions from m=1 to M as a side benefit (useful for recursively fitting an increasing number of sinusoids to a data set).
Author
Line Spectra; Algorithms; Sine Waves; Frequencies; Computation

20060011516 Military Technical Coll., Cairo, Egypt
EQUALIZATION of RAPID SELECTIVE FADINGS WITH UNKNOWN and TIME - VARYING FORMS
Eweda, Eweda; Macchi, Odile; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1390-1393; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper presents a new equalizer for rapidly time varying selective fading without an apriori information about the shape of that fading in frequency domain. The basic idea is to analyze the output of the channel by a set of adjacent filters covering the band of channel. Then, a gradient algorithm is used to identify frequency bands at which fading takes place and another gradient algorithm is used to adapt only the gains of filters lying in the vicinity of fading. This idea enables a high tracking speed for the equalizer and enables equalization of rapid fadings that are beyond the capabilities of presently existing equalizers.
Author
Equalizers (Circuits); Fading; Selective Fading; Gradients; Frequencies; Algorithms

20060011517 Royal Signals and Radar Establishment, Malvern, UK

'A DIGITAL ADAPTIVE NOISE-CANCELLER BASED ON A STABILIZED VERSION of THE WIDROW L.M.S. ALGORITHM'

McWhirter, J. G.; Palmer, K. J.; Roberts, J. B. G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1394-1397; In English; See also 20060011369; Copyright; Avail.: Other Sources

A powerful digital adaptive noise-canceller which has recently been constructed at RSRE is described. The processor is based on a number of identical adaptive filter modules. Each module functions as a 255-stage tapped delay line which operates with 12 bit data and coefficient words and can be clocked at any sample rate up to 14 kHz providing a maximum signal bandwidth of 6 kHz. Up to 16 modules may be connected in series to generate a long filter so it is possible to construct a 4080 stage device operating at full sample rate. The coefficients are updated using a modified version of the Widrow L.M.S. algorithm which greatly improves the stability of the filter and this important factor has had considerable impact on the overall design. The results of some noise cancellation experiments are also described.

Author

Adaptive Filters; Bandwidth; Coefficients; Delay Lines; Algorithms

20060011518 Stanford Univ., Stanford, CA, USA

FAST LEAST-SQUARES (LS) IN the VOICE ECHO CANCELLATION APPLICATION

Soong, Frank K.; Peterson, Allen M.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1398-1403; In English; See also 20060011369; Copyright; Avail.: Other Sources

The existing echo cancellation methods are primarily based on the LMS adaptive algorithm. Despite the fact that the LMS echo canceller works better than its predecessor--the echo suppressor, its performance can be substantially improved if the Recursive LS (RLS) algorithm is used instead. However the (alpha)p(sup 2) operations (p: filter order) per sample required prevents the RLS algorithm from being used in this and many other applications where the filter order is relatively high. The computational complexity of the RLS has recently been brought down to _p by exploiting the shifting structure of the signal covariance matrix. Two fast algorithms, namely the LS lattice and the 'fast Kalman', are used here. Comparisons between the two fast LS algorithms and the LMS gradient algorithm are made and the performance difference is demonstrated. Two important problems in voice echo cancellation: the flat delay estimation and the near-end speech detection, are approached novelly through a minimum-mean-squared-error flat delay estimator and a likelihood near-end speech detector. Simulation results are very satisfactory.

Author

Least Squares Method; Mean Square Values; Echo Suppressors; Errors; Cancellation; Algorithms; Gradients

20060011539 Laboratoires d'Electronique et de Physique Appliquee, Limeil-Brevannes, France

Performance Evaluation of Three Adaptive Equalization Algorithms

Sari, Hikmet; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1385-1389; In English; See also 20060011369; Copyright; Avail.: Other Sources

The three simplified versions of the stochastic gradient algorithm are analyzed. Assuming gaussian probability distributions for the input signal and the output error signal, their stability is studied, their output mean square error performance is evaluated and their optimal step-size parameters are given. For digitally implemented equalizers ve also indicate the minimum number of bits required to store the equalizer coefficients. Computer simulation results are reported which confirm the validity of the theoretical results.

Author

Equalizers (Circuits); Algorithms; Probability Distribution Functions; Error Signals; Mean Square Values; Coefficients

20060011548 Speech, Inc., Cambridge, MA, USA

THE KLATTALK TEXT-to-SPEECH CONVERSION SYSTEM

Klatt, Dennis H.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1589-1592; In English; See also 20060011369; Copyright; Avail.: Other Sources

A real time text-to-speech conversion system has been developed. Input is ordinary English spelling and/or simple numerical and algebraic expressions. Dynamic selection between a male or female output voice is under user control. The system executes a set of about 500 letter-to-sound rules to guess at the pronunciation of words that do not match a carefully selected exceptions dictionary of about 1500 words. A very simple syntactic analyzer determines probable locations of phrase and clause boundaries in order to improve the naturalness and intelligibility of input sentences. The resulting phonemic

representation is converted to speech by a synthesis-by-rule program and formant synthesizer. The rule program differs from others of this type in having an extensive set of segment duration rules and many detailed rules for the synthesis of consonant-vowel transitions.
Author
Speech Recognition; Real Time Operation; Texts; Synthesizers; Intelligibility; Vowels; Words (Language)

20060011610 National Renewable Energy Lab., Golden, CO USA
Electron Traps Detected in P-Type GaAsN Using Deep Level Transitent Spectroscopy
Johnson, S.; Kurtz, S.; Friedman, D.; Ptak, A.; Ahrenkiel, R.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860693; NREL/CP-520-37021; No Copyright; Avail.: National Technical Information Service (NTIS)

The GaAsN alloy can have a band gap as small as 1.0 eV when the nitrogen composition is about 2%. Indium can also be added to the alloy to increase lattice matching to GaAs and Ge. These properties are advantageous for developing a highly-efficient, multi-junction solar cell. However, poor GaAsN cell properties, such as low open-circuit voltage, have led to inadequate performance. Deep-level transient spectroscopy of p-type GaAsN has identified an electron trap having an activation energy near 0.2 eV and a trap density of at least 1016 cm-3. This trap level appears with the addition of small amounts of nitrogen to GaAs, which also corresponds to an increased drop in open-circuit voltage.
NTIS
Spectroscopy; Gallium Arsenides; Energy Gaps (Solid State); Open Circuit Voltage

20060012029 National Inst. for Occupational Safety and Health, Washington, DC, USA
NIOSH Health Hazard Evaluation Report: HETA No. 2001-0153-2994, Naval Computer and Telecommunications Station, Cutler, Maine, March 2006
Mar. 2006; 46 pp.; In English
Report No.(s): PB2006-107554; HETA-2001-0153-2994; No Copyright; Avail.: CASI: A03, Hardcopy

On February 2, 2001, the American Federation of Government Employees Local 2635 submitted a health hazard evaluation request on behalf of civilian employees at the Naval Computer and Telecommunications Station, Cutler, Maine. The request indicated that electronics workers, technicians, antenna workers, and administrative staff were exposed to radiofrequency (RF) electromagnetic fields (EMF) in the antenna fields and on the transmitter decks. The request also noted that employees suspected that they were incurring eye injuries as a result of exposure to RF fields.
NTIS
Electromagnetic Fields; Hazards; Health; Radio Frequencies; Telecommunication

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*.

20060011248 Iowa State Univ. of Science and Technology, Ames, IA USA
Improved Multiscale Model for Dilute Turbulent Gas Particle Flows Based on the Equilibration of Energy Concept
Xu, Y.; January 2004; 98 pp.; In English
Report No.(s): DE2006-850057; No Copyright; Avail.: Department of Energy Information Bridge

Many particle-laden flows in engineering applications involve turbulent gas flows. Modeling multiphase turbulent flows is an important research topic with applications in fluidized beds and particle conveying. A predictive multiphase turbulence model can help CFD codes to be more useful for engineering applications, such as the scale-up in the design of circulating fluidized combustor and coal gasifications. In engineering applications, the particle volume fraction can vary from dilute (\h10(sup -4)) to dense ((approx) 50%). It is reasonable to expect that multiphase turbulence models should at least satisfy some basic modeling and performance criteria and give reasonable predictions for the canonical problems in dilute particle-laden turbulent flows. In this research, a comparative assessment of predictions from Simonin and Ahmadi's turbulence models is performed with direct numerical simulation (DNS) for two canonical problems in particle-laden turbulent flows. Based on the comparative assessment, some criteria and the areas for model improvement are identified: (1) model for interphase TKE transfer, especially the time scale of interphase TKE transfer, and (2) correct prediction of TKE evolution with variation of particle Stokes number. Some deficiencies that are identified in the Simonin and Ahmadi models, limit the

applicability. A new multiphase turbulence model, the Equilibration of Energy Model (EEM), is proposed in this work. In EEM, a multiscale interaction time scale is proposed to account for the interaction of a particle with a range of eddy sizes. EEM shows good agreement with the DNS results for particle-laden isotropic turbulence. For particle-laden homogeneous shear flows, model predictions from EEM can be further improved if the dissipation rate in fluid phase is modeled with more accuracy.
NTIS
Gas Flow; Multiscale Models; Turbulent Flow

20060011312 Lawrence Livermore National Lab., Livermore, CA USA
Weighted Essentially Non-Oscillatory Simulations and Modeling of Complex Hydrodynamic Flows. Part 2. Single-Mode Richtmyer-Meshkov Instability with Reshock
Latini, M.; Schilling, O.; May 10, 2005; 204 pp.; In English
Report No.(s): DE2005-15016331; UCRL-TR-212120; No Copyright; Avail.: National Technical Information Service (NTIS)

The Richtmyer-Meshkov instability is a fundamental fluid instability that occurs when perturbations on an interface separating gases with different properties grow following the passage of a shock. This instability is typically studied in shock tube experiments, and constitutes a fundamental example of a complex hydrodynamic flow. Numerical simulations and models for the instability growth and evolution have also been used to further elucidate the physics of the Richtmyer-Meshkov instability. In the present work, the formally high-order accurate weighted essentially non-oscillatory (WENO) shock-capturing method using a third-order total-variation diminishing (TVD) Runge-Kutta time-evolution scheme (as implemented in the HOPE code (68)) is applied to simulate the single-mode Richtmyer-Meshkov instability with reshock in two spatial dimensions.
NTIS
Essentially Non-Oscillatory Schemes; Hydrodynamics; Oscillations; Shock Tubes; Simulation

20060012153 General Electric Aircraft Engines, Cincinnati, OH, USA
High Fidelity System Simulation of Multiple Components in Support of the UEET Program
Plybon, Ronald C.; VanDeWall, Allan; Sampath, Rajiv; Balasubramaniam, Mahadevan; Mallina, Ramakrishna; Irani, Rohinton; April 2006; 43 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): NAS3-01135; WBS 984754.02.07.03
Report No.(s): NASA/CR-2006-214230; E-15477; No Copyright; Avail.: CASI: A03, Hardcopy

The High Fidelity System Simulation effort has addressed various important objectives to enable additional capability within the NPSS framework. The scope emphasized High Pressure Turbine and High Pressure Compressor components. Initial effort was directed at developing and validating intermediate fidelity NPSS model using PD geometry and extended to high-fidelity NPSS model by overlaying detailed geometry to validate CFD against rig data. Both 'feedforward' and feedback' approaches of analysis zooming was employed to enable system simulation capability in NPSS. These approaches have certain benefits and applicability in terms of specific applications 'feedback' zooming allows the flow-up of information from high-fidelity analysis to be used to update the NPSS model results by forcing the NPSS solver to converge to high-fidelity analysis predictions. This apporach is effective in improving the accuracy of the NPSS model; however, it can only be used in circumstances where there is a clear physics-based strategy to flow up the high-fidelity analysis results to update the NPSS system model. 'Feed-forward' zooming approach is more broadly useful in terms of enabling detailed analysis at early stages of design for a specified set of critical operating points and using these analysis results to drive design decisions early in the development process.
Author
Computational Fluid Dynamics; Systems Simulation; Aircraft Engines; Technology Utilization; NASA Programs

35
INSTRUMENTATION AND PHOTOGRAPHY

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

20060011234 NASA Glenn Research Center, Cleveland, OH, USA
Validating Coherence Measurements Using Aligned and Unaligned Coherence Functions
Miles, Jeffrey Hilton; March 2006; 25 pp.; In English; 44th Aerospace Sciences Meeting and Exhibit, 9-12 Jan. 2006, Reno, NV, USA; Original contains color illustrations
Contract(s)/Grant(s): WBS 581.02.08.03
Report No.(s): NASA/TM-2006-214113; AIAA Paper 2006-1389; E-15447; No Copyright; Avail.: CASI: A03, Hardcopy

This paper describes a novel approach based on the use of coherence functions and statistical theory for sensor validation in a harsh environment. By the use of aligned and unaligned coherence functions and statistical theory one can test for sensor degradation, total sensor failure or changes in the signal. This advanced diagnostic approach and the novel data processing methodology discussed provides a single number that conveys this information. This number as calculated with standard statistical procedures for comparing the means of two distributions is compared with results obtained using Yuen's robust statistical method to create confidence intervals. Examination of experimental data from Kulite pressure transducers mounted in a Pratt & Whitney PW4098 combustor using spectrum analysis methods on aligned and unaligned time histories has verified the effectiveness of the proposed method. All the procedures produce good results which demonstrates how robust the technique is.
Author
Spectrum Analysis; Statistical Analysis; Degradation; Failure; Pressure Sensors

20060011483 Ecole Nationale Superieure du Petrole et des Monteurs, Fontainbleau, France
WATERSHEDS of FUNCTIONS and PICTURE SEGMENTATION
Beucher, Serge; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1928-1931; In English; See also 20060011369; Copyright; Avail.: Other Sources

The watersheds of a function are geometric features which are very useful in picture segmentation. We briefly and intuitively define the notion of watersheds, and we state that this transformation can be performed starting from the skeleton of the function. This skeleton is a particular case of a general morphological transformation called Thinning. Two examples of use of the watersheds are then given: the first one drawn from contour detection of defects in weld radiographs and the other one from the segmentation of bubbles on an electrophoresis gel.
Author
Watersheds; Segments; Nondestructive Tests; Contours; Images; Radiography

42
GEOSCIENCES (GENERAL)

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

20060011229 Geological Survey, Menlo Park, CA, USA
Principal Facts for 463 Gravity Stations in the Vicinity of Tangle Lakes, East-Central Alaska
Morin, R. L.; Glen, J. M. G.; January 2002; 26 pp.; In English
Report No.(s): PB2006-105479; USGS/OFR-02-96; No Copyright; Avail.: National Technical Information Service (NTIS)

During the summer of 2001, a gravity survey was conducted in the vicinity of Tangle Lakes, east-central Alaska. Measurements of 87 gravity stations were made. The Tangle Lakes area is located about 25 km west of Paxson and north of the Denali Highway. The gravity survey is located on the southwest corner of the Mt. Hayes and the northwest corner of the Gulkana 1:250,000 scale USGS topographic maps. The boundaries of the study area are 62 degrees 30' to 63 degrees 30' N. latitude and 145 degrees 30' to 147 degrees 00' W. longitude. One gravity base station was used for control for this survey. This base station, TLIN is located at the Tangle Lakes Inn. The observed gravity of this station was calculated based on

multiple ties to base stations ANCU in Anchorage, PALH in Palmer, BD27 in Gulkana, and base stations D42, and D57 along the Denali Highway.
NTIS
Alaska; Gravimetry; Gravitation; Lakes; Tangling

20060011326 Florida State Univ., Tallahassee, FL, USA
Short-Term Variability of Extinction by Broadband Stellar Photometry
Musat, I. C.; Ellingson, R. G.; January 2005; 8 pp.; In English
Report No.(s): DE2005-841538; No Copyright; Avail.: Department of Energy Information Bridge

Aerosol optical depth variation over short-term time intervals is determined from broadband observations of stars with a whole sky imager. The main difficulty in such measurements consists of accurately separating the star flux value from the non-stellar diffuse skylight. Using correction method to overcome this difficulty, the monochromatic extinction at the ground due to aerosols is extracted from heterochromatic measurements. A form of closure is achieved by comparison with simultaneous or temporally close measurements with other instruments, and the total error of the method, as a combination of random error of measurements and systematic error of calibration and model, is assessed as being between 2.6 and 3% rms.
NTIS
Aerosols; Broadband; Extinction; Photometry; Stellar Spectrophotometry; Variability

20060011634 Academy of Sciences (Russia), Tomsk, Russian Federation
Regularities of Angular Distribution of Near-Horizon Sky Brightness in the Cloudless Atmosphere
Sakerin, S. M.; Zhuravleva, T. B.; Nasridinov, I. M.; January 2005; 12 pp.; In English
Report No.(s): DE2005-841615; No Copyright; Avail.: National Technical Information Service (NTIS)

The methods of sun-photometry of the atmosphere based, for example, on interpretation of the angular distribution of radiation in the solar almucantar are widely used for retrieval of the aerosol optical characteristics (Dubovik et al. 2000). Preliminary analysis has shown that the near-horizon region also can be interesting for solving some applied problems. As is known, investigations of the structure of the daytime cloudless sky brightness at observation from the ground were carried out principally at zenith angles less than 80DG in visible wavelength range. For further development of the methods it is necessary to obtain more complete data on the distribution of the cloudless sky brightness at great zenith angles of observation and wider wavelength range. The regularities of formation of the sky brightness field in the near-horizon region and just above the horizon line are considered in this paper.
NTIS
Angular Distribution; Atmospheric Optics; Horizon; Mathematical Models; Sky Brightness

43
EARTH RESOURCES AND REMOTE SENSING

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

20060011213 NASA Ames Research Center, Moffett Field, CA, USA
An Agent-Based Interface to Terrestrial Ecological Forecasting
Golden, Keith; Nemani, Ramakrishna; Pang, Wanlin; Votava, Petr; [2005]; 1 pp.; In English; 8th International Symposium ISAIRAS, September 2005, Germany; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The latest generation of NASA Earth Observing System (EOS) satellites has brought a new dimension to continuous monitoring of the living part of the Earth System, the biosphere. EOS data can now provide weekly global measures of vegetation productivity and ocean chlorophyll, and many related biophysical factors such as land cover changes or snowmelt rates. However, the highest economic value would come from forecasting impending conditions of the biosphere, to allow decision makers to mitigate dangers or exploit positive trends. NASA's strategic plan for the Earth Science Enterprise i d e n a s ecological forecasting as a focus for research. Ecological forecasting predicts the effects of changes in the physical, chemical and biological environment on ecosystem activity. Possible applications of such a system include predicting shortfalls or bumper crops of agricultural production, populations of threatened or invasive species or wildfire danger in time to allow improves preparation and logistical efficiency. Petabytes of remote sensing data are now available to help measure,

understand and forecast changes in the Earth system, but using these data effectively can be surprisingly hard. The volume and variety of data files and formats are daunting. Simple data management activities, such as locating and transferring files, changing file formats, gridding point data, and scaling and reprojecting gridded data, can consume far more personnel time and resources than the actual data analysis. Some scientists commit to a particular data source or resolution just because using anything different would be more effort that it's worth. Better tools can help, but most of the tools developed to date are little more than shell scripts; they lack the flexibility to meet the diverse needs of users and are difficult to extend to handle changes in available data sources.
Author
Earth Observing System (EOS); Biosphere; Ecosystems; Remote Sensing; Vegetation; Forecasting; Data Management; Data Storage

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*.

20060011314 National Renewable Energy Lab., Golden, CO USA
Improving Battery Design with Electro-Thermal Modeling. Preprint
Pesaran, A.; Bharathan, D.; Kim, G.; Vlahinos, A.; Duong, T.; Apr. 2005; 16 pp.; In English
Report No.(s): DE2005-15016308; NREL/CP-40-37652; No Copyright; Avail.: National Technical Information Service (NTIS)

Temperature greatly affects the performance and life of batteries in electric and hybrid vehicles under real driving conditions, so increased attention is being paid to battery thermal management. Sophisticated electrochemical models and finite element analysis tools are available for predicting the thermal performance of batteries, but each has limitations. In this study we describe an electro-thermal finite element approach that predicts the thermal performance of a cell or module with realistic geometry, material properties, loads, and boundary conditions. To show the process, we simulated the thermal performance of two generations of Panasonic prismatic nickel-metal-hydride modules used in the Toyota Prius. The model showed why the new generation of Panasonic modules had better thermal performance. Thermal images from two battery modules under constant current discharge indicated that the model predicts the experimental trend reasonably well. These tools will greatly enhance the opportunity for lithium and other advanced batteries to perform better and become cost-effective alternatives in the future. The model has been used to improve the thermal performance of cylindrical lithium-ion batteries.
NTIS
Electric Batteries; Electric Motor Vehicles

20060011317 Duke Univ., Durham, NC, USA
Modeling Metallic Precipitate Dissolution in Silicon Under Point Defect Injection. Final Subcontract Report, January 20, 2004-January 19, 2005
Tan, T. Y.; May 2005; 18 pp.; In English
Report No.(s): DE2005-15016265; NREL/SR-520-37991; No Copyright; Avail.: Department of Energy Information Bridge

We have formulated the problem of gettering of metallic precipitates in Si for which there exists a volume misfit between the precipitate and the Si matrix material. The gettering process is modeled using an Al-Si liquid layer, and the volume misfit associated with dissolving the precipitates is assumed as accommodated by point defects, which may be dominated by vacancies (V), self-interstitials (I), or both contributing. Under the condition that V and I attained dynamical equilibrium, we found that for analytic purposes, the problem reduces to either the V or the I alone case, with the fast-diffusing case dominating. Our initial simulation results on gettering of FeSi2 (with a misfit of -0.15) showed that the process can be sped up by the injection of V.
NTIS
Dissolving; Getters; Injection; Photovoltaic Conversion; Point Defects; Precipitates; Silicon

20060011611 National Renewable Energy Lab., Golden, CO USA
Advanced in Solar Radiometry and Metrology
Myers, D.; Andreas, A.; Reda, I.; Gotseff, P.; Wilcox, S.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860501; NREL/CP-520-36989; No Copyright; Avail.: National Technical Information Service (NTIS)

The Solar Radiometry and Metrology task at the National Renewable Energy Laboratory (NREL) provides traceable optical radiometric calibrations and measurements to photovoltaic (PV) researchers and the PV industry. Traceability of NREL solar radiometer calibrations to the World Radiometric Reference (WRR) was accomplished during the NREL Pyrheliometer Comparison in October 2003. The task has calibrated 10 spectral and more than 180 broadband radiometers for solar measurements. Other accomplishments include characterization of pyranometer thermal offset errors with laboratory and spectral modeling tools; developing a simple scheme to correct pyranometer data for known responsivity variations; and measuring detailed spectral distributions of the NREL High Intensity Pulsed Solar Simulator (HIPSS) as a function of lamp voltage and time. The optical metrology functions support the NREL Measurement and Characterization Task effort for ISO 17025 accreditation of NREL Solar Reference Cell Calibrations. Optical metrology functions have been integrated into the NREL quality system and audited for ISO17025 compliance.
NTIS
Metrology; Radiometers

20060011612 National Renewable Energy Lab., Golden, CO USA
CIGS Thin-Film Solar Cell Research at NREL: FY04 Results and Accomplishments
Ramanthan, K.; Bhattacharya, R. N.; Contreras, M. A.; Hasoon, F. S.; Abushama, J.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860691; NREL/CR-520-37020; No Copyright; Avail.: Department of Energy Information Bridge

The Solar Radiometry and Metrology task at the National Renewable Energy Laboratory (NREL) provides traceable optical radiometric calibrations and measurements to photovoltaic (PV) researchers and the PV industry. Traceability of NREL solar radiometer calibrations to the World Radiometric Reference (WRR) was accomplished during the NREL Pyrheliometer Comparison in October 2003. The task has calibrated 10 spectral and more than 180 broadband radiometers for solar measurements. Other accomplishments include characterization of pyranometer thermal offset errors with laboratory and spectral modeling tools; developing a simple scheme to correct pyranometer data for known responsivity variations; and measuring detailed spectral distributions of the NREL High Intensity Pulsed Solar Simulator (HIPSS) as a function of lamp voltage and time. The optical metrology functions support the NREL Measurement and Characterization Task effort for ISO 17025 accreditation of NREL Solar Reference Cell Calibrations. Optical metrology functions have been integrated into the NREL quality system and audited for ISO17025 compliance.
NTIS
Solar Cells; Thin Films

20060011615 National Renewable Energy Lab., Golden, CO USA
Local Built-in Potential on Grain Boundary of Cu(In,Ga)Se2 Thin Films
Jiang, C. S.; Noufi, R.; Ramanathan, K.; AbuShama, J.A.; Moutinho, H. R.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860499; NREL/CP-520-36981; No Copyright; Avail.: Department of Energy Information Bridge

We report on a direct measurement of two-dimensional potential distribution on the surface of Cu(In,Ga)Se2 (CIGS) thin films using a nanoscale electrical characterization of scanning Kelvin probe microscopy (SKPM). The potential measurement reveals a higher surface potential or a smaller work function on grain boundaries (GBs) of the film than on the grain surfaces. This demonstrates the existence of a local built-in potential on GBs and that the GB is positively charged. The role of the built-in potential in device performance was further examined by tuning Ga content or band gap of the film. With increasing Ga content, the GB potential drops sharply in a Ga range of 28%-38%. Comparing the change in the built-in potential to the theoretical and experimental photoconversion efficiencies, we conclude that the potential plays a significant role in the device conversion efficiency of NREL's three-stage CIGS device.
NTIS
Grain Boundaries; Microscopy; Scanners; Thin Films

20060011616 National Renewable Energy Lab., Golden, CO USA
Conductive Atomic Force Microscopy of CdTe/CdS Solar Cells
Moutinho, H. R.; Dhere, R. G.; Jiang, C.S.; Al-Jassim, M. M.; Kazmerski, L. L.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860498; NREL/CP-520-37014; No Copyright; Avail.: Department of Energy Information Bridge

Conductive atomic force microscopy (C-AFM) is a recently developed technique that applies an electric voltage between a very sharp tip and the sample, permitting the study of the electrical properties of the sample with very high spatial resolution. It also provides current-voltage measurements at well-defined spots. C-AFM is applied simultaneously with atomic force microscopy, providing topographic and current images of the same region. In this work, we analyze CdTe/CdS samples, before

and after CdCl2 treatment, and after bromine/methanol and nitric/phosphoric etches. The as-deposited samples show grains with different contrasts, indicating that the material is not electrically uniform. The CdCl2 treatment resulted in less conductive grain boundaries, suggesting a relative decrease in the conductivity at these locations. After the bromine/methanol etch, the conductivity at grains boundaries was higher than inside the grains, whereas for the nitric/phosphoric etch the conductivity increased over the entire surface.
NTIS
Atomic Force Microscopy; Cadmium Tellurides; Electric Potential; Solar Cells; Spatial Resolution

20060011617 National Renewable Energy Lab., Golden, CO USA
Integrating Deposition, Processing, and Characterization Equipment within the National Center for Photovoltaics
Nelson, B.; Robbins, S.; Sheldon, P.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860497; NREL/CP-520-37018; No Copyright; Avail.: Department of Energy Information Bridge
The purpose of the process integration project of the National Center for Photovoltaics (NCPV) is to develop an infrastructure that will allow researchers to gain new knowledge that is difficult--if not impossible--to obtain with existing equipment. This difficulty is due, in part, to the state of our existing tool set, which lacks sufficient in-situ or real-time measurement capabilities, or lacks access to analytical tools where the sample remains in a controlled environment between deposition and processing or measurement. This new infrastructure will provide flexible and robust integration of deposition, processing (etching, annealing, etc.), and characterization tools via a standardized transfer interface such that samples move between tools in a controlled ambient. This concept will also require the cooperation of experts from various material technologies and characterization disciplines to work directly with each other to obtain answers to key scientific and technological questions. Ultimately, this synergistic effort between NREL staff, universities, and the photovoltaic (PV) industry--around an integrated tool base--will add to the PV knowledge base and help move many PV technologies forward.
NTIS
Characterization; Deposition; Photovoltaic Conversion; Solar Energy

20060011618 National Renewable Energy Lab., Golden, CO USA
Electronic and Optical Properties of Spinel TCOs: SnZn2O4, SnCd2O4, and Cdln2O4
Wei, S. H.; Segev, D.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860496; NREL/CO-520-37008; No Copyright; Avail.: Department of Energy Information Bridge
Using the band-structure method, we have studied the electronic and optical properties of the transparent conducting oxides SnZn2O4, SnCd2O4, and CdIn2O4. We analyzed the atomic and orbital characters of the band edge states and explained the general trends observed in the fundamental band gap, the optical band gap, the energy difference between the first and the second conduction bands, and the electron effective mass. General rules for designing more efficient transparent conducting oxides are proposed.
NTIS
Electrical Properties; Optical Properties; Oxides; Spinel; Transparence

20060011619 National Renewable Energy Lab., Golden, CO USA
High-Performance Photovoltaic Project Overview
Symko-Davies, M.; McConnell, R.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860495; NREL/CP-520-37013; No Copyright; Avail.: Department of Energy Information Bridge
The High-Performance Photovoltaic (HiPerf PV) Project was initiated by the U.S. Department of Energy to substantially increase the viability of photovoltaics (PV) for cost-competitive applications so that PV can contribute significantly to our energy supply and environment in the 21st century. To accomplish this, the National Center for Photovoltaics (NCPV) directs in-house and subcontracted research in high-performance polycrystalline thin-film and multijunction concentrator devices. In this paper, we describe the recent research accomplishments in the in-house directed efforts and the research efforts under way in the subcontracted area.
NTIS
Photovoltaic Conversion; Cost Effectiveness

20060011620 National Renewable Energy Lab., Golden, CO USA
Module Design, Materials, and Packaging Research Team: Activities and Capabilities
McMahon, T. J.; delCueto, J.; Glick, S.; Jorgensen, G.; Kempe, M.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860494; NREL/CP-520-36988; No Copyright; Avail.: National Technical Information Service (NTIS)

Our team activities are directed at improving PV module reliability by incorporating new, more effective, and less expensive packaging materials and techniques. New and existing materials or designs are evaluated before and during accelerated environmental exposure for the following properties: (1) Adhesion and cohesion: peel strength and lap shear. (2) Electrical conductivity: surface, bulk, interface and transients. (3) Water vapor transmission: solubility and diffusivity. (4) Accelerated weathering: ultraviolet, temperature, and damp heat tests. (5) Module and cell failure diagnostics: infrared imaging, individual cell shunt characterization, coring. (6) Fabrication improvements: SiOxNy barrier coatings and enhanced wet adhesion. (7) Numerical modeling: Moisture ingress/egress, module and cell performance, and cell-to-frame leakage current. (8) Rheological properties of polymer encapsulant and sheeting materials. Specific examples will be described.
NTIS
Modules; Packaging; Reliability

20060011621 National Renewable Energy Lab., Golden, CO USA
NREL PV Module Reliability and Performance R&D Status and Accomplishments
Osterwald, C. R.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860493; NREL/CP-520-36990; No Copyright; Avail.: Department of Energy Information Bridge

This paper presents a brief overview of the status and accomplishments during Fiscal Year (FY)2004 of the Photovoltaic (PV) Module Reliability and Performance R&D Subtask, which is part of the PV Module Reliability R&D Project (a joint NREL-Sandia project).
NTIS
Photovoltaic Cells; Reliability; Solar Energy

20060011622 National Renewable Energy Lab., Golden, CO USA
Correlation of DLTS and Performance of GalnNAs Cells
Kurtz, S.; Johnston, S.; Friedman, D.; Ptak, A.; Geisz, J.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860492; NREL/CP-520-36972; No Copyright; Avail.: National Technical Information Service (NTIS)

A four-junction GaInP/GaAs/GaInAsN/Ge solar cell should be able to reach 40% efficiency if each of the junctions can be made with a quality similar to that demonstrated for GaAs. However, the GaInAsN subcell has shown poor performance. Deep-level transient spectroscopy (DLTS) can elucidate recombination centers in a material and could help identify the problem with the GaInAsN. So far, DLTS studies of GaInAsN have shown many peaks. In this paper we compare the performance of the GaInAsN solar cells with the DLTS spectra to identify which DLTS peak is correlated with the device performance.
NTIS
Correlation; Solar Cells; Spectroscopic Analysis; Spectroscopy; Indium Phosphides; Gallium Phosphides; Gallium Arsenides

20060011623 National Renewable Energy Lab., Golden, CO USA
Packaging Materials and Design for Improved PV Module Reliability
Jorgensen, G.; Terwilliger, K.; Kempe, M.; Perm, J.; Glick, S.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860491; NREL/CP-520-36835; No Copyright; Avail.: Department of Energy Information Bridge

A number of candidate alternative encapsulant and soft backsheet materials have been evaluated in terms of their suitability for photovoltaic (PV) module packaging applications. Relevant properties, including peel strength as a function of damp heat exposure and permeability, have been measured. Based on these tests, promising new encapsulants with adhesion-promoting primers have been identified that result in improved properties. Test results for backsheets provided by industry and prepared at the National Renewable Energy Laboratory (NREL) have suggested strategies to achieve significantly improved products. The ability of glass/glass and glass/breathable backsheet constructions laminated with various encapsulant and/or edge seal materials to protect thin-film aluminum coatings deposited onto glass substrates was assessed. Glass/glass laminate constructions can trap harmful compounds that catalyze moisture-driven corrosion of the aluminum. Constructions with breathable backsheets allow higher rates of moisture ingress, but also allow egress of deleterious substances that can result in decreased corrosion.
NTIS
Encapsulating; Packaging; Photovoltaic Conversion; Reliability

20060011625 National Renewable Energy Lab., Golden, CO USA
Advanced Indoor Module Light-Soaking Facility
del Cueto, J. A.; Osterwald, C.; Pruett, J.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860490; NREL/CP-520-39686; No Copyright; Avail.: Department of Energy Information Bridge

An overview of the accelerated, indoor light-soaking test station is presented in this paper, along with data obtained for six modules that underwent exposure. The station comprises a climate-controlled chamber equipped with a solar simulator that allows 1-sun light intensity exposure. Concurrently, we monitor the electrical characteristics of multiple PV modules and exercise active control over their electrical bias using programmable electronic loads, interfaced to a data acquisition system that acquires power-tracking and current-voltage data. This capability allows us to the test different bias conditions and to cyclically alternate between them. Additionally, we can vary the light intensity and module temperatures to garner realistic temperature coefficients of module performance. Data obtained on cadmium telluride (CdTe) and amorphous silicon (a-Si) modules are presented.
NTIS
Solar Simulators; Modules; Electric Potential; Active Control

20060011626 National Renewable Energy Lab., Golden, CO USA
Scanning Tunneling Luminescence of Grain Boundaries in CU(In,Ga)Se2
Romero, M. J.; Jiang, C. S.; Al-Jassim, M. M.; Noufi, R.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860489; NREL/CP-520-36975; No Copyright; Avail.: Department of Energy Information Bridge

At the Laboratory, photon emission in semiconductors has been mapped in the nanoscale using scanning tunneling microscopy (STM). In this Solar Program Review Meeting, we report on the latest results obtained in Cu(In,Ga)Se2 (CIGS) thin films by this adapted STM. Scanning tunneling luminescence (STL) spectroscopy suggests that photons are emitted near the surface of CIGS. STL is excited either by (1) diffusion of tunneling electrons and subsequent recombination with available holes in CIGS or (2) impact ionization by hot electrons. Which process becomes predominant depends on the voltage applied to the STM tip. Photon mapping shows electronically active, extended defects near the surface of CIGS thin films.
NTIS
Grain Boundaries; Luminescence; Scanning Tunneling Microscopy

20060011627 National Renewable Energy Lab., Golden, CO USA
Development and Testing of Solar Reflectors
Kennedy, C.; Terwillinger, K.; Milbourne, M.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860488; NREL/CR-520-36582; No Copyright; Avail.: Department of Energy Information Bridge

To make concentrating solar power technologies more cost competitive, it is necessary to develop advanced reflector materials that are low in cost and maintain high reflectance for extended lifetimes under severe outdoor environments. The Advanced Materials Team performs durability testing of candidate solar reflectors at outdoor test sites and in accelerated weathering chambers. Several materials being developed by industry have been submitted for evaluation. These include silvered glass mirrors, aluminized reflectors, and front-surface mirrors. In addition to industry-supplied materials, NREL is funding the development of new, innovative reflectors, including a new commercial laminate reflector and an advanced solar reflective mirror (ASRM). To help commercialize the ASRM, a cost analysis was performed; it shows the total production cost could meet the goal. The development, performance, and durability of these candidate solar reflectors and cost analysis results will be described.
NTIS
Advanced Solid Rocket Motor (STS); Solar Reflectors

20060011638 National Renewable Energy Lab., Golden, CO USA
Thin Films and the Systems-Driven Approach
Zweibel, K.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860486; NREL/CP-520-36968; No Copyright; Avail.: National Technical Information Service (NTIS)

A systems-driven approach is used to discern tradeoffs between cost and efficiency improvements for various thin-film module technologies and designs. Prospects for reduced system cost via such strategies are enhanced as balance-of-systems

costs decline, and some strategies are identified for greater research focus.
NTIS
Solar Energy; Thin Films

20060011639 National Renewable Energy Lab., Golden, CO USA
Recent and Planned Enhancements for PVWATTS
Marion, B.; Anderberg, M.; Gray-Hann, P.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860485; NREL/CP-520-37016; No Copyright; Avail.: National Technical Information Service (NTIS)

PVWATTS is an Internet-accessible software program that allows the user to easily calculate the energy production and cost savings for grid-connected photovoltaic (PV) systems located throughout the USA. Recent enhancements have been made to allow the user to define the system location by the use of zip code or latitude and longitude coordinates, and to receive more detailed performance information by providing a.c. energy production for each hour of the year. Future enhancements under consideration are also discussed. They include more flexibility for the user in defining system losses from soiling and in the conversion from d.c. to a.c. power, an option for international locations, and accounting for PV module shading.
NTIS
Augmentation; Photovoltaic Cells; Simulation; Spatial Resolution

20060011640 National Renewable Energy Lab., Golden, CO USA
Outreach is Serious Fun
Larsen, W.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860484; NREL/CP-520-36977; No Copyright; Avail.: Department of Energy Information Bridge

This paper outlines the planning and effort that goes into a successful, inexpensive outreach project. Since 1996, the National Renewable Energy Laboratory has had an educational exhibit booth and has also presented workshops on renewable energy at the two-week-long National Western Stock Show held each January in Denver, Colorado. In our exhibit booth and workshops, farmers, ranchers, and homeowners learn how solar, wind, and biomass energy systems can provide economical electricity for the agricultural community. We show how this outreach has grown to include the presentation of renewable energy exhibits at events in South Dakota and Illinois at the request of the Deputy Secretary for Energy of the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy, and our support of the U.S. Department of Agriculture in Kansas and Nebraska on the issuance of the 2004 Farm Bill.
NTIS
Electricity; Renewable Energy

20060011647 National Renewable Energy Lab., Golden, CO USA
Small Hybrid Systems and Applications Testing at NREL's Outdoor Test Facility
Roybal, L.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2005-860830; NREL/CP-520-37078; No Copyright; Avail.: National Technical Information Service (NTIS)

The PV International Program at the National Renewable Energy Laboratory recently installed a small hybrid solar and wind energy system that could produce enough electricity to power a cabin or provide electricity in a remote village, without being connected to a utility grid. The solar system can provide 1,400 watts of power, and the wind turbine is rated at 900 watts when the wind is blowing at 28 miles per hour. The 48-volt system has eight batteries for storage. When the batteries are fully charged, the control system slows down the wind turbine so as not to overcharge the batteries. The turbine is mounted on a tilt-down, guyless, 30-foot tower that allows one person to easily lower and raise the machine for maintenance. A data acquisition system is being designed to monitor the individual outputs from the solar system and the wind system. The small hybrid system is housed in an insulated shed, the PV International Program's Test Building (ITB). The ITB contains electrical loads found in the average home, including a refrigerator, lights, heaters, air coolers, computers, and a radio.
NTIS
Energy Conservation; Renewable Energy; Solar Energy; Test Facilities; Windpower Utilization

45
ENVIRONMENT POLLUTION

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

20060011227 Environmental Protection Agency, Research Triangle Park, NC USA
National Scale Modeling of Air Toxics for the Mobile Source Air Toxics Rule, Technical Support Document
Jan. 2006; 228 pp.; In English
Report No.(s): PB2006-105743; EPA-454/R-06-002; No Copyright; Avail.: CASI: A11, Hardcopy

The purpose of the work described in this technical document was to project emissions for mobile source hazardous air pollutants (HAPs) to 2007, 2010, 2015, 2020, and 2030 from the 1999 National Emissions Inventory Version 3 (NEI), conduct air quality and exposure modeling, and estimate cancer and non-cancer risk for select future years. Air quality modeling utilized the Assessment System for Population Exposure Nationwide (ASPEN) model. Exposure modeling utilized the Hazardous Air Pollutant Exposure Model, Version 5 (HAPEM5). Modeling was done for reference cases, which included programs currently planned and in place, as well as control scenarios that evaluated potential impacts of additional control programs. This work was done to support regulatory needs related to the 2006 proposed mobile source air toxics rule. Intermediate year inventories for 2002 through 2010, inclusive, were also developed to support other program needs in the Office of Air and Radiation.
NTIS
Support Systems; Air Quality; Environment Models

20060011243 NASA Langley Research Center, Hampton, VA, USA
Science Overview: The LTTG Technology Review Meeting March 2006 Summary Report
Bruning, Claus; Ko, Malcolm; Lee, David; Miake-Lye, Richard; March 2006; 12 pp.; In English; LTTG Technology Review Meeting, 20-24 Mar. 2006, London, UK; Copyright; Avail.: CASI: A03, Hardcopy

This report presents an overview of the latest scientific consensus understanding of the effect of aviation emissions on the atmosphere for both local air quality and climate change in order to provide a contextual framework for raising future questions to help assess the environmental benefits of technology goals. Although studies of the two issues share a common framework (of quantifying the emissions, the change in concentrations in the atmosphere, and the environmental impacts), the communities of practitioners are distinctly different. The scientific community will continue to provide guidelines on trade-off among different contributors to a specific environmental impact, such as global climate, or local air quality. Ultimately, monetization of the costs and benefits of mitigation actions is the proper tool for quantifying and analyzing trade-offs between the two issues. Scientific assessment of the impacts and their uncertainties are critical inputs to these analyses. Until environmental effects of aviation emerge as a policy driven issue, there is little incentive within the scientific community to focus on research efforts specific to trade-off studies between local and global impacts.
Author
Science; Technologies; Earth Environment; Exhaust Emission; General Overviews; Civil Aviation

20060011265 Marine Mammal Commission, Washington, DC, USA
Advisory Committee on Acoustic Impacts on Marine Mammals: Report to the Marine Mammal Commission, February 1, 2006
Orenstein, S.; Langstaff, L.; Feb. 01, 2006; 140 pp.; In English
Report No.(s): PB2006-107706; No Copyright; Avail.: National Technical Information Service (NTIS)

In 2003 the U.S. Congress, through the Omnibus Appropriations Act of 2003, directed the Marine Mammal Commission (Commission) to fund an international conference or series of conferences to share findings, survey acoustic 'threats' to marine mammals, and develop means of reducing those threats while maintaining the oceans as a global highway of international commerce. The potential for human-generated (anthropogenic) sources of sound to affect marine mammals had been discussed in many forums in recent years, and had been the subject of four reports since 1994 from the National Research Council of the National Academy of Sciences. These previous efforts pointed to the need for more specific information about the effects of chronic and episodic sound on marine mammals and the means of reducing them.
NTIS
Acuity; Auditory Perception; Marine Mammals; Signal Transmission; Sound Waves

20060011266 Nuclear Waste Technical Review Board, Washington, DC, USA

U.S. Nuclear Waste Technical Review Board Fiscal Year (FY) 2007 Budget Request Submittal Including Performance Evaluation for FY 2005 and Supplementary Information About the Board

January 2005; 32 pp.; In English

Report No.(s): PB2006-107703; No Copyright; Avail.: National Technical Information Service (NTIS)

This is the U.S. Nuclear Waste Technical Review Board's performance-based budget request for fiscal year (FY) 2007. The request will support the Board efforts to achieve its performance goals for the year. The performance goals are listed in the budget document and have been established in accordance with the Board's congressional mandate: To conduct an independent evaluation of the technical and scientific validity of U.S. Department of Energy (DOE) activities related to disposing of commercial spent nuclear fuel and defense high-level radioactive waste. These activities include evaluating the proposed Yucca Mountain repository and packaging and transporting the waste. The Board's ongoing peer review is vital to the credibility of the DOE's technical and scientific activities.

NTIS

Evaluation; Mountains; Performance Tests; Radioactive Wastes; Waste Disposal

20060011278 Commerce Dept., Washington, DC, USA

Proceedings of the International Conference on Volcanic Ash and Aviation Safety (2nd). Held in Alexandria, Virginia on June 21-24, 2004

Nov. 2004; 354 pp.; In English; International Conference on Volcanic Ash and Aviation Safety (2nd)., June 21 - 24, 2004, Alexandria, Virginia

Report No.(s): PB2006-107683; No Copyright; Avail.: National Technical Information Service (NTIS)

In February 1997, the White House Commission on Aviation Safety and Security recommended a national goal for government and industry of reducing the fatal aviation accident rate by 80 percent in 10 years. The National Aviation Weather Program Council adopted the 80 percent reduction goal and in February 1999 the National Aviation Weather Initiatives document was published as the next major step in coordinating the many federal and nonfederal programs relevant to improving aviation safety. Because of the serious threat posed by volcanic ash and other airborne hazardous materials, these were identified as one of the principal service areas for the aviation weather program. Although there have been no fatal accidents caused by encounters with volcanic ash, there have been close calls with aircraft experiencing in-flight engine failures. Fortunately, these aircraft were able to land safely, but in some instances the cost to repair the aircraft was in the millions of dollars. The fact that there have not been recent incidents or accidents speaks to the work of the Volcanic Ash Advisory Centers around the world but there is more we can do to ensure that encounters are reduced to zero and that there is never a fatal accident resulting from a volcanic ash encounter. This document summarizes the proceedings of the 2nd International Conference on Volcanic Ash and Aviation Safety and provides a roadmap for building on our successes in aviation safety over the next decade.

NTIS

Air Pollution; Aircraft Safety; Ashes; Conferences; Flight Safety; Volcanoes

20060011279 Commerce Dept., Washington, DC, USA

Proceedings of the Workshop on Effective Emergency Response: Selecting a Suitable Dispersion Model for a Given Application. Held in Crystal City, Virginia on December 5-6, 2001

May 2002; 54 pp.; In English; Workshop on Effective Emergency Response: Selecting a Suitable Dispersion Model for a Given Application., December 5 - 6, 2001, Crystal City, Virginia

Report No.(s): PB2006-107661; No Copyright; Avail.: CASI: A04, Hardcopy

The Workshop on Effective Emergency Response was held December 3-5, 2001 at Crowne Plaza Washington National Airport Hotel, Crystal City, Virginia. The theme of Forum was ' Selecting a Suitable Dispersion Model for a Given Application.' A crosssection of nearly 90 people participated in the workshop, including representatives of the government, private, academic, and other sectors. The workshop was sponsored by the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM). The purpose of the workshop was to address issues associated with the number and variety of atmospheric transport and diffusion (ATD) models existing today in the federal government. In particular, participants considered what models should be used in particular situations and how those models are evaluated. The overarching goal of the workshop was to define a framework for supporting the objective determination of the most appropriate dispersion model to be used in a given situation.

NTIS

Air Pollution; Atmospheric Circulation; Atmospheric Diffusion; Conferences; Diffusion; Emergencies

20060011284 MACTEC Federal Programs, Inc., Research Triangle Park, NC, USA
Compliance Guide for Small Businesses to the Reinforced Plastic Composites Production, NESHAP, 40 CFR 63, Subpart WWWW
Sep. 2005; 28 pp.; In English
Report No.(s): PB2006-107488; No Copyright; Avail.: CASI: A03, Hardcopy

You should use this guide to (1) determine if the Reinforced Plastic Composites NESHAP applies to your facility, and (2) to understand the requirements of the rule if it does apply to your facility. Chapter 2 of this document addresses primarily those aspects of the rule that will help you determine if the rule applies to your facility. Chapter 3 of this document has a table that shows you where to find specific requirements in the rule. This table is the 'Requirements Matrix.'
NTIS
Commerce; Composite Materials; Reinforced Plastics

20060011285 Office of Air Quality Planning and Standards, Research Triangle Park, NC USA
Economic Impact Analysis for the Federal Implementation Plans Under the Clean Air Act for Indian Reservations in Idaho, Oregon, and Washington
Bradley, L.; Dec. 2004; 154 pp.; In English
Report No.(s): PB2006-107487; EPA-452/R-04-010; No Copyright; Avail.: CASI: A08, Hardcopy

In the Clean Air Act (CAA), Congress gave the U.S. Environmental Protection Agency (EPA) broad authority to protect air resources throughout the nation, including the air resources on Indian reservations. To meet this commitment to protect human health and air quality resources, EPA Region 10 developed gap-filling rules for Indian reservations in Idaho, Oregon, and Washington. The rules will regulate activities, pollutants, and sources by supplementing the existing Federal regulatory programs. These rules will provide regulatory tools for use by EPA Region 10 in implementing the CAA on Indian reservations, in addition to the regulations already established by EPA. This report evaluates the economic impacts resulting from these regulations.
NTIS
Air Quality; Economic Impact; Environment Protection

20060011298 California Inst. of Tech., Pasadena, CA USA
Development of On-Line Instrumentation and Techniques to Detect and Measure Particulates. Quarterly Technical Progress Report
Wu, S.; Paml, S.; Tang, Y.; Goddard, W. A.; Apr. 30, 2005; 18 pp.; In English
Report No.(s): DE2005-840431; No Copyright; Avail.: National Technical Information Service (NTIS)

In this quarter, we have rebuilt a new multiwavelength light source which boasts over 300mW combined output from 10 different wavelengths and loss of less than 15% for each wavelength and it is much more flexible than the previous version too. Compared to the previous version, the efficiency and construction complexity have been dramatically improved for field use. We also have refined the diode pumped laser which now could give out more pulse energy than before, and this will improve the signal to noise ratio. We are also using the water jet we built in the 2nd quarter to calibrate our laser scattering outside the engine exhaust, and water jet calibration data is used to simulate the scattering results in the exhaust line.
NTIS
On-Line Systems; Particulates; Detection

20060011308 Bechtel SAIC Company, LLC, Las Vagas, NV, USA, Itasca Consulting Group, Inc., Minneapolis, MN, USA
Thermal-Hydrologic-Mechanical Study of Pre-Closure Off-Normal Thermal Scenarios at Proposed Yucca Mountain Nuclear Waste Repository
January 2005; 12 pp.; In English
Report No.(s): DE2005-838907; No Copyright; Avail.: Department of Energy Information Bridge

The proposed nuclear waste repository at Yucca Mountain, Nevada currently includes a minimum of 50 years forced ventilation inside of emplacement drifts prior to repository closure. To regulate the heat generated from emplaced waste packages, the ventilation during the pre-closure period should be continuous. Off-normal thermal scenarios that consider temporary shutdown of the pre-closure ventilation are investigated to determine the impacts of ventilation shutdown on the thermal-hydrologic-mechanical behaviors of the emplacement drifts. In-drift heat transfer processes including radiation, convection, and conduction are studied. The analysis provides a ventilation heat removal ratio that varies on the drift location and the ventilation duration. The heat removal ratio is transferred and utilized in the NUFT thermal-hydrology software. The

NUFT software is used to investigate the thermal-hydrologic impacts on the repository rock mass for the off-normal thermal scenarios with various shutdown durations at various pre-closure times. The predicted rock mss temperature evaluated from the thermalhydrologic analysis is applied for the thermal-mechanical analysis of the off-normal thermal scenarios. The results show that degradation and rockfall of the emplacement drifts due to the off-normal thermal scenarios will be minimal, and it is concluded that the impacts of off-normal thermal scenarios on the stability of the emplacement drifis will be insignificant.
NTIS
Biomass; Mountains; Radioactive Wastes; Waste Disposal

20060011313 Agricultural Research Service, Phoenix, AZ, USA
Elevated CO(2) and Limited Water Supply Effects on Carbon Processes and Sequestration in a C4 Grass (Sorghum) Ecosystem. Final Report
January 2006; 10 pp.; In English
Report No.(s): DE2006-841876; No Copyright; Avail.: Department of Energy Information Bridge
No abstract available
Carbon; Carbon Dioxide; Ecosystems; Grasses; Sorghum; Water

20060011319 TECHSVCTRAIN, Inc., Jacksonville, FL, USA
Locomotive Emission and Engine Idle Reduction Technology Demonstration Project (April 8, 2003 - March 31, 2005)
Archer, J. R.; January 2006; 122 pp.; In English
Report No.(s): DE2006-838872; No Copyright; Avail.: National Technical Information Service (NTIS)
In response to a USA Department of Energy (DOE) solicitation, the Maryland Energy Administration (MEA), in partnership with CSX Transportation, Inc. (CSXT), submitted a proposal to DOE to support the demonstration of Auxiliary Power Unit (APU) technology on fifty-six CSXT locomotives. The project purpose was to demonstrate the idle fuel savings, the Nitrous Oxide (NOX) emissions reduction and the noise reduction capabilities of the APU. Fifty-six CSXT Baltimore Division locomotives were equipped with APUs, Engine Run Managers (ERM) and communications equipment to permit GPS tracking and data collection from the locomotives. Throughout the report there is mention of the percent time spent in the State of Maryland. The fifty-six locomotives spent most of their time inside the borders of Maryland and some spent all their time inside the state borders. Usually when a locomotive traveled beyond the Maryland State border it was into an adjoining state. They were divided into four groups according to assignment: - Power Unit/Switcher Mate units, Remote Control units, SD50 Pusher units and Other units. The primary data of interest were idle data plus the status of the locomotive - stationary or moving. Also collected were main engine off, idling or working. Idle data were collected by county location, by locomotive status (stationary or moving) and type of idle (Idle 1, main engine idling, APU off; Idle 2, main engine off, APU on; Idle 3, main engine off, APU off; Idle 4, main engine idle, APU on). Desirable main engine idle states are main engine off and APU off or main engine off and APU on. Measuring the time the main engine spends in these desirable states versus the total time it could spend in an engine idling state allows the calculation of Percent Idle Management Effectiveness (%IME). IME is the result of the operation of the APU plus the implementation of CSXT's Warm Weather Shutdown Policy. It is difficult to separate the two. The units demonstrated an IME of 64% at stationary idle for the test period. The data collected during calendar year 2004 demonstrated that 707,600 gallons of fuel were saved and 285 tons of NOX were not emitted as a result of idle management in stationary idle, which translates to 12,636 gallons and 5.1 tons of NOx per unit respectively. The noise reduction capabilities of the APU demonstrated that at 150 feet from the locomotive the loaded APU with the main engine shut down generated noise that was only marginally above ambient noise level.
NTIS
Exhaust Emission; Locomotives; Noise Reduction

20060011609 Brookhaven National Lab., Upton, NY USA
Influence of Elevated Ozone and Carbon Dioxide on Insect Densities
DeLucia, E. H.; Dermody, O.; O'Neill, B.; Aldea, M.; Hamilton, J. G.; Nov. 2005; 10 pp.; In English
Report No.(s): DE2006-861653; BNL-75251-2005-CP; No Copyright; Avail.: Department of Energy Information Bridge
The combustion of fossil fuels is profoundly altering the chemical composition of the atmosphere. Beginning with the Industrial Revolution, the concentration of carbon dioxide in the atmosphere has increased from approximately 280 to 370(micro)l l(sup -1) in 2004, and it is expected to exceed 550(micro)l l(sup -1) by 2050. Tropospheric ozone has risen even more rapidly than CO(sub 2) and average summer concentrations in the Northern Hemisphere are expected to continue to increase by 0.5-2.5% per year over the next 30 years. Although elevated CO(sub 2) stimulates photosynthesis and productivity

of terrestrial ecosystems, ozone (O(sub 3)) is deleterious. In addition to directly affecting the physiology and productivity of crops, increased concentrations of tropospheric CO(sub 2) and O(sub 3) are predicted to lower the nutritional quality of leaves, which has the potential to increase herbivory as insects eat more to meet their nutritional demands. We tested the hypothesis that changes in tropospheric chemistry affect the relationship between plants and insect herbivores by changing leaf quality. The susceptibility to herbivory of soybean grown in elevated CO(sub 2) or O(sub 3) was examined using free air gas concentration enrichment (SoyFACE). FACE technology has the advantage that plants are cultivated under realistic field conditions with no unwanted alteration of microclimate or artificial constraints on the insect community.
NTIS
Air Pollution; Carbon Dioxide; Insects; Ozone

20060012027 Dames and Moore, CA, USA
Evaluation of Carbon Monoxide Emissions Models and Mobile Source Dispersion Models Applicable to Alaskan Cities
Dec. 1986; 70 pp.; In English
Report No.(s): PB2006-108262; No Copyright; Avail.: CASI: A04, Hardcopy

This report describes an investigation of state-of-the-art models for predicting the impact on air quality of additions or changes to a highway system identified by the U.S. Environmental Protection Agency as a 'non-attainment area' for air quality standards, and identifies one, CALINE4, as a potentially useful tool to the Alaska Department of Transportation and Public Facilities. Alaska currently has two cities, Anchorage and Fairbanks, where non-attainment of carbon monoxide standards are identified during winter periods. Based on this report and other investigations, the time is considered appropriate for implementing an air quality modeling capability into the routine operations of the Department's Environmental Sections of the Divisions of Design and Construction.
NTIS
Carbon Monoxide; Contaminants; Exhaust Gases

20060012028 Science Applications International Corp., San Rafael, CA, USA
Methodologies for Estimating Emission and Travel Activity Effects of TCMs
Austin, B. S.; Heiken, J. G.; Shepard, S. B.; Duvall, L. L.; Jul. 1994; 168 pp.; In English
Report No.(s): PB2006-108257; No Copyright; Avail.: CASI: A08, Hardcopy

The 1990 Clean Air Act Amendments (CAAA) created a range of new, more stringent transportation control requirements. Major federal agencies such as EPA and the Department of Transportation must work together to ensure that transportation projects further attainment of air quality goals (conformity); the private sector must market a new slate of alternative, less polluting fuels; states must take action in the more serious nonattainment areas to offset any emissions growth related to increased vehicle miles travelled (VMT); and many state and local government agencies must implement transportation control measures (TCMs) that modify driving behavior and limit emissions resulting from traffic congestion. To help understand and meet the new Clean Air Act's requirements, Congress instructed the EPA to publish a number of guidance documents related to transportation control. This document is one of the many EPA-sponsored publications which state and local governments may find useful as they work to achieve their transportation planning goals.
NTIS
Estimating; Exhaust Emission; Transportation

20060012034 Carnegie-Mellon Univ., Pittsburgh, PA USA
Atmospheric Aerosol Source-Receptor Relationships: The Role Of Coal-Fired Power Plants
Apr. 2005; 50 pp.; In English
Report No.(s): DE2005-840468; No Copyright; Avail.: Department of Energy Information Bridge

This report describes the technical progress made on the Pittsburgh Air Quality Study (PAQS) during the period of September 2004 through February 2005. Significant progress was made this project period on the analysis of ambient data, source apportionment, and deterministic modeling activities. The major experimental achievement this project period was the characterization of the mercury and fine particle emissions from two modern, large, commercial pulverized coal boilers. This testing completes the field work component of the Source Characterization Activity. This report highlights results from mercury emission measurements made using a dilution sampler. The measurements clearly indicate that mercury is being transformed from an oxidized to an elemental state within the dilution. This report highlights results from mercury emission measurements made using a dilution sampler. The measurements clearly indicate that mercury is being transformed from an oxidized to an elemental state within the dilution. This report also presents results from an analysis that uses spherical

aluminum silicate (SAS) particles as a marker for primary PM2.5 emitted from coal combustion. Primary emissions from coal combustion contribute only a small fraction of the PM2.5 mass (less than 1.5% in the summer and less than 3% in the winter) at the Pittsburgh site. This report also presents results from applying the Unmix and PMF models to estimate the contribution of different sources to the PM2.5 mass concentrations in Pittsburgh using aerosol composition information. Comparison of the two models shows similar source composition and contribution for five factors: crustal material, nitrate, an Fe, Mn, and Zn factor, specialty steel production, and a cadmium factor. PMF found several additional factors.
NTIS
Aerosols; Air Quality; Coal; Combustion; Particulates

20060012042 Texas Univ., Austin, TX, USA
CO(sup 2) Capture by Absorption with Potassium Carbonate
Rochelle, G. T.; Chen, E.; Lu, J.; Apr. 29, 2005; 40 pp.; In English
Report No.(s): DE2005-840473; No Copyright; Avail.: National Technical Information Service (NTIS)

The objective of this work is to improve the process for CO(sub 2) capture by alkanolamine absorption/stripping by developing an alternative solvent, aqueous K (sub 2)CO(sub 3) promoted by piperazine. Stripper modeling suggests the energy requirement with a simple stripper will be about the same for 5 m K(sup +)/2.5 m PZ and 7 m MEA. Modeling with a generic solvent shows that the optimum heat of CO(sub 2) desorption to minimize heat duty lies between 15 and 25 kcal/gmol. On-line pH and density measurements are effective indicators of loading and total alkalinity for the K+/PZ solvent. The baseline pilot plant campaign with 30% MEA has been started.
NTIS
Carbon Dioxide; Carbonates; Potassium

20060012045 Environmental Protection Agency, Washington, DC, USA
Final Report on the World Trade Center (WTC) Dust Screening Method Study
Aug. 17, 2005; 76 pp.; In English
Report No.(s): PB2006-107535; No Copyright; Avail.: National Technical Information Service (NTIS)

The objective of this effort was to develop and validate a means of determining whether dust sampled as part of EPA's planned sampling program contains residual contamination attributable to the collapse of the World Trade Center (WTC) towers. The tested screening method is a critical component of the sampling program as it will be used for two primary purposes: (1) to determine the geographic extent of the dust remaining from the collapse impact, and (2) along with the results from contaminants of potential concern (COPC) testing, to determine the need for a clean-up of the sampled areas.
NTIS
Air Pollution; Dust; Indoor Air Pollution; Pollution Monitoring

20060012053 Florida State Univ., Tallahassee, FL, USA
Dependence of Cloud Particle Size on Non-Aerosol-Loading Related Variables
Shao, H.; Liu, G.; January 2005; 110 pp.; In English
Report No.(s): DE2005-841483; No Copyright; Avail.: National Technical Information Service (NTIS)

An enhanced concentration of aerosol may increase the number of cloud drops by providing more cloud condensation nuclei (CCN), which in turn results in a higher cloud albedo at a constant cloud liquid water path. This process is often referred to as the aerosol indirect effect (AIE). Many in situ and remote sensing observations support this hypothesis (Ramanathan et al. 2001). However, satellite observed relations between aerosol concentration and cloud drop size are not always in agreement with the AIE. Based on global analysis of cloud effective radius (r(sub e)) and aerosol number concentration (N(sub a)) derived from satellite data, Sekiguchi et al. (2003) found that the correlations between the two variables can be either negative, or positive, or none, depending on the location of the clouds. They discovered that significantly negative r(sub e) - N(sub a) correlation can only be identified along coastal regions of the continents where abundant continental aerosols inflow from land, whereas Feingold et al. (2001) found that the response of r(sub e) to aerosol loading is the greatest in the region where aerosol optical depth ((tau)(sub a)) is the smallest. The reason for the discrepancy is likely due to the variations in cloud macroscopic properties such as geometrical thickness (Brenguier et al. 2003). Since r(sub e) is modified not only by aerosol but also by cloud geometrical thickness (H), the correlation between re and (tau)(sub a) actually reflects both the aerosol indirect effect and dependence of H. Therefore, discussing AIE based on the r(sub e)-(tau)(sub a) correlation without taking into account variations in cloud geometrical thickness may be misleading. This paper is motivated to extract aerosols' effect from overall

effects using the independent measurements of cloud geometrical thickness, (tau)(sub a) and r(sub e).
NTIS
Aerosols; Clouds (Meteorology)

20060012054 California Univ., Santa Barbara, CA, USA
Effect of Non-Lambertian Surface Reflectance on Aerosol Radiative Forcing
Ricchiazzi, P.; O'Hirok, W.; Gautier, C.; Mar. 2005; 1 pp.; In English
Report No.(s): DE2005-841476; No Copyright; Avail.: National Technical Information Service (NTIS)

Surface reflectance is an important factor in determining the strength of aerosol radiative forcing. Previous studies of radiative forcing assumed that the reflected surface radiance is isotropic and does not depend on incident illumination angle. This Lambertian reflection model is not a very good descriptor of reflectance from real land and ocean surfaces. In this study we present computational results for the seasonal average of short and long wave aerosol radiative forcing at the top of the atmosphere and at the surface. The effect of the Lambertian assumption is found through comparison with calculations using a more detailed bi-direction reflectance distribution function (BRDF).
NTIS
Aerosols; Lambert Surface; Spectral Reflectance; Surface Properties

20060012055 Central Aerological Observatory, Dolgoprudnyi, Russian Federation, Academy of Sciences (Russia), Moscow, Russian Federation
Influence of High Aerosol Concentration on Atmospheric Boundary Layer Temperature Stratification
Khaykin, M. N.; Kadygrove, E. N.; Golitsyn, G. S.; January 2005; 114 pp.; In English
Report No.(s): DE2005-841474; No Copyright; Avail.: National Technical Information Service (NTIS)

Investigations of the changing in the atmospheric boundary layer (ABL) radiation balance as cased by natural and anthropogenic reasons is an important topic of the U.S. Department of Energy's Atmospheric Radiation Measurement (ARM) program. The influence of aerosol on temperature stratification of ABL while its concentration was extremely high within a long period of time was studied experimentally. The case was observed in Moscow region (Russia) with the transport of combustion products from peat-bog and forest fires in July-September, 2002. At this time the visibility was some times at about 100-300 m. Aerosol concentration measured by Moscow University Observatory and A.M. Obukhov Institute of Atmospheric Physics field station in Zvenigorod (55.7 N; 36.6 E) for several days was in 50-100 times more than background one (Gorchakov at al 2003). The high aerosol concentration can change the radiation balance at ABL, and so to change thermal stratification in ABL above the mega lopolis. For the analysis the data were used of synchronous measurements by MTP-5 (Microwave Temperature Profiler operating at wavelength 5 mm) in two locations, namely: downtown Moscow and country-side which is 50 km apart to the West (Zvenigorod station).
NTIS
Aerosols; Atmospheric Boundary Layer; Atmospheric Stratification; Boundary Layers; Temperature Distribution

20060012073 Ohio Univ., Athens, OH, USA, CONSOL Energy, Inc., South Park, PA, USA, Westinghouse Electric Corp., Pittsburgh, PA, USA, Atmospheric and Environmental Research, Inc., Lexington, MA, USA
Evaluation of the Emission, Transport, and Deposition of Mercury, Fine Particulate Matter, and Arsenic from Coal-Based Power Plants in the Ohio River Valley Region. Semi-Annual Technical Progress Report for the Period October 3, 2004-April 2, 2005
Crist, K.; Apr. 01, 2005; 28 pp.; In English
Report No.(s): DE2005-841386; No Copyright; Avail.: National Technical Information Service (NTIS)

Ohio University, in collaboration with CONSOL Energy, Advanced Technology Systems, Inc (ATS) and Atmospheric and Environmental Research, Inc. (AER) as subcontractors, is evaluating the impact of emissions from coal-fired power plants in the Ohio River Valley region as they relate to the transport and deposition of mercury, arsenic, and associated fine particulate matter. This evaluation will involve two interrelated areas of effort: ambient air monitoring and regional-scale modeling analysis. The scope of work for the ambient air monitoring will include the deployment of a surface air monitoring (SAM) station in southeastern Ohio. The SAM station will contain sampling equipment to collect and measure mercury (including speciated forms of mercury and wet and dry deposited mercury), arsenic, particulate matter (PM) mass, PM composition, and gaseous criteria pollutants (CO, NO(sub x), SO(sub 2), O(sub 3), etc.). Laboratory analysis of time-integrated samples will be used to obtain chemical speciation of ambient PM composition and mercury in precipitation. Near-real-time measurements will be used to measure the ambient concentrations of PM mass and all gaseous species including Hg(sup 0) and RGM.

Approximately of 18 months of field data will be collected at the SAM site to validate the proposed regional model simulations for episodic and seasonal model runs. The ambient air quality data will also provide mercury, arsenic, and fine particulate matter data that can be used by Ohio Valley industries to assess performance on multi-pollutant control systems. The scope of work for the modeling analysis will include (1) development of updated inventories of mercury and arsenic emissions from coal plants and other important sources in the modeled domain; (2) adapting an existing 3-D atmospheric chemical transport model to incorporate recent advancements in the understanding of mercury transformations in the atmosphere; (3) analyses of the flux of Hg(sup 0), RGM, arsenic, and fine particulate matter in the different sectors of the study region to identify key transport mechanisms; (4) comparison of cross correlations between species from the model results to observations in order to evaluate characteristics of specific air masses associated with long-range transport from a specified source region; and (5) evaluation of the sensitivity of these correlations to emissions from regions along the transport path.
NTIS
Air Pollution; Coal; Particulates; Pollution Control; Rivers; Valleys

20060012078 Research Triangle Inst., Research Triangle Park, NC USA
Carbon Dioxide Capture From Flue Gas Using Dry Regenerable Sorbents. Quarterly Technical Progress Report
Green, D. A.; Nelson, T.; Turk, B. S.; Portzer, J. W.; Gupta, R. P.; Apr. 2005; 24 pp.; In English
Report No.(s): DE2005-841299; No Copyright; Avail.: National Technical Information Service (NTIS)

This report describes research conducted between January 1, 2005 and March 31, 2005 on the use of dry regenerable sorbents for removal of carbon dioxide from flue gas. Engineered sorbents composed of sodium carbonate on a ceramic support were tested in a laboratory fluidized bed reactor system and found to be capable of essentially complete removal of carbon dioxide at 60 C in a short residence time. Upon breakthrough the sorbents can be thermally regenerated to recover essentially all of the absorbed carbon dioxide. An optimized supported sorbent tested in a pilot-scale entrained bed absorber retained its reactivity in multicycle tests and experienced no attrition. Removal of \g90% of carbon dioxide in simulated flue gas was achieved in an entrained bed reactor.
NTIS
Carbon Dioxide; Drying; Flue Gases; Sorbents

20060012079 Montana State Univ., Billings, MT, USA, Boise State Univ., Boise, ID, USA, South Dakota School of Mines and Technology, Rapid City, SD, USA, Texas A&M Univ., College Station, TX, USA
Big Sky Carbon Sequestration Partnership. Quarterly Report for January 1, 2005-March 31, 2005
January 2005; 116 pp.; In English
Report No.(s): DE2005-841147; No Copyright; Avail.: National Technical Information Service (NTIS)

The Big Sky Carbon Sequestration Partnership, led by Montana State University, is comprised of research institutions, public entities and private sectors organizations, and the Confederated Salish and Kootenai Tribes and the Nez Perce Tribe. Efforts under this Partnership in Phase I fall into four areas: evaluation of sources and carbon sequestration sinks that will be used to determine the location of pilot demonstrations in Phase II; development of GIS-based reporting framework that links with national networks; designing an integrated suite of monitoring, measuring, and verification technologies and assessment frameworks; and initiating a comprehensive education and outreach program. The groundwork is in place to provide an assessment of storage capabilities for CO(sub 2) utilizing the resources found in the Partnership region (both geological and terrestrial sinks), that would complement the ongoing DOE research agenda in Carbon Sequestration. The region has a diverse array of geological formations that could provide storage options for carbon in one or more of its three states. Likewise, initial estimates of terrestrial sinks indicate a vast potential for increasing and maintaining soil C on forested, agricultural, and reclaimed lands. Both options include the potential for offsetting economic benefits to industry and society. Steps have been taken to assure that the GIS-based framework is consistent among types of sinks within the Big Sky Partnership area and with the efforts of other DOE regional partnerships. The Partnership recognizes the critical importance of measurement, monitoring, and verification technologies to support not only carbon trading but all policies and programs that DOE and other agencies may want to pursue in support of GHG mitigation.
NTIS
Carbon; Montana; Organizations; Agriculture; Economics; Industries; Soils

20060012080 Ohio State Univ., Columbus, OH, USA
Carbon Sequestration in Reclaimed Mined Soils of Ohio
January 2005; 20 pp.; In English
Report No.(s): DE2005-841145; No Copyright; Avail.: Department of Energy Information Bridge

Assessment of soil organic carbon (SOC) sequestration potential of reclaimed minesoils (RMS) is important for preserving environmental quality and increasing agronomic yields. The mechanism of physical SOC sequestration is achieved by encapsulation of SOM in spaces within macro and microaggregates. The experimental sites, owned and maintained by American Electrical Power, were characterized by distinct age chronosequences of reclaimed minesoils and were located in Guernsey, Morgan, Noble, and Muskingum Counties of Ohio. These sites were reclaimed both with and without topsoil application, and were under continuous grass or forest cover. In this report results are presented from the sites reclaimed in 2003 (R03-G), in 1973 (R73-F), in 1969 (R69-G), in 1962 (R62-G and R62-F) and in 1957 (R57-F). Three sites are under continuous grass cover and the three under forest cover since reclamation. Three bulk soil samples were collected from each site from three landscape positions (upper; middle, and lower) for 0-15 and 15-30 cm depths. The samples were air dried and using wet sieving technique were fractionated into macro (\g 2mm), meso (2-0.25 mm) and microaggregate (0.25-0.053 mm). These fractions were weighted separately and water stable aggregation (WSA) and geometric mean (GMD) and mean weight (MWD) diameters of aggregates were obtained. The soil C and N concentrations were also determined on these aggregate fractions.
NTIS
Carbon; Soils; Ohio; Environmental Quality; Chronology; Topography; Agriculture; Aggregates

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GEOPHYSICS

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

20060011205
Olympus Mons aureole deposits: New evidence for a flank failure origin
Journal of Geophysical Research; August 28, 2004; ISSN 0148-0227; Volume 109; 10 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): NASW-4574; NCC5-679; NAG5-12226
Report No.(s): LPI-Contrib-1204; Paper-2004JE002258; Copyright; Avail.: Other Sources

The origin of the rough-textured aureoles that surround the immense Olympus Mons volcano on Mars is controversial. We present data from the Mars Global Surveyor and Mars Odyssey missions to demonstrate that at least two of the aureole lobes are derived from the volcano's flanks in large and probably catastrophic mass movement events, leaving behind headwalls that constitute the basal scarp. This evidence stems from the morphology and internal structure of aureole blocks, which exhibit remnants of volcanic flow units on their surfaces. Our claim is supported by plausible reconstructions of the prefailure flanks. Structural analogs to known flank failure events at Hawaiian volcanoes suggest that repeated cycles of flank growth and collapse at Olympus Mons allow generation of the observed aureoles from a protoedifice similar in size and shape to the present one.
Author
Mars Global Surveyor; Mars Volcanoes; Planetary Geology; Tectonics; Volcanology; Mars Surface; Landslides

20060011228 Geological Survey, Reston, VA USA
Shear-Wave Velocity Compilation for Northridge Strong-Motion Recording Sites
Borcherdt, R. D.; Fumal, T. E.; Mar. 07, 2002; 20 pp.; In English
Report No.(s): PB2006-105481; USGS/OFR-2002-107; No Copyright; Avail.: National Technical Information Service (NTIS)

Borehole and other geotechnical information collected at the strong-motion recording sites of the Northridge earthquake of January 17, 1994 provide an important new basis for the characterization of local site conditions. These geotechnical data, when combined with analysis of strong-motion recordings, provide an empirical basis to evaluate site coefficients used in current versions of U.S. building codes. Shear-wave-velocity estimates to a depth of 30 meters are derived for 176 strong-motion recording sites. The estimates are based on borehole shear-velocity logs, physical property logs, correlations with physical properties and digital geologic maps. Surface-wave velocity measurements and standard penetration data are compiled as additional constraints. These data as compiled from a variety of databases are presented via GIS maps and corresponding tables to facilitate use by other investigators.
NTIS
Earth Movements; Earthquakes; S Waves; Seismic Waves

20060011474 Schlumberger-Doll Research, Ridgefield, CT, USA

AN APPLICATION of KALMAN FILTERING IN NUCLEAR WELL LOGGING

Ruckebusch, Guy; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1866-1869; In English; See also 20060011369; Copyright; Avail.: Other Sources

The paper describes an application of (adaptive) Kalman filtering to a geophysical subsurface estimation problem. The NGT is a sonde designed to detect the natural gamma rays of various energies emitted from a formation by the thorium (Th), uranium (U) and potassium (K). Using a minicomputer at the surface, the (Th,U,K) concentrations along the borehole have to be estimated on-line from the detection of the gamma rays in five energy windows. The standard technique in the logging industry has been to compute the elemental concentrations at a given depth from the corresponding observed counting rates. The resulting estimates have fairly large statistical errors which have limited the application of the NGT in computer reservoir evaluation. In this paper, it is shown that much better estimates can be obtained from a Kalman Filter based on a dynamical model of the (Th,U,K) vertical variations.

Author

Kalman Filters; Logging (Industry); Wells; Geophysics; Nuclear Radiation; Mathematical Models

20060011475 INTEL Corp., Santa Clara, CA, USA

REVERSIBLE SEISMIC DATA COMPRESSION

Lee, Meemong; Yarlagadda, R.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1870-1873; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper is concerned with reversible seismic data compression techniques for transmitting data from exploration field to a research center via satellite. The statistical characteristics of seismic data, including Vibroseis data and impulsive data, are examined. Based on these characteristics, various compression techniques, including prediction, orthogonal transforms, and digital coding methods have been investigated. Explicit methods are proposed for compressing the Vibroseis and impulsive data. These methods have been simulated for extensive real data. The compression performance is measured by the compression ratio and the signal-to-noise ratio. The results indicate that a compression ratio ranging between; five to one and six to one with at least a 30 dB SNR can be achieved. Facts of real-time design that is, execution time, core size requirement, depth of queue, and transmission time are examined. For transmitting the compressed seismic data using a 7-bit block counter with continuous ARQ, 5000 bits per frame are recommended for a 9600 bps channel bandwidth.

Author

Data Compression; Seismology; Vibration; Statistical Analysis

20060012022 New York City Area Consortium for Earthquake Loss Mitigation, Albany, NY, USA

Earthquake Risks and Mitigation in the New York, New Jersey, and Connecticut Region. New York City Area Consortium for Earthquake Loss Mitigation, 1999-2003

Tantala, M.; Nordenson, G.; Deodatis, G.; Jacob, K.; Swiren, B.; January 2003; 56 pp.; In English

Report No.(s): PB2006-108347; No Copyright; Avail.: National Technical Information Service (NTIS)

When this study began in 1999, the date 9/11 was just another day on the calendar. It isn't any more. The destruction caused on that infamous day in 2001 has affected the nation profoundly. It has even affected the way studies such as ours perceive, assess, and mitigate risk. The terrorist attacks on the World Trade Center gave us a new benchmark for comparison: Would an earthquake in the New York City metro area incur comparable injuries, casualties, and financial losses. The answer to this question is disconcerting. Even a moderate event (Magnitude 6) could result in an estimated 1100-1200 deaths, as well as igniting up to 900 fires simultaneously in the NY-NJ-CT region. Considering the large population (18.5 million) and the regions building inventory (predominately unreinforced masonry), it is clear that even a moderate earthquake would have critical consequences on public safety and the economy of this area.

NTIS

Earthquakes; Losses; New York City (NY); Organizations; Risk

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METEOROLOGY AND CLIMATOLOGY

Includes weather observation forecasting and modification.

20060011212 NASA Ames Research Center, Moffett Field, CA, USA
Revealing Relationships among Relevant Climate Variables with Information Theory
Knuth, Kevin H.; Golera, Anthony; Curry, Charles T.; Huyser, Karen A.; Kevin R. Wheeler; Rossow, William B.; [2005]; 6 pp.; In English; Eart-Sun System Technology Conference 2005, 28-30 Jun. 2005, Adelphi, MD, USA; Original contains black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy

The primary objective of the NASA Earth-Sun Exploration Technology Office is to understand the observed Earth climate variability, thus enabling the determination and prediction of the climate's response to both natural and human-induced forcing. We are currently developing a suite of computational tools that will allow researchers to calculate, from data, a variety of information-theoretic quantities such as mutual information, which can be used to identify relationships among climate variables, and transfer entropy, which indicates the possibility of causal interactions. Our tools estimate these quantities along with their associated error bars, the latter of which is critical for describing the degree of uncertainty in the estimates. This work is based upon optimal binning techniques that we have developed for piecewise-constant, histogram-style models of the underlying density functions. Two useful side benefits have already been discovered. The first allows a researcher to determine whether there exist sufficient data to estimate the underlying probability density. The second permits one to determine an acceptable degree of round-off when compressing data for efficient transfer and storage. We also demonstrate how mutual information and transfer entropy can be applied so as to allow researchers not only to identify relations among climate variables, but also to characterize and quantify their possible causal interactions.
Author
Information Theory; Climate; Probability Theory; Entropy; Estimates

20060011263
Weather Information for Surface Transportation (WIST) Initiative Document: First Steps to Improve the Nation's WIST Capabilities and Services
Sep. 2005; 48 pp.; In English
Report No.(s): PB2006-107707; No Copyright; Avail.: National Technical Information Service (NTIS)

Since 1998, the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) has made weather services and research and development (R&D) activities supporting the surface transportation community a priority for the Federal meteorological community. In December 2002, the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) published the comprehensive report, Weather Information for Surface Transportation - National Needs Assessment Report. This publication provides the first ever compilation and analysis of weather support needs across six surface transportation sectors: roadway, railway, transit, marine transportation, pipeline systems, and airport ground operations. The report also made a number of recommendations for future work regarding weather information for surface transportation (WIST) R&D needs. Both the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) and the FCMSSR endorsed the recommendations to: identify gaps in coverage of WIST user needs; expand coordination among WIST R&D program managers and WIST providers; translate research results and new technologies into WIST applications; provide the fundamental knowledge to support future technology development and application; and expand WIST-related outreach and education.
NTIS
Meteorology; Surface Vehicles; Transportation

20060011268 Forest Service, Asheville, NC USA
Forest Health Monitoring 2004 National Technical Report
Coulston, J. W.; Ambrose, M. J.; Riitters, K. H.; Conkling, B. L.; Dec. 2005; 106 pp.; In English
Report No.(s): PB2006-108270; FSGTR-SRS-90; No Copyright; Avail.: National Technical Information Service (NTIS)

The Forest Health Monitoring (FHM) Programs annual national technical report presents results of forest health analyses from a national perspective using data from a variety of sources. Results presented in the report pertain to the Santiago Declarations Criterion Conservation of Biological Diversity and Criterion Maintenance of Forest Ecosystem Health and Vitality. We include status and trend information where possible, consistent with previous FHM national technical reports. Additional analytical techniques and results, new to the national report, are presented as examples of ways forest health data

can be used. This report has eight sections. The first contains introductory material. The next four contain results from analyses of status and change for selected forest health indicators, e.g., several measures of forest fragmentation, mortality and defoliation-causing insects and diseases, crown condition, and tree mortality, similar to analyses in previous FHM national reports. The next two sections describe analytical techniques and provide information about assessments presented in the national report for the first time, and the final section is a summary.
NTIS
Environmental Surveys; Forest Management; Forests; Health

20060011269 Commerce Dept., Washington, DC, USA
Proceedings of the Forum on Urban Meteorology: Meeting Weather Needs in the Urban Community. Held in Rockville, Maryland on September 21-23, 2004
Mar. 2005; 112 pp.; In English; Forum on Urban Meteorology: Meeting Weather Needs in the Urban Community., September 21 - 23, 2004, Rockville, Maryland
Report No.(s): PB2006-107666; No Copyright; Avail.: CASI: A06, Hardcopy

The United Nations predicts that by 2025, 60 percent of the world's population will live in cities. In fact, at the present time, nearly two-thirds of the U.S. population lives in urban areas occupying less than two percent of the landmass, and as urban populations grow and become more concentrated, they become more vulnerable to severe weather, homeland security incidents, risks from air and water quality, and climatic variations. Urban decision makers responsible for safety and well-being of their cities are demanding predictions with greater specificity and greater accuracy. The time is right for advances in the area of urban meteorology because of greater concern over public health and safety; new urban focus on potential acts of terrorism; and technology advances and increased spatial and temporal resolution capabilities in remote sensing, observations, assimilation, modeling, and prediction. Communication of weather information has to be an end-to-end process which includes the complete weather and climate database and all results of applications (such as models, forecasts, advisories, and warnings), and supports a wide spectrum of users in all levels of government, industry partners, and the general public. The Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) conducted a User Forum on Urban Meteorology. The theme of the forum was Information to Improve Community Responses to Urban Atmospheric Hazards, Weather Events, and Climate. It focused on the following elements of urban meteorology: severe weather, homeland security, air quality, water quality, and climate.
NTIS
Cities; Conferences; Forecasting; Meteorology; Weather Forecasting

20060011271 Commerce Dept., Washington, DC, USA
National Post-Storm Data Acquisition Plan, March 2003
Mar. 2003; 56 pp.; In English
Report No.(s): PB2006-107665; FCM-P33-2003; No Copyright; Avail.: CASI: A04, Hardcopy

This publication is the 1st edition of the National Post-Storm Data Acquisition Plan (NPSDAP). It is a compilation of procedures and agreements reached through efforts of the Working Group for Natural Disaster Reduction and Post-Storm Data Acquisition (WG/NDR/PSDA). The WG/NDR/PSDA brings together the cognizant federal agencies on items of mutual interest and concern related to the acquisition and preservation of perishable environmental data following a significant storm, flood, tornado, or tsunami event. The NPSDAP describes the mechanisms and procedures for coordinating the environmental data acquisition activities of participating federal agencies following a significant event. The intent of the NPSDAP is to provide a description of the types of data required or desired by the participating agencies and the means used to coordinate the various data acquisition activities. It is not the goal of the NPSDAP to prescribe the data acquisition activities of participating agencies, but instead to coordinate those agency activities already required by existing mission directives. The procedures outlined herein will no doubt be revised and refined as experience is gained in their application.
NTIS
Automatic Weather Stations; Data Acquisition; Information Systems; Storms

20060011272 Commerce Dept., Washington, DC, USA
Federal Research and Development Needs and Priorities for Atmospheric Transport and Diffusion Modeling
Sep. 2004; 212 pp.; In English
Report No.(s): PB2006-107687; FCM-P23-2004; No Copyright; Avail.: National Technical Information Service (NTIS)

Atmospheric transport and diffusion (ATD) modeling is a challenging and dynamic field of research, and the Federal

agencies have played a critical role in applying advances in the field to satisfy pressing national needs. Federal resources have proven to be vitally important to these efforts because ATD models typically must describe atmospheric processes in the most changeable and complex part of the atmosphere. For homeland security applications, the end-user's need for timely and accurate ATD information in the urban environment is one of the most pressing national needs.
NTIS
Atmospheric Circulation; Diffusion; Priorities

20060011273 Commerce Dept., Washington, DC, USA
National Winter Storms Operations Plan, December 2005
Dec. 2005; 84 pp.; In English
Report No.(s): PB2006-107664; FCM-P13-2005; No Copyright; Avail.: CASI: A05, Hardcopy

This is the 28th edition of the National Winter Storms Operations Plan (NWSOP). The purpose of the plan is to coordinate the efforts of the Federal meteorological community to provide enhanced weather observations of severe winter storms that impact the coastal regions of the USA. The goal is to improve the accuracy and timeliness of severe winter storm forecast and warning services provided by the Nation's weather service organizations. These forecast and warning responsibilities are shared by the National Weather Service, within the Department of Commerce and the National Oceanic and Atmospheric Administration (NOAA), and the weather services of the USA Air Force and the USA Navy, within the Department of Defense. While the plan documents requirements for surface, upper air, and satellite observations of all types, it focuses on the coordination of requirements for aircraft weather reconnaissance observations provided by the Air Force Reserve Command's 53rd Weather Reconnaissance Squadron and NOAA's Aircraft Operations Center.
NTIS
Storms; Winter

20060011274 Commerce Dept., Washington, DC, USA
Federal Plan for Meteorological Services and Supporting Research, Fiscal Year 2006: Wildland Fire in the Urban Environment
Estis, F.; Barnett, K.; Oct. 2005; 288 pp.; In English
Report No.(s): PB2006-107685; FCM-P1-2005; No Copyright; Avail.: National Technical Information Service (NTIS)

Since 1965, the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) has developed a Federal Plan that articulates the provision of meteorological services and the support for meteorological and related research by agencies of the Federal government. OFCM's 2006 Federal Plan provides Congress and the Executive Branch with a comprehensive compilation of proposed programs for fiscal year (FY) 2006 and a review of agency programs in FY 2005. The Federal Plan's narratives, timelines, and schedules are current as of August 2005. The Federal Plan consists of an Executive Summary, three sections, and Appendices. The Executive Summary, which is written as a concise, stand-alone report, provides a high-level view of the Federal resources dedicated to meteorological programs and the achievements of those programs.
NTIS
Cities; Fires; Forecasting; Meteorological Parameters; Meteorological Services

20060011275 Commerce Dept., Washington, DC, USA
USA Meteorological Codes and Coding Practices. Federal Meteorological Handbook No. 12
Dec. 1998; 32 pp.; In English
Report No.(s): PB2006-107663; FCM-H12-1998; No Copyright; Avail.: CASI: A03, Hardcopy

This first edition of Federal Meteorological Handbook No. 12 (FMH-12), USA Meteorological Codes and Coding Practices describes meteorological codes and coding practices used within the USA. The handbook serves as a USA supplement to codes that may or may not be covered in the World Meteorological Organization's (WMO) Manual of Codes No. 306. FMH-12 will not include all codes used in the USA but only those codes that are not documented elsewhere in the Federal Meteorological Handbook series. This handbook prescribes Federal standards and coding practices and provides a reference for users of these data. The standards in FMH-12 are applicable to all USA Federal agencies and should be reflected in their manuals and directives. The Working Group for Meteorological Codes is responsible for preparing FMH-12 and ensuring it remains current.
NTIS
Coding; Handbooks; Procedures; United States

20060011276 Commerce Dept., Washington, DC, USA

Report on Wind Chill Temperature and Extreme Heat Indices: Evaluation and Improvement Projects

Jan. 2003; 80 pp.; In English

Report No.(s): PB2006-107684; FCM-R19-2003; No Copyright; Avail.: National Technical Information Service (NTIS)

Over the last several years, there have been many articles on the inaccuracy of the wind chill index which were published in scientific journals, business journals, and newspapers. Convincing scientific evaluation, as well as public critique, of the current USA (U.S.) and Canadian weather services' wind chill indices based on the 1945 Siple & Passel Index led to the services' decision that an upgrade of the indices was needed. As a result of increasing federal agencies' concern, the Office of the Federal Coordinator for Meteorological Services and Supporting Research's (OFCM) Committee for Environmental Services, Operations and Research Needs (C/ESORN) formed a special group during the summer of 2000 called the Joint Action Group for Temperature Indices (JAG/TI). The JAG/TI's purpose was to evaluate the existing wind chill and extreme heat formulas in light of recent knowledge, and determine if changes were needed. The goal of JAG/TI was to upgrade and standardize the indices used for determining temperature extremes, with the first task of the group focused on the current wind chill temperature indices. Standardization of indices among the meteorological community is important so an accurate and consistent measure is provided and the public safety is ensured.

NTIS

Cooling; Meteorological Services; Operations Research

20060011277 Commerce Dept., Washington, DC, USA

Surface Weather Observations and Reports. Federal Meteorological Handbook No. 1

Sep. 2005; 108 pp.; In English

Report No.(s): PB2006-107662; FCM-H1-2005; No Copyright; Avail.: CASI: A06, Hardcopy

This handbook defines the observing, reporting, and coding standards for surface based meteorological reports. These standards are applicable to all Federal agency programs. These standards do not inhibit agencies from doing more than is specified. Standards described in this Handbook are applicable only if a station has the capability to comply. The phrase at designated stations refers to observing stations instructed by their responsible agency to perform a specified task. These specified tasks shall be performed in accordance with the standards described in this handbook. This handbook is applicable to stations taking the following types of observations: a. Automated - automated surface weather observing systems that prepare the meteorological reports for transmission without a certified weather observer. b. Augmented - automated surface weather observing systems that prepare the meteorological reports for transmission with certified weather observers signed-on to the system to add information to the observation. c. Manual - certified weather observers are responsible for the meteorological observations.

NTIS

Handbooks; Observation; Weather

20060011280 Commerce Dept., Washington, DC, USA

Proceedings of the Workshop on Strategy for Providing Atmospheric Information. Held in Crystal City, Virginia on December 3-5, 2001

Mar. 2002; 92 pp.; In English; Workshop on Strategy for Providing Atmospheric Information., December 3 - 5, 2001, Crystal City, Virginia

Report No.(s): PB2006-107668; No Copyright; Avail.: CASI: A05, Hardcopy

A cross-section of more than 150 people participated in the workshop, including representatives of the government, private, academic, and other sectors. The workshop was sponsored by the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM). The purpose of the workshop was to address issues identified in studies conducted by OFCM and the National Research Council (NRC) as the 21st Century approached. In particular, the NRC report entitled The Atmospheric Sciences Entering the Twenty-First Century proposed the following initiative: OFCM should lead a thorough examination of the issues that arise as the national system for providing atmospheric information becomes more distributed and develop a strategic plan. The workshop examined how the ever increasing inventory of atmospheric information could be accessed and used by those who need it. The issue was divided into two parts-(1) getting the information to where it is needed and (2) insuring that users can read and understand that information. The overarching goal of the workshop was to provide a framework for developing a strategy leading to an optimal 21st Century national atmospheric information system.

NTIS

Conferences; Forecasting; Information Systems; Meteorological Parameters

20060011282 Commerce Dept., Washington, DC, USA
Standard Formats for Weather Data Exchange Among Automated Weather Information Systems
Nov. 1994; 188 pp.; In English
Report No.(s): PB2006-107667; FCM-S2-1994; No Copyright; Avail.: CASI: A09, Hardcopy

This Weather Data Exchange Format Document presents a common set of formats to be used for the presentation of weather data among Federal government agencies. The document includes formats which meet current and planned requirements of the National Weather Service (NWS), USA Air Force, USA Navy, and Federal Aviation Administration.
NTIS
Automatic Control; Format; Information Systems

20060011315 National Renewable Energy Lab., Golden, CO USA
Towards a Wind Energy Climatology at Advanced Turbine Hub-Heights
Schwartz, M.; Elliott, D.; January 2005; 16 pp.; In English
Report No.(s): DE2005-15016266; NREL/CP-500-38109; No Copyright; Avail.: National Technical Information Service (NTIS)

Measurements of wind characteristics over a wide range of heights up to and above 100 m are useful to: (1) characterize the local and regional wind climate; (2) validate wind resource estimates derived from numerical models; and (3) evaluate changes in wind characteristics and wind shear over the area swept by the blades. Developing wind climatology at advanced turbine hub heights for the USA benefits wind energy development. Tall tower data from Kansas, Indiana, and Minnesota (which have the greatest number of tall towers with measurement data) will be the focus of this paper. Analyses of data from the tall towers will start the process of developing a comprehensive climatology.
NTIS
Climatology; Height; Turbines; Wind (Meteorology); Windpower Utilization

20060011325 Washington Univ., Seattle, WA, USA
Microphysical and Dynamical Influences on Cirrus Cloud Optical Depth Distributions
Kay, J.; Baker, M.; Hegg, D.; January 2005; 14 pp.; In English
Report No.(s): DE2005-841655; No Copyright; Avail.: National Technical Information Service (NTIS)

Cirrus cloud inhomogeneity occurs at scales greater than the cirrus radiative smoothing scale (approximately 100 m), but less than typical global climate model (GCM) resolutions (around 300 km). Therefore, calculating cirrus radiative impacts in GCMs requires an optical depth distribution parameterization. Radiative transfer calculations are sensitive to optical depth distribution assumptions (Fu et al. 2000; Carlin et al. 2002). Using raman lidar observations, we quantify cirrus timescales and optical depth distributions at the Atmospheric Radiation Measurement (ARM) Southern Great Plains (SGP) site in Lamont, OK (USA). We demonstrate the sensitivity of outgoing longwave radiation (OLR) calculations to assumed optical depth distributions and to the temporal resolution of optical depth measurements. Recent work has highlighted the importance of dynamics and nucleation for cirrus evolution (Haag and Karcher 2004; Karcher and Strom 2003). We need to understand the main controls on cirrus optical depth distributions to incorporate cirrus variability into model radiative transfer calculations. With an explicit ice microphysics parcel model, we aim to understand the influence of ice nucleation mechanism and imposed dynamics on cirrus optical depth distributions.
NTIS
Cirrus Clouds; Inhomogeneity; Optical Thickness; Climatology

20060011328 State Univ. of New York, Stony Brook, NY, USA
Simulations of Clouds and Sensitivity Study by Weather Research and Forecast Model for Atmospheric Radiation Measurement Case 4
January 2005; 42 pp.; In English
Report No.(s): DE2005-841524; No Copyright; Avail.: National Technical Information Service (NTIS)

One of the large errors in general circulation models (GCMs) cloud simulations is from the mid-latitude, synoptic-scale frontal cloud systems. Now, with the availability of the cloud observations from Atmospheric Radiation Measurement (ARM) 2000 cloud Intensive Operational Period (IOP) and other observational datasets, the community is able to document the model biases in comparison with the observations and make progress in development of better cloud schemes in models. Xie et al. (2004) documented the errors in midlatitude frontal cloud simulations for ARM Case 4 by single-column models (SCMs) and cloud resolving models (CRMs). According to them, the errors in the model simulated cloud field might be caused by

following reasons: (1) lacking of sub-grid scale variability; (2) lacking of organized mesoscale cyclonic advection of hydrometeors behind a moving cyclone which may play important role to generate the clouds there. Mesoscale model, however, can be used to better under stand these controls on the subgrid variability of clouds. Few studies have focused on applying mesoscale models to the forecasting of cloud properties. Weaver et al. (2004) used a mesoscale model RAMS to study the frontal clouds for ARM Case 4 and documented the dynamical controls on the sub-GCM-grid-scale cloud variability.
NTIS
Atmospheric General Circulation Models; Atmospheric Models; Atmospheric Radiation; Forecasting; Radiation Measurement; Simulation; Clouds (Meteorology)

20060011329 Scripps Institution of Oceanography, La Jolla, CA, USA
Single-Column Modeling, GCM Parameterizations and Atmospheric Radiation Measurement Data
Somerville, R. C. J.; Iacobellis, S. F.; Mar. 2005; 20 pp.; In English
Report No.(s): DE2005-841522; No Copyright; Avail.: National Technical Information Service (NTIS)

Our overall goal is identical to that of the Atmospheric Radiation Measurement (ARM) Program: the development of new and improved parameterizations of cloud-radiation effects and related processes, using ARM data at all three ARM sites, and the implementation and testing of these parameterizations in global and regional models. To test recently developed prognostic parameterizations based on detailed cloud microphysics, we have first compared single-column model (SCM) output with ARM observations at the Southern Great Plains (SGP), North Slope of Alaska (NSA) and Topical Western Pacific (TWP) sites. We focus on the predicted cloud amounts and on a suite of radiative quantities strongly dependent on clouds, such as downwelling surface shortwave radiation. Our results demonstrate the superiority of parameterizations based on comprehensive treatments of cloud microphysics and cloud-radiative interactions.
NTIS
Atmospheric Radiation; Climate Models; Parameterization; Radiation Measurement; Radiation Effects

20060011331 Academy of Sciences (Russia), Tomsk, Russian Federation
Statistical Estimation of the Atmospheric Aerosol Absorption Coefficient Based on the Data of Optical Measurements
Uzhegov, V. N.; Kozlov, V. S.; Panchenko, M. V.; Pkhalagov, Y. A.; Terpugova, S. A.; Mar. 2005; 14 pp.; In English
Report No.(s): DE2005-841497; No Copyright; Avail.: National Technical Information Service (NTIS)

The problem of the choice of the aerosol optical constants and, in particular, imaginary part of the refractive index of particles in visible and infrared (IR) wavelength ranges is very important for calculation of the global albedo of the atmosphere in climatic models. The available models of the aerosol optical constants obtained for the prescribed chemical composition of particles (see, for example, Ivlev etal. 1973; Ivlev 1982; Volz 1972), often are far from real aerosol. It is shown in (Krekov et al. 1982) that model estimates of the optical characteristics of the atmosphere depending on the correctness of real and imaginary parts of the aerosol complex refractive index can differ by some hundreds percent. It is known that the aerosol extinction coefficient alpha (lambda) obtained from measurements on a long horizontal path can be represented as alpha(lambda)=rho (delta)+beta(lambda), where rho is the directed light scattering coefficient, and beta is the aerosol absorption coefficient. The coefficient rho(delta) is measured by means of a nephelometer. Seemingly, if measure the values alpha(lambda) and rho(delta), it is easy to determine the value beta(lambda). However, in practice it is almost impossible for a number of reasons. Firstly, the real values alpha(lambda) and rho(lambda) are very close to each other, and the estimate of the parameter beta(lambda) is concealed by the errors of measurements. Secondly, the aerosol optical characteristics on the long path and in the local volume of nephelometer can be different, that also leads to the errors in estimating beta(lambda). Besides, there are serious difficulties in performing spectral measurements of rho(lambda) in infrared wavelength range. Taking into account these circumstances, in this paper we consider the statistical technique, which makes it possible to estimate the absorption coefficient of real aerosol on the basis of analysis of simultaneous measurements of the spectral aerosol extinction coefficients alpha(lambda), the directed scattering coefficient of dry aerosol rho(sub0)(0.55) and the mass concentration of aerosol containing BC (black carbon) Ms.
NTIS
Absorptivity; Aerosols; Albedo; Atmospheric Attenuation; Optical Measurement; Refractivity; Statistical Analysis

20060011339 Laboratoire de Meteorologie Dynamique du CNRS, Palaiseau, France, National Center for Atmospheric Research, Boulder, CO USA
Ability of MM5 to Simulate Ice Clouds: Systematic Comparison between Simulated and Measured Fluxes and Liar/Radar Profiles at SIRTA Atmospheric Observatory
Chiriaco, M.; Vautard, R.; Chepter, H.; Haeffelin, M.; January 2005; 16 pp.; In English
Report No.(s): DE2005-841492; No Copyright; Avail.: Department of Energy Information Bridge

Ice clouds play a major role in the radiative energy budget of the Earth-atmosphere system (Liou 1986). Their radiative effect is governed primarily by the equilibrium between their albedo and greenhouse effects. Both macrophysical and microphysical properties of ice clouds regulate this equilibrium. For quantifying the effect of these clouds onto climate and weather systems, they must be properly characterized in atmospheric models. In this paper we use remote-sensing measurements from the SIRTA ground based atmospheric observatory (Site Instrumental de Recherche par Teledetection Atmospherique, http://sirta. lmd.polytechnique.fr). Lidar and radar observations taken over 18 months are used, in order to gain statistical confidence in the model evaluation. Along this period of time, 62 days are selected for study because they contain parts of ice clouds. We use the model to observations approach by simulating lidar and radar signals from MM5 outputs. Other more classical variables such as shortwave and longwave radiative fluxes are also used. Four microphysical schemes, among which that proposed by Reisner et al. (1998) with original or modified parameterizations of particle terminal fall velocities (Zurovac-Jevtic and Zhang 2003, Heymsfield and Donner 1990), and the simplified Dudhia (1989) scheme are evaluated in this study.
NTIS
Albedo; Greenhouse Effect; Ice; Ice Clouds; Observatories; Remote Sensing

20060011624 Florida State Univ., Tallahassee, FL, USA
Retrieval of Cloud Ice Water Content Profiles from Advanced Microwave Sounding Unit-B Brightness Temperatures Near the Atmospheric Radiation Measurement Southern Great Plains Site
Seo, E. K.; Liu, G.; Mar. 2005; 10 pp.; In English
Report No.(s): DE2005-841578; No Copyright; Avail.: National Technical Information Service (NTIS)
One of the Atmospheric Radiation Measurement (ARM) Program important goals is to develop and test radiation and cloud parameterizations of climate models using single column modeling (SCMs) (Randall et al. 1996). As forcing terms, SCMs need advection tendency of cloud condensates besides the tendencies of temperature, moisture and momentum. To compute the tendency terms of cloud condensates, 3D distribution of cloud condensates over a scale much larger than the climate models grid scale is needed. Since they can cover a large area within a short time period, satellite measurements are useful utilities to provide advection tendency of cloud condensates for SCMs. However, so far, most satellite retrieval algorithms only retrieve vertically integrated quantities, for example, in the case of cloud ice, ice water path (IWP). To fulfill the requirement of 3D ice water content field for computing ice water advection, in this study, we develop an ice water content profile retrieval algorithm by combining the vertical distribution characteristics obtained from long-term surface radar observations and satellite high-frequency microwave observations that cover a large area. The algorithm is based on the Bayesian theorem using a priori database derived from analyzing cloud radar observations at the Southern Great Plains (SGP) site. The end product of the algorithm is a 3D ice water content covering 10 degrees x 10 degrees surrounding the SGP site during the passage of the satellite. This 3D ice water content, together with wind field analysis, can be used to compute the advection tendency of ice water for SCMs.
NTIS
Advanced Microwave Sounding Unit; Atmospheric Radiation; Brightness Temperature; Great Plains Corridor (North America); Ice; Moisture Content; Radiation Measurement

20060011629 Florida State Univ., Tallahassee, FL, USA
Results from the Longwave Effective Cloud Fraction in the Cloudiness Intercomparison
Takara, E. E.; Ellingson, R. G.; January 2005; 12 pp.; In English
Report No.(s): DE2005-841579; No Copyright; Avail.: National Technical Information Service (NTIS)
The results from two sets of thresholds for computing effective cloud fraction (Ne) were compared with the total sky cover for opaque clouds measured by the TSI. The first set used threshold values to determine clear sky and cloud radiances. The second used only the previous clear sky threshold. The Ne found using clear and cloud thresholds were almost always lower than the TSI opaque cloud amount. This Ne showed agreement with the TSI for clouds below 4 km. The agreement between Ne and TSI decreased for middle and high clouds. The Ne found using only the clear sky threshold was more sensitive to low-emitting clouds, noticeable for the high clouds (Zb = 8 km). The increase in sensitivity caused an overestimate of cloud amount, for middle (4 km = Zb less than 8 km) and low clouds (Zb less than 4 km).
NTIS
Atmospheric Radiation; Cloud Cover; Radiance

20060011630 Oklahoma Univ., Norman, OK, USA
Representing Cloud Processing of Aerosol in Numerical Models
Mechem, D. B.; Kogan, Y. L.; January 2005; 12 pp.; In English
Report No.(s): DE2005-841588; No Copyright; Avail.: National Technical Information Service (NTIS)

It is thought that, through the effects it has on precipitation (drizzle), aerosol can also affect the structure and persistence of planetary boundary layer (PBL) clouds. Regions of cellular convection, or open pockets of cloudiness (bottom image) are thought to be remnants of strongly drizzling PBL clouds. Pockets of Open Cloudiness (POCs) (Stevens et al. 2005) or Albrechts rifts are low cloud fraction regions characterized by anomalously low aerosol concentrations, implying they result from precipitation. These features may in fact be a demonstration of the second indirect effect. To accurately represent these clouds in numerical models, we have to treat the coupled cloud-aerosol system. We present the following series of mesoscale and large eddy simulation (LES) experiments to evaluate the important aspects of treating the coupled cloud-aerosol problem. 1. Drizzling and nondrizzling simulations demonstrate the effect of drizzle on a mesoscale forecast off the California coast. 2. LES experiments with explicit (bin) microphysics gauge the relative importance of the shape of the aerosol spectrum on the 3D dynamics and cloud structure. 3. Idealized mesoscale model simulations evaluate the relative roles of various processes, sources, and sinks.
NTIS
Aerosols; Atmospheric Models; Mathematical Models; Precipitation (Meteorology)

20060011631 Illinois Univ., Urbana-Champaign, IL, USA, Sandia National Labs., Livermore, CA, USA
Remote Sensing and In-Situ Observations of Arctic Mixed-Phase and Cirrus Clouds Acquired During Mixed-Phase Arctic Cloud Experiment: Atmospheric Radiation Measurement Uninhabited Aerospace Vehicle Participation
McFarquhar, G. M.; Freer, M.; Um, J.; McColy, R.; Bolton, W.; January 2005; 14 pp.; In English
Report No.(s): DE2005-841589; No Copyright; Avail.: National Technical Information Service (NTIS)

The Atmospheric Radiation Monitor (ARM) uninhabited aerospace vehicle (UAV) program aims to develop measurement techniques and instruments suitable for a new class of high altitude, long endurance UAVs while supporting the climate community with valuable data sets. Using the Scaled Composites Proteus aircraft, ARM UAV participated in Mixed-Phase Arctic Cloud Experiment (M-PACE), obtaining unique data to help understand the interaction of clouds with solar and infrared radiation. Many measurements obtained using the Proteus were coincident with in-situ observations made by the UND Citation. Data from M-PACE are needed to understand interactions between clouds, the atmosphere and ocean in the Arctic, critical interactions given large-scale models suggest enhanced warming compared to lower latitudes is occurring.
NTIS
Aerospace Vehicles; Arctic Regions; Atmospheric Radiation; Cirrus Clouds; Remote Sensing

20060011632 Academy of Sciences (Russia), Tomsk, Russian Federation
Relative Content of Black Carbon in Submicron Aerosol as a Sign of the Effect of Forest Fire Smokes
Kozlov, V. S.; Panchenko, M. V.; Yausheva, E. P.; January 2005; 14 pp.; In English
Report No.(s): DE2005-841607; No Copyright; Avail.: National Technical Information Service (NTIS)

Biomass burning occurs often in regions containing vast forest tracts and peat-bogs. These processes are accompanied by the emission of a large amount of aerosol particles and crystal carbon (black carbon (BC), soot). BC is the predominant source of solar absorption in atmospheric aerosol, which impacts climate. (Jacobson 2001; Rozenberg 1982). In this paper, we analyze the results of laboratory and field investigations that focused on the relative content of BC in aerosol particles. Main attention is given to the study of possibility using this parameter as an informative sign for estimating the effect of remote forest fire smokes on the near-ground aerosol composition.
NTIS
Aerosols; Carbon; Climate Change; Forest Fires; Soot; Symbols

20060011633 Colorado Univ., Boulder, CO USA, National Oceanic and Atmospheric Administration, Boulder, CO, USA, California Univ., Santa Barbara, CA, USA
SPGET: AN SBDART Module for Aerosol Radiative Transfer
McComiskey, A.; Richiazzi, P.; Ogren, J. A.; Dutton, E.; Mar. 2005; 8 pp.; In English
Report No.(s): DE2005-841539; No Copyright; Avail.: National Technical Information Service (NTIS)

Quantification of the aerosol direct effect and climate sensitivity requires accurate estimates of optical properties as inputs to a radiative transfer model. Long-term measurements of aerosol properties at the Southern Great Plains (SGP) site can be

used as an improvement over a best guess or global average for optical properties (e.g., asymmetry factor of 0.7) used in Atmospheric Radiation Measurement (ARM) products such as the Broadband Heating Rate Profile VAP. To make this information readily available to the ARM community and others, an add-on module for a commonly used radiative transfer model, SBDART (Ricchiazzi et al. 1998), is being developed. A look up table and algorithm will provide aerosol related model inputs including aerosol optical and atmospheric state properties at high temporal resolution. These inputs can be used in conjunction with any mode of operation and with any other information, for example, cloud properties, in SBDART or any other radiative transfer model. Aerosol properties measured at three visible wavelengths are extrapolated so that flux calculations can be made in any desired wavelength across the shortwave spectrum. Several sources of uncertainty contribute to degraded accuracy of the aerosol property estimation. The effect of these uncertainties is shown through error analysis and comparisons of modeled and observed surface irradiance. A module is also being developed for the North Slope of Alaska site.
NTIS
Aerosols; Atmospheric Radiation; Radiative Heat Transfer; Radiative Transfer

20060011635 Academy of Sciences (Russia), Tomsk, Russian Federation
Reconstruction and Prediction of Variations of Total Ozone and Associated Variations of UV-B Solar Radiation for Subarctic Regions Based on Dendrochronologic Data
Zuev, V. V.; Bondarenko, S. L.; Mar. 2005; 8 pp.; In English
Report No.(s): DE2005-841616; No Copyright; Avail.: National Technical Information Service (NTIS)

Variations of dendrochronologic parameters, especially annual ring density, significantly reflect the physiological tree response to systematic variations of solar UV-B radiation, taking place on monthly and longer timescales during growing season. Such variations of UV-B radiation are totally governed by variations of total ozone (TO). Thus, in any dendrochronologic signal, especially for coniferous trees, there is also a recorded response to TO variations, characterizing variations of UV-B radiation. Because a monitoring of global TO distribution is regularly performed since 1979 using TOMS satellite instrumentation, there appears a possibility to reconstruct TO behavior in the past practically at any point of dendrochronologic monitoring network. The reconstruction is performed by the method of linear regression, based on significant correlation of annual ring density of coniferous trees and TO for coordinates of denrochronologic signal. The present report considers the Subarctic latitudes, which are characterized by considerable TO variations in the second half of twentieth century.
NTIS
Arctic Regions; Atmospheric Radiation; Environmental Monitoring; Ozone; Solar Radiation; Subarctic Regions; Ultraviolet Radiation

20060011636 Florida State Univ., Tallahassee, FL, USA
Real Effect or Artifact of Cloud Cover on Aerosol Optical Thickness
Joeng, M. J.; Li, Z.; January 2005; 14 pp.; In English
Report No.(s): DE2005-841617; No Copyright; Avail.: National Technical Information Service (NTIS)

Aerosol measurements over the Southern Great Plains (SGP) Cloud And Radiation Test bed (CART) site under Department of Energy's (DOE) Atmospheric Radiation Measurement (ARM) program characterize the temporal variability, vertical distribution, and optical properties of aerosols in the region. They were made by the Cimel sunphotometer and Multifilter Rotating Shadow-band Radiometer (MFRSR), Raman Lidar, In situ Aerosol Profiling (IAP) flights, and the Aerosol Observing System (AOS). The spatial variability of aerosols relies a network of MFRSR at the Central Facility (CF) and Extended Facilities (EF), together with satellite remote sensing. The current state-of-art satellite-based estimates over land--e.g., MODerate resolution Imaging Scanner (MODIS) aerosol optical thickness--still suffer from large uncertainties. Contamination due to sub-pixel and/or thin cirrus clouds is believed to be one of the major sources of uncertainties. Retrievals near clouds are discouraged to use, which reduces considerably the amount of useful data. In this regard, cloud is considered as an artifact. However, cloud could have a real impact on AOT by changing humidity, which affects aerosol through the aerosol swelling effect. As a preliminary study, we first investigate the effects of cloud cover and humidity on the retrievals of AOT from ground-based Cimel sunphotometer measurements, in order to help us sort out the real influence and artifact. In general, it is very difficult to verify and quantify the effects of cloud on satellite retrieval of aerosol quantities. Speculation and warning of cloud contamination have been made whenever there is a correlation between the retrieved AOT and cloud fraction or their spatial variabilities, while it has also been argued that aerosol humidification effect (AHE) might be at work. The ample measurements available from ARM over the SGP region may allow us to unravel this complex issue. Our ultimate goals are to (1) evaluate various effects on the retrievals of AOT from both satellite and ground sensors; (2) separate artifact

from real effect; (3) create ''clean'' aerosol products for studying their direct and indirect effect. Presented are some very preliminary findings.
NTIS
Aerosols; Cloud Cover; Optical Properties; Optical Thickness; Remote Sensing

20060011637 Academy of Sciences (Russia), Tomsk, Russian Federation
Sensitivity of Spectral Radiative Fluxes to Atmospheric Water Vapor in the 940 nm Region (Numerical Simulation)
Zhuravleva, T. B.; Firsov, K. M.; Mar. 2005; 14 pp.; In English
Report No.(s): DE2005-841618; No Copyright; Avail.: National Technical Information Service (NTIS)

Water vapor is well known to be a critical component in many aspects of atmospheric research, such as radiative transfer and cloud and aerosol processes. This requires both improved measurements of the columnar water vapor and its profiles in the atmosphere in a wide range of conditions, and adjustment of water vapor parameterizations in radiation codes including the perfection of spectroscopic parameters. In this paper we will present the results of comparison of our calculations and downward solar fluxes measured with Rotating Shadowband Spectroradiometer under conditions of horizontally homogeneous clouds. We also will discuss the sensitivity of atmospheric radiation characteristics to variations of water vapor in the band 940 nm: these results may be useful for development of new methods of retrieval of the total column water vapor content (WVC) in the atmosphere from data of radiation observations.
NTIS
Aerosols; Atmospheric Moisture; Atmospheric Radiation; Sensitivity; Spectra

20060011641 Pennsylvania State Univ., University Park, PA, USA
Mesoscale Modeling During Mixed-Phase Arctic Cloud Experiment
January 2005; 12 pp.; In English
Report No.(s): DE2005-841657; No Copyright; Avail.: National Technical Information Service (NTIS)

Mixed-phase arctic stratus clouds are the predominant cloud type in the Arctic (Curry et al. 2000) and through various feedback mechanisms exert a strong influence on the Arctic climate. Perhaps one of the most intriguing of their features is that they tend to have liquid tops that precipitate ice. Despite the fact that this situation is colloidally unstable, these cloud systems are quite long lived - from a few days to over a couple of weeks. It has been hypothesized that mixed-phase clouds are maintained through a balance between liquid water condensation resulting from the cloud-top radiative cooling and ice removal by precipitation (Pinto 1998; Harrington et al. 1999). In their modeling study Harrington et al. (1999) found that the maintenance of this balance depends strongly on the ambient concentration of ice forming nucleus (IFN). In a follow-up study, Jiang et al. (2002), using only 30% of IFN concentration predicted by Meyers et al. (1992) IFN parameterization were able to obtain results similar to the observations reported by Pinto (1998). The IFN concentration measurements collected during the Mixed-Phase Arctic Cloud Experiment (M-PACE), conducted in October 2004 over the North Slope of Alaska and the Beaufort Sea (Verlinde et al. 2005), also showed much lower values then those predicted (Prenne, pers. comm.) by currently accepted ice nucleation parameterizations (e.g. Meyers et al. 1992). The goal of this study is to use the extensive IFN data taken during M-PACE to examine what effects low IFN concentrations have on mesoscale cloud structure and coastal dynamics.
NTIS
Arctic Regions; Atmospheric Models; Beaufort Sea (North America); Mesoscale Phenomena; Nucleation

20060011642 Colorado Univ., Boulder, CO, USA
Multi-Filter Rotating Shadowband Radiometers Mentor Report and Baseline Surface Radiation Network Submission Status
Hodges, G.; January 2005; 20 pp.; In English
Report No.(s): DE2005-841656; No Copyright; Avail.: National Technical Information Service (NTIS)

There are currently twenty-four Multi-Filter Rotating Shadowband Radiometers (MFRSR) operating within Atmospheric Radiation Measurement (ARM). Eighteen are located within the Southern Great Plains (SGP) region, there is one at each of the North Slope of Alaska (NSA) and Tropical Western Pacific (TWP) sites, and one is part of the instrumentation of the ARM Mobile Facility. At this time there are four sites, all extended facilities within the SGP, that are equipped for a MFRSR but do not have one due to instrument failure and a lack of spare instruments. In addition to the MFRSRs, there are three other MFRSR derived instruments that ARM operates. They are the Multi-Filter Radiometer (MFR), the Normal Incidence Multi-Filter Radiometer (NIMFR) and the Narrow Field of View (NFOV) radiometer. All are essentially just the head of a

MFRSR used in innovative ways. The MFR is mounted on a tower and pointed at the surface. At the SGP Central Facility there is one at ten meters and one at twenty-five meters. The NSA has a MFR at each station, both at the ten meter level. ARM operates three NIMFRs; one is at the SGP Central Facility and one at each of the NSA stations. There are two NFOVs, both at the SGP Central Facility. One is a single channel (870) and the other utilizes two channels (673 and 870).
NTIS
Radiometers; Rotation; Solar Radiation

20060011653 Pennsylvania State Univ., University Park, PA, USA, Colorado State Univ., Fort Collins, CO, USA
LES Simulations of Roll Clouds Observed During Mixed-Phase Arctic Cloud Experiment
Greenberg, S. D.; Harrington, J. Y.; Prenni, A.; DeMott, P.; January 2005; 12 pp.; In English
Report No.(s): DE2005-841658; No Copyright; Avail.: National Technical Information Service (NTIS)

Roll clouds, and associated roll convection, are fairly common features of the atmospheric boundary layer. While these organized cumuliform clouds are found over many regions of the planet, they are quite ubiquitous near the edge of the polar ice sheets. In particular, during periods of off-ice flow, when cold polar air flows from the ice pack over the relatively warm ocean water, strong boundary layer convection develops along with frequent rolls. According to Bruemmer and Pohlman (2000), most of the total cloud cover in the Arctic is due to roll clouds. In an effort to examine the influences of mixed-phase microphysics on the boundary layer evolution of roll clouds during off-ice flow, Olsson and Harrington (2000) used a 2D mesoscale model coupled to a bulk microphysical scheme (see Section 2). Their results showed that mixed-phase clouds produced more shallow boundary layers with weaker turbulence than liquid-phase cases. Furthermore, their results showed that because of th e reduced turbulent drag on the atmosphere in the mixed-phase case, regions of mesoscale divergence in the marginal ice-zone were significantly affected. A follow-up 2D study (Harrington and Olsson 2001) showed that the reduced turbulent intensity in mixed-phase cases was due to precipitation. Ice precipitation caused downdraft stabilization which fed back and caused a reduction in the surface heat fluxes. In this work, we extend the work of Olsson and Harrington (2000) and Harrington and Olsson (2001) by examining the impacts of ice microphysics on roll convection. We will present results that illustrate how microphysics alters roll cloud structure and dynamics.
NTIS
Arctic Regions; Ice; Roll; Simulation

20060011667 Meteorological Satellite Center, Tokyo, Japan
METEOROLOGICAL SATELLITE CENTER TECHNICAL NOTE, NO. 47
March 2006; ISSN 0388-9653; 65 pp.; In Japanese; See also 20060011668 - 20060011669; Original contains color and black and white illustrations; Copyright; Avail.: Other Sources

Topics covered include: Investigations for the relationships between characteristic patterns on water vapor imagery and occurrences of severe weathers; and Visiting the Cooperative Institute for Research in the Atmosphere, Colorado State University.
Derived from text
Meteorological Satellites; Geosynchronous Orbits; Rain; Aerology; Anomalies; Troposphere

20060011668 Colorado State Univ., CO, USA
Visiting the Cooperative Institute for Research in the Atmosphere, Colorado State University
Koyama, Tomoko; METEOROLOGICAL SATELLITE CENTER TECHNICAL NOTE; March 2006; In Italian; See also 20060011667; Copyright; Avail.: Other Sources

This is a brief summary of a one-year research abroad conducted by the Ministry of Education, Culture, Sports, Science and Technology as a visiting scientist at the Cooperative Institute for Research in the Atmosphere, Colorado State University in the USA.
Author
Research and Development; Education; Technologies; Students; Atmospherics

20060011669 Meteorological Satellite Center, Tokyo, Japan
Investigations for the relationships between characteristic patterns on water vapor imagery and occurrences of severe weathers
Nakajima, Yukihisa; Nishimura, Shuuji; Kato, Teruyuki; Hatsuta, Toshio; Mayuzumi, Mikio; Nonaka, Nobuhide; Syoji, Akiko; Makino, Sachiko; Asano, Jun'ichi; METEOROLOGICAL SATELLITE CENTER TECHNICAL NOTE; March 2006; In Japanese; See also 20060011667; Copyright; Avail.: Other Sources

The relationships between characteristic patterns on water vapor imagery of Geostationary Meteorological Satellite (GMS) and occurrences of severe weathers were investigated. The results for this study are as follows: 1. Statistically examining the relationships between characteristic patterns on water vapor imagery of GMS and the occurrence places of cumulonimbi (Cb) associated with severe weathers, 2. Examining the vertical profiles of dry region in the middle-troposphere by using of the water vapor imagery of GMS and the aerological data observed by wind profilers and rawinsonde soundings, 3. Clarifying the characteristics of the inside boundary on the water vapor imagery of GMS, which was observed in the Niigata and Fukushima heavy rainfall event during 12 - 13 July 2004 in Japan, 4. Clarifying the characteristics of the upper vortex with high anomaly of isentropic potential vorticity on the water vapor imagery of GMS, which was observed on 7 August 2004 over the Sea of Japan, and, 5. Clarifying the characteristics of the head boundary on the water vapor imagery of GMS, which was observed in the Fukui heavy rainfall event during 17- 18 July 2004 in Japan.
Author
Water Vapor; Meteorological Satellites; Geosynchronous Orbits; Synchronous Platforms; Imagery; Aerology; Wind Profiles

20060011670 Colorado Univ., Boulder, CO, USA, National Oceanic and Atmospheric Administration, Boulder, CO, USA, Argonne National Lab., IL USA, Montana State Univ., Bozeman, MT, USA
Microwave and Millimeter Wave Forward Modeling Results from the 2004 North Slope of Alaska Arctic Winter Radiometric Experiment
January 2005; 16 pp.; In English
Report No.(s): DE2005-841652; No Copyright; Avail.: National Technical Information Service (NTIS)
The 2004 Arctic Winter Radiometric Experiment was conducted at the North Slope of Alaska (NSA) Atmospheric Radiation Measurement (ARM) Program field site near Barrow, Alaska from March 9 to April 9, 2004. The goals of the experiment were: to study the microwave and millimeter wave radiometric response to water vapor and clouds during cold and dry conditions; to obtain data for forward model studies at frequencies ranging from 22.235 to 400 GHz, to demonstrate new Environmental Technology Laboratory's (ETL) radiometric receiver and calibration technology and to compare both radiometric and in situ measurements of water vapor.
NTIS
Arctic Regions; Microwaves; Millimeter Waves; Radiometers; Simulation; Slopes; Winter

20060011671 Florida State Univ., Tallahassee, FL, USA
New Improved Data Logging and Collection System for Atmospheric Radiation Measurement Climate Research Facility, Tropical Western Pacific, and North Slope of Alaska Sky Radiation, Ground Radiation, and MET Systems. Cloudiness Intercomparison
Ritsche, M. T.; Holdridge, D. J.; Pearson, R.; January 2005; 10 pp.; In English
Report No.(s): DE2005-841635; No Copyright; Avail.: National Technical Information Service (NTIS)
Aging systems and technological advances mandated changes to the data collection systems at the Atmospheric Radiation Measurement (ARM) Programs Tropical Western Pacific (TWP) and North Slope of Alaska (NSA) ARM Climate Research Facility (ACRF) sites. Key reasons for the upgrade include the following: Achieve consistency across all ACRF sites for easy data use and operational maintenance. Minimize the need for a single mentor requiring specialized knowledge and training. Provide local access to real-time data for operational support, intensive operational period (IOP) support, and public relations. Eliminate problems with physical packaging (condensation, connectors, etc.). Increase flexibility in programming and control of the data logger. The TWP ACRF site has used Coastal Environmental Systems, Inc., ZENO 3200 data loggers to collect data from the sky radiation (SKYRAD), ground radiation (GNDRAD), and surface meteorology (SMET) systems.
NTIS
Alaska; Atmospheric Radiation; Climate; Cloud Cover; Collection; Data Acquisition; Pacific Ocean; Procedures; Radiation Measurement; Research Facilities; Sky Radiation; Slopes; Tropical Regions

20060011672 National Center for Atmospheric Research, Boulder, CO, USA
New Technique for Retrieving Liquid Water Path over Land using Satellite Microwave Observations
Deeter, M. N.; Vivekanandan, J.; Mar. 2005; 16 pp.; In English
Report No.(s): DE2005-841634; No Copyright; Avail.: National Technical Information Service (NTIS)
We present a new methodology for retrieving liquid water path over land using satellite microwave observations. As input, the technique exploits the Advanced Microwave Scanning Radiometer for earth observing plan (EOS) (AMSR-E) polarization-difference signals at 37 and 89 GHz. Regression analysis performed on model simulations indicates that over

variable atmospheric and surface conditions the polarization-difference signals can be simply parameterized in terms of the surface emissivity polarization difference ((Delta)(var-epsilon)), surface temperature, liquid water path (LWP), and precipitable water vapor (PWV). The resulting polarization-difference parameterization (PDP) enables fast and direct (noniterative) retrievals of LWP with minimal requirements for ancillary data. Single- and dual-channel retrieval methods are described and demonstrated. Data gridding is used to reduce the effects of instrumental noise. The methodology is demonstrated using AMSR-E observations over the Atmospheric Radiation Measurement (ARM) Southern Great Plains (SGP) site during a six day period in November and December, 2003. Single- and dual-channel retrieval results mostly agree with ground-based microwave retrievals of LWP to within approximately 0.04 mm.
NTIS
Microwaves; Radiometers; Satellite Observation; Water; Water Vapor

20060012014 Oklahoma Univ., Norman, OK, USA
Scale Dependence of Variability in Straitform Clouds Based on Millimeter Wave Cloud Radar
Kogan, Z. N.; Kogan, Y. L.; Mechem, D. B.; Mar. 2005; 14 pp.; In English
Report No.(s): DE2005-841576; No Copyright; Avail.: National Technical Information Service (NTIS)

Internal variability of stratiform clouds is manifested on grid scales ranging from cloud resolving models to general circulation models, and its accurate formulation is one of the most important tasks in improvement of model predictions. Understanding cloud variability on different scales will help to develop and improve subgrid-scale cloud parameterizations. Information about variability is also crucial when dealing with retrieval of microphysical information from observations of volume averaged reflectivity parameters, since neglecting variability can lead to substantial biases in estimation of retrieved microphysical variables. The Atmospheric Radiation Measurement Program (ARM) operates millimeter wave cloud radar (MMCR) at the ARM Climate Research Facility over the Southern Great Plains (ACRF SGP) that provides a unique opportunity to obtain continuous observations in order to address issues of cloud variability. These data contain information on spatial and/or temporal short- and long-range correlations in cloudiness, enabling scale-by-scale (scaling) analyses over a range of hundreds of meters to hundreds of kilometers. The objective of this study is to conduct an analysis based on radar reflectivity observations of clouds over the ACRF SGP site with special emphasis on boundary layer clouds, and the effect of drizzle.
NTIS
Millimeter Waves; Variability

20060012020 Mission Research Corp., Santa Barbara, CA, USA
Instrument Cross-Comparisons and Automated Quality Control of Atmospheric Radiation Measurement Data
Moore, S.; Hughes, G.; January 2005; 12 pp.; In English
Report No.(s): DE2005-841680; No Copyright; Avail.: National Technical Information Service (NTIS)

Within the Atmospheric Radiation Measurement (ARM) instrument network, several different systems often measure the same quantity at the same site. For example, several ARM instruments measure time-series profiles of the atmosphere that were previously available only from balloon-borne radiosonde systems. These instruments include the Radar Wind Profilers (RWP) with Radio-Acoustic Sounding Systems (RASS), the Atmospheric Emitted Radiance Interferometer (AERI), the Microwave Radiometer Profiler (MWRP), and the Raman Lidar (RL). ARM researchers have described methods for direct cross-comparison of time-series profiles (Coulter and Lesht 1996; Turner et al. 1996) and we have extended this concept to the development of methods for automated quality control (QC) of ARM datastreams.
NTIS
Atmospheric Radiation; Automatic Control; Data Acquisition; Quality Control; Radiation Measurement

20060012037 California Univ., Santa Barbara, CA, USA
Incorporation of 3D Shortwave Radiative Effects within the Weather Research and Forecasting Model
O'Hirok, W.; Ricchiazzi, P.; Gautier, C.; January 2005; 10 pp.; In English
Report No.(s): DE2005-841681; No Copyright; Avail.: National Technical Information Service (NTIS)

A principal goal of the Atmospheric Radiation Measurement (ARM) Program is to understand the 3D cloud-radiation problem from scales ranging from the local to the size of global climate model (GCM) grid squares. For climate models using typical cloud overlap schemes, 3D radiative effects are minimal for all but the most complicated cloud fields. However, with the introduction of superparameterization methods, where sub-grid cloud processes are accounted for by embedding high resolution 2D cloud system resolving models within a GCM grid cell, the impact of 3D radiative effects on the local scale

becomes increasingly relevant (Randall et al. 2003). In a recent study, we examined this issue by comparing the heating rates produced from a 3D and 1D shortwave radiative transfer model for a variety of radar derived cloud fields (OHirok and Gautier 2005). As demonstrated in Figure 1, the heating rate differences for a large convective field can be significant where 3D effects produce areas of intense local heating. This finding, however, does not address the more important question of whether 3D radiative effects can alter the dynamics and structure of a cloud field. To investigate that issue we have incorporated a 3D radiative transfer algorithm into the Weather Research and Forecasting (WRF) model. Here, we present very preliminary findings of a comparison between cloud fields generated from a high resolution non-hydrostatic mesoscale numerical weather model using 1D and 3D radiative transfer codes.
NTIS
Atmospheric Radiation; Climate Models; Forecasting

20060012038 Pacific Northwest National Lab., Richland, WA, USA
Estimation of Clear-Sky Upwelling Shortwave and Longwave
Long, C. N.; Mar. 2005; 14 pp.; In English
Report No.(s): DE2005-841619; No Copyright; Avail.: National Technical Information Service (NTIS)

If we are to estimate the surface radiative cloud forcing, the means must be developed to estimate what the upwelling shortwave and longwave irradiance would be if the clouds were not present. We present here methodologies developed for estimating the clear-sky upwelling SW and LW components using only standard surface radiation and meteorological measurements. Thus, the clear-sky estimates, as well as the calculated cloud effects and surface radiative cloud forcing, are derived independent from data that are typically used in model calculations and satellite retrievals such as sonde profiles (measured or interpolated) and aerosol optical depth measurements. These results can be used as independent data for model and satellite comparisons.
NTIS
Clearing; Surface Energy; Upwelling Water

20060012046 Michigan Univ., Ann Arbor, MI, USA
Investigation of the Impact of Aerosols on Clouds During May 2003 Intensive Operational Period at the Southern Great Plains
Guo, H.; Penner, J. E.; Herzog, M.; January 2005; 18 pp.; In English
Report No.(s): DE2005-841659; No Copyright; Avail.: National Technical Information Service (NTIS)

The performance of the Active Tracer High-resolution Atmospheric Model (ATHAM) in this stratiform cloud case is encouraging. The vertical profile and the time evolution of the cloud morphology, the cloud water content, as well as the cloud droplet size from ATHAM show features that are similar to those observed. The main reason is the agreement between the predicted temperature and moisture profiles from the surface up to the inversion layer with the measurements, which largely determines the thermal and moisture status within clouds. Different nucleation schemes have little impact on the cloud water content. In this case, the cloud droplet size is so small that there is almost no precipitation to deplete the cloud water. It is mainly determined by the meteorological conditions. The largest difference of the different nucleation schemes is exhibited through the cloud droplet effective radius and the cloud optical depth. The Nenes and Seinfeld (2003) (NS) scheme predicts a larger cloud droplet number concentration than the other two schemes. As a result, the cloud droplet size is smaller and the cloud optical depth is larger since the cloud water content remains unchanged.
NTIS
Aerosols; Atmospheric Models; Great Plains Corridor (North America); High Resolution

20060012056 Pacific Northwest National Lab., Richland, WA, USA, Sandia National Labs., Livermore, CA, USA
Refurbishment and Upgrade of the Atmospheric Radiation Measurement Raman Lidar
Turner, D.D.; Goldsmith, J.E.; Mar. 2005; 10 pp.; In English
Report No.(s): DE2005-841473; No Copyright; Avail.: National Technical Information Service (NTIS)

The Atmospheric Radiation Measurement Program (ARM) Climate Research Facility (ACRF) Raman lidar (CARL) is an autonomous, turn-key system that profiles water vapor, aerosols, and clouds throughout the diurnal cycle for days without attention (Goldsmith et al. 1998). CARL was first deployed to the Southern Great Plains CRF during the summer of 1996 and participated in the 1996 and 1997 water vapor intensive operational periods (IOPs). Since February 1998, the system has collected over 38,000 hrs of data (equivalent of almost 4.4 years), with an average monthly uptime of 62% during this time period. This unprecedented performance by CARL makes it the premier operational Raman lidar in the world. Unfortunately,

CARL began degrading in early 2002. This loss of sensitivity, which affected all observed variables, was very gradual and thus was not identified until the autumn of 2003. Analysis of the data suggested the problem was not associated with the laser or transmit portion of the system, but rather in the detection subsystem, as both the background values and the peak signals showed marked decreases over this time period.
NTIS
Atmospheric Radiation; Optical Radar; Radiation Measurement; Radiometers

20060012057 Los Alamos National Lab., NM USA
Tools for Teaching Climate Change Studies
Mar. 2005; 8 pp.; In English
Report No.(s): DE2005-841471; No Copyright; Avail.: Department of Energy Information Bridge

Numerous observational studies of marine stratocumulus have demonstrated a pronounced diurnal cycle. At night, longwave flux divergence at the top of the cloud drives negatively buoyant eddies that tend to keep the boundary layer well mixed. During the day, solar absorption by the cloud tends to reduce the turbulent intensity and often decouples the planetary boundary layer (PBL) into cloud- and sub-cloud circulations. The delicate balance between turbulent intensity, entrainment, and fluxes dictates cloud geometry and persistence, which can significantly impact the shortwave radiation budget. Millimeter-wavelength cloud radars (MMCRs) have been used to study the turbulent structure of boundary layer stratocumulus (e.g. Frisch et al. 1995; Kollias and Albrecht 2000). Analysis is confined to nondrizzling or lightly drizzling cloud systems for which precipitation contamination is negligible. Under such assumptions the Doppler velocity field becomes a proxy for vertical velocity. Prior research has mainly consisted of a few case studies of specific cloud systems using radar scan strategies optimized for this particular cloud type.
NTIS
Climate Change; Education

20060012058 Oklahoma Univ., Norman, OK, USA
Toward a Diurnal Climatology of Cold-Season Turbulence Statistics in Continental Stratocumulus as Observed by the Atmospheric Radiation Millimeter--Wavelength Cloud Radars
Mechem, D. B.; Kogan, Y. L.; Childers, M. E.; Donner, K. M.; January 2005; 12 pp.; In English
Report No.(s): DE2005-841470; No Copyright; Avail.: National Technical Information Service (NTIS)

Numerous observational studies of marine stratocumulus have demonstrated a pronounced diurnal cycle. At night, longwave flux divergence at the top of the cloud drives negatively buoyant eddies that tend to keep the boundary layer well mixed. During the day, solar absorption by the cloud tends to reduce the turbulent intensity and often decouples the planetary boundary layer (PBL) into cloud- and sub-cloud circulations. The delicate balance between turbulent intensity, entrainment, and fluxes dictates cloud geometry and persistence, which can significantly impact the shortwave radiation budget. Millimeter-wavelength cloud radars (MMCRs) have been used to study the turbulent structure of boundary layer stratocumulus (e.g. Frisch et al. 1995; Kollias and Albrecht 2000). Analysis is confined to nondrizzling or lightly drizzling cloud systems for which precipitation contamination is negligible. Under such assumptions the Doppler velocity field becomes a proxy for vertical velocity. Prior research has mainly consisted of a few case studies of specific cloud systems using radar scan strategies optimized for this particular cloud type.
NTIS
Atmospheric Radiation; Climatology; Diurnal Variations; Millimeter Waves; Stratocumulus Clouds; Turbulence

20060012142 Georgia Inst. of Tech., Atlanta, GA, USA
Influence of isentropic transport on seasonal ozone variations in the lower stratosphere and subtropical upper troposphere
Jing, P.; Cunnold, D. M.; Yang, E.-S.; Wang, H.-J.; Journal of Geophysical Research; May 26, 2005; ISSN 0148-0227; Volume 110; 1 pp.; In English
Contract(s)/Grant(s): NAS5-00171; Copyright; Avail.: Other Sources

The isentropic cross-tropopause ozone transport has been estimated in both hemispheres in 1999 based on the potential vorticity mapping of Stratospheric Aerosol and Gas Experiment 11 ozone measurements and contour advection calculations using the NASA Goddard Space Flight Center Global and Modeling Assimilation Office analysis. The estimated net isentropic stratosphere-to-troposphere ozone flux is approx.118 +/- 61 x 10(exp9)kg/yr globally within the layer between 330 and 370 K in 1999; 60% of it is found in the Northern Hemisphere, and 40% is found in the Southern Hemisphere. The monthly

average ozone fluxes are strongest in summer and weakest in winter in both hemispheres. The seasonal variations of ozone in the lower stratosphere (LS) and upper troposphere (UT) have been analyzed using ozonesonde observations from ozonesonde stations in the extratropics and subtropics, respectively. It is shown that observed ozone levels increase in the UT over subtropical ozonesonde stations and decrease in the LS over extratropical stations in late spring/early summer and that the ozone increases in the summertime subtropical UT are unlikely to be explained by photochemical ozone production and diabatic transport alone. We conclude that isentropic transport is a significant contributor to ozone levels in the subtropical upper troposphere, especially in summer.
Author
Advection; Annual Variations; Ozone; Temperate Regions; Southern Hemisphere; Northern Hemisphere; Stratosphere; Gas Analysis

20060012143 NASA Langley Research Center, Hampton, VA, USA
SAGE III solar ozone measurements: Initial results
Wang, Hsiang-Jui; Cunnold, Derek M.; Trepte, Chip; Thomason, Larry W.; Zawodny, Joseph M.; Geophysical Research Letters; Feb. 8, 2006; ISSN 0094-8276; Volume 33; 1 pp.; In English
Contract(s)/Grant(s): NAS5-00171; Copyright; Avail.: Other Sources

Results from two retrieval algorithms, o3-aer and o3-mlr , used for SAGE III solar occultation ozone measurements in the stratosphere and upper troposphere are compared. The main differences between these two retrieved (version 3.0) ozone are found at altitudes above 40 km and below 15 km. Compared to correlative measurements, the SAGE II type ozone retrievals (o3-aer) provide better precisions above 40 km and do not induce artificial hemispheric differences in upper stratospheric ozone. The multiple linear regression technique (o3_mlr), however, can yield slightly more accurate ozone (by a few percent) in the lower stratosphere and upper troposphere. By using SAGE III (version 3.0) ozone from both algorithms and in their preferred regions, the agreement between SAGE III and correlative measurements is shown to be approx.5% down to 17 km. Below 17 km SAGE III ozone values are systematically higher, by 10% at 13 km, and a small hemispheric difference (a few percent) appears. Compared to SAGE III and HALOE, SAGE II ozone has the best accuracy in the lowest few kilometers of the stratosphere. Estimated precision in SAGE III ozone is about 5% or better between 20 and 40 km and approx.10% at 50 km. The precision below 20 km is difficult to evaluate because of limited coincidences between SAGE III and sondes. SAGE III ozone values are systematically slightly larger (2-3%) than those from SAGE II but the profile shapes are remarkably similar for altitudes above 15 km. There is no evidence of any relative drift or time dependent differences between these two instruments for altitudes above 15-20 km.
Author
Ozone; Atmospheric Composition; Halogen Occultation Experiment; Algorithms; Sondes; Occultation; Troposphere; Stratosphere

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*.

20060011217 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Rijswijk, Netherlands
Diagnosis of exposure to chemical warfare agents A comprehensive literature survey 1990 - 2005
Noort, D.; January 2006; 86 pp.; In English; Original contains color illustrations
Contract(s)/Grant(s): A03/C04/CA; TNO Proj. 014.15094
Report No.(s): TD2005-0422; TNO-DV2 2005 A217; Copyright; Avail.: Other Sources

This report is an update of TNO report PML 2003-A63. In this report an overview is presented of the methods currently available for detection of exposure to a number of chemical warfare agents (CWA), i.e., sulfur mustard, lewisite and nerve agents. Such methods can be applied for various purposes, e.g., diagnosis and dosimetry of exposure of casualties, confirmation of non-exposure, verification of non-adherence to the Chemical Weapons Convention, health surveillance, and forensic purposes. The methods are either based on mass spectrometric analysis of urine or plasma metabolites that result from hydrolysis and/or glutathione conjugation (Part 1), or on mass spectrometric or immunochemical analysis of CWA adducts

with DNA or proteins (Part 2). Several of the methods have been successfully applied to actual cases.
Author
Metabolites; Exposure; Chemical Warfare; Sulfur; Hydrolysis; Dosimeters; Diagnosis

20060011218 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Zeist, Netherlands
The effect of a hypotonic carbohydrate drink, and caffeine supplementation on mental and physical performance after recovery of a single exhaustive endurance exercise performance in combat soldiers.
Pasman, W. J.; November 2005; 128 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): A04/KL/154; TNO Proj. 010.22111
Report No.(s): TD2005-0909; TNO-Rept-V6468; Copyright; Avail.: Other Sources

In this field study, a mission was simulated: strenuous activity followed with some leisure time and again strenuous activity and mental performance. The main objective was to fred out whether recovery between two exhaustive activities could be stimulated or improved by consumption of a carbohydrate rich drink (NBC drink) and or caffeine capsules. It was clearly shown that in the fatigued state drinking carbohydrates during the recovery period in between the activities resulted in a better performance at the speed march at the end than drinking a placebo drink. Of the 20 in-study adverse events 10 were not related to the treatment and 10 were unlikely related to treatment. The total numbers of AEs between treatments are not different (4 versus 6). The reported AEs are mostly related to study design and habitual use (marches and lower leg complaints), not to study treatment. Based on the results of the study, the main application of the study is that enough NBC drink and caffeine should be supplied in the rations, to fully cover the carbohydrate needs during a mission.
Author
Physical Exercise; Combat; Mental Performance; Carbohydrates; Caffeine; Rations

20060011219 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Rijswijk, Netherlands
Sex differences in the physostigmine pretreatment against soman intoxication in guinea pigs
Philippens, I. H. C. H. M.; Groen, B.; Vanwersch, R. A. P.; December 2005; 30 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): A98/M/541; TNO Proj. 014.17111
Report No.(s): TD2005-0413; TNO-DV2-2005-A208; Copyright; Avail.: Other Sources

The goal of this study was to compare the appearance of behavioral and neurophysiological side effects and the efficacy of physostigmine pretreatment between male and female guinea pigs. The appearance of side effects was comparable between the two sexes: there were hardly any side effects found. Only small differences on the EEG frequency bands were found. After organophosphate intoxication the condition of both test groups were different. Physostigmine protects female guinea pigs more adequately against 2x LD(sub 50) soman. Furthermore, male guinea pigs may still suffer from post intoxication incapacitation. Presumable there exist also a species difference, because in a former study with marmoset monkeys the opposite effect was found. This, together with the fact that in most Defence organization females also play an important role during military operations, emphasises that it is necessary to incorporate both sexes in the experimentation set-up and not be ruled out during research in the area of treatment by medication.
Author
Guinea Pigs; Intoxication; Pretreatment; Neurophysiology; Behavior; Physiological Effects; Sex

20060011614
Wading Bird Population of the Kennedy Space Center
Smith, Rebecca B.; Breininger, David R.; 1995; 6 pp.; In English; Original contains black and white illustrations; Copyright; Avail.: Other Sources

No abstract available
Birds; Wildlife

52
AEROSPACE MEDICINE

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

20060011656 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
Aeromedical Education: Spatial Disorientation ... and Technology Transfer
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series; March 2005, pp. 66-68; In English; See also 20060011654; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

Interactions between CAMI's research and educational activities have been considerable. They include joint efforts with the hypobaric (altitude) and environmental chambers and with the ditching tank, use of researchers in the presentation of specialty lectures during the training of aviation medical examiners, and use of research findings in physiological and other safety training of pilots by the education staff. But perhaps the most visible and most widely applicable interaction is that related to familiarizing general aviation pilots with spatial disorientation.
Author
Aerospace Medicine; Technology Transfer; Pilot Training; Hypobaric Atmospheres; Disorientation; Altitude Simulation

20060011657 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
A Brief Early History of Aeromedical Research in the FAA
Collins, William E.; Dills, Gale G.; A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series; March 2005, pp. 7 - 17; In English; See also 20060011654; Original contains black and white illustrations; Copyright; Avail.: CASI: A02, Hardcopy

The beginnings of aeromedical research in what is now the Federal Aviation Administration (FAA) are sometimes associated with the creation of the Civil Aeromedical Research Institute (CARI - later CAMI) at the (Mike Monroney) Aeronautical Center in Oklahoma City. That association reflects in part the relatively sudden emergence and size of the enterprise at that time, including the construction of a unique edifice, designed by researchers from various scientific fields, and built specifically for aeromedical research across multiple specialties. Indeed, the creation of CARI did signal a marked change in the FAA5 aeromedical research programs - significant increases in scope, funding, personnel, visibility, and responsibility. However, the aeromedical office of the FAA had a long, tortuous, and tenuous prior history of attempting to establish aeromedical research. That history, culled extensively from the work of Heber A. Holbrook (29), is summarized below. Underlying all of the sporadic early attempts to make civil aeromedical research a reality is the fact that aeromedical directors were faced with a variety of difficult medical, political, funding, and priority issues through the decades. Those various elements, not addressed here, are presented in detail by Holbrook (29) and Lopa (35).
Author
Aerospace Medicine; Construction; Personnel; Histories

20060011660 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
Aeromedical Certification ... and Health
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series; March 2005, pp. 21-23; In English; See also 20060011654; Original contains black and white illustrations; Copyright; Avail.: CASI: A01, Hardcopy

The top priority of the Office of Aerospace Medicine and of CAMI is not research but the recurrent aeromedical certification of all of the country's civilian pilots. However, the co-location of the research enterprise with the certification function encourages research from both entities. Some studies have described the performance effectiveness of aviation medical examiners; others defined disease prevalence and incidence among pilot populations; still others compared medical status variables among accident vs. nonaccident airmen. From the certification staff Charles E Booze, Ph.D., was pre-eminent for more than two decades in tapping the extensive certification database and reporting his findings on a variety of certification topics. Similarly, beginning in the mid OS, Shirley J. Dark initiated a series of studies on characteristics of medically disqualified airmen in general and air line pilots in particular.
Author
Aerospace Medicine; Certification; Health; Diseases

20060012133 NASA Johnson Space Center, Houston, TX, USA
Biomechanical Evaluation of Locomotion on the Russian BD-1 Treadmill in a Weightless Environment (KC-135)
DeWitt, John; Schaffner, Grant; Bentley, Jason; Yarmanova, Eugenia; Kozlovskaya, Inessa; Hagan, Donald; March 2006; 38 pp.; In English; Original contains color and black and white illustrations
Report No.(s): NASA/TM-2006-213718; S-975; Copyright; Avail.: CASI: A03, Hardcopy

The purpose of this investigation was to evaluate locomotion on the Russian BD-1 non-motorized treadmill under three conditions weightlessness (0G) without a simulated subject positioning device, or horizontal restraint strap (RS), normal gravity (1G) without a RS, and 1G with a RS. Various outcome measures were evaluated, including the applied external load (EL), vertical ground reaction force (GRF), the ability to achieve specific locomotion speeds, and joint kinematics. The goal of this research was to better understand how locomotion and the related forces experienced by the musculoskeletal system during non-motorized treadmill locomotion in 0G compare to locomotion on the same device in 1G.
Author
Locomotion; Gravitation; Biodynamics; Treadmills; Weightlessness; Loads (Forces); Kinematics

53
BEHAVIORAL SCIENCES

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

20060011664 Civil Aerospace Medical Inst., Oklahoma City, OK, USA
Human Factors: Performance ... Doing It Right
A Milestone of Aeromedical Research Contributions to Civil Aviation Safety: The 1000th Report in the CARI/OAM Series; March 2005, pp. 59-65; In English; See also 20060011654; Original contains black and white illustrations; Copyright;
Avail.: CASI: A02, Hardcopy

Many of the CAMI research projects on human performance in aviation-related tasks have involved the effects of various stressors on complex performance (more recently referred to as time sharing performance or multi-tasking). The range of types of performance studies extends from laboratory task consoles (e.g., the Multiple Task Performance Battery) to flight (or radar) simulators, to in-flight (or on-site) observations. Stressors evaluated for their effects on performance-and often on physiological responses - have included simulated altitude exposure, alcohol, sleep loss, various drugs and medications, temperature, startle, smoking, motion vs. static environments, and others, singly and in combination. Other research has investigated the effects on performance of color-coded targets, flash rates for target detection, peripheral visual cues, various visual approach slope indicators, communication methods, situational awareness, and other conditions affecting safe performance.
Author
Human Performance; Physiological Responses; Situational Awareness; Evoked Response (Psychophysiology); Altitude Simulation; Exposure; Visual Stimuli; Sleep; Peripheral Vision

54
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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

20060011301 Lawrence Livermore National Lab., Livermore, CA USA
Implementation of a New Nonnuclear Standard at LNNL
van Warmerdam, C.; Apr. 28, 2005; 16 pp.; In English
Report No.(s): DE2005-15016239; UCRL-CONF-211823; No Copyright; Avail.: Department of Energy Information Bridge

The objective of this paper is to introduce the process and philosophies used to implement the new Work Smart Standard (WSS), 'Safety Basis Requirements for Nonnuclear Facilities at Lawrence Livermore National Laboratory Site Specific Standard' (UCRL-ID-150214), approved in 2003 and revised January, 2004. This work relates directly to the following workshop theme: 'Improvements in Chemical, Biological, and Non-nuclear Safety Analysis.' This paper will describe the approach used to implement the new nonnuclear standard at LLNL and corresponding guidance manual: ES&H Manual, Document 3.1. The varied activities can be broken down into three main parts: DT Implementation Plan Schedule. The Implementation Plan includes the due dates for revising nonnuclear facility safety analysis documentation to meet the new

standard. Implementation of the new methodology is being phased over a 4-year period. Each directorate was tasked to schedule the revision date for each of their nonnuclear facilities, using agreed upon priority-ranking criteria. DT Program Infrastructure. This includes the development of training courses, procedures, a website and tools required to perform the work (i.e. Q List, de minimus list) or tools helpful to perform the work; such as a program to automate the classification of chemical inventories and establish maximum facility inventory limits (MFILs). DT Delegation request packages. NNSA agreed to grant delegation to LLNL for local approval of nonnuclear safety basis documents (SBDs) in a phased manner. The first package submitted was for the Tier 1 (or Screening Report SBDs), the next is for the Tier 2 SBDs, and the last package will include the Tier 3 SBDs. The packages generally include 2-4 example SBDs at the level for which NNSA delegation is being sought, relevant training course material, and applicable procedures.
NTIS
Safety; Safety Management; Radiation Protection; Training Devices; Visual Aids; Classifications

59
MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

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

20060011194 NASA Glenn Research Center, Cleveland, OH, USA
Spotlight-8 Image Analysis Software
Klimek, Robert; Wright, Ted; January 2006; 60 pp.; In English; Original contains color and black and white illustrations
Contract(s)/Grant(s): WBS 080-08-02
Report No.(s): NASA/TM-2006-214084; E-15421; No Copyright; Avail.: CASI: A04, Hardcopy

Spotlight is a cross-platform GUI-based software package designed to perform image analysis on sequences of images generated by combustion and fluid physics experiments run in a microgravity environment. Spotlight can perform analysis on a single image in an interactive mode or perform analysis on a sequence of images in an automated fashion. Image processing operations can be employed to enhance the image before various statistics and measurement operations are performed. An arbitrarily large number of objects can be analyzed simultaneously with independent areas of interest. Spotlight saves results in a text file that can be imported into other programs for graphing or further analysis. Spotlight can be run on Microsoft Windows, Linux, and Apple OS X platforms.
Author
Image Analysis; Image Processing; Graphical User Interface; Combustion Physics; Fluid Dynamics; Microgravity; Augmentation

20060011224 Texas A&M Univ., College Station, TX USA
Aggregate Imaging System (AIMS): Basics and Applications
Masad, E. A.; Oct. 2005; 62 pp.; In English
Report No.(s): PB2006-107471; REPT-5-1707-01; No Copyright; Avail.: CASI: A04, Hardcopy

This report summarizes the design, basic operations, and analysis methods used in the Aggregate Imaging System (AIMS). The system is designed to analyze the form, angularity, and texture of coarse aggregates and the angularity and form of fine aggregates. Aggregates sizes from 37.5 mm to 150 mm can be analyzed using this system. In addition, the report summarizes the statistical-based methodology used in AIMS for the analysis and classification of aggregate shape. This methodology offers several advantages over current methods used in the practice. It is based on the distribution of shape characteristics in an aggregate sample rather than average indices of these characteristics. The coarse aggregate form is determined based on three-dimensional analysis of particles, which allows distinguishing between flat, elongated, or flat and elongated particles. The fundamental gradient and wavelet methods are used to quantify angularity and surface texture, respectively. The classification methodology can be used for the evaluation of the effects of different processes such as crushing techniques and blending on aggregate shape distribution. It also lends itself for the development of aggregate specifications based on the distribution of shape characteristics.
NTIS
Aggregates; Imaging Techniques

20060011225 Federal Railroad Administration, Washington, DC USA
ITIC-IM Version 1.0. Intermodal Transportation and Inventory Cost Model. Highway-to-Rail Intermodal. User's Manual
Mar. 2005; 40 pp.; In English
Report No.(s): PB2006-106911; No Copyright; Avail.: National Technical Information Service (NTIS)

The Intermodal Transportation and Inventory Cost (ITIC) Model is a personal computer model for performing policy analysis of issues concerning longhaul freight movement, such as modal diversion or the assessment of economic benefits associated with changes in transportation policy or infrastructure. The model replicates the decision-making tradeoffs made by a logistics manager in selecting the mode and shipment size used to resupply his company's inventory of a particular product. The implications of making alternative choices are assessed in both modal choice and in dollars and cents terms.
NTIS
Computerized Simulation; Cost Analysis; Highways; Inventories; Mathematical Models; Rails; Transportation; User Manuals (Computer Programs)

20060011230 Geological Survey, Spokane, WA, USA, Washington State Dept. of Natural Resources, Olympia, WA, USA
Raster Images of Geologic Maps of Middle Proterozoic Belt Strata in Parts of Benewah, Bonner, Kootenai and Shoshone Counties, Idaho and Lincoln, Mineral and Sanders Counties, Montana
Boleneus, D. E.; Applegate, L. M.; Joseph, N. L.; Brandt, T. R.; January 2001; 42 pp.; In English
Report No.(s): PB2006-105470; USGS/OFR-01-438; No Copyright; Avail.: National Technical Information Service (NTIS)

Geologic maps of the western part of the Belt Basin of western Montana and northern Idaho were converted into digital raster (TIFF image) format to facilitate their manipulation in geographic information systems. The 85-mile x 100-mile map area mostly contains rocks belonging to the lower and middle Belt Supergroup. The area is of interest as these Middle Proterozoic strata contain vein-type lead-zinc-silver deposits in the Coeur d'Alene Mining District in the St. Regis and Revett formations and stratabound copper-silver deposits, such as the Troy mine, within the Revett Formation. The Prichard Formation is also prospective for strata-bound lead-zinc deposits because equivalent Belt strata in southern British Columbia, Canada host the Sullivan lead-zinc deposit. Map data converted to digital images include 13 geological maps compiled in the 1980's at scales ranging from 1:48,000 to 1:12,000. Geologic map images produced from these maps by color scanning were registered to grid tick coverages in a Universal Transverse Mercator (North American Datum of 1927, zone 11) projection using ArcView Image Analysis. Geo-registering errors vary from 10 ft to 114 ft.
NTIS
Image Processing; Minerals; Precambrian Period; Strata

20060011237 Geological Survey, Spokane, WA, USA
Digital Database of Mining-Related Features at Selected Historic and Active Phosphate Mines, Bannock, Bear Lake, Bingham, and Caribou Counties, Idaho
Causey, J. D.; Moyle, P. R.; January 2001; 50 pp.; In English
Report No.(s): PB2006-105452; USGS/OFR-01-142; No Copyright; Avail.: National Technical Information Service (NTIS)

This report provides a description of data and processes used to produce a spatial database that delineates mining-related features in areas of historic and active phosphate mining in the core of the southeastern Idaho phosphate resource area. The data have varying degrees of accuracy and attribution detail. Classification of areas by type of mining-related activity at active mines is generally detailed; however, the spatial coverage does not differentiate mining-related surface disturbance features at many of the closed or inactive mines. Nineteen phosphate mine sites are included in the study.
NTIS
Data Bases; Data Mining; Lakes; Mining; Phosphates

20060011241 Geological Survey, Spokane, WA, USA
Digital Geologic Map of the Coeur d'Alene 1:100,000 Quadrangle, Idaho and Montana
Munts, S. R.; January 2000; 36 pp.; In English
Report No.(s): PB2006-105388; USGS/OFR-00-135; No Copyright; Avail.: National Technical Information Service (NTIS)

The map area is located in north Idaho. This open-file report describes the geologic map units, the methods used to convert the geologic map data into a digital format, the ArcInfo GIS file structures and relationships, and explains how to download

the digital files from the U.S. Geological Survey public access World Wide Web site on the Internet.
NTIS
Digital Data; Idaho; Maps; Geological Surveys

20060011262 New Jersey Inst. of Tech., Newark, NJ, USA
Computer Modeling and Simulation of New Jersey Signalized Highways. Volume II. Cost and Benefit Analysis
Chien, S. I.; Opie, K.; Kim, K.; Jun. 2005; 54 pp.; In English
Report No.(s): PB2006-107718; No Copyright; Avail.: National Technical Information Service (NTIS)

This study developed a practical method to quantify costs and benefits associated with optimizing traffic signal timing plans. A benefit analysis tool (BAT) was developed for calculating the differences between existing and optimized traffic signal timing plans by interfacing the SYNCHRO results. A corridor for which data was recently collected and available is used as a case study to demonstrate the application of BAT. Results showed substantial benefit in reducing signal delay, fuel consumption, and vehicular emission.
NTIS
Cost Effectiveness; Highways; Intersections; Simulation; Traffic

20060011291 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA, College of William and Mary, Williamsburg, VA, USA
Message Passing for Linux Clusters with Gigabit Ethernet Mesh Connections
Chen, J.; Watson, W.; Edwards, R.; Mao, W.; January 2005; 12 pp.; In English
Report No.(s): DE2005-840531; No Copyright; Avail.: Department of Energy Information Bridge

Multiple copper-based commodity Gigabit Ethernet (GigE) interconnects (adapters) on a single host can lead to Linux clusters with mesh/torus connections without using expensive switches and high speed network interconnects (NICs). However traditional message passing systems based on TCP for GigE will not perform well for this type of clusters because of the overhead of TCP for multiple GigE links. In this paper, we present two os-bypass message passing systems that are based on a modi- fied M-VIA (an implementation of VIA specification) for two production GigE mesh clusters: one is constructed as a 4x8x8 (256 nodes) torus and has been in production use for a year; the other is constructed as a 6x8x8 (384 nodes) torus and was deployed recently. One of the message passing systems targets to a specific application domain and is called QMP and the other is an implementation of MPI specification 1.1. The GigE mesh clusters using these two message passing systems achieve about 18.5 s half-way round trip latency and 400MB/s total bandwidth, which compare reasonably well to systems using specialized high speed adapters in a switched architecture at much lower costs.
NTIS
Architecture (Computers); Data Transmission; Ethernet; Messages; Unix (Operating System)

20060011393 Philips Research Labs., Brussels, Belgium
ON the MATHEMATICAL FOUNDATIONS of THE GENERALIZED LEVINSON ALGORITHM
Delsarte, Ph.; Genin, Y.; Kamp, Y.; International Conference on Acoustics, Speech and Signal Processing (ICASSP ‘82); Volume 3; [1982], pp. 1717-1720; In English; See also 20060011369; Copyright; Avail.: Other Sources

The paper is concerned with the generalized Levinson algorithm based on the displacement rank concept. It turns out that this algorithm for inverting an arbitrary positive definite matrix can be approached from two different mathematical viewpoints : the theory of Sigma-lossless transfer functions on the one hand and the matrix version of the standard Levinson algorithm applied to an appropriate block-Toeplitz embedding of the given matrix on the other hand.
Author
Algorithms; Transfer Functions; Matrices (Mathematics); Displacement

20060011413 Montpellier Univ., France
0N the INTERPRETATIONS of A POLYHEDRAL FIGURE
Terouanne, Eric; International Conference on Acoustics, Speech and Signal Processing (ICASSP ‘82); Volume 3; [1982], pp. 1944-1947; In English; See also 20060011369; Copyright; Avail.: Other Sources

A polyhedral figure is a drawing that an observer interprets as the representation of a solid, or solids, with planar faces. The aim of this paper is to furnish a mathematical model that represents all conceivable interpretations of a polyhedral figure, for the purpose of testing the consistency of each one. Various types of inconsistency are thus defined, and the relationship

between the consistency and realizability of an interpretation is discussed.
Author
Polyhedrons; Mathematical Models; Concavity; Convexity; Edges

20060011414 Texas Instruments, Inc., TX, USA
AN ANALYSIS-BY-SYNTHESIS APPROACH FOR AUTOMATIC TIME SEGMENTATION of SPEECH SIGNALS
Chen, Yeunung; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1956-1959; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper presents an analysis-by-synthesis speech segmentation algorithm. The approach employs a variable-frame-length LPC speech synthesizer, and the segmentation process is performed by constantly monitoring the synthesis output. The resulting segments, in general, do not correspond to elemental units of speech such as phonemes, but rather they represent a minimum number of acoustic limits necessary for a high-quality reproduction of the particular utterance. On a limited speech data base, synthetic continuous speech with an average rate of 20 frames per second and with quality comparable to about 333 frames per second fixed rate LPC speech has been achieved.
Author
Phonemes; Time Signals; Synthesizers; Algorithms; Segments

20060011422 Office National d'Etudes et de Recherches Aeronautiques, Chatillon, France, Ecole Centrale des Arts et Manufactures, Chatenay-Malabry, France
FAST COMPUTATION of FOURIER-BESSEL TRANSFORMS
Candel, Sebastien M.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2076-2079; In English; See also 20060011369; Copyright; Avail.: Other Sources

The Fourier-Bessel transforms (also designated as Hankel transforms) arise in numerous signal processing problems. They are particularly important in image analysis, reconstruction of unknown media from projections, synthesis of waves from their spatial spectrum. Three basic techniques (and a number of possible variations) for calculating Fourier-Bessel transforms have been recently developed by us. The present paper provides a brief review of these methods and a discussion of their accuracy. Test calculations illustrate this analysis and yield further indications for proper application of the proposed methods.
Author
Fourier-Bessel Transformations; Image Analysis; Signal Processing

20060011456 Technische Hogeschool, Delft, Netherlands
FAST NON-STATIONARY LATTICE RECURSIONS FOR ADAPTIVE MODELING and ESTIMATION
Deprettere, E.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1721-1726; In English; See also 20060011369; Copyright; Avail.: Other Sources

A class of least squares time-variant lattice recursions is presented, in which the lattice coefficients are sequences that are generated in a recursive test for matrix positivity. The computations of these sequences go partly along the lines of the test recursion and partly via recursive update procedures reflecting a low index of non Toeplitzness of the underlying matrix. In applications, these mixed form algorithms allow for a substantially reduction of the computational complexity, by performing stepwise tracking, in an exact manner, of estimation parameters
Author
Algorithms; Coefficients; Lattices (Mathematics); Estimating; Sequencing

20060011484 Ecole Nationale Superieure du Petrole et des Monteurs, Fontainebleau, France
THE PERCEPTUAL GRAPH: A NEW ALGORITHM
Meyer, Fernand; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1932-1935; In English; See also 20060011369; Copyright; Avail.: Other Sources

One of the major tools in the daily routine world of image processing is certainly ... the lightpen. A contour which should be closed is broken. A moving particle has a continuous trajectory, but a camera will see only a dotted trail. Single cells overlap, and one wishes to separate them. The algorithm we propose here, which connects neighboring points or particles, will bring a solution in such situations. Noteworthy is the fact that the execution time does not depend upon the number of points to be processed. Two particles are to be connected if in a given sense, they are neighbors The neighborhood criterion used here

goes back to Dirichlet and Delaunay. For its nice visual properties S. Sternberg called the result a perceptual graph.(5) Author
Image Processing; Trajectories; Algorithms; Graphs (Charts)

20060011650 Government Accountability Office, Washington, DC, USA
Information Security: Continued Progress Needed to Strengthen Controls at the Internal Revenue Service
Mar. 2006; 38 pp.; In English
Report No.(s): PB2006-109686; GAO-06-328; No Copyright; Avail.: CASI: A03, Hardcopy

The Internal Revenue Service (IRS) has a demanding responsibility in collecting taxes, processing tax returns, and enforcing the nations tax laws. It relies extensively on computerized systems to support its financial and mission-related operations. Effective information security controls are essential for ensuring that information is adequately protected from inadvertent or deliberate misuse, disruption, or destruction. As part of its audit of IRSs fiscal year 2005 financial statements, GAO assessed (1) the status of IRSs actions to correct or mitigate previously reported information security weaknesses at two sites and (2) whether controls over key financial and tax processing systems located at the facilities are effective in ensuring the confidentiality, integrity, and availability of financial and sensitive taxpayer data.
NTIS
Revenue; Security; Laws; Computer Techniques; Collection

20060011652 National Inst. of Standards and Technology, Gaithersburg, MD, USA
Fingerprint Identification and Mobile Handheld Devices: An Overview and Implementation
Jansen, W.; Daniellou, R.; Cilleros, N.; Mar. 2006; 28 pp.; In English
Report No.(s): PB2006-109108; NISTIR-7290; No Copyright; Avail.: CASI: A03, Hardcopy

The use of mobile handheld devices within the workplace is expanding rapidly. These devices have become indispensable tools that offer competitive business advantages for the mobile workforce. While these devices provide productivity benefits, they also pose new risks to an organization's security by the information they contain or can access remotely. Enabling adequate user authentication is the first line of defense against unauthorized use of an unattended, lost, or stolen handheld device. This report describes using fingerprint identification on handheld devices. Two types of solutions are described: one that uses the computational capabilities of the handheld device to authenticate a user's fingerprints, the other that uses the computational capabilities of a specialized processor to offload processing by the handheld device. Details of the design and implementation of both solutions are provided.
NTIS
Computer Information Security; Risk

20060011675 National Inst. of Standards and Technology, Gaithersburg, MD, USA
Proximity Beacons and Mobile Device Authentication: An Overview and Implementation
Jansen, W.; Gavrila, S.; Korolev, V.; Jun. 2005; 40 pp.; In English
Report No.(s): PB2006-109106; NISTIR-7200; No Copyright; Avail.: CASI: A03, Hardcopy

The use of mobile handheld devices within the workplace is expanding rapidly. These devices have become indispensable tools that offer competitive business advantages for the mobile workforce. While these devices provide productivity benefits, they also pose new risks to an organization's security by the information they contain or can access remotely. Enabling adequate user authentication is the first line of defense against unauthorized use of an unattended, lost, or stolen handheld device. This report describes an innovative type of authentication mechanism that relies on the presence of a signal from a wireless beacon for access to be granted. Such proximity beacons can be either organizational or personal oriented. Details of the design and implementation for both personal and organizational proximity beacons are provided.
NTIS
Beacons; Computer Information Security

20060012011 National Inst. of Standards and Technology, Rockville, MD, USA
Cell Phone Forensic Tools: An Overview and Analysis
Ayers, R.; Jansen, W.; Cilleros, N.; Daniellou, R.; Oct. 2005; 192 pp.; In English
Report No.(s): PB2006-109103; NISTIR-7250; No Copyright; Avail.: National Technical Information Service (NTIS)

Cell phones and other handheld devices incorporating cell phone capabilities (e.g., Personal Digital Assistant (PDA) phones) are ubiquitous. Rather than just placing calls, certain phones allow users to perform additional tasks such as SMS

(Short Message Service) messaging, Multi-Media Messaging Service (MMS) messaging, IM (Instant Messaging), electronic mail, Web browsing, and basic PIM (Personal Information Management) applications (e.g., phone and date book). PDA phones, often referred to as smart phones, provide users with the combined capabilities of both a cell phone and a PDA. In addition to network services and basic PIM applications, one can manage more extensive appointment and contact information, review electronic documents, give a presentation, and perform other tasks. All but the most basic phones provide individuals with some ability to load additional applications, store and process personal and sensitive information independently of a desktop or notebook computer, and optionally synchronize the results at some later time. As digital technology evolves, the capabilities of these devices continue to improve rapidly. When cell phones or other cellular devices are involved in a crime or other incident, forensic examiners require tools that allow the proper retrieval and speedy examination of information present on the device. This report gives an overview of current forensic software, designed for acquisition, examination, and reporting of data discovered on cellular handheld devices, and an understanding of their capabilities and limitations.
NTIS
Telephones; Digital Systems; Information Management; Data Acquisition; Crime

20060012012 National Inst. of Standards and Technology, Gaithersburg, MD, USA
Healthcare Strategic Focus Area: Clinical Informatics
Bock, C.; Carnahan, L.; Fenves, S.; Gruninger, M.; Kashyap, V.; Sep. 2005; 38 pp.; In English
Report No.(s): PB2006-109102; NISTIR-7263; No Copyright; Avail.: CASI: A03, Hardcopy
NIST has conducted several workshops and other information gathering activities, that have identified several key strategic opportunities in healthcare information technology (HIT) for NIST: clinical informatics; bioinformatics; medical devices; pharmaceuticals; biosurveillance; and enterprise modeling. This report addresses the first area, clinical informatics, as being of prime interest to NIST and focuses on roles that are suitable for NIST. The report presents three aspects of clinical informatics of most immediate interest to NIST's Information Technology (ITL) and Manufacturing Engineering Laboratories (MEL): - electronic medical records, approaches and standards for the integration and interchange of health information; - vocabularies, controlled collections of concepts that cover medical knowledge for particular purposes; and - evidence-based medicine (EBM), applying up-to-date healthcare knowledge by filtering and disseminating it in a way that integrates into clinical experience and patient values.
NTIS
Information Systems; Medical Equipment; Health

20060012017 Geological Survey, Spokane, WA, USA
Digital Mining Claim Density Map for Federal Lands in Montana: 1996
Campbell, H. W.; Hyndman, P. C.; January 1998; 14 pp.; In English
Report No.(s): PB2006-108392; USGS-OFR-98-489; No Copyright; Avail.: National Technical Information Service (NTIS)
This report describes a digital map and data files generated by the U.S. Geological Survey (USGS) to provide digital spatial mining claim information for Federal lands in Montana as of March, 1997. Mining claim data is earth science information deemed to be relevant to the assessment of historic, current, and future ecological, economic, and social systems. The digital map and data files that are available in this report are suitable for geographic information system (GIS)-based regional assessments at a scale of 1:100,000 or smaller.
NTIS
Claiming; Digital Data; Geological Surveys; Maps; Mining; Surveys

20060012026 Geological Survey, Spokane, WA, USA, Spokane City Dept. of Public Utiities, Spokane, WA, USA
Digital Geologic Map of the Rosalia 1:100,000 Quadrangle, Washington and Idaho: A Digital Database for the 1990 S.Z. Waggoner Map
Derkey, P. D.; Johnson, B. R.; Lackaff, B. B.; Derkey, R. E.; January 1998; 34 pp.; In English
Report No.(s): PB2006-108309; USGS-OFR-98-357; No Copyright; Avail.: National Technical Information Service (NTIS)
Geologic data from the geologic map of the Rosalia 1:100,000-scale quadrangle compiled by Waggoner (1990) were entered into a geographic information system (GIS) as part of a larger effort to create regional digital geology for the Pacific Northwest. The intent was to provide a digital geospatial database for a previously published black-andwhite paper geologic map. This database can be queried in many ways to produce a variety of geologic maps. Digital base map data files are not included: they may be obtained from a variety of commercial and government sources. This database is not meant to be used

or displayed at any scale larger than 1:100,000 (e.g., 1:62,500 or 1:24,000). The map area is located in eastern Washington and extends across the state border into western Idaho. This open-file report describes the methods used to convert the geologic map data into a digital format, documents the file structures, and explains how to download the digital files from the U.S. Geological Survey public access World Wide Web site on the Internet.
NTIS
Data Bases; Digital Data; Maps; Washington; Geographic Information Systems; Geological Surveys

20060012036 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Integrated Safeguards and Security Management Self-Assessment 2004
May 2005; 88 pp.; In English
Report No.(s): DE2005-841738; LBNL/PUB-3183; No Copyright; Avail.: National Technical Information Service (NTIS)

In 2002 Ernest Orlando Lawrence Berkeley National Laboratory deployed the first Integrated Safeguards and Security Management (ISSM) Self-Assessment process, designed to measure the effect of the Laboratory's ISSM efforts. This process was recognized by DOE as a best practice and model program for self-assessment and training. In 2004, the second Self-Assessment was launched. The cornerstone of this process was an employee survey that was designed to meet several objectives: (1) Ensure that Laboratory assets are protected. (2) Provide a measurement of the Laboratory's current security status that can be compared against the 2002 Self-Assessment baseline. (3) Educate all Laboratory staff about security responsibilities, tools, and practices. (4) Provide security staff with feedback on the effectiveness of security programs. (5) Provide line management with the information they need to make informed decisions about security. This 2004 Self Assessment process began in July 2004 with every employee receiving an information packet and instructions for completing the ISSM survey. The Laboratory-wide survey contained questions designed to measure awareness and conformance to policy and best practices. The survey response was excellent--90% of Berkeley Lab employees completed the questionnaire. ISSM liaisons from each division followed up on the initial survey results with individual employees to improve awareness and resolve ambiguities uncovered by the questionnaire. As with the 2002 survey, the Self-Assessment produced immediate positive results for the ISSM program and revealed opportunities for longer-term corrective actions.
NTIS
Safety; Security; Surveys

20060012061 Fluent, Inc., Lebanon, NH, USA, West Virginia Univ., Morgantown, WV, USA, ALSTOM Power, Inc.,, Windsor, CT, USA, Aspen Technology, Inc., Cambridge, MA, USA
Development of Technologies and Analytical Capabilities for Vision 21 Energy Plants
Apr. 2005; 116 pp.; In English
Report No.(s): DE2005-841446; No Copyright; Avail.: National Technical Information Service (NTIS)

To accelerate the development of advanced power plants, DOE's Vision 21 program identified the need for an integrated suite of software tools that could be used to simulate and visualize new plant concepts. Existing process simulation software did not meet this objective of virtual-plant simulation. Sophisticated models of many individual equipment items are available; however, a seamless coupling capability that would integrate the advanced equipment (component) models to the process (system) simulation software remained to be developed. The inability to use models in an integrated manner causes knowledge loss (e.g., knowledge captured in detailed equipment models is usually not available in process simulation) and modeling inconsistencies (e.g., physical properties and reaction kinetics data in different models are not the same). A team consisting of Fluent Inc., ALSTOM Power Inc., Aspen Technology Inc., Intergraph Corporation, and West Virginia University, in collaboration with the National Energy Technology Laboratory (NETL), addressed this challenge in a project performed over the period from October 2000 through December 2004. In this project the integration of the cycle analysis software was based on widely used commercial software: Aspen Plus(reg-sign) for process simulation and FLUENT(reg-sign) for computational fluid dynamics (CFD) modeling of equipment items. The integration software was designed to also include custom (in-house, proprietary, legacy) equipment models that often encapsulate the experience from the many years of designing and operating the equipment. The team adopted CAPE-OPEN (CO) interfaces, the de facto international standard for communication among process models, for exchanging information between software.
NTIS
Computerized Simulation; Power Plants; Energy Technology; Reaction Kinetics

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*.

20060011377 Nippon Telegraph and Telephone Public Corp., Tokyo, Japan
A HARDWARE IMPLEMENTATION of A NEW NARROW to MEDIUM BAND SPEECH CODING
Itakura, Fumitada; Kobayashi, Tsutomu; Honda, Masaaki; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1964-1967; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper will describes a digital speech signal processor(DSSP) designed for a narrow band and a medium band speech coding system, both of them are recently developed at the E.C.L., N.T.T.. The narrow band system is LSP(Line Spectrum Pair) vocoder, which is based on the frequency domain representation of LPC parameters. The LSP parameters are superior to conventional LPC parameters in view of its quantization and interpolation properties. The medium band system is a split band adaptive predictive coding with adaptive bit-allocation, APC-AB. This system can achieve a toll quality coding at 16 Kbit/s. We have made an extensive software simulation of LSP and APC-AB , and decided the specification of the DSSP. The DSSP can handle arithmetic and shifting operations in both 12 and 24 bit mode. Multiplications are done by a 12- by-12 parallel multiplier. Multiplier, ALU and shifters can operate concurrently in a pipeline mode at the minimum interval of 0.5 micro-s per multiplication-accumulation.
Author
Voice Data Processing; Narrowband; Computerized Simulation; Vocoders; Speech Recognition; Coding; Arithmetic and Logic Units

20060011388 Institute for Defense Analyses, Princeton, NJ, USA
ON TALKER-INDEPENDENT WORD RECOGNITION IN CONTINUOUS SPEECH
Kuhn, G. M.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1612-1615; In English; See also 20060011369; Copyright; Avail.: Other Sources

Results are presented from an experiment on talker-independent word recognition in which three experimental parameters were manipulated. Those parameters were 1) whether the word model had a mean vector and a variance vector, or a mean vector and a covariance matrix, at each time frame; 2) Whether a single estimate was made of the word model or whether there was one re-estimate; and 3) whether word recognition was based on a Pass 1 distance score or on a novel Pass 2 log odds score. The results were 1) a multivariate word model did not do better than a word model based on a sum of univariate distributions; 2) a re-estimated word model did better than a word model based on initial estimates; and 3) the Pass 2 log odds score did better than the Pass 1 distance score.
Author
Words (Language); Articulation (Speech); Talking; Mathematical Models

20060011552 Ruhr Univ., Bochum, Germany
SYNTEX: A MICROPROCESSOR BASED SYSTEM FOR AUTOMATIC CONVERSION of GERMAN TEXT to SPEECH
Ruehl, Hans-Wilhelm; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1608-1611; In English; See also 20060011369; Copyright; Avail.: Other Sources

SYNTEX has been developed for real time conversion of unrestricted German text to speech. Main part of the system is a word parser used to decompose compounds, to mark affixes, and to detect accented syllables in foreign words. The results of this parsing are used by a set of letter-to-sound rules working on morps and by algorithm for computation of word intonation. The intonation algorithm treats German words as well as foreign adaptions. It assigns main and rhythmical stress and converts it to a fundamental frequency contour. SYNTEX is supported by a text preprocessor treating upper and lower case letters, numbers and punctuation. Routines for the conversion of phonemes and intonation contour to synthesizer parameters are written for a Votrax VS6-G2 so far, but can easily be adapted to other synthesizers.
Author
Microprocessors; Texts; Automatic Control; Parsing Algorithms; Synthesizers; Conversion

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*.

20060011258 NASA Johnson Space Center, Houston, TX, USA
Innovative Robot Archetypes for In-Space Construction and Maintenance
Rehnmark, Fredrik; Ambrose, Robert O.; Kennedy, Brett; Diftler, Myron; Mehling Joshua; Brigwater, Lyndon; Radford, Nicolaus; Goza, S. Michael; Culbert, Christopher; [2005]; 8 pp.; In English; STAIF Conference, 13-17 Feb. 2005, Albuquerque, NM, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): NAS9-19100; Copyright; Avail.: CASI: A02, Hardcopy

The space environment presents unique challenges and opportunities in the assembly, inspection and maintenance of orbital and transit spaceflight systems. While conventional Extra-Vehicular Activity (EVA) technology, out of necessity, addresses each of the challenges, relatively few of the opportunities have been exploited due to crew safety and reliability considerations. Extra-Vehicular Robotics (EVR) is one of the least-explored design spaces but offers many exciting innovations transcending the crane-like Space Shuttle and International Space Station Remote Manipulator System (RMS) robots used for berthing, coarse positioning and stabilization. Microgravity environments can support new robotic archetypes with locomotion and manipulation capabilities analogous to undersea creatures. Such diversification could enable the next generation of space science platforms and vehicles that are too large and fragile to launch and deploy as self-contained payloads. Sinuous manipulators for minimally invasive inspection and repair in confined spaces, soft-stepping climbers with expansive leg reach envelopes and free-flying nanosatellite cameras can access EVA worksites generally not accessible to humans in spacesuits. These and other novel robotic archetypes are presented along with functionality concepts
Author
Aerospace Environments; Extravehicular Activity; Construction; Maintenance; Robots; Robotics; Inspection

20060011497 Bell Telephone Labs., Inc., Holmdel, NJ, USA
Study of Human and Machine Discrete Utterance Recognition (DUR)
Vickroy, Carolyn A.; Silverman, Harvey F.; Dixon, N. Pox; International Conference on Acoustics, Speech and Signal Processing (ICASSP ‘82); Volume 3; [1982], pp. 2022-2025; In English; See also 20060011369; Copyright; Avail.: Other Sources

Performance evaluation of DUR systems has typically consisted of percentage-correct recognition (PCR) for specific vocabularies. This numerical measure is misleading because it presumes that 100% recogni+icn is equally achievable for all vocabularies. This, in fact, is not the case. In this paper, results from an experiment which compared human- listener performance to that of a particular recognition machine will be presented. Three different vocabularies were studied. Preliminary results for normalizing machine performance with respect to the difficulty of a test vocabulary are given. Relevant data from the experiment are included to demonstrate the problem and its potential solution.
Author
Artificial Intelligence; Evaluation; Human Performance; Performance Tests; Ratios

64
NUMERICAL ANALYSIS

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

20060011374 Osaka Univ., Suita, Japan
LEAST-SQUARES METHOD FOR MULTI-DIMENSIONAL DECONVOLUTION
Yanagida, Masuzo; Kakusho, Osamu; International Conference on Acoustics, Speech and Signal Processing (ICASSP ‘82); Volume 3; [1982], pp. 1849-1852; In English; See also 20060011369
Contract(s)/Grant(s): MOE-56550038; Copyright; Avail.: Other Sources

Least-squares method is applied to multidimensional deconvolution or estimation of input waveforms to a multi-input multi-output system given the transfer characteristics of the system. Suppose a system accepts n-dimensional input s(t) and it produces m-dimensional output f(t). Let h(sub jj)(t) be the impulse response of the channel from jth input terminal to ith output terminal. Using an mxn matrix h(t) = [h(sub jj)(t)], the input-output relation can be written as f(t) = h(t) circle plus s(t), where circle plus denotes the matrix convolution introduced here. The minimum-norm least-squares estimate for s(t) is

expressed as s(circumflex)(t) = h circle plus(t) circle plus f(t), where circle plus denotes the generalized convolutional inverse matrix. In the case of m greater than n, s (circumflex)(t) yields the least squares estimate for s(t). Efficient computation can be performed in the frequency domain. Practical applications are shown as source sound estimation in a multi-source multi-microphone configuration using sinusoidal waves and stationary vowels as source sounds.
Author
Least Squares Method; Waveforms; Convolution Integrals; Matrices (Mathematics)

20060011438 Illinois Univ., Urbana, IL, USA
ALGORITHMS and EXPERIMENTAL RESULTS ON IMAGE RECONSTRUCTION FROM LIMITED DATA
Hayner, D. A.; Renjen, S.; Huang, T. S.; Jenkins, W. K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1557-1560; In English; See also 20060011369
Contract(s)/Grant(s): N00014-79-C-0424(25); Copyright; Avail.: Other Sources

Multidimensional imaging of three dimensional (3-D) objects is often complicated by physical constraints imposed by the observation technique. An example of this problem occurs in 3-D imaging of specimens with electron-microscopes. In this case the range of observation angle (perspective) is typically less than pi/2 radians due to the limited angle through which the specimen can be rotated relative to the electron beam. This paper presents three novel algorithms that significantly enhance the resolution of techniques limited by lack of perspective. The methods are based on a combination of Gerchberg's spectral error energy reduction algorithm (1) and tomographic image reconstruction techniques.
Author
Algorithms; Image Reconstruction; Imaging Techniques; Image Enhancement; Three Dimensional Models

20060011543 Universidad Politecnica de Barcelona, Barcelona, Spain
ON the INVERSION of SINGULAR OPERATORS
Casares-Giner, Vincente; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1541-1544; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper is concerned with the inversion of digital singular convolution - operators defined by a polynomial in the z-transform domain. For that purpose, in the one dimensional case (1D), the method given here proceeds by first approximating the polynomial by a rational transfer function, which numerator results to be an autocorrelation functions, free of zeros on the unit circle. This is obtained by using the least square inverse concept of a polynomial. The extension to the 2D case, can be achieved using the well known 2D planar least square inverse polynomial (PLSI) in semicausal form. With this approach, the inversion deals with a non singular autocorrelation functions, so we can use the asymptotical method given recently.
Author
Operators (Mathematics); Singularity (Mathematics); Inversions; Digital Systems; Convolution Integrals

65
STATISTICS AND PROBABILITY

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

20060011444 Bolt, Beranek, and Newman, Inc., Cambridge, MA, USA
THE APPLICATION of PROBABILITY DENSITY ESTIMATION to TEXT-INDEPENDENT SPEAKER IDENTIFICATION
Schwartz, R.; Schwartz, R.; Berouti, M.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1649-1652; In English; See also 20060011369; Copyright; Avail.: Other Sources

Most text-independent speaker identification methods to date depend on the use of some distance metric for classification. In this paper we develop the use of probability density function (PDF) estimation for text-independent speaker identification. We compare the performance of two parametric and one non-parametric PDF estimation methods to one distance classification method that uses the Mahalanobis distance. Under all conditions tested, the PDF estimation methods performed substantially better than the Mahalanobis distance method. The best method is a non-parametric PDF estimation method.
Author
Speech Recognition; Classifications; Probability Theory; Estimating

67
THEORETICAL MATHEMATICS

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

20060012112 Helsinki Univ., Helsinki, Finland, Finnish Academy of Technical Sciences, Helsinki, Finland
Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1
Martio, Olli, Editor; January 2006; 263 pp.; In English; See also 20060012113 - 20060012127; Original contains black and white illustrations; Copyright; Avail.: Other Sources

The contents of this journal issue include: Non-accessible critical points of certain rational functions with Cremer points; Extension of internally bilipschitz maps in John disks; Simple geodesics on surfaces of genus 2; Characterization of rearrangement invariant spaces with fixed points for the Hardy-Littlewood maximal operator; On the sharpness of the Stolz approach; Banach spaces whose bounded sets are bounding in the bidual; Removable singularities for bounded p-harmonic functions and quasi(super)harmonic functions on metric spaces; Simply connected quasiregularly elliptic 4-manifolds; Weighted distortion in conformal mapping in euclidean, hyperbolic and elliptic geometry; The existence of quasimeromorphic mappings; Generalized mean porosity and dimension; A sharpening of a theorem of Bouligand, with an application to harmonic maps; Fixed points of meromorphic solutions of higher order linear differential equations; On Hecke L-functions associated with cusp forms II: On the sign changes of S(sub f)(T); and The boundedness of classical operators on variable L(sup P) spaces.
CASI
Mathematics; Theorems; Functional Analysis; Functions (Mathematics); Mathematical Logic; Theorem Proving

20060012113 University of Western Illinois, Macomb, IL, USA
Non-accessible critical points of certain rational functions with Cremer points
Petracovici, Lia; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 3-11; In English; See also 20060012112; Copyright; Avail.: Other Sources

Let R be a rational function with a completely invariant (super)attracting Fatou component. We show that R has a non-accessible critical point in its Julia set, provided that R has a Cremer fixed point with the small cycles property. This extends Kiwi's result stating that the same is true for polynomials with Cremer fixed points.
Author
Rational Functions; Critical Point; Polynomials

20060012114 Wuerzburg Univ., Germany
Weighted distortion in conformal mapping in euclidean, hyperbolic and elliptic geometry
Kraus, Daniela; Roth, Oliver; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 111-130; In English; See also 20060012112; Copyright; Avail.: Other Sources

Golusin-type inequalities for normalized univalent functions are combined with elementary monotonicity arguments to give quick and simple proofs for numerous sharp two-point distortion theorems for conformal maps from the unit disk into (i) the complex plane equipped with euclidean geometry, (ii) the unit disk equipped with hyperbolic geometry, and (iii) the real projective plane equipped with elliptic geometry.
Author
Inequalities; Proving; Distortion; Euclidean Geometry; Monotone Functions

20060012115 Copenhagen Univ., Denmark
A sharpening of a theorem of Bouligand, with an application to harmonic maps
Fuglede, Bent; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 173-190; In English; See also 20060012112; Copyright; Avail.: Other Sources

The result by G. Bouligand (1926) about the boundary behaviour of the solution to the generalized Dirichlet problem is sharpened, the requirement that the prescribed boundary function f be bounded being now replaced by [f] having a superharmonic majorant. By way of application, a recent result on the boundary behaviour of the solution to the variational Dirichlet problem for harmonic maps is sharpened by leaving out the previous requirement that the prescribed boundary map be bounded.
Author
Boundaries; Harmonic Functions; Theorems; Potential Theory; Nonlinearity; Calculus of Variations

20060012116 Jyvaskyla Univ., Finland
Generalized mean porosity and dimension
Nieminen, Tomi; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 143-172; In English; See also 20060012112; Copyright; Avail.: Other Sources

We define the class of weakly mean porous sets and prove a sharp dimension estimate for the sets in this class. By using this geometric tool, we establish an essentially sharp dimension bound for the boundaries of generalized Holder domains and John domains.
Author
Porosity; Domains; Integrals

20060012117 Sao Paulo Univ., Brazil
Banach spaces whose bounded sets are bounding in the bidual
Carrion, Humberto; Galindo, Pablo; Lourenco, Mary Lilian; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 61-70; In English; See also 20060012112; Copyright; Avail.: Other Sources

We discuss necessary conditions for a Banach space to satisfy the property that its bounded sets are bounding in its bidual space. Apart from the classic case of c(sub 0),we prove that, among others, the direct sum is another example of spaces having such property.
Author
Banach Space; Boundaries; Convergence; Analytic Functions

20060012118 Helsinki Univ., Helsinki, Finland
Simply connected quasiregularly elliptic 4-manifolds
Rickman, Seppo; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 97-110; In English; See also 20060012112; Copyright; Avail.: Other Sources

We construct a quasiregular map of R(sup 4) onto the connected sum of S(sup 2) x S(sup 2) with itself. The proof is based on a symmetric splitting of T(sup 4) to two pieces together with some technique from Piergallini's article.
Author
Manifolds (Mathematics); Ellipticity; Toruses; Theorems; Proving; Homotopy Theory

20060012119 Tata Inst. of Fundamental Research, Mumbai, India
On Hecke L-functions associated with cusp forms II: On the sign changes of S(sub f)(T)
Sankaranarayanan, A.; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 213-238; In English; See also 20060012112; Copyright; Avail.: Other Sources

We study the number of sign changes of S(sub f)(t) (related to Hecke L-functions attached to holomorphic cusp forms of even positive integral weight with respect to the full modular group) over shorter intervals.
Author
Analytic Functions; Symbols; Entire Functions; Continuity (Mathematics); Coefficients

20060012120 Toulouse Univ., France
Simple geodesics on surfaces of genus 2
McShane, Greg; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 31-38; In English; See also 20060012112; Copyright; Avail.: Other Sources

We derive various identities satisfied by the spectrum of lengths of simple geodesics of a surface of genus 2.
Author
Geodesic Lines; Homomorphisms; Identities; Toruses

20060012121 Universidad Autonoma de Barcelona, Bellaterra, Spain
Characterization of rearrangement invariant spaces with fixed points for the Hardy-Littlewood maximal operator
Martin, Joaquim; Soria, Javier; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 39-46; In English; See also 20060012112; Copyright; Avail.: Other Sources

We characterize the rearrangement invariant spaces for which there exists a nonconstant fixed point, for the Hardy-Littlewood maximal operator(the case for the spaces L(sup p)(R(sup n)) was first considered in [7]).The main resul tthat

we prove is that the space L(sup n/(n-2),infinity)(R(sup n) L(sup infinity)(R(sup n)) is minimal among those having this property.
Author
Banach Space; Estimates; Function Space

20060012122 Trinity Coll., Hartford, CT, USA
The boundedness of classical operators on variable L(sup P) spaces
Cruz-Uribe, D.; Fiorenza, A.; Martell, J. M.; Perez, C.; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 236-263; In English; See also 20060012112
Contract(s)/Grant(s): MTM2004-00678; PB980106; Copyright; Avail.: Other Sources

We show that many classical operators in harmonic analysis--such as maximal operators, singular integrals, commutators and fractional integrals--are bounded on the variable Lebesgue space L(sup p(center dot) whenever the Hardy-Littlewood maximal operator is bounded on L(sup p(center dot). Further, we show that such operators satisfy vector-valued inequalities. We do so by applying the theory of weighted norm inequalities and extrapolation. As applications we prove the Calderon-Zygmund inequality for solutions of delta u = f in variable Lebesgue spaces, and prove the Calderon extension theorem for variable Sobolev spaces.
Author
Harmonic Analysis; Operators (Mathematics); Sobolev Space; Lebesgue Theorem

20060012123 Technion - Israel Inst. of Engineering, Haifa, Israel
The existence of quasimeromorphic mappings
Saucan, Emil; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 131-142; In English; See also 20060012112; Copyright; Avail.: Other Sources

Let G be a Kleinian group G acting on B(sup n) , n greater than or equal to 2. We show that if the orders of the elliptic elements in G which have non-degenerate fixed set are bounded, then G carries non-constant G-automorphic quasimeromorphic mappings. This together with an earlier non-existence theorem by Srebro gives a complete characterization of Kleinian groups that admit non-constant quasimeromorphic automorphic mappings.
Author
Euclidean Geometry; Existence Theorems; Triangulation

20060012124 Universita ‘G. d’Annunzio, Pescara, Italy
On the sharpness of the Stolz approach
DiBiase, Fausto; Stokolos, Alexander; Svensson, Olof; Weiss, Tomasz; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 47-59; In English; See also 20060012112; Copyright; Avail.: Other Sources

study the sharpness of the Stolz approach for the a.e. convergence of functions in the Hardy spaces in the unit disc, first settled in the rotation invariant case by J. E. Littlewood in 1927 and later examined, under less stringent, quantitative hypothesis, by H. Aikawa in 1991. We introduce a new regularity condition, of a qualitative type, under which we prove a version of Littlewood’s theorem for tangential approach whose shape may vary from point to point. Our regularity condition can be extended in those contexts where no group is involved, such as NTA domains in R(sup n). We show exactly in what sense our regularity condition is sharp.
Author
Hypotheses; Domains; Convergence; Theorems

20060012125 Linkoeping Univ., Sweden
Removable singularities for bounded p-harmonic functions and quasi(super)harmonic functions
Bjoern, Anders; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 71-95; In English; See also 20060012112; Copyright; Avail.: Other Sources

We study removable singularities for bounded p-harmonic functions in complete doubling metric spaces supporting a Poincare’ inequality. We show that a relatively closed set E of an arbitrary open set Omega is removable if it has zero capacity. Moreover, the extensions are unique. We give several general results showing nonremovability and giving us characterizations of removable sets as sets of capacity zero in various situations. We also provide examples of removable sets with positive capacity. Such examples can have some unexpected behaviour: e.g., E may disconnect Omega; the extensions may not be

unique; and there exists a nonremovable union of two compact disjoint removable sets. Similar results for superharmonic, quasiharmonic and quasisuperharmonic functions are also given.
Author
Harmonic Functions; Singularity (Mathematics); Inequalities

20060012126 South China Normal Univ., Guangzhou, China
Fixed points of meromorphic solutions of higher order linear differential equations
Ming-Sheng, Liu; Xiao-Mei, Zhang; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 191-211; In English; See also 20060012112; Copyright; Avail.: Other Sources

In this paper we discuss the problems on the fixed points of meromorphic solutions of higher order linear differential equations with meromorphic coefficients and their derivatives. Because of the restriction of differential equations, we obtain that the properties of fixed points of meromorphic solutions of higher order linear differential equations with meromorphic coefficients and their derivatives are more interesting than those of general transcendental meromorphic functions. Some estimates of the exponent of convergence of fixed points of solutions and their derivatives are obtained.
Author
Differential Equations; Derivation; Coefficients; Meromorphic Functions; Transcendental Functions

20060012127 Norwegian Univ. of Science and Technology, Trondheim, Norway
Extension of internally bilipschitz maps in John disks
Broch, Ole Jacob; Annals of the Finnish Academy of Sciences: Mathematics, Volume 31, No. 1; January 2006, pp. 13-30; In English; See also 20060012112; Copyright; Avail.: Other Sources

A map is said to be internally bilipschitz if it is bilipschitz with respect to internal distances. We prove the following extension theorem for John disks: any internally billpschitz map of the boundary (delta)D of a Jordan John disk D extends as an internally bilipschitz map of D. This result is a partial analogue to a result of Gehring for quasidisks.
Author
Boundaries; Theorems; Distance

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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*.

20060011222 Brookhaven National Lab., Upton, NY USA
State of the Art Electron Guns and Injector Designs for Energy Recovery Linacs (ERL)
Todd, A. M.M.; Bluem, H.; Christina, V.; Cole, M. D.; Falletta, M.; May 2005; 10 pp.; In English
Report No.(s): DE2005-861327; BNL-75161-2005-CP; No Copyright; Avail.: Department of Energy Information Bridge

A key technology issue of energy recovery linac (ERL) devices for high-power free-electron laser (FEL) and fourth generation light sources is the demonstration of reliable, high-brightness, high-power injector operation. Three ongoing programs that target up to 0.5 Ampere photocathode injector performance with required EFU brightness, are described. The first is a DC gun and superconducting RF (SRF) booster cryomodule. Such a 748.5 MHz device is being assembled and will be tested up to 100 mA at the Thomas Jefferson National Accelerator Facility (JLAB) beginning in 2006. The second approach is a high-current normal-conducting RF (NCRF) injector. A 700 MHz gun will undergo thermal test in late 2005 at the Los Alamos National Laboratory (LANL), which when equipped with a suitable cathode, would be capable of exceeding 0.5 Ampere operation. Finally, a half-cell 703.75 MHz SRF gun with a diamond amplifier and other cathodes, will be tested to 0.5 Ampere at the Brookhaven National Laboratory (BNL) in 2007. The status and projected performance for each of these injector projects is presented.
NTIS
Electron Guns; Injectors; Linear Accelerators

20060011240 Geological Survey, Menlo Park, CA, USA

Principal Facts for Gravity Stations in the Vicinity of San Bernardino, Southern California

Anderson, M. L.; Roberts, C. W.; Jachens, R. C.; January 2000; 36 pp.; In English

Report No.(s): PB2006-105390; USGS/OFR-00-193; No Copyright; Avail.: National Technical Information Service (NTIS)

New gravity measurements in the vicinity of San Bernardino, California were collected to help define the characteristics of the Rialto-Colton fault. The data were processed using standard reduction formulas and parameters. Rock properties such as lithology, magnetic susceptibility and density also were measured at several locations. Rock property measurements will be helpful for future modeling and density inversion calculations from the gravity data. On both the Bouguer and isostatic gravity maps, a prominent, 13-km long (8 mi), approximately 1-km (0.62 mi) wide gradient with an amplitude of 7 mGal, down to the northeast, is interpreted as the gravity expression of the Rialto-Colton fault. The gravity gradient strikes in a northwest direction and runs from the San Jacinto fault zone at its south end to San Sevine Canyon at the foot of the San Gabriel mountains at its north end. The Rialto-Colton fault has experienced both right-lateral strike-slip and normal fault motion that has offset basement rocks; therefore it is interpreted as a major, through-going fault.

NTIS

Gravitation; Surveys; Magnetic Permeability; Rocks; Inversions

20060011283 Geological Survey, Menlo Park, CA, USA, California Univ., Riverside, CA, USA

Isotopes and Ages in the Northern Peninsular Ranges Batholith, Southern California

Kistler, R. W.; Wooden, J. L.; Morton, D. M.; January 2003; 50 pp.; In English

Report No.(s): PB2006-107656; USGS/OFR-03-489; No Copyright; Avail.: National Technical Information Service (NTIS)

Strontium, oxygen and lead isotopic and rubidium-strontium geochronologic studies havebeencompleted on Cretaceous and Jurassic granitic rock samples from the northern Peninsular Ranges batholith in southern California. Many of these samples were collected systematically and studied chemically by A. K. Baird and colleagues (Baird and others, 1979). The distribution of these granitic rocks is shown in the Santa Ana, Perris, and San Jacinto Blocks, bounded by the Malibu Coast-Cucamonga, Banning, and San Andreas fault zones, and the Pacific Ocean on the map of the Peninsular Ranges batholith and surrounding area, Southern California. The granitic rock names are by Baird and Miesch (1984) who used a modal mineral classification that Bateman and others (1963) used for granite rocks in the Sierra Nevada batholith. In this classification, granitic rocks have at least 10% quartz. Boundaries between rock types are in terms of the ratio of alkali-feldspar to total feldspar: quartz diorite, 0-10%; granodiorite, 10-35%; quartz monzonite 35-65%; granite\g65%. Gabbros have 0-10% quartz.

NTIS

Batholiths; Geological Surveys; Granite; Igneous Rocks; Isotopes; Rocks; Samples

20060011286 Lawrence Livermore National Lab., Livermore, CA USA

Advanced Electric and Magnetic Material Models for FDTD Electromagnetic Codes

Poole, B. R.; Nelson, S. D.; Langdon, S.; May 09, 2005; 10 pp.; In English

Report No.(s): DE2005-15016257; UCRL-CONF-212095; No Copyright; Avail.: National Technical Information Service (NTIS)

The modeling of dielectric and magnetic materials in the time domain is required for pulse power applications, pulsed induction accelerators, and advanced transmission lines. For example, most induction accelerator modules require the use of magnetic materials to provide adequate Volt-sec during the acceleration pulse. These models require hysteresis and saturation to simulate the saturation wavefront in a multipulse environment. In high voltage transmission line applications such as shock or soliton lines the dielectric is operating in a highly nonlinear regime, which require nonlinear models. Simple 1-D models are developed for fast parameterization of transmission line structures. In the case of nonlinear dielectrics, a simple analytic model describing the permittivity in terms of electric field is used in a 3-D finite difference time domain code (FDTD). In the case of magnetic materials, both rate independent and rate dependent Hodgdon magnetic material models have been implemented into 3-D FDTD codes and 1-D codes.

NTIS

Dielectrics; Finite Difference Theory; Finite Difference Time Domain Method; Magnetic Materials; Transmission Lines

20060011287 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA
High Average Current DC GaAs Photocathode Gun for ERLs and FELs
Hernandez-Garcia, C.; Siggins, T.; Benson, S.; Bullard, D.; Dylla, H. F.; January 2005; 8 pp.; In English
Report No.(s): DE2005-840300; No Copyright; Avail.: National Technical Information Service (NTIS)
No abstract available
Free Electron Lasers; Gallium Arsenides; High Current; Photocathodes

20060011289 Lawrence Livermore National Lab., Livermore, CA USA
Proceedings of the Workshop on Accelerator Driven High Energy Density Physics. Held in Berkeley, California on October 26,2004-October 29, 2004
Barnard, J. J.; May 05, 2005; 196 pp.; In English; Workshop on Accelerator Driven High Energy Density Physics., October 26,2004 - October 29, 2004, Berkeley, California
Report No.(s): DE2005-15016255; UCRL-PROC-212000; No Copyright; Avail.: National Technical Information Service (NTIS)
On October 26-29, 2004, the Heavy Ion Fusion (HIF) Virtual National Laboratory (VNL) hosted a workshop at Lawrence Berkeley National Laboratory (LBNL) on 'Accelerator- Driven High Energy Density Physics (HEDP).' The workshop was attended by sixty five researchers, from the VNL (the HIF/HEDP groups of LBNL, Lawrence Livermore National Laboratory (LLNL), and Princeton Plasma Physics Laboratory (PPPL)) as well as LBNL's Center for Beam Physics, and LLNL's X-and V-Divisions, Sandia National Laboratory, University of Maryland, Fermilab, Argonne National Laboratory, SLAC, Mission Research Corporation, SAIC, Tech X Corp, University of Nevada, Reno, and the University of Electrocommunication,Tokyo, who, together, gave representation to accelerator-, laser-, high energy density-, and computational- physics. The objectives of the meeting were to 1.explore options and possibilities for a staged experimental program in Warm Dense Matter (WDM)/HEDP that utilizes ion accelerator sources as they become available, from early machines that can be developed at modest cost beginning with existing equipment, to later machines that reach well into the HEDP regime. The goals included defining physics regimes and scientific objectives to be explored, requirements for targets and diagnostics, and the scientific program that can be carried out using the ion beam drivers under consideration. The objectives were also to study various accelerator approaches, including conceptual designs of three types of accelerators: pulse-power-driven single-stage diodes; pulse-power-driven multi-stage accelerators; and rf-accelerators. In addition, options for pulse compression and final focus were to be studied.
NTIS
Conferences; Flux Density; Radio Frequencies; Pulse Compression; Plasma Physics

20060011294 Lawrence Livermore National Lab., Livermore, CA USA
Dispersion Analysis of the Pulseline Accelerator
Caporaso, G. J.; Briggs, R. J.; Poole, B. R.; Nelson, S. D.; May 12, 2005; 10 pp.; In English
Report No.(s): DE2005-15016247; UCRL-CONF-212192; No Copyright; Avail.: National Technical Information Service (NTIS)
The authors analyze the sheath helix model of the pulseline accelerator. They find the dispersion relation for a shielded helix with a dielectric material between the shield and the helix and compare it against the results from 3-D electromagnetic simulations. Expressions for the fields near the beam axis are obtained. A scheme to taper the properties of the helix to maintain synchronism with the accelerated ions is described. An approximate circuit model of the system that includes beam loading is derived.
NTIS
Wave Dispersion; Synchronism; Circuits

20060011297 Lawrence Livermore National Lab., Livermore, CA USA
Mechanical Design of a Heavy Ion Beam Dump for the RIA Fragmentation Line
Stein, W.; Ahle, L. E.; Conner, D. L.; May 04, 2005; 10 pp.; In English
Report No.(s): DE2005-15016246; UCRL-PROC-211987; No Copyright; Avail.: National Technical Information Service (NTIS)
The RIA fragmentation line requires a beam stop for the primary beam downstream of the first dipole magnet. The beam may consist of U, Ca, Sn, Kr, or O ions. with a variety of power densities. The configuration with highest power density is for the U beam, with a spot size of 3 cm x 3 cm and a total power of up to 300 kW. The mechanical design of the dump that

meets these criteria consists of a 70 cm diameter aluminum wheel with water coolant channels. A hollow drive shaft supplies the coolant water and connects the wheel to an electrical motor located in an adjacent air space. The beam strikes the wheel along the outer perimeter and passes through a thin window of aluminum where 15% of its power is absorbed and the remainder of the beam is absorbed in flowing water behind the window. Rotation of the wheel at 400 RPM results in maximum aluminum temperatures below 100 C and acceptably low thermal stresses of 3 ksi. Rotating the wheel also results in low radiation damage levels by spreading the damage out over the whole perimeter of the wheel. For some of the other beams, a stationary dump consisting of a thin aluminum window with water acting as a coolant and absorber appears to be feasible.
NTIS
Fragmentation; Heavy Ions; Ion Beams; Mechanical Engineering

20060011299 Lawrence Livermore National Lab., Livermore, CA USA
Accelerator and Ion Beam Tradeoffs for Studies of Warm Dense Matter
Barnard, J. J.; Briggs, R. J.; Callahan, D. A.; Davidson, R. C.; Friedman, A.; May 17, 2005; 10 pp.; In English
Report No.(s): DE2005-15016243; UCRL-CONF-212342; No Copyright; Avail.: National Technical Information Service (NTIS)

One approach for heating a target to 'Warm Dense Matter' conditions (similar, for example, to the interiors of giant planets or certain stages in Inertial Confinement Fusion targets), is to use intense ion beams as the heating source. By consideration of ion beam phase space constraints, both at the injector, and at the final focus, and consideration of simple equations of state and relations for ion stopping, approximate conditions at a target foil may be calculated. Thus target temperature and pressure may be calculated as a function of ion mass, ion energy, pulse duration, velocity tilt, and other accelerator parameters. We connect some of these basic parameters to help search the extensive parameter space (including ion mass, ion energy, total charge in beam pulse, beam emittance, target thickness and density).
NTIS
Confinement; Ion Beams; Tradeoffs

20060011300 Princeton Univ., NJ USA
U.S. Contributions to ITER
Sauthoff, N. R.; May 2005; 14 pp.; In English
Report No.(s): DE2005-840422; PPPL-4071; No Copyright; Avail.: Department of Energy Information Bridge

The USA participates in the ITER project and program to enable the study of the science and technology of burning plasmas, a key programmatic element missing from the world fusion program. The 2003 U.S. decision to enter the ITER negotiations followed an extensive series of community and governmental reviews of the benefits, readiness, and approaches to the study of burning plasmas. This paper describes both the technical and the organizational preparations and plans for U.S. participation in the ITER construction activity: in-kind contributions, staff contributions, and cash contributions as well as supporting physics and technology research. Near-term technical activities focus on the completion of R&D and design and mitigation of risks in the areas of the central solenoid magnet, shield/blanket, diagnostics, ion cyclotron system, electron cyclotron system, pellet fueling system, vacuum system, tritium processing system, and conventional systems.
NTIS
Fusion Reactors; Thermonuclear Reactions; Tokamak Devices

20060011305 Vanderbilt Univ., Nashville, TN, USA
Final Report on Grant 02-ER45972
Pantelides, S. T.; January 2005; 8 pp.; In English
Report No.(s): DE2005-838992; No Copyright; Avail.: National Technical Information Service (NTIS)

This report covers the final one-year period of work done by the Principal Investigator (S.T. Pantelides) and his group in collaboration with other team members. The focus of the work was to pursue understanding of core excitation spectra in doped managnites where experimental data obtained at Oak Ridge National Laboratory by S. J. Pennycook showed inequivalent Mn atoms. Calculations found that doping sets up a Peierls-like instability that drives the observed distortion.
NTIS
Excitation; Atoms; Doped Crystals; Distortion

20060011306 Iowa State Univ. of Science and Technology, Ames, IA USA
Global Structural Optimizations of Surface Systems with a Genetic Algorithm
Chuang, F.; January 2005; 110 pp.; In English
Report No.(s): DE2006-850036; No Copyright; Avail.: National Technical Information Service (NTIS)

Global structural optimizations with a genetic algorithm were performed for atomic cluster and surface systems including aluminum atomic clusters, Si magic clusters on the Si(111) 7x7 surface, silicon high-index surfaces, and Ag-induced Si(111) reconstructions. First, the global structural optimizations of neutral aluminum clusters Al(sub n) (n up to 23) were performed using a genetic algorithm coupled with a tight-binding potential. Second, a genetic algorithm in combination with tight-binding and first-principles calculations were performed to study the structures of magic clusters on the Si(111) 7x7 surface. Extensive calculations show that the magic cluster observed in scanning tunneling microscopy (STM) experiments consist of eight Si atoms. Simulated STM images of the Si magic cluster exhibit a ring-like feature similar to STM experiments. Third, a genetic algorithm coupled with a highly optimized empirical potential were used to determine the lowest energy structure of high-index semi- conductor surfaces. The lowest energy structures of Si(105) and Si(114) were determined successfully. The results of Si(105) and Si(114) are reported within the framework of highly optimized empirical potential and first-principles calculations. Finally, a genetic algorithm coupled with Si and Ag tight-binding potentials were used to search for Ag-induced Si(111) reconstructions at various Ag and Si coverages. The optimized structural models of radical 3x radical 3, 3x1, and 5x2 phases were reported using first-principles calculations. A novel model is found to have lower surface energy than the proposed double-honeycomb chained (DHC) model both for Au/Si(111) 5x2 and Ag/Si(111) 5x2 systems.
NTIS
Atomic Clusters; Genetic Algorithms; Optimization; Surface Energy

20060011309 Russian Research Centre Kurchatov Inst., Moscow, Russian Federation
Development of Scientific Simulation 3D Full Wave ICRF Code for Stellarators and Heating/CD Scenarios Development
Vdovin, V. L.; January 2006; 138 pp.; In English
Report No.(s): DE2006-842635; No Copyright; Avail.: National Technical Information Service (NTIS)
In this report we describe theory and 3D full wave code description for the wave excitation, propagation and absorption in 3-dimensional (3D) stellarator equilibrium high beta plasma in ion cyclotron frequency range (ICRF). This theory forms a basis for a 3D code creation, urgently needed for the ICRF heating scenarios development for the operated LHD, constructed W7-X, NCSX and projected CSX3 stellarators, as well for re evaluation of ICRF scenarios in operated tokamaks and in the ITER .
NTIS
Heating; Ion Cyclotron Radiation; Plasma Heating; Radio Frequency Heating; Simulation; Stellarators

20060011320 San Diego State Univ., San Diego, CA USA
Final Report on the U.S. Department of Energy Grant No. DE-FG03-00ER54568 Entitled 'Edge, Sol, and Diverter Plasma Turbulence and Macroscopic Transport'
Krasheninnikov, S.; Apr. 27, 2005; 10 pp.; In English
Report No.(s): DE2006-841026; No Copyright; Avail.: Department of Energy Information Bridge
No abstract available
Diverters; Plasma Turbulence; Plasmas (Physics); Tokamak Devices

20060011323 New Mexico Univ., Albuquerque, NM, USA
Laboratory Study of Magnetic Reconnection Generated Alfven Waves
Watts, C.; January 2006; 10 pp.; In English
Report No.(s): DE2006-836185; No Copyright; Avail.: National Technical Information Service (NTIS)
The grants were funded through the Department of Energy, Office of Fusion Energy Junior Faculty Development Program. The grants funded the construction and start-up of lpha, A Largearea Plasma Helicon Array experimental facility, and initial studies of Alfven wave propagation in helicon generated plasmas. The initial three year grant contract with Auburn University was terminated early (after two years) due to PI's acceptance of a faculty position at New Mexico Tech. The project continued for two years at New Mexico Tech. The project met all of the goals outlined in the original proposal: (1) The lpha experimental facility was completed; (2) Single helicon operation was demonstrated in both argon and helium; (3) Multi-helicon operation was demonstrated, operating seven sources simultaneously to created a homogeneous, large-area plasma; and (4) Propagation of Alfven waves in a helicon plasma was demonstrated.
NTIS
Magnetic Field Reconnection; Magnetohydrodynamic Waves; Plasma Waves

20060012018 National Science Foundation, Arlington, VA USA

Computation As a Tool for Discovery in Physics: A Report to the National Science Foundation by the Steering Committee on Computational Physics

Sep. 2001; 60 pp.; In English

Report No.(s): PB2006-108377; No Copyright; Avail.: National Technical Information Service (NTIS)

The Steering Committee was charged with the task of surveying opportunities and challenges in computational physics, broadly construed. A workshop was held on September 11 and 12, 2001, in which the presenters were asked to represent the state of the computational art in their respective fields and to identify both the outstanding opportunities as well as the barriers to progress in their disciplines. While the workshop could not cover all areas of computational physics that are of interest to the National Science Foundation, the Steering Committee heard many exciting examples of new research directions and problems that are being opened up by the application of modern computational approaches. Some of these examples came from areas that are mature users of computation, such as cosmology, fluid dynamics, plasma physics, and lattice gauge theory. Others came from areas where the use of computation is just coming into prominence or rapidly evolving, such as accelerator design, biophysics, experimental high energy physics, and numerical relativity. All of these research opportunities are in areas that address fundamental scientific questions and/or are of tremendous current societal importance. The central finding of the committee is that the NSF should create a new program in computational physics, which could serve as an exemplar of similar programs in other NSF directorates. Such a program should support those activities in computational physics that are not adequately addressed by existing programs, placing the NSF in a better position to capitalize on the emerging opportunities in this field. Although the workshop on which this recommendation is based focused on computational physics, it was not constrained by the disciplinary boundaries of the Physics Division. The breadth of opportunity that was demonstrated in the presentations strongly suggests that a new NSF program in this area could be profitably extended to encompass the entire range of disciplines supported by the NSF.

NTIS

Computation; Mathematical Models

20060012019 Geological Survey, Menlo Park, CA, USA, Woods Hole Oceanographic Inst., MA, USA

Cruise Report for a Seismic Investigation of Gas Hydrates in the Mississippi Canyon Region, Northern Gulf of Mexico: Cruise M1-98-GM

Cooper, A.; Hart, P.; Pecher, I.; January 1998; 26 pp.; In English

Report No.(s): PB2006-108390; USGS-OFR-98-506; No Copyright; Avail.: CASI: A03, Hardcopy

During June 1998, the U.S. Geological Survey (USGS) and the University of Mississippi Marine Minerals Technology Center (MMTC) conducted a 12-day cruise in the Mississippi Canyon region of the Gulf of Mexico. The R/V Tommy Munro, owned by the Marine Research Institute of the University of Southern Mississippi, was chartered for the cruise. The general objective was to acquire very high resolution seismic-reflection data across of the upper and middle continental slope (200-1200-m water depths) to study the acoustic character, distribution and potential effects of gas hydrates within the shallow subsurface, extending from the sea floor down to the base of the gas-hydrate stability zone.

NTIS

Canyons; Geological Surveys; Gulfs; Hydrates; Surveys

20060012031 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA, Michigan State Univ., East Lansing, MI, USA, European Organization for Nuclear Research, Geneva, Switzerland

Experimental Results from the Small Isochronous Ring

Pozdeyev, E.; Marti, F.; York, R. C.; Rodriguez, J.; January 2005; 10 pp.; In English

Report No.(s): DE2005-840484; No Copyright; Avail.: National Technical Information Service (NTIS)

The Small Isochronous Ring (SIR) is a compact, low-energy storage ring designed to investigate the beam dynamics of high-intensity isochronous cyclotrons and synchrotrons at the transition energy. The ring was developed at Michigan State University (MSU) and has been operational since December 2003. It stores 20 keV hydrogen beams with a peak current of 10-20 microamps for up to 200 turns. The transverse and longitudinal profiles of extracted bunches are measured with an accuracy of approximately 1 mm. The high accuracy of the measurements makes the experimental data attactive for validation of multi-particle space charge codes. The results obtained in the ring show a fast growth of the energy spread induced by the space charge codes.

NTIS

Storage Rings (Particle Accelerators); Cyclotrons

20060012032 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA
Two Dimensional Aspects of Regenerative BBU in Two-Pass Recirculating Accelerators
Pozdeyev, E.; January 2005; 8 pp.; In English
Report No.(s): DE2005-840483; No Copyright; Avail.: Department of Energy Information Bridge

In this paper, I present the formula, describing a threshold of the regenerative multi-pass Beam Breakup (BBU) for a single dipole higher order mode with arbitrary polarization in a two-pass accelerator with a general-form, 4x4 recirculation matrix. To illustrate specifics of the BBU in two dimensions, the formula is used to calculate the threshold for the reflecting and rotating optics of the recirculator that can lead to higher threshold currents.
NTIS
Circulation; Accelerators; Beams (Radiation)

20060012033 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA, Michigan State Univ., East Lansing, MI, USA, European Organization for Nuclear Research, Geneva, Switzerland
Future Plans for the Small Isochronous Ring
Pozdeyev, E.; Marti, F.; York, R. C.; January 2005; 18 pp.; In English
Report No.(s): DE2005-840482; No Copyright; Avail.: National Technical Information Service (NTIS)

The Small Isochronous Ring (SIR) has been operational at Michigan State University since December 2003. It has been used for experimental studies of the beam dynamics in high-intensity isochronous cyclotrons and synchrotons at the transition energy. Operational experience with SIR had demonstrated that the ring can be successfully used to study space charge effects in accelerators. The low velocity of beam particles in the ring allowed longitudinal profile measurements with an accuracy that would be difficult to achieve in full-size in full-size accelerators.
NTIS
Cyclotrons; Synchrotron Radiation

20060012040 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, Stanford Linear Accelerator Center, CA, USA
Accelerator Control Middle Layer Using MATLAB
Portmann, G.; Corbett, J.; Terebilo, A.; January 2005; 8 pp.; In English
Report No.(s): DE2005-841887; No Copyright; Avail.: National Technical Information Service (NTIS)

Matlab is a matrix manipulation language originally developed to be a convenient language for using the LINPACK and EISPACK libraries. What makes Matlab so appealing for accelerator physics is the combination of a matrix oriented programming language, an active workspace for system variables, powerful graphics capability, built-in math libraries, and platform independence. A number of software toolboxes for accelerators have been written in Matlab -- the Accelerator Toolbox (AT) for machine simulations, LOCO for accelerator calibration, Matlab Channel Access Toolbox (MCA) for EPICS connections, and the Middle Layer. This paper will describe the middle layer software toolbox that resides between the high-level control applications and the low-level accelerator control system.
NTIS
Numerical Control; Accelerators; Calibrating; Programming Languages

20060012081 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA
Ion-Back-Bombardment of GaAs Photocathodes Inside DC High Voltage Electron Guns
Grames, J.; Adderley, P.; Brittian, J.; Charles, D.; Clark, J.; January 2005; 8 pp.; In English
Report No.(s): DE2005-840492; No Copyright; Avail.: National Technical Information Service (NTIS)

DC high voltage GaAs photoguns are key components at accelerator facilities worldwide. New experiments and new accelerator facilities demand improved performance from these guns, in particular higher current operation and longer photocathode operating lifetime. This conference submission explores bulk GaAs photocathode lifetime as a function of beam current, active photocathode area, laser spot size and the vacuum of the gun and beam line.
NTIS
Electron Guns; Gallium Arsenides; High Voltages; Ion Irradiation; Photocathodes

20060012082 Jefferson (Thomas) Lab. Computer Center, Newport News, VA, USA, Stanford Univ., Stanford, CA, USA, Cornell Univ., Ithaca, NY, USA, Deutsches Elektronen-Synchrotron, Hamburg, Germany

Experimental Investigation of Beam Breakup in the Jefferson Laboratory 10 k W Fel Upgrade Driver

Tennat, C.; Douglas, D.; Jordan, K.; Merminga, L.; Pozdeyev, E.; January 2005; 8 pp.; In English

Report No.(s): DE2005-840485; No Copyright; Avail.: National Technical Information Service (NTIS)

In recirculating accelerators, and in particular energy recovery linacs (ERLs), the maximum current has been limited by multipass, multibunch beam breakup (BBU), which occurs when the electron beam interacts with the higher-order modes (HOMs) of an accelerating cavity on the accelerating pass and again on the energy recovered pass. This effect is of particular concern in the design of modern high average current energy recovery accelerators utilizing superconducting RF technology. Experimental observations of the instability at the Jefferson Laboratory 10 kW Free-Electron Laser (FEL) are presented. Measurements of the threshold current for the instability are presented and compared to the predictions of several BBU simulation codes.

NTIS

Linear Accelerators; Computerized Simulation; High Current; Radio Frequencies; Superconductivity

20060012101 Fermi National Accelerator Lab., Batavia, IL, USA

Ghost Signals In Allison Emittance Scanners

Stockli, M. P.; Leitner, M.; Moehs, D. P.; Keller, R.; Welton, R. F.; January 2005; 8 pp.; In English

Report No.(s): DE2005-15018263; FERMILAB-CONF-04-510-AD; No Copyright; Avail.: Department of Energy Information Bridge

For over 20 years, Allison scanners have been used to measure emittances of low-energy ion beams. We show that scanning large trajectory angles produces ghost signals caused by the sampled beamlet impacting on an electric deflection plate. The ghost signal strength is proportional to the amount of beam entering the scanner. Depending on the ions, and their velocity, the ghost signals can have the opposite or the same polarity as the main beam signals. The ghost signals cause significant errors in the emittance estimates because they appear at large trajectory angles. These ghost signals often go undetected because they partly overlap with the real signals, are mostly below the 1% level, and often hide in the noise. A simple deflection plate modification is shown to reduce the ghost signal strength by over 99%.

NTIS

Emittance; Ghosts; Ion Beams; Trajectories

71
ACOUSTICS

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

20060011369 Institute of Electrical and Electronics Engineers, New York, NY, USA

International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3

[1982]; 827 pp.; In English; IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3, 3-5 May 1982, Paris, France; See also 20060011370 - 20060011558; Original contains black and white illustrations

Report No.(s): IEEE-Catalog-82CH1746-7-Vol-3; LC-82-80125; Copyright; Avail.: Other Sources

The 1 982 International Conference on Acoustics, Speech and Signal Processing (ICASSP), sponsored by the IEEE Acoustics, Speech and Signal Processing Society, is the seventh in a series of international conferences devoted to experimental and theoretical aspects of signal processing, speech, acoustics and Image. Conferences of this scope are possible only because of the continuing interest and support of the Society membership, expressed both by their submission of papers of high quality and by their attendance at the Conference. The ICASSP Conference Committee is grateful to all of the authors and session chairmen for contributing to the success of the Conference.

Derived from text

Acoustics; Image Processing; Signal Processing; Electronics; Optics; Speech Recognition

20060011382 Philips Research Labs., Eindhoven, Netherlands

THE INFLUENCE of PSEUDO NOISE DATA SIGNALS ON ECHO CANCELLER PERFORMANCE

Clasasen, T. A. C. M.; Verhoeckx. N. A. M.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1408-1411; In English; See also 20060011369; Copyright; Avail.: Other Sources

The convergence of an adaptive echo canceller operating with the stochastic iteration algorithm in the presence of pseudo-noise data signals has been analyzed. This convergence can deviate appreciably from that with 'random' data. An approximate expression for the convergence characteristic has been derived and verified by computer simulations.
Author
Echoes; Random Noise; Data Transmission; Echo Suppressors; Signal Processing

20060011383 Centro Studi e Laboratori Telecomunicazioni, Turin, Italy
APPLICATION of ECHO-CANCELLING TECHNIQUES to AUDIOCONFERENCE
Ceruti, Rodolfo; Pira, Franco; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1444-1447; In English; See also 20060011369; Copyright; Avail.: Other Sources

The least mean squares (LMS) and short time spectral analysis (SSA) identification algorithms are considered with respect to their applicability to echo-cancelling in audio conference systems. The SSA method turns out to be more suitable, especially from the point of view of the computation complexity, which is strictly associated with the real-time implementability. The performances of this algorithm are analyzed by reproducing the operating conditions that may be actually expected in audioconference rooms. It's particularly shown that a reasonably fast identification time can be obtained with respect to audioconference requirements, while ensuring to the echo-return path a loss enhancement (ERLE) of up to 20 dB. The effects of echo on stability are also dealt with in detail by calculating the frequency dependence of the incremental loss. It is shown that the stability condition is fulfilled almost at all frequencies, excepting some isolated points corresponding to sharp dips in the frequency response. Anyhow, the loss of the dips itself should likely prevent the system from howling.
Author
Echoes; Algorithms; Audio Signals; Teleconferencing; Echo Suppressors

20060011384 Floating Point Systems, France
TWO CHANNELS RANDOM ACOUSTICS SIMULATION and MULTICHANNEL DATA ACQUISITION
Monteil, P.; Thiebaud, V.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1501-1504; In English; See also 20060011369; Copyright; Avail.: Other Sources

The main use of random shaker-control systems is to reproduce, by mean of appropriate signals applied on shakers, predetermined power spectral densities at the output of sensors;the predetermined spectra may be previously computed on a theoretical basis or measured in the actual environment which we want in fact to reproduce. This closed-loop computer-based digital system allows the realization of auto and cross spectral densities equal to those of the responses previously computed. Its possibilities are large (for instance road and runways profiles). The problems to be solved are: multiple input-output system identification, multiple true random signal generation and real-time-programming.
Author
Data Acquisition; Random Signals; Simulation; Acoustics; Multichannel Communication

20060011385 North Carolina State Univ., Raleigh, NC, USA
Convergence of Iterative Restoration Methods
Trussell, H. J.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1527-1530; In English; See also 20060011369; Copyright; Avail.: Other Sources

Many iterative signal restoration methods have been shown to converge in a mathematical sense but lack a practical criterion for halting the iterative process. The residual signal can be used to define such a criterion. The results of applying this criterion show a definite advantage over the simple method of examining successive iterations.
Author
Convergence; Iterative Solution; Signal Processing; Image Reconstruction

20060011386 Bolt, Beranek, and Newman, Inc., Cambridge, MA, USA
SEGMENT QUANTIZATION FOR VERY-LOW-RATE SPEECH CODING
Roucos, S.; Schwartz, R.; Makhoul, J.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1565-1568; In English; See also 20060011369
Contract(s)/Grant(s): F19628-80-C-0165; Copyright; Avail.: Other Sources

We introduce a new method for very-low-rate vocoding that models the input speech as a sequence of variable-length segments. A segment is a sequence of frames, where each frame is represented by a spectrum, pitch and gain. We use an automatic segmentation algorithm to obtain segments with an average duration comparable to that of a phoneme. A segment

is quantized as a single block. The distance measure used for quantization incorporates the appropriate time alignment of two segments. We employ a computationally efficient metric that does not use the usual dynamic programming time warping. Two basic vocoders using the above approach of block quantization have been used to transmit intelligible speech at 200 b/s.
Author
Segments; Vocoders; Measurement; Articulation (Speech); Automatic Control

20060011387 Case Western Reserve Univ., Cleveland, OH, USA
A CHINESE TEXT-to-SPEECH SYNTHESIS SYSTEM BASED ON AN INITIAL-FINAL MODEL
Huang, Tai-Yi; Wang, Cai-Fei; Pao, Yoh-han; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1604-1607; In English; See also 20060011369; Copyright; Avail.: Other Sources

An experimental text-to-speech software system has been developed. The principle of the system is based on an initial-final model. Under this model, only 58 phonemes and semisyllables are needed for synthesizing unrestricted Chinese words. The standard Pin-Yin system is used for input through a conventional keyboard. Since tone information is an essential acoustic feature of each spoken Chinese word, four basic tonal variation patterns have been developed and are incorporated into the synthesis process. Some principal sandhi rules are also considered. For improving the intelligibility and quality of the output sound, mixed excitation is used for unaspirated fricatives. Also 'zeros' of the spectrum are added into the vocal tract model when appropriate for nasals and some consonants.
Author
China; Mathematical Models; Synthesis; Texts; Articulation (Speech); Computer Programs

20060011390 Speech Communication Research Lab., Los Angeles, CA, USA
DEVELOPMENT of AN AUTOMATIC IDENTIFICATION SYSTEM of SPOKEN LANGUAGES: PHASE I
Cimarusti, Deidre; Ives, Russell, B.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1661-1663; In English; See also 20060011369; Copyright; Avail.: Other Sources

The feasibility of a new approach to automatic language identification is examined in this pilot study. The procedure involves the application of pattern analysis techniques to features extracted from the speech signal. The database of the extracted features for five speakers from each of eight languages was divided into a learning subset and an evaluation subset. A potential function was then generated for all features in the learning subset. The complexity of the decision function was systematically increased until all members within the learning subset could be separated into the properly identified languages. Although the constraints on this pilot study necessarily precluded feature ordering and selection, the application of the decision function to the evaluation subset resulted in an overall 84% classification accuracy.
Author
Speech; Languages; Speech Recognition; Classifications; Accuracy

20060011391 Centre National d'Etudes des Telecommunications, Lannion, France
COMPARISON of BASIC and SIMPLIFIED SEQUENTIAL ALGORITHMS FOR the COMPUTATION of LATTICE FILTER PREDICTOR COEFFICIENTS IN ADPCM CODING of SPEECH
Guyader, A Le; Gilloire, A.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1676-1679; In English; See also 20060011369; Copyright; Avail.: Other Sources

In the view of transmitting telephone speech signals at the bit rate of 32 kbit/s, the implementation of a predictor with lattice filters has been investigated instead of the classical gradient updated transversal filter commonly used in ADPCM coders. Several simplified methods for updating the lattice filters have been developed. Then those codecs are compared against the standard PCM 64 kbit/s, the PCM 56 kbit/s, the fixed predictor and the gradient updated ADPCM coders at 32 kbit/s on a subjective scale derived from listening tests. The improvement given by the adaptive predictors over fixed ones clearly appears. It is also shown that the simplified lattice ADPCM coders perform significantly better than the non simplified ones for high bit error rates (10(exp -4) or 10(exp -3)). Another feature of the algorithms developed here is their simplicity that makes them suitable for hardware and VLSI implementation not only for ADPCM coding but also for the speech analysis part in linear predictive vocoders.
Author
Bit Error Rate; Telephones; Speech; Vocoders

20060011405 Institut National des Sciences Appliquees de Lyon, Villeurbanne, France

KERNEL SPLITTING METHOD IN SUPPORT CONSTRAINED DECONVOLUTION FOR SUPER-RESOLUTION

Prost, Remy; Goutte, Robert; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1841-1844; In English; See also 20060011369; Copyright; Avail.: Other Sources

The principle of the method is to split the kernel into two secondary kernels : r(t)=k(t)+d(t), where d(t) must be invertible and satisfy a convergence condition. Then the deconvolution problem is to solve the following equation: i(t)=i(sub o)(t)-integral(sub T) i(t) g (t-t)dt where T is the signal support, i(sub o) (t)=d(t) (sup *-1)* o(t) and g(t)=d(t)(sup *-1)*k(t). This equation is solved by using successive substitutions. The deconvolution algorithm may be two steps or iterative and gives a super-resolution. Only the iterative form has been experimented. A noise free restoration of two pulses shows the validity of the method and the convergence speed with different splitting modes. Finally deconvolution from noisy data is studied.
Author

Kernel Functions; Algorithms; Iteration

20060011406 Trinity Coll., Dublin, Ireland

DECONVOLUTION IN REAL TIME of NOISY SIGNALS

Boland, F. M.; Doyle, T.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1853-1857; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper presents an analysis of the constrained least squares filter and a feedback structure is derived which shows the noise cancelling properties of the filter. Using an identification algorithm, it is shown how the constrained least squares filter can be replaced by a finite impulse response filter which can be implemented on-line. The limitations of this F.I.R. filter are discussed. The non-linear behaviour of the constrained least squares (C.L.S.) filter is investigated and, using the proposed feedback structure, it is indicated how a nonlinear recursive filter can be identified for on-line implementation.
Author

Real Time Operation; Signal Transmission; Least Squares Method; Noise (Sound)

20060011407 SACLANT ASW Research Center, La Spezia, Italy

SEISMIC SENSING of EXTREMELY-LOW-FREQUENCY SOUNDS IN COASTAL WATERS

Barbagelata, A.; Michelozzi, E.; Rauch, D.; Schmalfeldt, B.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1878-1881; In English; See also 20060011369; Copyright; Avail.: Other Sources

A very compact, but quite lightweight digital, triaxial ocean-bottom seismometer has been developed to study ELF-acoustics (1 to 100 Hz) in shallow water by mounting three active, non orientation-privileged 1-Hz geophones in a flat container together with a compass, two tilt-meters, a thermistor, and tile pertinent A/D electronics. Each geo-acoustic channel is sampled at 600 Hz and the floating-point conversion is performed with 12 + 2 bits, giving the large dynamic range of 120 dB needed to cope simultaneously with ambient noise and signals from nearby cw or explosive sources. The signals are then transmitted by a radio buoy to the shipboard acquisition and pre-processing systems. These sensor stations have been deployed to investigate infrasound propagation in coastal waters. Signals from small charges and LF-sources are analyzed, together with records of the noise background.
Author

Coastal Water; Extremely Low Frequencies; Noise (Sound); Ocean Bottom; Seismographs; Seismology; Sensors

20060011416 Tampere Univ. of Technology, Finland

MODELLING of LIP RADIATION IMPEDANCE IN Z-DOMAIN

Laine, Unto K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1992-1995; In English; See also 20060011369; Copyright; Avail.: Other Sources

Three z-domain models for lip radiation impedance are introduced. Two of them are based on the observation that the normalized acoustic impedance can be modelled as z(w) = C*[1.-cos(wT)] + j*B*sin(wT). The values of the parameters C and B for different sampling frequencies and radiation areas are found by minimizing the mean square error (MSE) between the modelled and the acoustic impedance. Owing to the sine and cosine functions used, the modelled impedance can be transformed exactly and straightforwardly into the z-domain. The third model described is a pole-zero-model, the parameters

of which are also optimized by MSE-criterion. The limits for acceptable errors of the modelled impedances are studied and the models compared to the well known Flanagan s model.
Author
Acoustic Impedance; Mean Square Values; Sampling

20060011431 Stanford Univ., Stanford, CA, USA
COMPARISON of SOME ALGORITHMS FOR TAP WEIGHT EVALUATION IN ADAPTIVE ECHO CANCELLERS
Citron, T. K.; Kailath, T.; Reddy, V. U.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 2084-2097; In English; See also 20060011369
Contract(s)/Grant(s): DAA29-81-K-0057; Copyright; Avail.: Other Sources

The performance of some adaptive algorithms for coefficient updating of a digital echo canceller are compared. The examined algorithms are the least mean square one (LMS), the normalized LMS and the simplified versions employing the sign information. Their performance are evaluated on the basis of the echo return loss enhancement (ERLE) steady state value and convergence speed. For the algorithms employing a linear function of the error, as gradient estimate, the results show that convergence speed is dependent on the echo canceller tap number and that its trend is exponential. Algorithms employing the error sign as gradient estimate are the slowest if the same variance of residual echo must be obtained. Furthermore some consideration are made in comparison with an algorithm designed in order to minimize the mean square error evaluated over a M sample block.
Author
Algorithms; Echoes; Adaptive Control; Echo Suppressors

20060011432 Technische Univ., Darmstadt, Germany
CIRCULAR ELECTRET MICROPHONES : THEORETICAL and EXPERIMENTAL INVESTIGATIONS
Zahn, Rolf W.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1432-1435; In English; See also 20060011369; Copyright; Avail.: Other Sources

Theoretical and experimental investigations of the acoustic frequency response of circular backplate electret microphones are discussed. In particular the sensitivity to air-borne sound and the vibration sensitivity of the transducers are studied for different parameters such as membrane tension and radius. Furthermore, the influence of hole geometry of the backplate and the effect of ambient pressure on the microphone damping. Measured and calculated responses show very good agreement.
Author
Audio Frequencies; Electrets; Microphones

20060011433 McMaster Univ., Hamilton, Ontario, Canada
GENERALIZED BURG ALGORITHM FOR BEAMFORMING IN CORRELATED MULTIPATH FIELD
Kesler, S. B.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1481-1484; In English; See also 20060011369; Copyright; Avail.: Other Sources

Array beamforming employing nonlinear methods of spectral estimation presents a difficult problem when the spatial field is inhomogeneous, e.g., when correlated multipath is present, and hence, the corresponding cross-spectral (CS) matrix is non-Toeplitz. To overcome this difficulty in the maximum entropy (ME) beamforming, we present a generalization of the Burg algorithm for dealing with a non-Toeplitz CS matrix. The stability and minimum phase properties of the original Burg algorithm are retained. The use of the generalized Burg algorithm for elevation angle estimation is illustrated for the case of a passive sonar field. Statistical properties of the estimator are analyzed using (1) uncorrelated Gaussian noise only, and (2) the direct and specular multipath components of the target signal, embedded in uncorrelated noise and in directional ambient noise.
Author
Algorithms; Beamforming; Maximum Entropy Method; Multipath Transmission

20060011434 Defence Research Establishment Atlantic, Dartmouth, Nova Scotia, Canada
QUANTIZATION DEGRADATION IN SUPERDIRECTIVE PROCESSING of UNDERWATER ACOUSTIC ARRAYS
Walker, R. S.; D'Eon, K. L.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1489-1492; In English; See also 20060011369; Copyright; Avail.: Other Sources

The paper examines the effects of quantization in digital signal telemetry and processing of undersea acoustic signals. In particular, degradation in array gain is assessed for vertical line arrays that use superdirective beamforming. The background acoustic noise is modelled as broadband Gaussian noise having a spectrum and directionality typical of that measured in the deep ocean. Effects due to choice of number of bits, overload level and quantization scheme (uniform and mu-law) are examined over the entire frequency band of the received signals. The results agree qualitatively with those of earlier studies, but yield a better estimate of losses likely to be encountered in practice.
Author
Arrays; Underwater Acoustics; Degradation; Mathematical Models; Measurement

20060011435 Grenoble Univ., France
P-TIME DELAY MEASUREMENT of A DOUBLET of MICROEARTHQUAKES
Poupinet, G.; Glangeaud, F.; Cote, P.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1516-1519; In English; See also 20060011369; Copyright; Avail.: Other Sources

The measurement of temporal changes in crustal properties is important for earthquake prediction studies. This note shows that P-time delays of doublets of earthquakes recorded by standard seismic networks can be timed by crosscorrelation with a precision of a few milliseconds. Such precision is at least 50 times better than that of usual analysis of natural earthquakes and compares with that achieved with artificial sources experiments.
Author
Earthquakes; Time Lag; Seismology; Time Measurement

20060011436 Ecole Nationale Superieure des Telecommunications, Paris, France
SUPERRESOLUTION USING LINEAR SYSTEM METHODS A COMPARISON
Maitre, Henri; Levy, Armand J.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1537-1540; In English; See also 20060011369; Copyright; Avail.: Other Sources

When seen as a linear system of equations, superresolution appears as a classical problem of numerical analysis. The main property of this problem is its strong ill-condition. Many methods are candidates to invert this system; they differ with many aspects: computational cost, regularization properties, flexibility. A review of these methods is presented with application to a given case.
Author
Linear Systems; Numerical Analysis; Algorithms

20060011439 Osaka Univ., Suita, Japan
SPEECH ANALYSIS BY SELECTIVE LINEAR PREDICTION IN the TIME DOMAIN
Mizoguchi, Riichiro; Yanagida, Masuzo; Kakusho, Osamu; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1573-1576; In English; See also 20060011369; Copyright; Avail.: Other Sources

Linear prediction method is one of the most frequently used analysis methods of speech. Covariance method and auto-correlation method of linear prediction often fail to make a precise analysis of speech because of the excitation source or fundamental frequency. In order to decrease the affect of the excitation source, various kinds of difference operations are usually employed for preprocessing. However, such preprocessings do not always work satisfactorily. Here proposed is a new approach to LPC analysis based on selective use of speech data to reject the data disturbed by the excitation source, and is called selective linear prediction method. The method is constructed aiming to improve the accuracy of analysis. First, the formulation of linear prediction is presented using generalized inverse matrices. Then, a successive computation is described based on Givens' reduction. The selective computation, which plays an essential role in our method, owes its efficiency to Givens' reduction. Finally the advantage of the proposed method is demonstrated by computer simulation using both synthetic and natural speech.
Author
Linear Prediction; Time Domain Analysis; Speech Recognition; Numerical Analysis

20060011440 Escuela Tecnica Superior de Ingenieros de Telecomunicacion, Barcelona, Spain
SPEECH ANALYSIS and MODELLING USING A SEQUENTIAL ARMA ESTIMATION TECHNIQUE
Gomez, Ramon Garcia; Tribolet, Jose Manuel; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1585-1588; In English; See also 20060011369; Copyright; Avail.: Other Sources

Pole/zero modelling of speech has -- been investigated for many years, yet the techniques developed so far have not proven satisfactory for most speech processing applications. Often these techniques separate the modelling problem in two: first and attempt is made to estimate the vocal tract impulse response; then an ARMA model is fit to such impulse response. The purpose of this paper is to discuss a different approach which is best-suited for speech analysis. This approach consist in first deriving from the speech signal a running approximation of a pseudo glottal excitation. Using a sequential minimization technique, the parameters of the ARMA model are then derived to fit a system whose input is the excitation signal and whose output is the speech signal.
Author
Autoregressive Moving Average; Speech Recognition; Mathematical Models; Estimating

20060011441 Universite de la Mediterranee, Marseille, France
A SPEECH RECOGNITION SYSTEM
Meloni, H.; Guizol, J.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1625-1628; In English; See also 20060011369; Copyright; Avail.: Other Sources

The system we present here processes linguistic informations in two stages. In phase one we identify in a deterministic way pseudo-phonetic and prosodic events tending to characterize in flexible and concrete terms nonsignificant segmental and supra-segmental units (phonemes and prosodic boundaries). Phase two uses higher linguistic knowledge (phonology, prosodics, lexicon, syntax, semantics and pragmatics) to interpret in a non-deterministic way the data that have been partially defined in the previous proceeding.
Author
Linguistics; Speech Recognition; Artificial Intelligence

20060011442 Verbex Corp., Bedford, MA, USA
AUTOMATIC LABELING of SPEECH
Spohrer, James C.; Brown, Peter F.; Roth, Robert; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1641-1644; In English; See also 20060011369; Copyright; Avail.: Other Sources

To evaluate the performance of a speech recognition system, large databases of labeled speech, including various speakers, noise conditions, and vocabularies, are necessary. This paper describes a method for automatically labeling speech data. In the past, speech has been labeled manually, typically by listening to and viewing waveforms through real-time, interactive computer I/O stations. This process is slow and tedious, and accounts for the shortage of large speech databases. The automatic labeling method reported here uses dynamic programming to align a script which is produced as the output of a recognition system, and a known script. The alignment gives a tentative labeling which can be refined by repeating the training, recognition, and alignment processes. The method was used to label a 50 speaker database of 140,000 digits.
Author
Speech Recognition; Automatic Control; Marking; Dynamic Programming

20060011443 Philips G.m.b.H., Hamburg, Germany
SPEAKER RECOGNITION USING A FEATURE WEIGHTING TECHNIQUE
Ney, Hermann; Gierloff, Rainer; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1645-1648; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper describes a technique for increasing the ability of a text-dependent speaker recognition system to discriminate between speaker classes; this technique is to be performed in conjunction with the nonlinear time alignment between a reference pattern and a test pattern. Unlike the standard approach, where the training of the recognition system merely consists of storing and averaging or selecting the time normalized training patterns separately for each class, the training phase of the system is extended in that a weight is determined for each individual feature component of the complete reference pattern according to the ability of the feature to distinguish between speaker classes. The weights depend on the time axis as well as on the frequency axis. The overall distance computed after nonlinear time alignment between a reference pattern and a test pattern thus becomes a function of the given set of weights of the reference class considered. For each class, the optimum weights result from the ideal criterion of minimum error rate. Instead of this criterion, the closely related but mathematically more convenient Fisher criterion is used that leads to a closed form solution for the unknown weights. Based on these weights, the selection of subsets of effective features is studied in order to further improve the class discrimination. The feature weighting and selecting techniques are tested using a data base of utterances recorded off dialed-up telephone lines. The

experiments indicate that feature weighting and feature selection can reduce the error rates by a factor of two or more both for speaker identification and speaker verification.
Author
Speech Recognition; Texts; Time Signals; Frequencies

20060011471 Groupe de Analyse des Processus Stochastiques en Electronique, Toulouse, France
AN APPROXIMATELY UNBIASED RECOVERY of DISCRETE FOURIER TRANSFORMS ALTERED BY JITTERED SAMPLING EPOCHS
Castanie, F.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1837-1840; In English; See also 20060011369; Copyright; Avail.: Other Sources

The effects of e time jitter on the computed D.F.T. of analog signals are investigated. It is shown that it results in a Dies described as a filtering affect based on the knowledge of the characteristic function of the jitter. An inverse filtering is proposed. With the additional hypothesis of jitter sample to sample independent, the computations are also carried out for squared modulus of D.F.T., or F.S.D. of stochastic processes. Simulation results are given, shawing good agreement with theoretical expressions. Application fields include debiased recovery of true D.F.T., as well as jitter characterization.
Author
Discrete Functions; Fourier Transformation; Time Measurement; Vibration

20060011472 Georgia Inst. of Tech., Atlanta, GA, USA
CONSTRAINED ITERATIVE DECONVOLUTION USING A CONJUGATE GRADIENT ALGORITHM
Marucci, Richard; Mersereau, Russell M.; Schafer, Ronald W.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1845-1848; In English; See also 20060011369; Copyright; Avail.: Other Sources

In this paper the problem of contrained deconvolution is related to the minimization of a functional. By applying the conjugate gradient algorithm of optimization theory to this minimization an efficient iterative algorithm for deconvolution is developed. This algorithm is then extended to perform constrained deconvolution and the performance of the new algorithms is compared with other published algorithms.
Author
Algorithms; Conjugate Gradient Method; Iteration; Constraints

20060011473 Institute of Sound and Vibration Research, Southampton, UK
A COMPARATIVE STUDY of LEAST-SQUARES and HOMOMORPHiC TECHNIQUES FOR the INVERSION of MIXED PHASE SIGNALS
Mourjopoulos, J.; Clarkson, P. M.; Hammond, J. K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1858-1861; In English; See also 20060011369; Copyright; Avail.: Other Sources

The inversion of minimum phase signals is well understood. However, many signals are nonminimum phase and the deconvolution of such sequences is less well documented. The aim of this paper is to compare two of the main techniques for inversion of finite length sequences, namely, homomorphic and least squares. Homomorphic methods require separation of the sequence into minimum and maximum phase components prior to inversion. On the other hand, least squares methods are applicable directly to the time sequence. However, the usual formulation applied to mixed phase signals produces an output having an all-pass form, but the use of delay yields an operator which can approximately invert mixed phase inputs. A brief summary of the two approaches is given, followed by a detailed comparison of the methods as applied to several case studies.
Author
Homomorphisms; Least Squares Method; Inversions; Signal Transmission

20060011476 Massachusetts Inst. of Tech., Cambridge, MA, USA
Maximum Likelihood Dereverberation with Applications in Sonic Well Logging
Kurkjian, Andrew L.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1882-1885; In English; See also 20060011369; Copyright; Avail.: Other Sources

In the sonic well logging application, an acoustic source and an array of receivers are deployed along the axis of a fluid-filled borehole for the purpose of learning about the formation. Conventional sonic methods position the receiver array many wavelengths from the source and, in effect, perform a refraction experiment in the hole. In this paper, we introduce a new method in which a short-spaced array is used to perform a reflection experiment. Our interest is in the maximum

likelihood estimate of the cylindrical wave reflection coefficient of the formation from measurements of the field within the borehole. The problem is fundamentally one of dereverberation and is nonlinear. We present an iterative ML solution which requires only'linear estimation at each step. This solution is new and is based on the iterative ML theory developed by Musicus. Preliminary results are encouraging.
Author
Maximum Likelihood Estimates; Sound Generators; Wells; Iterative Solution; Mathematical Models

20060011478 Institute of Sound and Vibration Research, Southampton, UK
IMPROVEMENT of THE SIGNAL to NOISE RATIO of SEISMIC TRACES BY RE-ALIGNMENT of REVERBERANT ENERGY
Clarkson, P. M.; Hammond, J. K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1882-1886; In English; See also 20060011369; Copyright; Avail.: Other Sources

Marine seismic sections recorded in areas having a hard sea-bottom are characterized by high levels of reverberant energy, as in many North Sea sections for example. Reverberant energy is undesirable from a seismic interpretation viewpoint since it interferes with the identification of the deeper substructure. Conventional processing attempts to remove or attenuate the reverberant energy. Conceptually at least, this is wasteful since each reverberant component (multiple) contains coherent signal energy which, if suitably re-aligned, could be used to enhance the trace signal to noise ratio (SNR). Any such re-alignment is complicated by the fact that successiye components are, in general, overlapping and distorted, and the interval between successive multiples is only approximately known. Nevertheless, the aim of this paper is to show that it is feasible to extract the coherent energy from multiple components in such a way as to make possible improvements in SNR by averaging the extracted components with the original. We further demonstrate that the SNR enhancing function may be combined with conventional predictive filtering.
Author
Seismic Energy; Signal to Noise Ratios; Reverberation; Seismology; Alignment; Mathematical Models

20060011519 Bell Telephone Labs., Inc., Holmdel, NJ, USA
FURTHER RESULTS of A LEAST SOUARES and GRADIENT ADAPTIVE LATTICE ALGORITHM COMPARISON
Medaugh, R.; Griffiths, L. J.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1412-1415; In English; See also 20060011369; Copyright; Avail.: Other Sources

An expansion of the results presented in [1] which is a comparison of least squares adaptive lattice (LSAL) and gradient adaptive lattice (GAL) linear prediction algorithms is given. New results obtained from the simulation configuration earlier described show close conformity of estimated mean reflection coefficient and squared prediction error sequences for the three algorithms. Additionally. some simulation results obtained using a single impulse superimposed on colored stationary noise and also speech-like data as lattice input processes are presented. In the former case, divergent performance of two coefficient GAL and LSAL is noted and explained.
Author
Algorithms; Least Squares Method; Linear Prediction; Adaptive Control

20060011520 Centre National de la Recherche Scientifique, Saint Martin d'Heres, France
THEORETICAL and COMPUTER SIMULATION STUDY of THE 'CORRELOFILTRE' ADAPTATIVE SYSTEM FOR NON STATIONARY PROCESSES
Bouthemy G.; Kofman, W.; Silvent, A.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1416-1419; In English; See also 20060011369; Copyright; Avail.: Other Sources

The adaptative filter for real time noise cancelling applications is shown. The signal is corrupted by an additive noise which is a linear transformation of the noise 'source' available as a reference input. To obtain the disturbing noise it is necessary to estimate this transformation. The difference between the input and the estimated noise gives an estimation of the signal. The system presented here is an open loop filter which is a different case from that proposed by Widrow. The theoretical study of the performance of the system (in the case where the disturbing noise is a non stationary process) is shown. To check the stationarity of the process we introduce a criterion which compare the estimated transformation with the previous one (learning process) and decide if it is necessary or not to change the last estimated transformation. We studied typical cases of non stationarity as change of the power of the disturbing noise or in the impulse response of the linear system. The theoretical

and computer calculated results are shown. We find a good agreement between the two approaches.
Author
Computerized Simulation; Adaptive Filters; White Noise

20060011521 Tokyo Univ. of Agriculture and Technology, Japan
A SYNCHRONOUS ADAPTIVE NOISE CANCELLER FOR PERIODIC INTERFERENCE
Kobatake, Hidefumi; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1424-1427; In English; See also 20060011369; Copyright; Avail.: Other Sources

A new type adaptive noise canceller for periodic interference is proposed. The operation of this adaptive filter is controlled by the phase-locked loop which captures the fundamental frequency component of the noise and generates clock pulse whose frequency is N times that of it, where N is the length of the impulse response function of the adaptive filter. This clock is used to keep the operation of the adaptive filter synchronous with the noise and also to keep the length of the impulse response function of the adaptive filter equal to the noise period. By the usual least-mean-squares (LMS) algorithm there needs 2N multiplications and 2N additions for the correction of the filter coefficients at each sampling time. However, the synchronous method needs only one multiplication and one addition. It means that the total computational cost decreases to about 1/(2N) times as compared with the usual LMS algorithm and it will be a great help in simplifying the hardware construction and also in widening the operational frequency range of the adaptive filter. A pilot study has showed the proposed adaptive filter has excellent performance.
Author
Adaptive Filters; Interference; Noise (Sound); Cancellation Circuits; Synchronism

20060011522 Rennes Univ., France
PROPOSAL and EXPERIMENTAL EVALUATION of A COMBINED STRUCTURE 'CORRELOFILTER-ADAPTER' FOR the CONTINUOUS ESTIMATION of A NOISY SIGNAL WITH A REFERENCE NOISE
Arques, Pierre-Yves; Faucon, Gerard; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1420-1423; In English; See also 20060011369; Copyright; Avail.: Other Sources

We consider the problem of the continuous estimation of an unknown signal S(t) disturbed by an additive noise B(sub l)(t) when in presence of a reference input consisting only of a noise B(sub 2)(t), correlated with B(sub 1)(t). The signal is independent of the noises. A new structure which combines the correlofilter and the Widrow adaptive filter, is proposed. Experimentally, the system is evaluated and compared to the isolated structures. In the studied cases, the combined structure is shown to be superior to the isolated structures, given equivalent filtering dimensions.
Author
Adaptive Filters; Noise (Sound); Estimating; Structural Analysis; Signal Transmission

20060011523 Florida Univ., Tampa FL, USA
Signal Processing Technique For Measurement Of Vented-Box Loudspeaker System Parameters
Jain, V. K.; Leach, W. M.; Schafer, R. W.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1428-1431; In English; See also 20060011369; Copyright; Avail.: Other Sources

From a single transient test we determine all of the parameters of a vented-box loudspeaker system. A complete electroacoustical circuit representation is thus obtained from the time domain test using digital signal processing techniques. First, we apply the pencil-of-functions technique to the digitally recorded response and determine the impedance-function coefficients of the circuit. Next, using the relationships between the impedance coefficients and the circuit parameters, we show that every circuit parameter can be computed without resorting to simultaneous nonlinear equations. The methodology is demonstrated by analysis of laboratory-recorded experimental data.
Author
Digital Techniques; Electroacoustics; Loudspeakers; Signal Processing; Mathematical Models; Venting

20060011524 Centro Studi e Laboratori Telecomunicazioni, Turin, Italy
MEASUREMENTS ON NON LINEAR MICROPHONES BY A SPEECH-LIKE SIGNAL
Depaoli, Adriano; Modena, Giulio; Reolon, Aldo; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1436-1439; In English; See also 20060011369; Copyright; Avail.: Other Sources

Carbon microphones are nonlinear and time varying devices, so that their response curve widely depends on the type of excitation signal. To carry our measurements well correlated with the real performance, the transducers must be excited by

a signal as close as possible to real voice. For the artificial signals already proposed, the attention was practically concentrated on both waveform behaviour and long-time characteristics. The speech-like signal here presented, in addition to previous items, also accounts for syllabic-rate of real speech, showing an envelope very similar to real voices. Sensitivity frequency characteristics and distortion measured on 4 microphones (3 carbon and 1 linear) using this signal are presented.
Author
Microphones; Nonlinearity; Speech; Signal Transmission

20060011525 Wien Univ., Austria
MEASUREMENT of NONLINEAR DISTORTIONS IN TAPE RECORDERS and ELECTRO-ACOUSTIC TRANSDUCERS APPLYING T.I.M. TEST SIGNALS
Skritek, Paul; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1440-1443; In English; See also 20060011369; Copyright; Avail.: Other Sources

Measurement procedures for transient intermodulation distortions (TIM) have been extended and applied to magnetic tape recorders, high-frequency loudspeakers and microphones. The tests proved as a good measure for high-frequency compression distortions in tape recorders. Squarewave/sine test signals can be used for unified VU-meter calibration in tape recorders and for specification of peak-power handling of high-frequency loudspeakers (tweeters). Thermally forced fluctuation in the sound pressure of tweeters is described.
Author
Distortion; Electroacoustic Transducers; Intermodulation; Nonlinearity; Tape Recorders; Signal Transmission

20060011526 Telecommunications Radioelectriques et Telephoniques, Le Plessis-Robinson, France
A NEW PRINCIPLE to AVOID UNDESIRABLE OSCILLATIONS IN ELECTRO ACOUSTIC LOOPS APPLICATION to THE DESIGN of A HANDS FREE TELEPHONE SET WITHOUT VOICE SWITCHING
Ferrieu, Gilbert; Amstutz, Pierre; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1448-1451; In English; See also 20060011369; Copyright; Avail.: Other Sources

A new general principle is described which makes possible the avoidance of undesirable oscillations in feedback systems. The design of a hands free telephone set is taken as an example. This principle, whose theory and practical limitations are given, makes use of a sustained auxiliary electroacoustic oscillation, created intentionally in an auxiliary feedback loop containing a narrow band pass filter, to regulate the gain of an AGC amplifier inserted in the main loop in order that the modulus of the overall gain along the main loop might be always less than one. A suitable realization of the narrow band pass filter in the form of a special mechanical filter is also described.
Author
Electroacoustics; Telephones; Voice Communication; Switching; Oscillations

20060011527 Centre National de la Recherche Scientifique, Marseilles, France
THE ARCHITECTURE of A DIGITAL SOUND SYNTHESIS SYSTEM
Arfib, Daniel; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 14661468; In English; See also 20060011369; Copyright; Avail.: Other Sources

We describe an architecture of a digital sound system based upon the MUSIC V Program. This kind of equipment tends to fill the gap between real time machines and sophisticated computer programs. A new approach is presented, starting from the software point of view. The design of the machine is therefore a direct implication of the software requirement.
Author
Digital Systems; Acoustics; Mechanical Engineering; Synthesizers

20060011528 Japan Broadcasting Corp., Tokyo, Japan
TIMBRE of COMPLEX TONE BURSTS WITH TIME VARYING SPECTRAL ENVELOPE
Miyasaka, Eiichi; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1462-1465; In English; See also 20060011369; Copyright; Avail.: Other Sources

Temporal change of a spectral envelope is one of five major acoustic parameters which are considered to determine the timbre of a time-varying sound, [Schouten(1)]. An experiment was conducted to see the effects of rapid time-varying spectral envelopes on the timbre of short-complex tone bursts ranging from 60 ms to 100 ms. Each burst consists of three segments: an initial steady segment, a middle frequency-glide segment and a final steady segment. Similarity judgments of pairs of these stimuli were made. A non-metric two-dimensional analysis of the experimental data showed that the timbre of short-complex

tone bursts with a frequency-glide segment where the spectral envelope is changed in time depends mainly on two factors. One corresponds to dynamic property which appear to be related to the temporal position of the glide segment. The other corresponds to pitch sensation.
Author
Time; Variations; Pitch; Spectra; Acoustics

20060011529 Academia Sinica, Beijing, China
ADAPTIVE ARRAY PROCESSING USING PREDICTED COEFFICIENTS AS CONSTRAINED CONDITIONS
Hou, Chao-huan; Yan, Shi-zun; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1473-1478; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper describes a new method of adaptive array processing for the unknown frequency characteristics. In the practical situations, it is easy to obtain the estimation of the power spectrum in the observed direction instead of the frequency characteristics. Then the maximum entropy spectral analysis can be incorporated with the adaptive array processing. The predicted coefficients of MESA can be obtained. The predicted coefficients can be used as the constrained conditions of the algorithm for the adaptive array processing. In this paper the above method is further expanded and the adaptive array processor is presented for the more general cases, in which the signal characteristics in the observed direction are completely unknown. A series of computer simulation experiments have been conducted.
Author
Antenna Arrays; Algorithms; Computerized Simulation; Adaptive Control

20060011530 Shanghai Jiao Tong Univ., China
ARRAY PROCESSING FOR ESTIMATING MULTIPLE EMITTER PARAMETERS
Gu, Wei-wen; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1477-1480; In English; See also 20060011369; Copyright; Avail.: Other Sources

In this paper the Multiple Signal Classification Method (MUSIC) is used to generate estimates of angles of arrival of multiple signals. The method involves determining the covariance matrix of the signals seen on the elements, then utilizing the elgenstructures in an algorithm to find estimates of the numbers of signal arrivals, angles of arrival, and power and cross-power of the arrivals. Various array layouts with uniform and non-uniform element spacing are examined Estimates are made using source pairs widely separated and closely spaced; equal and unequal amplitudes; uncorrelated and correlated signals; and long and short signal sample records. Although correlated sources are viewed by the algorithm as a single signal, a small uncorrelated component in one of the arrivals makes it possible to resolve the two arrivals if enough samples are observed.
Author
Emitters; Signal Transmission; Linear Arrays; Algorithms

20060011531 Laboratoire Traitement du Signal et Instrumentation, Saint-Etienne, France
INTERFEROMETRIC ACOUSTIC IMAGING, JOINT REPRESENTATION and IMAGE DECONVOLUTION
Chiollaz, M.; Escudie, B.; Biraud, Y.; Pachiaudi, G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1485-1488; In English; See also 20060011369; Copyright; Avail.: Other Sources

Far field acoustics deals with intensity distribution as a function of angle and frequency. Interferometric antennas and processors are able to display it. This distribution is described as a joint representation associated to the conjugated variables time and frequency. For moving sources such interferometric images are deeply related to the so called 'running spectrum' of the incoming wave. Angular resolution of the interferometric processor depends both on antenna and space coherence properties of the incoming waves. Deconvolution techniques are able to improve it. Some examples about noise imaging of vehicles are given.
Author
Acoustic Imaging; Image Processing; Interferometry

20060011532 Royal Roads Military Coll., Victoria, British Columbia, Canada
SIMULATION FOR TESTING ARRAY RESPONSE
Wolfe, Warren W.; Wilmut, Michael; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1493-1496; In English; See also 20060011369; Copyright; Avail.: Other Sources

The theory, development, and evaluation of STARPAK is presented. STAR is a package of Standard Fortran subroutines

designed to simulate the performance of an arbitrary array configuration of sensors in a variety of signal noise environments. Either real frequency domain data may be input or the user may define control signal-noise parameters to generate purely simulated data. STAR will output random samples having identical second order statistics. Output may be used to evaluate array configuration types and errors, or to evaluate beamforming algorithms. Confidence limits are established for the simulated output. Conventional and fast, reliable versions of optimal and stochastic descent beamforming algorithms are presented to illustrate the simulation.
Author
Simulation; Statistical Analysis; Mathematical Models; Linear Arrays

20060011533 Academia Sinica, China
OPTIMUM SIGNAL PROCESSING of VERTICAL MODE-SELECTIVE ARRAY IN SHALLOW WATER
Zi-qiang, Hou; Zhi-guang, Li; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1497-1500; In English; See also 20060011369; Copyright; Avail.: Other Sources

The normal modes with different mode number can be separated by using a vertical mode selective array in shallow water. The optimum receiver may be implemented by means of coherence integrating of the separated modes. This paper suggests that the coherence integrating of modes can be implemented by using adaptive correlation cancellation loops or correlation filters to get sane phase. The performance analysis and some results of the model experiments are given. Using this method, the output SNR can be improved and the interference due to multipath arrival can be removed. So, the reliability of detection will be improved and the code rate of communication may be increased.
Author
Shallow Water; Signal Processing; Modes (Standing Waves); Arrays

20060011534 Baghdad Univ., Iraq
VLSI CIRCUITS FOR A SAMPLING DIGITAL ACOUSTIC ENERGY METER
Taha, Salim M. R.; Abdul-Karim, Majid A. H.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1469-1472; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper introduces a method of measuring acoustic power digitally by employing VLSI circuit throughout the design. The method is based on sampling the voltage audio signals. These samples are then encoded via the appropriate A/D converter LSI chips to 8 bit representation together with the sign. The samples are multiplied through VLSI chip to yield a 16 bit format product. The product are then accumulated throughout a desired period suitable for acoustical observations. The sum of the products is taken at the end of that specified time. The system has the advantage of measuring acoustic power over a specified period of time irrespective of voltage waveforms. This will be useful for the subjective test of auditorium as it gives the study of the acoustical quality of halls and theatres.
Author
Acoustic Emission; Integrated Circuits; Very Large Scale Integration; Sound Waves; Digital Systems

20060011535 Naval Underwater Systems Center, New London, CT, USA
FITTING POLYNOMIALS to DATA IN the PRESENCE of NOISE
Owsley, N. L.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1505-1508; In English; See also 20060011369; Copyright; Avail.: Other Sources

Procedures are examined for fitting a polynomial to data consisting of uniformly spaced samples of either the polynomial directly or the derivative of the polynomial plus measurement noise. For the time invariant polynomial, the maximum likelihood (ML) and maximum a posteriori (MAP) estimators are presented. For the time varying case, the dynamic system and measurement equations required for a recursive estimator are specified. The estimator variance for a polynomial fit metric of distortion is discussed. The ML and MAP estimator variances reach a lower bound when the measurement noise is zero mean. For measurement noise with unknown means, expressions for the resultant biased estimator excess mean squared error are presented. The important case of a second order polynomial is considered as an example.
Author
Polynomials; Noise (Sound); Maximum Likelihood Estimates; Mathematical Models

20060011536 Forschungsinstitut fuer Funk und Mathematik, Wachtberg, Germany
OPTIMUM CLUTTER SUPPRESSION IN AIRBORNE PHASED ARRAY RADARS
Klemm, Richard; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1509-1512; In English; See also 20060011369; Copyright; Avail.: Other Sources

The platform motion of an airborne radar system causes clutter returus to be doppler shifted. The doppler shift is proportional to the directional cosine between the velocity vector and the individual clutter element. Such clutter echoes are characterized by a two-dimensional velocity-azimuth spectrum. Therefore, suppression of clutter echoes requires two-dimensional sampling and filtering. The results presented are obtained from a theoretical study by applying optimum detection theory to a statistical clutter model. Optimum filtering as given by the LR-test may be difficult to implement, but gives some impression of how much gain in signal-to-clutter-ratio can be obtained. It turns out that the gain is limited by the receiver noise rather than by the clutter. In other words, two-dimensional spectra treated by two dimensional filters behave similar to the one-dimensional case. It is also shown that the number of spatial samples should be roughly equal to the number of time samples. Furthermore, the results promise that the optimum gain can be approached by much simpler suboptimum methods. Author

Airborne Radar; Phased Arrays; Mathematical Models; Clutter; Retarding

20060011537 Nuclear Research Center of Grenoble, Grenoble, France

DYNAMIC FOCUSSING and ULTRASONIC IMAGING

Martin, M.; Piquard, J. F.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1513-1515; In English; See also 20060011369; Copyright; Avail.: Other Sources

Ultrasonic imaging in B echography requires high resolution over the entire scanning zone. Phased array transducers in conjunction with analogical shift registers (CCD) allow sector scanning and dynamic focussing. Working within this framework a measurement instrument has been devised to evaluate the influence of the different parameters on the image. Author

Imaging Techniques; Ultrasonics; Focusing; Dynamic Control

20060011538 University of Southern California, Los Angeles, CA, USA

NONSTATIONARY 2-D RECURSIVE FILTER FOR SPECKLE REDUCTION

Kuan, D. T.; Sawchuk, A. A.; Strand, T. C.; Chavel, P.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1561-1564; In English; See also 20060011369; Copyright; Avail.: Other Sources

Speckle noise exists in all types of coherent imagery such as synthetic aperture radar, acoustic imagery and laser illuminated imagery. Speckle can be reduced by averaging over several uncorrelated speckle images of the same object when these are available. In this paper, we attempt to reduce speckle noise from a single speckle image by using adaptive digital image restoration techniques. Many speckle noise reduction algorithms assume speckle noise is multiplicative. We model the speckle according the exact physical process of coherent image formation. Thus, the model includes signal-dependent effects and accurately represents the statistical properties of speckle. A linear minimum mean-square error filter is derived based on our speckle model and a nonstationary image model. The filter responds adaptively to the signal-dependent speckle noise and the nonstationary mean and variance of the original image. The necessary parameters are estimated from the noisy image. The 2-D recur sire implementation of this filter is developed as a fast computation algorithm.
Author

Noise Reduction; Speckle Patterns; Two Dimensional Models; IIR Filters; Algorithms

20060011540 California Univ., Davis, CA, USA

IMAGE RESTORATION and EDGE EXTRACTION BASED ON 2-D STOCHASTIC MODELS

Jain, Anil K.; Ranganath, Surendra; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1520-1523; In English; See also 20060011369
Contract(s)/Grant(s): DAAG-78-G-0206; Copyright; Avail.: Other Sources

In this paper, we consider application of 2-D stochastic models discussed in [1] to develop noncausal FIR filters for restoration of images degraded by additive white noise. The semicausal model of [1] is used to design masks for edge extraction from the noisy images. The results presented here indicate that good restorations and robust edge detection are possible using relatively simple algorithms.
Author

Stochastic Processes; Two Dimensional Models; Image Reconstruction; Edge Detection; Extraction

20060011541 Rensselaer Polytechnic Inst., Troy, NY, USA

RESTORATION and ENHANCEMENT of ARBITRARY FINITE-ENERGY IMAGES FROM INCOMPLETE SPATIAL and SPECTRAL INFORMATION

Stark, Henry; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1524-1528; In English; See also 20060011369; Copyright; Avail.: Other Sources

In this paper we extend the generalized image restoration theory developed by Youla (i) to arbitrary L2 (i.e., square-integrable) images or signals. Specifically we furnish recursive algorithms to restore images from (i) extended segments and low-pass spectra and (2) short segments and highpass spectra. We also assert that it is not possible to restore an arbitrary image from only its low-pass spectrum and a short segment.
Author
Image Enhancement; Image Reconstruction; Algorithms; Spectra

20060011542 Institut National des Sciences Appliquees, Rennes, France
DECOMPOSITION and SEPARATED ADAPTIVE DIGITAL PROCESSING of DEGRADED IMAGES WITH AN VISUAL QUALITY CRITERION
Barba, Dominique; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1531-1536; In English; See also 20060011369; Copyright; Avail.: Other Sources

In this paper, image restoration in the context of visual quality criterion and two-component image model is considered. Taking a signal as a two additive components is a very useful way for modeling the two fundamental features of images : edges and textures. We propose a new algorithm which splits the luminance signal of complex images into plateau luminance signal and texture. The method is based on 2-D median filtering with adaptive support shape and offset as estimator of the local-luminance mean value. Using an objective visual quality criterion deduced from a model of human perception, separate adaptive 2-D linear filtering are performed on the two components according to specific action the degradations have made on.
Author
Adaptive Filters; Decomposition; Image Processing; Degradation; Two Dimensional Models

20060011544 Georgia Inst. of Tech., Atlanta, GA, USA
THE IMPORTANCE of BOUNDARY CONDITIONS IN the PHASE RETRIEVAL PROBLEM
Hayes, Monson H.; Quatieri, Thomas F.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1545-1548; In English; See also 20060011369
Contract(s)/Grant(s): DAAG29-81-K-0024; Copyright; Avail.: Other Sources

In this paper, the importance of the boundary values of a two dimensional sequence in the phase retrieval problem is investigated. Specifically, it is shown that, given the boundary values, phase retrieval becomes a linear problem. Therefore, the interior points of the two-dimensional sequence may easily be deduced from the boundary values of the sequence and the magnitude of its Fourier transform or, equivalently, the autocorrelation function of the sequence. Furthermore, although the determination of the boundary values from only Fourier transform magnitude information is, in general, a non-trivial problem, it is shown that the shape of the region of support of the two-dimensional sequence determines the ease with which the boundary values may be determined.
Author
Boundary Conditions; Two Dimensional Models; Algorithms

20060011545 Newcastle-upon-Tyne Univ., Newcastle, UK
AN OPTIMAL TECHNIQUE FOR TOMOGRAPHIC IMAGE RECONSTRUCTION FROM CURVED RAY PROJECTIONS
Goutis, C. E.; Durrani, T. S.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1549-1552; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper extends the constrained optimisation image reconstruction techniques to curved-ray projections for a number of scanning systems and for 2-D and 3-D reconstructions. The work presented is general in that it includes the previous results on parallel-ray and divergent-ray geometries as special cases. Treating the problem in Hilbert space a general cost function is optimized and the solution is applied to a number of practical criteria. This has led to a convergent iterative algorithm which evaluates the associated Lagrange multiplier functions and establishes the reconstruction for all scanning geometries. Further a generalized Projection Slice Theorem is introduced based on a new Projection Transform.
Author
Image Reconstruction; Optimization; Tomography; Algorithms; Geometrical Optics

20060011546 Centre National de la Recherche Scientifique, Orsay, France
IMPULSE ANALYSIS of SPEECH : SPOTTING and PRECLASSIFYING the IMPULSES IN the SPEECH WAVE
Manceron, F.; Lienard, J. S.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1569-1572; In English; See also 20060011369; Copyright; Avail.: Other Sources

The usual methods for speech signal analysis give a spectrum evaluation on a time interval (20 to 40 ms) larger than the largest pitch period, which eliminates most phonetically relevant information. Our approach consists in a decomposition of the signal into a string of 'impulses' defined in the frequency-time domain. The work described in the present paper is done using a filterbank followed by short-time integrators. An 'Impulse Coherence Function' is defined; its maxima are used to mark the places where the impulse are. Classification experiments are carried out, in order to segment the speech wave according to the regularity and similarity of the successive impulses. Applications may be envisioned in the fields of voicing and pitch detection, consonant features recognition, and auditory modeling.
Author
Signal Analysis; Speech Recognition; Spectra; Preprocessing; Impulses

20060011547 Gold Star Electric Co., Osan, Korea, Republic of
POLE-ZERO MODELING of NOISY SPEECH and ITS APPLICATION to VOCODING
Song, K. H.; Un, C. K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1581-1584; In English; See also 20060011369; Copyright; Avail.: Other Sources

In this paper four pole-zero modeling algorithms that are based on high-order pole model fitting and decomposition method have been studied, and application to robust vocoding has been considered. They are autocorrelation prediction (AP), modified Yule-Walker (MYW), modified least square (MLS) and modified least square with autocorrelation compensation (MLSAC) methods. They involve only linear equations, and therefore are computationally efficient. Among those algorithms, the MLSAC method appears to be the most effective in spectral envelope estimation of noisy as well as clean speech. According to our simulation result, the improvement resulting from the use of the MLSAC pole-zero model for noisy speech is equivalent to increasing signal-to- noise ratio (SNR) by about 5 dB when SNR of input speech is 10 dB or less. The use of the MLSAC method in multi-rate vocoding is also discussed.
Author
Algorithms; Coding; Fitting; Signal to Noise Ratios; Least Squares Method; Decomposition; Autocorrelation

20060011549 Escuela Tecnica Superior de Ingenieros de Telecomunicacion, Madrid, Spain
TEXT-to-SPEECH CONVERSION IN SPANISH A COMPLETE RULE-BASED SYNTHESIS SYSTEM
Santos, Juan M.; Nombela, Jose r.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1593-1596; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper describes a Spanish Synthesis-by-Rule system, which is completely simulated on a PDP 11/60 minicomputer and produces an intelligible and natural speech. Input to the system is any orthographic text. A linguistic preprocessing converts this input to a phonemic text with stress and pause marks included. Then a phonetical process inserts prosodic parameters and evaluates the acoustic parameters of each phonetic segment, wich are then used to feed a vocal tract model, that generates the sampled waveform, ready to be outputted to a D/A converter and a speaker. The vocal tract model which has been chosen is the dormant synthesizer proposed by D.H. Klatt. Automatic letter to phoneme transcription is based on rules stated by the Spanish phonologist A. Quilis. Besides, the set of algorithms for phoneme to parameter conversion has been extracted from an extensive experimental and original work carried by the authors on acoustic phonetic characterization of spanish sounds in their spectral and temporal behavior. (A cassette recording of speech output from the system will be played).
Author
Linguistics; Synthesis; Texts; Minicomputers; Algorithms; Acoustics; Synthesizers; Articulation (Speech)

20060011550 Case Western Reserve Univ., Cleveland, OH, USA
SPARTE: A TEXT-to-SPEECH MACHINE USING SYNTHESIS BY DIPHONES
Huang, Tai-Yi; Wang, Cai-Fei; Pao, Yoh-Han; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1601-1603; In English; See also 20060011369; Copyright; Avail.: Other Sources

An operational synthesis system for the French language has been developed at the CNET. Vocal output of any message in the language may be obtained from input typed on a keyboard. This speech synthesis equipment is built in an autonomous cabinet of fairly small dimensions; it can also be used as a single board with a V24-RS232 connection. The device consists of the following items: a keyboard, a display and a built-in loudspeaker, a linear prediction synthesizer, 1200 diphones. The software implemented on a microprocessor includes algorithms for orthographic-phonetic translation and systematic prosody processing; automatic syntactic analysis has been simulated and will soon be implemented. The vocal message is obtained in real time; the synthesized speech is intelligible and fairly natural.
Author
Texts; Articulation (Speech); Synthesizers; Linguistics; Microprocessors

20060011551 Royal Inst. of Tech., Stockholm, Sweden

A MULTI-LANGUAGE TEXT-to-SPEECH MODULE

Carlson, Rolf; Granstrom, Bjorn; Hunnicutt, Sheri; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1604-1607; In English; See also 20060011369; Copyright; Avail.: Other Sources

Recent advances in microprocessor, memory and signal processor technology have made it feasible to put complete speech processing equipment into a portable form. At our laboratory a higher-level programming language has been developed that is especially suitable for rule description of linguistic processes. Text-to-speech systems for several languages have been written in this framework. Now also a cross compiler has been designed for the 16-bit microprocessor MC 68000, which makes transportation of programs from our research computer trivial. The language-independent parts of the program for the microprocessor are written in efficient assembler code. Special hardware development has resulted in a portable, battery-operated unit that is capable of transforming text-to-speech at a speaking rate of 250 wpm (words per minute). This opens up the possibility of speech options on computer terminals, portable, large vocabulary talking language translators, etc. The module has been tried in several applications for people with communication handicaps.

Author

Linguistics; Microprocessors; Programming Languages; Electronic Modules; Articulation (Speech); Texts

20060011553 Nancy Univ., France

PROBLEMS IN the DESIGN and USE of A CONNECTED SPEECH UNDERSTANDING SYSTEM

Haton, Jean-Paul; Pierrel, Jean-Marie; Sabbach, Simon; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1616-1620; In English; See also 20060011369; Copyright; Avail.: Other Sources

MYRTILLE II is a connected speech understanding system which is presently designed by our research group in order to recognize a wide subset of spoken French. The syntax accepted by this system is approximately the one of basic French without pronominal references, the vocabulary is presently about 400 words. The application is concerned with a meteorological inquiry system. A first version of MYRTILLE II using a best-first left-to-right strategy is presently operational and has already been tested on a number of sentences. In this paper we present several practicle examples illustrating the various choices made in the system and the interactions between processing levels : acoustic-phonetic-lexical decoding, syntactic-semantic analysis, interaction between the recognition and dialog modules, together with several programs which are intended to help in the development and use of this system.

Author

Syntax; Acoustics; Speech Recognition; Voice Communication

20060011554 Bell Telephone Labs., Inc., Murray Hill, NJ, USA

An Embedded Word Training Procedure for Connected Digit Recognition

Rabiner, L. R.; Bergh, A.; Wilpon, J. G.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1621-1624; In English; See also 20060011369; Copyright; Avail.: Other Sources

The 'conventional' way of obtaining word reference patterns for connected word recognition systems is to use isolated word patterns, and to rely on the dynamics of the matching algorithm to account for the differences in connected speech. Connected word recognition, based on such an approach, tends to become unreliable (high error rates) when the talking rate becomes grossly incommensurate with the rate at which the isolated word training patterns were spoken. To alleviate this problem, an improved training procedure for connected word (digit) recognition is proposed in which word reference patterns from isolated occurrences of the vocabulary words are combined with word reference patterns extracted from within connected word strings to give a robust, reliable word recognizer over all normal speaking rates. In a test of the system (as a speaker trained, connected digit recognizer) with 18 talkers each speaking 40 different strings (of variable length from 2 to 5 digits), median string error rates of 0% and 2.5% were obtained for deliberately spoken strings and naturally spoken strings, respectively, when the string length was known. Using just isolated word training tokens, the comparable error rates were 10% and 11.3% respectively.

Author

Algorithms; Digits; Words (Language); Articulation (Speech)

20060011555 Verbex Corp., Bedford, MA, USA

PARTIAL TRACEBACK and DYNAMIC PROGRAMMING

Brown, Peter F.; Spohrer, James C.; Hochschild, Peter H.; Baker, James K.; International Conference on Acoustics, Speech

and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1629-1632; In English; See also 20060011369; Copyright; Avail.: Other Sources

Dynamic programming is used in speech recognition to search efficiently for word sequences whose templates best match acoustic data. The search is constrained by finite-state networks embodying grammatical rules. Typically, dynamic programming is implemented in two steps: the first calculates, for each state in a network and for each time, the best way of arriving at that state at that time; the second traces back from the final state at the final time to the initial state at the initial time to determine the best path through the network. This second step cannot be initiated before the determination (usually from the detection of silence) that the final state has been reached. Such a determination is difficult in the recognition of truly continuous speech; there are often no reliable anchor points. Further, it is often desirable to be able to recognize at least part of an utterance before a speaker has stopped talking. In this paper we introduce a technique for discovering the initial section of the optimal path through a network before the traversal of the network is complete. It can be used to report a system's interpretation of acoustic data from the not-too-distant past without re!ying on or making any decisions which may degrade recognition accuracy.

Author

Acoustic Properties; Dynamic Programming; Speech Recognition; Words (Language); Algorithms

20060011556 Centre National d'Etudes des Telecommunications, Lannion, France

FROM SPEECH RECOGNITION to SPEECH UNDERSTANDING : A CASE STUDY of KEAL

Gillet, Dominique; Quinton, Patrice; Siroux, Jacques; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1633-1636; In English; See also 20060011369; Copyright; Avail.: Other Sources

We describe in this paper the comprehension part of a man-machine dialog system which performs automatic inquiry in a limited domain. The comprehension part involves a semantic interpreter and a dialog manager. The extraction of the semantic information conveyed by a sentence is based on an interpretation of the parse-tree; the semantic knowledge is represented by transformation rules associated with the production rules of a semantic context-free grammar. The pragmatic model, which has been designed with respect to its recognition environment, is able to take into account some particularities of the oral conversation (ellipsis, unexpected information), in order to make the dialog as natural as possible. It also makes predictions about possible user's replies to assist recognition and semantic interpretation.

Author

Speech Recognition; Semantics; Mathematical Models

20060011557 Centre National de la Recherche Scientifique, Orsay, France

THE AESOP CONTINUOUS SPEECH UNDERSTANDING SYSTEM

Mariani, Joseph J.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1637-1640; In English; See also 20060011369; Copyright; Avail.: Other Sources

The continuous speech understanding system AESOP that we are presently developing at LIMSI, has gone through several phases since the first preliminary version, AESOP, in 1978. This version allowed for man-machine speech communication in real time, with unrestricted text-to-speech synthesis. About 80% of the sentences were correctly recognized, for a language having an average branching factor of 10. In the AESOP 1 system, sentence recognition is 90%,(95% on words) for the same language. Apart from this improvement, the system has been designed to be used easily for artificial languages, by adding graceful interaction to define semantic grammar (including automatic grapheme-to-phoneme translation of the vocabulary) and talker adaptation. Simultaneously, we developed a method for diphone recognition of continuous speech, using a 1089-diphone dictionary. Although the results are presently mediocre on pure phoneme recognition, its use as the acoustic level of the SUS gave good results. All those systems use top-down, left-to-right strategy, with beam-search. A bottom-up approach has also been tested for future use, having a tree-structure vocabulary; this still yields the same results.

Author

Acoustic Measurement; Speech Recognition; Algorithms; Autonomy

20060011558 Ulster Coll., Newtownabbey, UK

ANALYTIC POLE-ZERO MODELLING of SPEECH SPECTRA

Owens, F. J.; Linggard, R.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1577-1580; In English; See also 20060011369; Copyright; Avail.: Other Sources

This paper describes an analytic technique, thereby the transfer function of a pole-zero model of the speech production process may be derived from the speech signal. The process involves fitting the model to the smoothed short-time amplitude

spectrum which is derived by processing the speech signal through a hank of fourth-order, bandpass filters and cepstrally smoothing the outout. The order of the pole-zero model is defined by twice the number of spectral maxima in the derived spectrum. The fitting criteria are specified on a perceptual basis rather than the usual least-squared error, the model being constrained to fit exactly the maxima and minima of the spectral curve.
Author
Fitting; Mathematical Models; Speech Recognition; Spectrum Analysis

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OPTICS

Includes light phenomena and the theory of optical devices; for specific optical devices see also *35 Instrumentation and Photography*. For lasers see *36 Lasers and Masers*.

20060011307 Stevens Inst. of Tech., Hoboken, NJ, USA
IR Laser Based Chemical Sensor for the Cooperative Monitoring Program. June 8, 1999-January 31, 2003
Whittaker, E. A.; January 2006; 8 pp.; In English
Report No.(s): DE2006-842649; No Copyright; Avail.: Department of Energy Information Bridge
No abstract available
Infrared Lasers; Lasers; Quantum Cascade Lasers; Remote Sensing

20060011437 Minnesota Univ., Minneapolis, MN, USA
TOMOGRAPHIC IMAGING VIA WAVE EQUATION INVERSION
Kaveh, M.; Soumekh, M.; Mueller, R. K.; International Conference on Acoustics, Speech and Signal Processing (ICASSP '82); Volume 3; [1982], pp. 1553-1556; In English; See also 20060011369
Contract(s)/Grant(s): NSF ENG-76-84521; NSF ECS-79-26008; Copyright; Avail.: Other Sources
Methods that include diffraction effects are discussed for the tomographic reconstruction of the complex index of refraction within a softscattering object. The methods are Fourier-domain based and are therefore computationally efficient. An important signal-processing issue is shown to be the determination of the unwrapped phase of the sensed fields. The theoretical presentation is followed by examples of experimental results.
Author
Imaging Techniques; Inversions; Tomography; Wave Equations

20060012138 NASA Langley Research Center, Hampton, VA, USA
Real-time Enhancement, Registration, and Fusion for a Multi-Sensor Enhanced Vision System
Hines, Glenn D.; Rahman, Zia-ur; Jobson, Daniel J.; Woodell, Glenn A.; January 2006; 8 pp.; In English; SPIE Defense and Security Symposium 2006, 17-21 Apr. 2006, Orlando, FL, USA; Original contains color and black and white illustrations
Contract(s)/Grant(s): NCC1-01030; NNL04AA02A; 23-079-60-30
Report No.(s): SPIE Paper 6226-9; No Copyright; Avail.: CASI: A02, Hardcopy
Over the last few years NASA Langley Research Center (LaRC) has been developing an Enhanced Vision System (EVS) to aid pilots while flying in poor visibility conditions. The EVS captures imagery using two infrared video cameras. The cameras are placed in an enclosure that is mounted and flown forward-looking underneath the NASA LaRC ARIES 757 aircraft. The data streams from the cameras are processed in real-time and displayed on monitors on-board the aircraft. With proper processing the camera system can provide better-than- human-observed imagery particularly during poor visibility conditions. However, to obtain this goal requires several different stages of processing including enhancement, registration, and fusion, and specialized processing hardware for real-time performance. We are using a real-time implementation of the Retinex algorithm for image enhancement, affine transformations for registration, and weighted sums to perform fusion. All of the algorithms are executed on a single TI DM642 digital signal processor (DSP) clocked at 720 MHz. The image processing components were added to the EVS system, tested, and demonstrated during flight tests in August and September of 2005. In this paper we briefly discuss the EVS image processing hardware and algorithms. We then discuss implementation issues and show examples of the results obtained during flight tests. Keywords: enhanced vision system, image enhancement, retinex, digital signal processing, sensor fusion
Author
Enhanced Vision; Image Processing; Real Time Operation; Signal Analyzers; Multisensor Applications; Digital Systems; Image Enhancement; Visibility

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PLASMA PHYSICS

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

20060011296 Princeton Univ., NJ USA
Measurement of Turbulence Decorrelation during Transport Barrier Evolution in a High Temperature Fusion Plasma
Nazikian, R.; Shinohara, K.; Kramer, G. J.; Valeo, E.; Hill, K.; May 2005; 28 pp.; In English
Report No.(s): DE2005-840434; PPPL-4074; No Copyright; Avail.: National Technical Information Service (NTIS)

A low power polychromatic beam of microwaves is used to diagnose the behavior of turbulent fluctuations in the core of the JT-60U tokamak during the evolution of the internal transport barrier. A continuous reduction in the size of turbulent structures is observed concomitant with the reduction of the density scale length during the evolution of the internal transport barrier. The density correlation length decreases to the order of the ion gyroradius, in contrast to the much longer scale lengths observed earlier in the discharge, while the density fluctuation level remain similar to the level before transport barrier formation.
NTIS
High Temperature Plasmas; Tokamak Devices; Turbulence

20060011318 Naval Research Lab., Washington, DC, USA, Lawrence Livermore National Lab., Livermore, CA USA, National Inst. of Standards and Technology, Gaithersburg, MD USA, Sachs/Freeman Associates, Inc., Landover, MD, USA
Krypton K-Shell X-Ray Spectra Recorded by the HENEX Spectrometer
Seely, J. F.; Back, C. A.; Constantin, C.; Lee, R. W.; Chung, H. K.; Jan. 04, 2005; 28 pp.; In English
Report No.(s): DE2006-841129; No Copyright; Avail.: Department of Energy Information Bridge

High resolution x-ray spectra were recorded by the High Energy Electronic X-Ray (HENEX) spectrometer from a variety of targets irradiated by the Omega laser at the Laboratory for Laser Energetics. The HENEX spectrometer utilizes four reflection crystals covering the 1 keV to 20 keV energy range and one quartz(10-11) transmission crystal (Laure geometry) covering the 11 keV to 40 keV range. The time-integrated spectral images were recorded on five CMOS x-ray detectors. In the spectra recorded from krypton-filled gasbag and hohlraum targets, the helium-like K-shell transitions n=1-2, 1-3, and 1-4 appeared in the 13 keV to 17 keV energy range. A number of additional spectral features were observed at energies lower than the helium-like n=1-3 and n=1-4 transitions. Based on computational simulations of the spectra using the FLYCHK/FLYSPEC codes, which included opacity effects, these additional features are identified to be inner-shell transitions from the Li-like through N-like krypton charge states. The comparisons of the calculated and observed spectra indicate that these transitions are characteristic of the plasma conditions immediately after the laser pulse when the krypton density is 2x1018 cm-3 and the electron temperature is in the range 2.8 keV to 3.2 keV. These spectral features represent a new diagnostic for the charge state distribution, the density and electron temperature, and the plasma opacity. Laboratory experiments indicate that it is feasible to record K-shell spectra from gold and higher Z targets in the \g 60 keV energy range using a Ge(220) transmission crystal.
NTIS
Krypton; Spectrometers; X Ray Spectra

20060011644 Rensselaer Polytechnic Inst., Troy, NY, USA
Helicon Plasma Potential Measurements Using a Heavy Ion Beam Probe (Final Report)
Schoch, P. M.; Connor, K. A.; Si, J.; January 2005; 14 pp.; In English
Report No.(s): DE2006-850281; No Copyright; Avail.: Department of Energy Information Bridge

A Heavy Ion Beam Probe, HIBP, has been installed on a helicon plasma device. The objective was to measure plasma fluctuations at the 13.55MHz RF frequency. This offers a unique challenge for the HIBP, because the transit time of the probing ion is long compared to the fluctuations of interest. For previous HIBPs, the transit time has been short compared to the period of the fluctuations which permits one to assume that the magnetic and electric fields are static. Modeling has shown that the diagnostic will still accurately measure the average potential. The fluctuating potential was to be detected but the absolute magnitude is difficult to determine with signal from a single point. However, modeling indicates multipoint measurements will allow one to resolve the absolute fluctuation magnitude.
NTIS
High Frequencies; Ion Beams; Plasma Potentials; Plasmas (Physics)

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SOLID-STATE PHYSICS

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

20060011221 Brookhaven National Lab., Upton, NY USA
Scaling of the Superfluid Density in High-Temperature Superconductors
Homes, C. C.; January 2005; 26 pp.; In English
Report No.(s): DE2005-861325; BNL-75159-2005-CP; No Copyright; Avail.: Department of Energy Information Bridge
No abstract available
High Temperature Superconductors; Superconductors (Materials); Superfluidity

20060011293 Brookhaven National Lab., Upton, NY USA, European Organization for Nuclear Research, Geneva, Switzerland, California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA
Design of a Non-Scaling FFAG Accelerator for Proton Therapy
Trbojvic, D.; Ruggiero, A. G.; Keith, E.; Neskovic, N.; January 2005; 18 pp.; In English
Report No.(s): DE2005-840458; No Copyright; Avail.: National Technical Information Service (NTIS)
In recent years there has been a revival of interest in Fixed Field Alternating Gradient (FFAG) accelerators.1 In Japan a number have been built, or are under construction. A new non-scaling approach to the FFAG reduces the required orbit offsets during acceleration and the size of the required aperture, while maintaining the advantage of the low cost magnets associated with fixed fields. An advantage of the non-scaling FFAG accelerator, with respect to synchrotrons, is the fixed field and hence the possibility of high current and high repetition rate for spot scanning. There are possible advantages of the nonscaling design with respect to fixed-field cyclotrons. The non-scaling FFAG allows strong focusing and hence smaller aperture requirements compared to scaling designs, thus leading to very low losses and better control over the beam. We present, here, a non-scaling FFAG designed to be used for proton therapy.
NTIS
Carbon; Particle Accelerators; Protons; Therapy

20060011304 Rochester Univ., NY, USA
Flux Flow, Pinning, Resistive Behavior in Superconducting Networks
January 2005; 16 pp.; In English
Report No.(s): DE2005-839348; No Copyright; Avail.: Department of Energy Information Bridge
Numerical simulators are used to study the behavior of interacting quantized vortices and vortex lines in superconducting networks, films, and three dimensional bulk samples. An emphasis is on the explanation of the phenomenological behavior of the 'high-Tc' copper-oxide superconductors and related model systems.
NTIS
Flux Pinning; High Temperature Superconductors; Superconductivity

20060011310 Department of Energy, Washington, DC USA
2nd American Conference on Neutron Scattering
January 2005; 12 pp.; In English
Report No.(s): DE2005-838634; No Copyright; Avail.: Department of Energy Information Bridge
The Neutron Scattering Society of America (NSSA) held its second American Conference on Neutron Scattering (ACNS) on June 6-10, 2004 at the Conference Center on the University of Maryland campus. The attendance at the ACNS conference included 128 students and 345 other scientists, not including organizers. The conference was designed to be interdisciplinary within the neutron scattering community. It received assistance from the National Science Foundation, the Department of Energy, the various neutron scattering centers in the USA, and the Canadian Institute for Neutron Scattering/NRC. There were 35 oral, both invited and contributed, and poster sessions. These covered a wide range of fields, including soft and hard condensed matter, liquids, biology, magnetism, engineering materials, chemical spectroscopy, crystal structure, fundamental physics, and developments in neutron instrumentation.
NTIS
Conferences; Neutron Diffraction; Neutron Scattering

20060011311 Michigan State Univ., East Lansing, MI, USA
Final Report on Radiation Resistant Manets II
Zeller, A. F.; January 2006; 12 pp.; In English
Report No.(s): DE2006-841880; No Copyright; Avail.: National Technical Information Service (NTIS)

The development of magnet designs capable of reasonable life times in high-radiation environments and having reasonable performance is of paramount importance for RIA as well as other high-intensity projects under consideration, such as the Neutrino Factory and FAIR project at GSI. Several approaches were evaluated for radiation resistant superconducting magnets. One approach was to simply use a more radiation resistant epoxy for the coil fabrication. Another approach for cryostable magnets, like the S800 Spectrograph dipole, is the use of all-inorganic materials. The final approach was the development of radiation resistant Cable-In-Conduit-Conductor (CICC) like that used in fusion magnets; though these are not radiation resistant because an organic insulator is used. Simulations have shown that the nuclear radiation heating of the first quadrupoles in the RIA Fragment Separator will be so large that cold mass minimization will be necessary with the magnet iron being at room temperature.
NTIS
Radiation Tolerance; Superconducting Magnets; Radiant Heating

20060011613 National Renewable Energy Lab., Golden, CO USA
III-V/Silicon Lattice-Matched Tandem Solar Cells
Geisz, J.; Olson, J.; Friedman, D.; Kurtz, S.; Jan. 2005; 10 pp.; In English
Report No.(s): DE2006-860500; NREL/CP-36991; No Copyright; Avail.: Department of Energy Information Bridge

A two-junction device consisting of a 1.7-eV GaNPAs junction on a 1.1-eV silicon junction has the theoretical potential to achieve nearly optimal efficiency for a two-junction tandem cell. We have demonstrated a monolithic III-V-on-silicon tandem solar cell in which most of the III-V layers are nearly lattice-matched to the silicon substrate. The cell includes a GaNPAs top cell, a GaP-based tunnel junction (TJ), and a diffused silicon junction formed during the epitaxial growth of GaNP on the silicon substrate. To accomplish this, we have developed techniques for the growth of high crystalline quality lattice-matched GaNPAs on silicon by metal-organic vapor-phase epitaxy.
NTIS
Photovoltaic Conversion; Silicon; Solar Cells

20060011643 Bechtel Nevada Corp., Las Vegas, NV, USA
Emplacement Gantry GAP Analysis Study
May 2005; 62 pp.; In English
Report No.(s): DE2006-850425; No Copyright; Avail.: Department of Energy Information Bridge

To date, the project has established important to safety (ITS) performance requirements for structures, systems, and components (SSCs) based on the identification and categorization of event sequences that may result in a radiological release. These performance requirements are defined within the 'Nuclear Safety Design Bases for License Application' (NSDB). Further, SSCs credited with performing safety functions are classified as ITS. In turn, assurance that these SSCs will perform as required is sought through the use of consensus codes and standards. This gap analysis is based on the design completed for license application only. Accordingly, identification of ITS SSCs beyond those defined within the NSDB are based on designs that may be subject to further development during detail design. Furthermore, several design alternatives may still be under consideration to satisfy certain safety functions, and final selection will not be determined until further design development has occurred. Therefore, for completeness, alternative designs currently under consideration will be discussed throughout this study. This gap analysis will evaluate each code and standard identified within the 'Emplacement Gantry ITS Standards Identification Study' (BSC 2005 (DIRS 173586)) to ensure each ITS performance requirement is fully satisfied. When a performance requirement is not fully satisfied, a gap is highlighted. This study will identify requirements to supplement or augment the code or standard to meet performance requirements.
NTIS
Gantry Cranes; Superconducting Super Collider

20060012075 Academia Sinica, Taipei, Taiwan, Province of China, Argonne National Lab., IL USA, Istituto Nazionale di Fisica Nucleare, Bologna, Italy, Brandeis Univ., Waltham, MA, USA
Measurement of Partial Widths and Search for Direct CP Violation in D (sup O) Meson Decays K(sup -)K(sup +) and pi(sup -)pi(sup +)
Acosta, D.; Affolder, T.; Akomoto, T.; Albrow, M. G.; Ambrose, D.; Apr. 04, 2005; 12 pp.; In English
Report No.(s): DE2005-841338; No Copyright; Avail.: Department of Energy Information Bridge

We present a measurement of relative partial widths and decay rate CP asymmetries in K(sup -)K(sup +) and (pi)(sup -)(pi)(sup +) decays of D(sup 0) mesons produced in p(bar p) collisions at (radical)s = 1.96TeV. We use a sample of 2 x 10(sup 5) D*(sup +) (yields) D(sup 0)(pi)(sup +) (and charge conjugate) decays with the D(sup 0) decaying to K(sup -)(pi)(sup +), K(sup -)K(sup +), and (pi)(sup -)(pi)(sup +), corresponding to 123 pb(sup -1) of data collected by the Collider Detector at Fermilab II experiment at the Fermilab Tevatron collider. No significant direct CP violation is observed. We measure (Lambda)(D(sup 0) (yields) K(sup -)K(sup +))/(Lambda)(D(sup 0) (yields) K(sup -)(pi)(sup +)) = 0.0992 (+-) 0.0011 (+-) 0.0012, (Lambda)(D(sup 0) (yields) (pi)(sup -)(pi)(sup +))/(Lambda)(D(sup 0) (yields) K(sup -)(pi)(sup +)) = 0.03594 (+-) 0.00054 (+-) 0.00040, A(sub CP) (K(sup -)K(sup +)) = (2.0 (+-) 1.2 (+-) 0.6)%, and A(sub CP) ((pi)(sup -)(pi)(sup +)) = (1.0 (+-) 1.3 (+-) 0.6) %, where, in all cases, the first uncertainty is statistical and the second is systematic.
NTIS
CP Violation; Mesons; Particle Decay

20060012076 California Univ., Lawrence Berkeley National Lab., Berkeley, CA, USA, Academia Sinica, Taipei, Taiwan, Province of China, Argonne National Lab., IL USA, Bologna Univ., Italy
Measurement of the Itoa (overbar iota) Production Cross Section in rho (overbar rho) Collisions at Square Root of s=1.96 TeV using Lepton + Jets Events with Secondary Vertex b-Tagging
Acosta, D.; Adelman, J.; Affolder, T.; Akimoto, T.; Albrow, M. G.; January 2005; 32 pp.; In English
Report No.(s): DE2005-841337; No Copyright; Avail.: Department of Energy Information Bridge

We present a measurement of the t(bar t)production cross section using events with one charged lepton and jets from p(bar p)collisions at a center-of-mass energy of 1.96TeV. In these events, heavy flavor quarks from top quark decay are identified with a secondary vertex tagging algorithm. From 162 pb(sup -1)of data collected by the Collider Detector at Fermilab, a total of 48 candidate events are selected, where 13.5 (+-)1.8 events are expected from background contributions. We measure a t(bar t)production cross section of 5.6(sub -1.1)(sup -1.2)(stat.)(sub -0.6)(sup +0.9)(syst.)pb.
NTIS
Collisions; Marking; Pair Production; Cross Sections

82
DOCUMENTATION AND INFORMATION SCIENCE

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

20060011214 NASA Ames Research Center, Moffett Field, CA, USA
Expedition Memory: Towards Agent-based Web Services for Creating and Using Mars Exploration Data.
Clancey, William J.; Sierhuis, Maarten; Briggs, Geoff; Sims, Mike; [2005]; 4 pp.; In English; 2nd Mars Expedition Planning Workshop 2005, 6-7 Aug. 2005, Vancouver, Canada; Original contains black and white illustrations; No Copyright; Avail.: CASI: A01, Hardcopy

Explorers ranging over kilometers of rugged, sometimes ‘feature-less’ terrain for over a year could be overwhelmed by tracking and sharing what they have done and learned. An automated system based on the existing Mobile Agents design [I] and Mars Exploration Rover experience [2], could serve as an ‘expedition memory’ that would be indexed by voice as wel1 as a web interface, linking people, places, activities, records (voice notes, photographs, samples). and a descriptive scientific ontology. This database would be accessible during EVAs by astronauts, annotated by the remote science team, linked to EVA plans, and allow cross indexing between sites and expeditions. We consider the basic problem, our philosophical approach, technical methods, and uses of the expedition memory for facilitating long-term collaboration between Mars crews and Earth support teams. We emphasize that a ‘memory’ does not mean a database per se, but an interactive service that combines different resources, and ultimately could be like a helpful librarian.
Derived from text
Mars Exploration; Data Bases; Expeditions; Terrain; Rangefinding; Extravehicular Activity; World Wide Web

20060011244 Geological Survey, Washington, DC, USA
Chromite Deposits in Central Part Stillwater Complex, Sweet Grass County, Montana: A Digital Database for the Geologic Map of the East Slope of Iron Mountain
Howland, A. L.; Moyer, L. A.; January 2001; 30 pp.; In English
Report No.(s): PB2006-105383; USGS/OFR-01-321; No Copyright; Avail.: National Technical Information Service (NTIS)

This digital geospatial database is one of many being created by the U.S. Geological Survey as an ongoing effort to provide geologic information in a geographic information system (GIS) for use in spatial analysis. The map area is located in the central part of the Stillwater complex of south central Montana. This report lists the geologic map units, the methods used to convert the geologic map data into a digital format, the ArcInfo GIS file structures and relationships, and explains how to download the digital files from the U.S. Geological Survey public access World Wide Web site on the Internet.
NTIS
Data Bases; Digital Data; Geographic Information Systems; Geological Surveys; Geology; Grasses; Iron; Maps; Mountains; Slopes

20060011290 Lawrence Livermore National Lab., Livermore, CA USA
Character and Effective Leadership of the Knowledge Worker
Khoury, A. E.; May 03, 2005; 162 pp.; In English
Report No.(s): DE2005-15016252; UCRL-TH-211921; No Copyright; Avail.: Department of Energy Information Bridge
The purpose of the study was twofold. The first purpose was to explore the proposed relationship between effective leadership and the two character dimensions - leadership credibility and self-efficacy - within an organization comprised primarily of knowledge workers. Little has been done to measure the relationship between leadership character dimensions and leadership effectiveness, particularly on the self-efficacy dimension. The second purpose of this study was to propose a development model that applies the studys findings to leadership development. To apply the findings of this study to leadership behaviors and actions, leader-managers need an explicit development and performance feedback path for improvement. Current leadership development programs often do not provide an explicit framework for developing the character dimensions needed by leader-managers for leadership success within their organizations.
NTIS
Leadership; Personnel Development; Management Methods

20060011608 National Inst. of Standards and Technology, Gaithersburg, MD USA
Overview of TREC-2001 (10th). Held in Gaithersburg, Maryland on November 13-16, 2001
Voorhees, E. M.; Harman, D.; January 2001; 20 pp.; In English; Overview of TREC-2001 (10th), November 13 - 16, 2001, Gaithersburg, Maryland
Report No.(s): PB2002-105123; No Copyright; Avail.: CASI: A03, Hardcopy
The Text REtrieval Conference (TREC), co-sponsored by the National Institute of Standards and Technology (NIST) and U.S. Department of Defense, was started in 1992 as part of the TIPSTER Text program. Its purpose was to support research within the information retrieval community by providing the infrastructure necessary for large-scale evaluation of text retrieval methodologies. In particular, the TREC workshop series has the following goals: to encourage research in information retrieval based on large test collections; to increase communication among industry, academia, and government by creating an open forum for the exchange of research ideas; to speed the transfer of technology from research labs into commercial products by demonstrating substantial improvements in retrieval methodologies on real-world problems; and to increase the availability of appropriate evaluation techniques for use by industry and academia, including development of new evaluation techniques more applicable to current systems.
NTIS
Data Processing; Information Retrieval; Texts

20060011648 Federal Transit Administration, Washington, DC USA
Washington State Ferries Wireless Connection Project Evaluation Report
Benoit, J. H.; Combs, C. A.; Gregory, D. D.; May 31, 2005; 284 pp.; In English
Report No.(s): PB2006-101180; FTA-WA-26-7006-05.1; No Copyright; Avail.: National Technical Information Service (NTIS)
No abstract available
High Speed; Internets; Passengers

20060011649 Federal Transit Administration, Washington, DC USA
Washington State Ferries Wireless Connection Project Evaluation Report (on CD-ROM)
May 31, 2005; In English
Report No.(s): PB2006-500028; FTA-WA-26-7006-05.1-CD; No Copyright; Avail.: National Technical Information Service (NTIS)

This product is provided on a CD-ROM and includes a Manual. The purpose of the Wireless Connection Project was to provide passengers of the WSF system continuous high speed internet access at the dock and onboard ferries while enroute to enhance the user experience. The objective of this evaluation report was to determine if the proposed network design of the Washington State Ferries (WSF) Wireless Connection Project met these evaluation success criteria. Over the course of a 12 month period, wireless network performance evaluations were conducted on three separate ferry routes designated for the wireless pilot. Lockheed Martin Information Technology was selected to make a non-biased assessment of the proposed network design and installation completed by Mobilisa, Inc. This report details the evaluation criteria, testing procedures and results of the evaluation. A sample survey and business case analysis also was performed by Lockheed Martin Information Technology to validate the Business Case Study submitted by Mobilisa, Inc. The results are included in this report.
NTIS
CD-ROM; High Speed; Internets; Passengers

20060011651 National Inst. of Standards and Technology, Gaithersburg, MD, USA
Shop Data Model and Interface Specification
McLean, C.; Lee, Y. T.; Shao, G.; Riddick, F.; Jan. 2005; 134 pp.; In English
Report No.(s): PB2006-109109; NISTIR-7198; No Copyright; Avail.: CASI: A07, Hardcopy

The machine shop information model contains twenty major elements. Each of the major data elements discussed in this paper are italicized. The data elements are called: organizations, calendars, resources, skill-definitions, setup-definitions, operation-definitions, maintenance-definitions, layout, parts, bills-of-materials, inventory, procurements, process-plans, work, schedules, revisions, time-sheets, probability-distributions, references, and units-of-measurement.
NTIS
Shops; Specifications; Interfaces

20060012021 State Univ. of New York, Buffalo, NY, USA
Looking Beyond the Borders: A Project Director's Handbook of Best Practices for International Research Experiences for Undergraduates
Loretz, C. A.; January 2002; 106 pp.; In English
Report No.(s): PB2006-108378; No Copyright; Avail.: CASI: A06, Hardcopy

Scientific and technological research and education are increasingly global in nature, and other countries are increasing their investments in these areas (National Science Board, Science and Engineering Indicators-2000). It is critically important to nation's science and technology (S&T) enterprise that U.S. scientists and engineers, early stages in their careers, develop the international experience and capabilities to support and participate in these activities. This sentiment resonates, most recently, in an interim report from the National Science Board on the NSF role in international science engineering, especially in broadening opportunities for students and young researchers (National Science Board, Toward a More Effective NSF Role in International Science and Engineering-Interim Report). Beyond the opportunities presented by new global communication technologies, efforts to engage future generations of U.S. scientists and engineers in gaining first-hand professional experience beyond this nation's borders are essential, and should continue. Addition of an international dimension to successful, established models for undergraduate science and engineering education could have an immediate and positive impact on educational quality in the global scientific context.
NTIS
Developing Nations; Handbooks; Information Systems; Procedures

20060012023 Marshall Univ., Huntington, WV, USA
Development of Transportation and Economic Development Information Systems (TEDIS) Delivered Over the Internet for WV
Litteral, S.; Hicks, M.; May 2003; 28 pp.; In English
Contract(s)/Grant(s): DTRS-98G-0012
Report No.(s): PB2006-108337; TTP-00-11; No Copyright; Avail.: National Technical Information Service (NTIS)

The WV Department of Transportation is currently pursuing the integration of GIS technology across the agency including web delivered capabilities and functionality. This project will develop a prototype system that will store and disseminate transportation and economic development information for the entire state of West Virginia through a website that offers GIS capabilities (TEDIS-WV). This system will utilize satellite and aerial imagery as background for overlays of

transportation and economic development data including capabilities for queries by users with little or no GIS training or expertise.
NTIS
Economic Development; Geographic Information Systems; Information Systems; Internets; Transportation; Websites

20060012024 SEARCH Group, Inc., Sacramento, CA, USA
Survey of State Criminal History Information Systems, 2003. Criminal Justice Information Policy
Feb. 2006; 72 pp.; In English
Report No.(s): PB2006-108320; NCJ-210297; No Copyright; Avail.: CASI: A04, Hardcopy

This report is based upon the results from a survey conducted of the administrators of the State criminal history record repositories in May-December 2004. Fifty-three jurisdictions were surveyed, including the 50 States, the District of Columbia, the Commonwealth of Puerto Rico, and the U.S. Virgin Islands. Responses were received from all 53 jurisdictions. Throughout this report, the 50 States will be referred to as States; the District of Columbia, Puerto Rico, and the Virgin Islands will be referred to as territories, consistent with prior surveys; Nation refers collectively to both the States and territories.
NTIS
Information Systems; Policies; Records Management; Surveys

20060012041 Westat Research, Inc., Rockville, MD, USA
User-Friendly Handbook for Project Evaluation, 2002
Frechtling, J.; Frierson, H.; Hood, S.; Hughes, G.; Jan. 2002; 96 pp.; In English
Contract(s)/Grant(s): RED-99-12175
Report No.(s): PB2006-108369; No Copyright; Avail.: CASI: A05, Hardcopy

This Handbook was developed to provide managers working with the National Science Foundation (NSF) with a basic guide for the evaluation of NSF's educational programs. It is aimed at people who need to learn more about both what evaluation can do and how to do an evaluation, rather than those who already have a solid base of experience in the field. It builds on firmly established principles, blending technical knowledge and common sense to meet the special needs of NSF and its stakeholders.
NTIS
Education; Handbooks

20060012131 NASA Johnson Space Center, Houston, TX, USA
Knowledge Representation Standards and Interchange Formats for Causal Graphs
Throop, David R.; Malin, Jane T.; Fleming, Land; [2005]; 9 pp.; In English; 2005 IEEE Aerospace Conference, 5-12 Mar. 2005, Big Sky, MT, USA; Original contains color and black and white illustrations
Report No.(s): IEEEAC Paper 1528; Copyright; Avail.: CASI: A02, Hardcopy

In many domains, automated reasoning tools must represent graphs of causally linked events. These include fault-tree analysis, probabilistic risk assessment (PRA), planning, procedures, medical reasoning about disease progression, and functional architectures. Each of these fields has its own requirements for the representation of causation, events, actors and conditions. The representations include ontologies of function and cause, data dictionaries for causal dependency, failure and hazard, and interchange formats between some existing tools. In none of the domains has a generally accepted interchange format emerged. The paper makes progress towards interoperability across the wide range of causal analysis methodologies. We survey existing practice and emerging interchange formats in each of these fields. Setting forth a set of terms and concepts that are broadly shared across the domains, we examine the several ways in which current practice represents them. Some phenomena are difficult to represent or to analyze in several domains. These include mode transitions, reachability analysis, positive and negative feedback loops, conditions correlated but not causally linked and bimodal probability distributions. We work through examples and contrast the differing methods for addressing them. We detail recent work in knowledge interchange formats for causal trees in aerospace analysis applications in early design, safety and reliability. Several examples are discussed, with a particular focus on reachability analysis and mode transitions. We generalize the aerospace analysis work across the several other domains. We also recommend features and capabilities for the next generation of causal knowledge representation standards.
Author
Graphs (Charts); Probability Distribution Functions; Knowledge Representation; Risk; Fault Trees

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TECHNOLOGY UTILIZATION AND SURFACE TRANSPORTATION

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

20060011559 Research and Technology Organization, Neuilly-sur-Seine, France
Nanotechnology Aerospace Applications
December 2005; In English; Nanotechnology Aerospace Applications, 9-10 May 2005, Monterey, CA, USA; See also 20060011560 - 20060011569; Original contains color illustrations
Report No.(s): RTO-EN-AVT-129; AC/323(AVT-129)TP/91; Copyright; Avail.: CASI: C01, CD-ROM

Nanotechnology, which deals with the creation of materials, devices and systems in the nanometer scale (1-100 nm) through manipulating matter at that scale and exploiting novel properties arising because of the nanoscale, will have an impact on numerous commercial, defense, and space applications. The lectures provide a general introduction into nanotechnologies with selected topics, including nanotechnology fabrication, characterization, applications, and commercialisation. In the introductory lecture nanotechnology is defined, particularly describing what it is and what it is not, followed by detailed examples of change in various properties seen by going from bulk to nanoscale. The effect of nanoscale on physical properties, bandgap, etc. is illustrated. Examples of novel nano-materials such as nanotubes, nanowires, nanoparticles, etc. are introduced. The fabrication is classified into: top down nanotechnology utilizing high-end lithography and similar technologies, bottom up technologies building up the products at the atom level, and nanoparticle and nanotube production. An additional classification is discussed on the basis of the enabling properties derived from the final products and novel properties not found in bulk or micro sized particles. The characterization lecture focuses on the techniques currently in use or being developed for measuring nanoparticles and nanotechnology-based products from all aspects, including geometries, forms, conformity, as well as functional characteristics such as absorption, charge or porosity. The lecture also aims to address the systems-response based measurements of such materials and novel nano-composites. The discussions on nanotechnology applications include applications to lifestyle, general defence, and aerospace. Lifestyle applications include new textiles, cosmetics, surfaces, and bio/pharmaceutical devices, with examples such as stain repellent and wrinkle-resistant textiles, high-performance ski wax, deep penetrating skin care, high performing sun-glasses, smart motorcycle visors, nano-socks, nanocrystalline sunscreen, and high-tech tennis rackets and tennis balls. For defence, nanotechnologies will enable new and enhanced capabilities, novel and improved platforms, and medical and biomedical advances. Examples are wearable wireless power and communication, advanced personal health care, improved camouflage and protection, smart materials, harder/lighter platforms, new fuel sources and storage, as well as novel medical applications. Examples of specific aerospace applications include high strength and low weight composites, improved electronics and displays with low power consumption, variety of physical sensors, multifunctional materials with embedded sensors, and other examples of what the aerospace industry can expect from the field of nanotechnology. Also, potential applications to energetics (for example novel solid propellants) and power generation (for example batteries and fuel cells) are discussed. Furthermore MEMS/nanotechnology integration is addressed as a potential to improve MEMS sensors through nanotechnology and to build bio/nano sensors using MEMS technology. Finally, a forecast of short term to long term prospects for potential applications is discussed, including the challenges currently being faced to commercialize nanotechnology and the efforts across the world.
Derived from text
Nanotechnology; Aerospace Engineering; Microelectromechanical Systems; Technology Utilization; Energy Consumption; Fabrication; Nanostructure Growth; Nanotubes; Textiles; Space Commercialization

20060011561 Schadow (Klaus), San Clemente, CA, USA
MEMS / Nanotechnology Integration
Schadow, Klaus; Nanotechnology Aerospace Applications; December 2005, pp. 8-1 - 8-2; In English; See also 20060011559; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

A new generation of sensors is emerging based on the combination/integration of MEMS and nanotechnology. New capabilities include higher sensitivity, lighter weight, and lower power consumption. After a brief introduction into micromachining, the lecture will discuss three examples of micro/nano level gas sensors.
Author (revised)
Microelectromechanical Systems; Nanotechnology; Systems Integration

20060011563 MM Associates, Moffett Field, CA, USA

Introduction to Nanotechnology

Meyyappan, Meyya; Nanotechnology Aerospace Applications; December 2005, pp. 1-1; In English; See also 20060011559; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Nanotechnology deals with creation of materials, devices and systems in the nanometer scale (1-100 nm) through manipulating matter at that scale and exploiting novel properties arising because of the nanoscale. This lecture will first define nanotechnology, particularly describing what it is and what it is not, followed by detailed examples of change in various properties seen by going from bulk to nanoscale. The effect of nanoscale on physical properties, bandgap, etc. will be illustrated. Examples of novel nanomaterials such as nanotubes, nanowires, nanoparticles, etc. will be introduced. Also, the tools used in nanotechnology research such as the scanning probe microscopes, scanning tunneling microscopes etc. will be mentioned and a summary of top-down and bottom-up processes needed in manufacturing will be presented as an introduction to the more detailed coverage later. Finally, a broad overview of the potential of nanotechnology on a sector-by-sector basis will be given to set the stage for the subsequent lectures in this NATO series. Nanotechnology deals with creation of materials, devices and systems through manipulation of matter at the nanometer length scale. The object created itself does not have to be nanoscale, but can be micro or macro size. What is critical is the ability to exploit the novel properties that arise because of nanometer length scale. Indeed when we go down from bulk to nanoscale, physical, chemical, mechanical, electrical, optical, magnetic and other properties change. The field is about making use of such changes and developing novel products and processes which have not been possible until now. The advent of scanning tunneling microscope and atomic force microscope in the 1980s has essentially ushered in the nano era. With these powerful tools, scientists were able to see nature at the atomic level. Simultaneously, with increased computing power available, modeling and simulation enabled an understanding of properties at the nanoscale. This powerful combination of atomic scale characterization and detailed modeling has led to the explosion we see today in nanoscale science and technology research. Nanoscale materials have a large surface area for a given volume. The surface properties dominate compared to bulk properties. Quantum phenomena becomes critical at reduced length scales. In most cases, the change in behavior is not a simple extrapolation of bulk behavior as we know. In materials where strong chemical bonding is present, delocation of valence electrons can be extensive. The extent of delocalization can vary with the size of the system. Structure also changes with the size. These two changes can lead to different physical and chemical properties depending on size, for example, magnetic, optical properties, melting point, specific heat, surface reactivity, bandgap, etc. Nanomaterials currently under investigation include nanoparticles, nanotubes, nanowires, powders, quantum dots, nanoporous materials, dendrimers, nanofibers, fullerenes, etc. Examples of each of these will be discussed in the presentation. The application range for these materials is very broad from electronics, sensors, electromechanical systems to composites, coatings and lubricants.

Author

Nanoparticles; Nanotechnology; Nanotubes; Energy Gaps (Solid State); Chemical Properties; Electromechanics; Nanowires; Surface Properties

20060011568 Schadow (Klaus), San Clemente, CA, USA

Energetics and Power Generation

Schadow, Klaus; Nanotechnology Aerospace Applications; December 2005, pp. 7-1 - 7-2; In English; See also 20060011559; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Materials that are produced on the nanoscale have the promise for increased performance for energetics (such as propellants & explosives) and power generation devices (such as batteries & fuel cells). This lecture provides selected examples based on recent publications by the US Army (Ref. 1 and 2) and the US Navy (Ref. 3 and 4). For energetics the focus is on solid propellants, where utilization of nanomaterials promises increased energy density, controlled energy release, reduced sensitivity, reduced environmental impact, and long-term stability. In the near-term novel propellants with nanoscale material will be used to reduce particle size dispersion (greater uniformity), reduce agglomeration of aluminum (increased combustion efficiency), and increase reaction rates (increased burning rates). In the long-term radical new propellant approaches will be explored to utilize 3-dimensional nanostructures that might yield controllable energy release and tailorable sensitivity. Recent experiments have shown that the ignition sensitivity and burning rate of nano-aluminum particles can be significantly higher than micron-aluminum particles. This resulted in increased burning rates and improved combustion efficiency for conventional composite propellants. It was observed that the nanometer-sized aluminum powder significantly reduced aluminum agglomeration. The low agglomeration rate may be the result of a thin aluminum oxide layer on the aluminum particles as observed on transmission electron microscope images. New efforts are directed towards coated

nanometer-sized metal powder, which may yield controlled oxidation and improved storage lifetime. Encapsulation of aluminum particles in an oxidizer matrix has been successfully demonstrated as an example for the creation of a novel nanostructure using aerosol and sol-gel chemistry. The reactivity of the encapsulated aluminum increased by a factor of 10, when the structures were ordered through bipolar coagulation as compared to random structures with Brownian coagulation. Future goals are 3-dimensional nano-energetics with a high degree of structure and order for controlled reactivity and improved manufacturability. For batteries nanostructured materials are being explored to increase electrical capacity of the electrodes and to increase ion conductivity and long-term stability of the electrolytes. For lithium batteries anodes, templated nanostructures are being explored to fabricate nanoscale materials having the specific sizes and dimension needed for optimum performance. One example is an anode consisting of 110-nm-diamter SnO2 nanofibers reduced to a Sn based nanocomposite to increase number of discharge cycles, improve discharge rates, and reduce capacity losses.
Author
Explosives; Nanotechnology; Solid Propellants; Nanocomposites

20060011569 MM Associates, Moffett Field, CA, USA
Commercialization of Nanotechnology
Meyyappan, Meyya; Nanotechnology Aerospace Applications; December 2005, pp. 9-1 - 9-2; In English; See also 20060011559; Original contains color and black and white illustrations; Copyright; Avail.: CASI: A03, Hardcopy; Available from CASI on CD-ROM only as part of the entire parent document

Nanotechnology is an enabling technology and as such, will have an impact on electronics, computing, data storage, communications, materials and manufacturing, energy, environment, transportation, health and medicine, national security and space exploration. This lecture will cite examples in each of these sectors and present a forecast of short term (less than 5 years), medium term (10 years) and long term (greater than 15 years) prospects. In addition, the challenges currently being faced to commercialize nanotechnology will be discussed in detail. A summary outlining efforts across the world in terms of commercialization, startup activities, participation of major multinational corporations, government funding etc. will be presented. It is important to recognize that nanotechnology is not any one technology or a one-sector technology. Its reach is extremely broad: electronics, computing, data storage, communications, aerospace, materials, manufacturing, health, medicine, energy, environment, transportation and national defense. In that sense, it is an enabling technology. In the electronics and computing, we can expect processors with million times better performance than the state-of-the-art with less power consumption, multi-terabit storage in small mass devices, and quantum computing from advances in nanotechnology. Also, it is possible to envision integration of logic, memory and sensing on the same chip. In the nearer term, one major area to benefit from nanotechnology is field emission devices for large area flat panel devices. In the materials sector, the major focus is on high strength, low weight composites enabled by nanomaterials. Other characteristics researchers are currently paying attention include multifunctionality and self-healing. Biologically-inspired materials are also receiving much attention and examples include synthetic gecko, and self-cleaning glass (inspired by the lotus flower). In health and medicine, the biggest impact can come from fast gene sequencing devices. A nanopore based technology appears to have the potential to sequence the entire human genetic makeup in less than two hours. This advance would enable individualized medicine. Other possibilities include effective drug delivery approaches, early warning sensors for serious illnesses, rejection-proof artificial ligaments, bones and other parts. In the energy sector, while the major focus is on how nanomaterials can improve the long standing efficiency problems in solar and other alternative energy sources, the most significant benefit may well be in the energy utilization. The conventional filament light bulbs, though inexpensive, are very energy inefficient. Solid state lighting in contrast is extremely energy efficient. Current efforts include novel materials and processes to make this technology cost-competitive.
Author (revised)
Commercialization; Nanotechnology; Technology Utilization

88
SPACE SCIENCES (GENERAL)

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

20060011196 NASA Marshall Space Flight Center, Huntsville, AL, USA
THE DEFINITION and INTERPRETATION of TERRESTRIAL ENVIRONMENT DESIGN INPUTS FOR VEHICLE DESIGN CONSIDERATIONS
Johnson, Dale L.; Keller, Vernon W.; Vaughan, William W.; October 24, 2005; 14 pp.; In English; 12th Conference on

Aviation, Range, and Aerospace Meteorology, 29 Jan. - 2 Feb. 2006, Atlanta, GA, USA; Original missing page 14; Copyright; Avail.: CASI: A03, Hardcopy

The description and interpretation of the terrestrial environment (0-90 km altitude) is an important driver of aerospace vehicle structural, control, and thermal system design. NASA is currently in the process of reviewing the meteorological information acquired over the past decade and producing an update to the 1993 Terrestrial Environment Guidelines for Aerospace Vehicle Design and Development handbook. This paper addresses the contents of this updated handbook, with special emphasis on new material being included in the areas of atmospheric thermodynamic models, wind dynamics, atmospheric composition, atmospheric electricity, cloud phenomena, atmospheric extremes, sea state, etc. In addition, the respective engineering design elements will be discussed relative to the importance and influence of terrestrial environment inputs that require consideration and interpretation for design applications. Specific lessons learned that have contributed to the advancements made in the acquisition, interpretation, application and awareness of terrestrial environment inputs for aerospace engineering applications are discussed.

Author

Aerospace Vehicles; Structural Design; Environmental Engineering; Aerospace Engineering; Control Systems Design; Atmospheric Electricity

92
SOLAR PHYSICS

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

20060011202 California Univ., Los Angeles, CA, USA

Occurrence frequencies of IMF triggered and nontriggered substorms

Hsu, Tung-Shin; McPherron, Robert L.; Journal of Geophysical Research; July 29, 2003; ISSN 0148-0227; Volume 108, No. A7; 20 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NAG5-11898; NSF ATM-98-19935; NSF ATM-99-72069; CS-31-98; Copyright; Avail.: Other Sources

The occurrence of triggered and nontriggered substorm are examined in light of current interest in such issues as substorm identification, IMF By variations, and potentially undetected small-scale solar wind perturbation. Global substorms are identified using a sudden, persistent decrease in the AL index. The onset of this global expansion is taken to be the time of the Pi 2 burst nearest in time to the beginning of the AL, decrease. IMF triggers were identified both subjectively through visual scanning of the data and automatically with a computer algorithm. Both northward turnings of the IMF Bz and decreases in the amplitude of the By component were considered as possible triggers. Two different solar wind monitors were used in the investigation: IMP-8 in a circular orbit with a distance 12 to approx.35 Re to the Earth-Sun line and ISEE-2 in an elliptical orbit with a distance only 5 to approx.10 Re to the Earth-Sun line. The IMP-8 results show that the triggering probability does not depend on the distance of the monitor from the Earth-Sun line in the range 12-35 Re. The ISEE dataset shows that closer than 12 Re the triggering probability is the same as it is in the IMP-8 data set. Thus there appears to be no dependence of triggering on the location of the monitor provided it is within 35 Re of the Earth. We also demonstrate that including the By component does not significantly increase the probability of substorm triggering. Approximately 60% of all substorms appear to be triggered. Of the 40% for which we could not identify a trigger, 10% occurred while the IMF was northward. The data suggest that substorm onset is a consequence of an internal magnetospheric instability that is highly sensitive to changes in magnetospheric convection induced by a sudden change in the IMF, but that these changes are not always necessary.

Author

Solar Wind; Magnetospheric Instability; Magnetic Storms; Convection; Perturbation

20060011203 California Univ., Los Angeles, CA, USA

Average Characteristics of Triggered and Nontriggered Substorms

Hsu, Tung-Shin; McPherron, Robert L.; Journal of Geophysical Research; July 17, 2004; ISSN 0148-0227; Volume 109; 11 pp.; In English; Original contains black and white illustrations

Contract(s)/Grant(s): NAG5-11898; NSF ATM-99-72069; Copyright; Avail.: Other Sources

Magnetic field data from ground stations, geosynchronous orbit, and magnetotail are examined to study the response to substorm activity with and without apparent interplanetary magnetic field (IMF) perturbations. Global substorms are identified using a sudden, persistent decrease in the AL index. The onset of this global expansion is taken to be the time of the Pi2 burst nearest to the beginning of the AL decrease. IMF triggers were identified subjectively through visual scanning of the data. Both

northward turnings of the IMF B, and decreases in the amplitude of the By component were considered as possible triggers. Two different solar wind monitors were used in the investigation: IMP 8 in a circular orbit with a distance between approx.12 and approx.35 R(sub E) from the Earth-Sun line and ISEE 2 in an elliptical orbit with a distance of only approx.5- 10 R(sub E) from the Earth-Sun line. The results of superposed epoch analysis show that the temporal response from ground stations, geosynchronous orbit, and magnetotail are nearly identical for triggered (with apparent IMF perturbation) and nontriggered (without apparent IMF perturbation) substorms. It is therefore concluded that the nontriggered substorms are not a different form of activity than triggered substorms. However, we demonstrate that the magnitude of the response is different for the two types of substo&. By every measure considered, triggered substorm are systematically larger than nontriggered substorms. We interpret the fact that nearly 40% of all substorms cannot be associated with an IMF trigger as evidence that substorms are caused by an internal instability. However, the fact that so many appear to be triggered suggests that this internal instability is susceptible to external perturbations by the IMF. The fact that triggered substorms are larger than nontriggered substorms is counterintuitive, and we have no explanation for the observation.
Author

Interplanetary Magnetic Fields; Magnetic Storms; Solar Wind; Perturbation

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