NASA/SP—1998–7037/SUPPL369
March 6, 1998

AERONAUTICAL ENGINEERING

A CONTINUING BIBLIOGRAPHY WITH INDEXES

National Aeronautics and
Space Administration
Langley Research Center

**Scientific and Technical
Information Program Office**

The NASA STI Program Office . . . in Profile

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- Write to:
  NASA Access Help Desk
  NASA Center for AeroSpace Information
  800 Elkridge Landing Road
  Linthicum Heights, MD 21090-2934

Introduction

This supplemental issue of *Aeronautical Engineering, A Continuing Bibliography with Indexes* (NASA/SP—1998-7037) lists reports, articles, and other documents recently announced in the NASA STI Database.

The coverage includes documents on the engineering and theoretical aspects of design, construction, evaluation, testing, operation, and performance of aircraft (including aircraft engines) and associated components, equipment, and systems. It also includes research and development in aerodynamics, aeronautics, and ground support equipment for aeronautical vehicles.

Each entry in the publication consists of a standard bibliographic citation accompanied, in most cases, by an abstract.

The NASA CASI price code table, addresses of organizations, and document availability information are included before the abstract section.

Two indexes—subject and author are included after the abstract section.

SCAN Goes Electronic!

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

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

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

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

Timely
Flexible
Complete
FREE!

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

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

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

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

Subscribe <desired list> <Your name>

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

Phone: (301) 621-0390

Fax: (301) 621-0134

Write: NASA Access Help Desk
NASA Center for AeroSpace Information
800 Elkridge Landing Road
Linthicum Heights, MD 21090-2934

Looking just for *Aerospace Medicine and Biology* reports?

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

New Feature!
subscribe SCAN-AEROMED

Table of Contents

Records are arranged in categories 1 through 19, the first nine coming from the Aeronautics division of *STAR*, followed by the remaining division titles. Selecting a category will link you to the collection of records cited in this issue pertaining to that category.

01 Aeronautics **1**

02 Aerodynamics **3**

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

03 Air Transportation and Safety **6**

Includes passenger and cargo air transport operations; and aircraft accidents.

04 Aircraft Communications and Navigation **19**

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

05 Aircraft Design, Testing and Performance **22**

Includes aircraft simulation technology.

06 Aircraft Instrumentation **N.A.**

Includes cockpit and cabin display devices; and flight instruments.

07 Aircraft Propulsion and Power **24**

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft.

08 Aircraft Stability and Control **26**

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 Research and Support Facilities (Air) **28**

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

10 Astronautics **N.A.**

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; space communications, spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

11 Chemistry and Materials **31**

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; propellants and fuels; and materials processing.

12 Engineering **34**

Includes engineering (general); communications and radar; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.

13 Geosciences **39**

Includes geosciences (general); earth resources and remote sensing; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.

14 Life Sciences **42**

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and space biology.

15 Mathematical and Computer Sciences **43**

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

16 Physics **N.A.**

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.

17 Social Sciences **44**

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law, political science, and space policy; and urban technology and transportation.

18 Space Sciences **N.A.**

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.

19 General **N.A.**

Indexes

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

Subject Term Index **ST–1**

Author Index **PA–1**

Selecting an index above will link you to that comprehensive listing.

Document Availability

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

The New NASA Video Catalog is Here

Free!

To order your copy,
call the NASA Access Help Desk at
(301) 621-0390,
fax to
(301) 621-0134,
e-mail to
help@sti.nasa.gov,
or visit the NASA STI Program
homepage at
http://www.sti.nasa.gov

(Select STI Program Bibliographic Announcements)

Explore the Universe!

Document Availability Information

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

Eligibility and Registration for NASA STI Products and Services

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

E-mail:	help@sti.nasa.gov
Fax:	301-621-0134
Phone:	301-621-0390
Mail:	ATTN: Registration Services NASA Center for AeroSpace Information 800 Elkridge Landing Road Linthicum Heights, MD 21090-2934

Limited Reproducibility

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

NASA Patents and Patent Applications

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

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

NASA patent application specifications are sold in both paper copy and microfiche by the NASA Center for AeroSpace Information (CASI). The document ID number should be used in ordering either paper copy or microfiche from CASI.

The patents and patent applications announced in the STI Database are owned by NASA and are available for royalty-free licensing. Requests for licensing terms and further information should be addressed to:

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

Sources for Documents

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Addresses of Organizations

British Library Lending Division
Boston Spa, Wetherby, Yorkshire
England

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

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

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

ESDU International
27 Corsham Street
London
N1 6UA
England

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

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

NASA Center for AeroSpace Information
800 Elkridge Landing Road
Linthicum Heights, MD 21090–2934

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

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

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

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

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

University Microfilms, Ltd.
Tylers Green
London, England

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

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

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

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

NASA CASI Price Code Table

(Effective July 1, 1996)

CASI PRICE CODE	NORTH AMERICAN PRICE	FOREIGN PRICE
A01	$ 6.50	$ 13.00
A02	10.00	20.00
A03	19.50	39.00
A04-A05	21.50	43.00
A06	25.00	50.00
A07	28.00	56.00
A08	31.00	62.00
A09	35.00	70.00
A10	38.00	76.00
A11	41.00	82.00
A12	44.00	88.00
A13	47.00	94.00
A14-A17	49.00	98.00
A18-A21	57.00	114.00
A22-A25	67.00	134.00
A99	Call For Price	Call For Price

Important Notice

The $1.50 domestic and $9.00 foreign shipping and handling fee currently being charged will remain the same. Foreign airmail is $27.00 for the first 1-3 items, $9.00 for each additional item. Additionally, a new processing fee of $2.00 per each video ordered will be assessed.

For users registered at the NASA CASI, document orders may be invoiced at the end of the month, charged against a deposit account, or paid by check or credit card. NASA CASI accepts American Express, Diners' Club, MasterCard, and VISA credit cards. There are no shipping and handling charges. To register at the NASA CASI, please request a registration form through the NASA Access Help Desk at the numbers or addresses below.

Return Policy

The NASA Center for AeroSpace Information will gladly replace or make full refund on items you have requested if we have made an error in your order, if the item is defective, or if it was received in damaged condition and you contact us within 30 days of your original request. Just contact our NASA Access Help Desk at the numbers or addresses listed below.

NASA Center for AeroSpace Information
800 Elkridge Landing Road
Linthicum Heights, MD 21090-2934

E-mail: help@sti.nasa.gov
Fax: (301) 621-0134
Phone: (301) 621-0390

Rev. 6/96

Federal Depository Library Program

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

Public Collection of NASA Documents

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

Submitting Documents

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

ATTN: Acquisitions Specialist
NASA Center for AeroSpace Information
800 Elkridge Landing Road
Linthicum Heights, MD 21090-2934.

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

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

Federal Regional Depository Libraries

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Typical Report Citation and Abstract

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

Key

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

AERONAUTICAL ENGINEERING

A Continuing Bibliography (Suppl. 369)

MARCH 6, 1998

01
AERONAUTICS

19980009836 National Aerospace Lab., Tokyo, Japan
Proceedings of the 13th NAL Symposium on Aircraft Computational Aerodynamics
1996; 232p; In Japanese; 13th; NAL Symposium on Aircraft Computational Aerodynamics, 7-9 Jun. 1995, Tokyo, Japan
Report No.(s): PB96-177456; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The proceedings of the 13th NAL Symposium on Aircraft Computational Aerodynamics is presented. The discussion include: Annotated Catalog of some CFD methodology trends for the nineties; 3D-display technology and stereoscopic effect of view; Numerical MPP simulation on compressible fluid; Applications and role of numerical simulation of hypersonic flow for the development of HOPE (H-II Orbiting Plane); Effect of grid quality on the accuracy and convergency of computations: Aerodynamic inverse optimization method for transonic wings; Study on design of helicopter blade for reduction of high-speed impulsive noise; Role of CFD in aeronautical engineering (13)-research of numerical shock front instability; Navier-Stokes simulation for a complete aircraft configuration; and Parallel computation of a tip vortex induced by an aircraft wing.
NTIS
Computational Fluid Dynamics; Numerical Flow Visualization; Turbulent Flow; Mixing Layers (Fluids); Incompressible Flow; Compressible Flow; Conferences

19980010860 Army Command and General Staff Coll., Fort Leavenworth, KS USA
Aviation Contract Maintenance and Its Effects on AH64 Unit Readiness
Evans, Samuel S., Army Command and General Staff Coll., USA; Jun. 07, 1997; 101p; In English
Report No.(s): AD-A331510; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This study investigates the use of contractors to perform aviation maintenance on U.S. Army helicopters. It traces the development of the concept of privatization and the evolution of this process to the point where, currently, many duties formerly performed by soldiers are now the responsibility of contractors. The study analyzes why privatization became necessary in aviation maintenance and analyzes the effects of privatizing AH64 helicopter maintenance using the criteria of training, cost, readiness and deployability. The study concludes that the structure, training requirements and other nonproductive maintenance tasks required of today's soldiers forces commanders to hire contractors to maintain the readiness of the aviation fleet. The study also concludes that contractors are cost effective, when their cost and maintenance production is compared to soldiers. The readiness of aircraft is directly related to the number of maintenance man hours expended and it takes multiple soldiers to equal the production of one contractor. Based on the use of contractors to perform aviation maintenance in many recent contingency deployments, the deployability of contract maintenance is not a problem. The study further concludes that the benefits of contract aviation maintenance can be enhanced if the army formally recognizes the need for contracting and standardizes the program.
DTIC
Aircraft Maintenance; Contingency; Contractors; Cost Effectiveness

19980010972 Vought Corp., Dallas, TX USA
Development of Probabilistic Design Methodology for Composite Structures ***Final Report, Jan. - Dec. 1994***
Gary, P. M., Vought Corp., USA; Riskalla, M. G., Vought Corp., USA; Aug. 1997; 94p; In English
Contract(s)/Grant(s): N00019-18-D-0248
Report No.(s): AD-A331612; DOT/FAA/AR-95/17; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This program was conducted by Vought Aircraft Company, Dallas, Texas, to perform technical studies to aid in the development of a probabilistic design methodology. The foundation of the probabilistic design approach, applied to composite structure, is to base design criteria and objectives on reliability targets instead of factors of safety. Control of the process, in terms of how much it differs from the traditional approach, is maintained by the 'Probability of Structural Failure.' The key technical issues addresssed in this contract were the overall assessment of the accuracy of the methodology, current reliability experience, definition of appropriate goals, and database development. The overall assessment of the accuracy of the methodology was done by reviewing current published documents and papers in the probabilistic design field. This review focused on similarities and differences between approaches. The database development was done by visiting airline maintenance depots and naval aviation depots to collect data on structural failures. The analyses of such data produced historical values for aircraft structural reliability. Current structural reliability issues and reliability goals were addressed by analyzing the wing box of the Lear Fan aircraft using Vought's Probabilistic Design Model. Measures of structural reliability such as single flight hour probability of failure for the whole wing box, including upper skin, lower skin, and substructure were produced.
DTIC
Aircraft Maintenance; Technologies; Composite Structures; Structural Reliability; Design Analysis; Reliability Analysis

19980011656 Naval Postgraduate School, Monterey, CA USA
Measuring Customer Satisfaction of Depot Maintenance: An Analysis of Customer Satisfaction of F/A-18 Maintenance at Naval Aviation Depot North Island, CA
Forsyth, Brian A., Naval Postgraduate School, USA; Jun. 1997; 159p; In English
Report No.(s): AD-A331743; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

The Department of Defense (DoD) spends about $15 billion annually on depot level maintenance. About 60 percent of this funding is provided to government owned and operated depots. In light of defense budget downsizing, it has become more critical than ever that depots are run in the most efficient manner possible. DoD has tried to adopt a 'best commercial practices' approach to improve efficiency of depot maintenance. A key focus of commercial practices is delivering customer satisfaction. to this extent, it is imperative that DoD depots understand and properly measure their customer's concerns if they wish to improve their performance. An adaptation of the gaps model, developed by Parasuraman, Zeithamal and Berry in 1985, was used to measure the current customer satisfaction of the NADEP NI F/A-18 aircraft maintenance program. The gaps model measures differences between customer expectations and perceptions of performance of various attributes, and ranks the attributes by importance. A pretest questionnaire was developed and sent out to customers of NADEP Ni's F/A-18 aircraft maintenance program in order to evaluate alternative measures of customer satisfaction. Through this process, a tailored set of customer satisfaction measures was developed to provide better feedback to the depot management team and improve the depot maintenance process.
DTIC
Aircraft Maintenance; Military Aviation

19980011801
Using advanced optical multiple-access techniques in high-speed avionic local area networks for future aircraft applications. Part I: Optical code-division multiple-access networks
Zhang, Jian-Guo, Asian Inst. of Technology, Thailand; ISA Transactions; 1997; ISSN 0019-0578; Volume 36, no. 1, pp. 49-64; In English; Copyright; Avail: Issuing Activity

In the first part of this paper, we propose high-speed fiber optic code-division multiple-access (CDMA) local area networks (LANs) for future real-time on-board command and control communications in aircrafts. We give new design concepts to implement avionic LANs which use optical CDMA schemes with a full tunability and can support sensor data distribution and computer interconnects. Reliable short-pulse generation and optical sampling are presented to optical CDMA transmitters to facilitate the application of avionic LANs. Optical architectures for fastly tunable CDMA encoders and correlators using prime codes are given. Their simple delay control logic is described, and it can be easily performed by using optical fiber delay lines. Moreover, the power losses of all-optical CDMA encoders and correlators are analyzed. Topologies for avionic fiber optic CDMA LANs are also discussed. We show that optical CDMA can be used in an avionic LAN to support high-speed parallel data communications with a low latency and multiple connections with a very fast reconfiguration time. This in turn can ensure real-time on-board command and control communications for future high-performance aircraft applications.
Author (EI)
Code Division Multiple Access; Fiber Optics; High Speed; Local Area Networks; Multiple Access; Aircraft Communication; Avionics; Optical Communication; Communication Networks

02
AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

19980009948 Army Research Lab., Aberdeen Proving Ground, MD USA
Computational Fluid Dynamics Modeling of Parachute Clusters ***Final Report***
Sahu, Jubaraj, Army Research Lab., USA; Benney, Richard J., Natick Research, Development and Engineering Center, USA; Ramakrishnan, Sekaripuram V., Rockwell International Science Center, USA; Nov. 1997; 33p; In English
Contract(s)/Grant(s): DA Proj. 1L1-61102-AH43
Report No.(s): AD-A332229; ARL-TR-1440; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A computational tool that models the terminal descent characteristics of a single or a cluster of parachutes is a technology that is needed by parachute designers and engineers. As part of a Technology Program Annex (TPA), a joint effort between the U.S. Army Natick Research, Development, and Engineering Center (RRDEC) and the U.S. Army Research Laboratory (ARL) to develop this computational tool is now under way. As a first effort, attempts are being made to analyze both two-dimensional (2-D) and three-dimensional (3-D) flow fields around a parachute using a coupling procedure in which the fluid dynamics are coupled to 2-D and 3-D Structural Dynamic (SD) codes. This effort uses Computational Fluid Dynamic (CFD) codes to calculate a pressure field, which is then used as an input load for the SD code. Specifically, this report presents the methods and results of the flow field plus the structural characteristics of a single axisymmetric parachute and a 3-D gore configuration for the terminal descent velocity. Computed results have been obtained using the payload weight and unstretched constructed geometry of the canopies as input. Significant progress has been made in determining the terminal descent flow field along with the terminal shape of the parachute. A discussion of the fluid and structural dynamics codes, coupling procedure, and the associated technical difficulties is presented. Examples of the codes' current capabilities are shown.
DTIC
Computational Fluid Dynamics; Models; Parachutes; Technologies; Computation

19980009996 Illinois Inst. of Tech., Fluid Dynamics Research Center, Chicago, IL USA
A PIV System for Time-Resolved Measurements at High Reynolds Numbers in the National Diagnostic Facility ***Final Report, 15 Mar. 1995 - 14 Mar. 1997***
Wark, Candace, Illinois Inst. of Tech., USA; Naguib, Ahmed, Illinois Inst. of Tech., USA; Fabris, Drazen, Illinois Inst. of Tech., USA; Nagib, Hassan, Illinois Inst. of Tech., USA; Jun. 30, 1997; 5p; In English
Contract(s)/Grant(s): F49620-95-I-0237
Report No.(s): AD-A330735; AFOSR-TR-97-0522; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The necessary equipment for a two camera DPIV system was purchased. It included two cameras, two frame grabbers, a PC based computer, a laser and shutter, optics for the camera, optics for the laser, a workstation for computational processing, and control and signal conditioning electronics. A unique feature of this system is the utilization of special cameras which allow externally synchronized acquisition of two frames separated by only 1- 5 microns, permitting cross-correlation PIV analysis for flows up to 250 m/s. The DPIV system has been put together and tested in the Mark V Morkovin wind tunnel at IIT. Comparison between the statistics of the resulting velocity field and earlier hot-wire measurements in the same wind tunnel reveals the ability of the new DPIV system to provide high spatial resolution measurements with high accuracy. The new system is currently being adapted for use in the National Diagnostic Facility (NDF) at IIT.
DTIC
Two Dimensional Flow; Particle Image Velocimetry; Signal Processing; High Reynolds Number; Velocity Measurement; Flow Velocity

19980010029 Maryland Univ., Dept. of Aerospace Engineering, College Park, MD USA
Rotorcraft Center of Excellence ***Final Report, 1 Jul. 1994 - 10 Jul. 1996***
Sep. 1997; 140p; In English
Contract(s)/Grant(s): DAAH04-94-G-0074
Report No.(s): AD-A332060; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

The status of a number of rotorcraft research tasks supported under the Army Research Office 'Center of Excellence' program is reported herein. The tasks are grouped under the disciplinary headings of dynamics, flight dynamics, aerodynamics, composite structures, and computational fluid dynamics. For each task an attempt is made to describe the objective of the work, the approach

being taken, the status of the work in terms of recent results, problems or changes in approach or objective, and pertinent abstracts of journal articles or conference papers coming out of the task.
DTIC
Rotary Wing Aircraft; Research

19980010177 Air Force Academy, CO USA
An Investigation of the Flowfield for an Integrated Airframe/Propulsion System ***Final Report, 1 Apr. - 30 Sep. 1997***
Kreins, Alois F., Air Force Academy, USA; Oct. 1997; 40p; In English
Contract(s)/Grant(s): F61708-97-W0084
Report No.(s): AD-A332525; EOARD-97-4029; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This report results from a contract tasking USAFA/DFAN as follows: The contractor will modify an existing wind tunnel model of a hypersonic vehicle to incorporate devices that permit control of the onset of boundary layer transition. He will conduct comprehensive wind tunnel tests to determine the effect on the forebody flowfield of fixing the transition location.
DTIC
Flow Distribution; Engine Airframe Integration; Boundary Layer Transition; Hypersonic Flow

19980010453 Tennessee Univ. Space Inst., Tullahoma, TN USA
Large-Vortex Capture by a Wing at Very High Angles of Attack ***Final Report***
Wu, J. M., Tennessee Univ. Space Inst., USA; Wu, J. Z., Tennessee Univ. Space Inst., USA; Denny, G. A., Tennessee Univ. Space Inst., USA; Lu, X. Y., Tennessee Univ. Space Inst., USA; Jul. 1996; 47p; In English
Contract(s)/Grant(s): NAG1-1612
Report No.(s): NASA/CR-97-206133; NAS 1.26:206133; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
In generating the lift on a wing, the static stall is a severe barrier. As the angle of attack, alpha, increases to the stall angle, alpha(sub stall) the flow separation point on the upper surface of the wing moves to the leading edge, so that on a two-dimensional airfoil or a large-aspect-ratio wing, the lift abruptly drops to a very low level. Therefore, the first generation of aeronautical flow type, i.e., the attached steady flow, has been limited to alpha less than alpha(sub stall). Owing to the obvious importance in applications, therefore, a great effort has been made in the past two decades to enlarge the range of usable angles of attack by various flow controls for a large-aspect-ratio wing. Basically, relevant works fall into two categories. The first category is usually refereed to as separation control, which concentrates on partially separated flow at alpha less than alpha(sub stall). Since the first experimental study of Collins and Zelenevitz, there has been ample literature showing that a partially separated flow can be turned to almost fully attached by flow controls, so that the lift is recovered and the stall is delayed (for a recent work see Seifert et al.). It has been well established that, in this category, unsteady controls are much more effective than steady ones and can be realized at a very low power-input level (Wu et al.; Seifert et al.). The second and more ambitious category of relevant efforts is the post-stall lift enhancement. Its possibility roots at the existence of a second lift peak at a very high angle of attack. In fact, As alpha further increases from alpha(sub stall), the completely separated flow develops and gradually becomes a bluff-body flow. This flow gives a normal force to the airfoil with a lift component, which reaches a peak at a maximum utilizable angle of attack, alpha(sub m) approx.= 40 deg. This second peak is of the same level as the first lift peak at alpha(sub stall). Meanwhile, the drag is also quickly increased (e.g., Fage and Johansen ; Critzos et al.). Figure 1 shows a typical experimental lift and drag coefficients of NACA-0012 airfoil in this whole range of angle of attack. Obviously, without overcoming the lift crisis at alpha(sub stall) the second lift peak is completely useless. Thus, the ultimate goal of post-stall lift enhancement is to fill the lift valley after stall by flow controls, so that a wing and/or flap can work at the whole range of 0 deg less than alpha less than alpha(sub m). Relevant early experimental studies have been extensively reviewed by Wu et al., who concluded that, first, similar to the leading-edge vortex on a slender wing, the lift enhancement on a large-aspect-ratio wing should be the result of capturing a vortex on the upper surface of the wing; and, second, using steady controls cannot reach the goal, and one must rely on unsteady controls with low-level power input as well. Wu et al. also conjectured that the underlying physics of post-stall lift enhancement by unsteady controls consists of a chain of mechanisms: vortex layer instability - receptivity resonance - nonlinear streaming.
Author
Vortices; Wing Flaps; Angle of Attack; Aerodynamic Drag; Separated Flow

19980010853 Ecole Centrale de Lyon, Ecully, France
Reynolds Stress Transport Equations in the Momentumless Wake of an Axisymmetric Propeller-Driven Body: A Comparison between Experiments and Models
Faure, T., Ecole Centrale de Lyon, France; Robert, G., Ecole Centrale de Lyon, France; 1996; 12p; In English
Report No.(s): PB96-175187; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The aim of the study is to investigate the momentumless axisymmetric wake of a propeller-driven body, where the drag of the body is completely cancelled by the thrust created by the propulsion system. However, for this kind of flow, very few experimental data are available, and no Reynolds stress balances have been published.
NTIS
Reynolds Stress; Turbulent Flow; Reynolds Number; Computational Fluid Dynamics; Propellers; Axisymmetric Bodies; Boltzmann Transport Equation

19980010877 Arizona State Univ., Tempe, AZ USA
Stability of Hypersonic Boundary-Layer Flows ***Final Report, 15 Oct. 1994 - 17 Apr. 1997***
Reed, Helen L., Arizona State Univ., USA; Sep. 1997; 24p; In English
Contract(s)/Grant(s): F49620-95-1-0033
Report No.(s): AD-A329724; AFOSR-TR-97-0501; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This Final Report describes our program in studies of (laminar/turbulent) stability and transition in non-equilibrium chemistry flows characteristic of those on the forebodies of hypersonic vehicles. The configuration best modelling a hypersonic vehicle is an elliptic cone. Specifically, we investigated and optimized a Parabolized Navier-Stokes solution for the basic-state flow past a sharp elliptic cone including the region between the wall and the shock. We formulated the Parabolized Stability Equations for 3-D flows.
DTIC
Hypersonic Vehicles; Hypersonic Flow; Turbulent Flow; Boundary Layers; Laminar Flow; Equilibrium Flow

19980011164
Electron beam fluorescence methods in hypersonic aerothermodynamics
Gochberg, Lawrence A., Novellus Systems, Inc., USA; Progress in Aerospace Sciences; 1997; ISSN 0376-0421; Volume 33, no. 7-8, pp. 431-480; In English; Copyright; Avail: Issuing Activity
Experimental methods using the decades-old electron beam fluorescence technique (EBFT) are reviewed in an historical perspective, with an emphasis on applications relating to hypersonic aerothermodynamics. The various gases of aerothermodynamic interest are discussed and research work relating to their use with the EBFT is reviewed. The different experimental techniques are described and typical experimental results from previous research work are presented for each method. This compilation of research activity identifies the areas in high-speed flows where electron beam fluorescence measurement methods can be successfully applied. EBFT applications for a variety of hypersonic and short-duration flow facilities are also discussed and recent activity relating to the use of electron beams, primarily in hypersonic aerothermodynamics, is highlighted. An extensive bibliography of over 450 references is included.
Author (EI)
Electron Beams; Hypersonics; Thermodynamics; Fluorescence; Light (Visible Radiation); Measuring Instruments

19980011987 California Univ., Dept. of Mechanical and Aeronautical Engineering, Davis, CA USA
Study of the Mutual Interaction Between a Wing Wake and an Encountering Airplane ***Final Report***
Walden, A. B., California Univ., USA; vanDam, C. P., California Univ., USA; Mar. 1996; 91p; In English
Contract(s)/Grant(s): NAG1-1572
Report No.(s): NASA/CR-97-206493; NAS 1.26:206493; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
In an effort to increase airport productivity, several wind-tunnel and flight-test programs are currently underway to determine safe reductions in separation standards between aircraft. These programs are designed to study numerous concepts from the characteristics and detection of wake vortices to the wake-vortex encounter phenomenon. As part of this latter effort, computational tools are being developed and utilized as a means of modeling and verifying wake-vortex hazard encounters. The objective of this study is to assess the ability of PMARC, a low-order potential-flow panel method, to predict the forces and moments imposed on a following business-jet configuration by a vortex interaction. Other issues addressed include the investigation of several wake models and their ability to predict wake shape and trajectory, the validity of the velocity field imposed on the following configuration, modeling techniques and the effect of the high-lift system and the empennage. Comparisons with wind-tunnel data reveal that PMARC predicts the characteristics for the clean wing-body following configuration fairly well. Non-linear effects produced by the addition of the high-lift system and empennage, however, are not so well predicted.
Author
Wakes; Vortices; Panel Method (Fluid Dynamics); Potential Flow; Body-Wing Configurations; Configuration Interaction; Computational Fluid Dynamics

19980011994 Wright Lab., Wright-Patterson AFB, OH USA
Computational Fluid Dynamic Analysis of a Single-Engine Business Jet ***Final Report, Sep. 1995 - Nov. 1996***
Wurtzler, Kenneth, Wright Lab., USA; Ansari, Amid, Wright Lab., USA; Dec. 1996; 100p; In English
Contract(s)/Grant(s): AF Proj. 2404
Report No.(s): AD-A332966; WL-TR-97-3046; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

This report documents the longitudinal and lateral-directional aerodynamic analysis of a single-engine business jet aircraft. A Euler level analysis was chosen for the evaluation because of the size of the problem (complete aircraft with inlet and nozzle flow simulated) and the relatively large number of runs desired. While Euler analyses ignore viscous effects, ft was determined that these effects would be small (except on drag estimates) for the cruise and low-speed flight conditions under consideration. Also, the primary emphasis was on providing incremental effects from a baseline condition, which is more accurate than absolute values. Variation of longitudinal and lateral-direction characteristics with Mach number, angle of attack and control deflections were determined. The maximum Mach number is up to the estimated wing drag divergence Mach number. Integrated force coefficient data and selected pressure coefficient data are presented. Comparisons with low-speed wind tunnel data are made where appropriate experimental data is available.
DTIC
Computational Fluid Dynamics; Jet Aircraft; Longitudinal Stability; Lateral Stability; Single Engine Aircraft

03
AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

19980009270 Eurocontrol Experimental Centre, Bretigny, France
Object Oriented Analysis for Advanced Flight Data Management
Wortmann, J., Eurocontrol Experimental Centre, France; Mar. 1997; 165p; In English
Report No.(s): PB97-159370; EEC-306; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

Object-orientation techniques are used in the report to model relevant aspects of Air Traffic Control (ATC) from slot allocation to the arrival at the gate including the main actors - controllers and pilots. Starting with a preliminary class diagram, controller activities during sector hand-over are described with use cases. Object interaction is derived from these use cases leading to a refined analysis model. For the decomposition and modularization of complex use cases, path expressions have been introduced. The object model presented in this report forms a stable and extensible basis for the design and evaluation of new ATC functionality in the areas air navigation, operational procedures and communication facilities. Existing functional specifications can be related to this object model, thus guaranteeing a downward compatibility.
NTIS
Data Management; Flight Management Systems; Air Traffic Control; Object-Oriented Programming; Air Traffic Controllers (Personnel)

19980009916 Nebraska Univ., Aviation Inst., Omaha, NE USA
The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society, Volume 1
Oum,Tae Hoon, Editor, British Columbia Univ., Canada; Bowen, B. D., Editor, Nebraska Univ., USA; Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; 186p; In English; 1997 Air Transport Research Group (ATRG) Conference, 25-27 Jun. 1997, Vancouver, British Columbia, Canada; Sponsored by British Columbia Univ., Canada; Also announced as 19980009917 through 19980009922
Report No.(s): NASA/CR-97-206489; UNOAI-97-2; NAS 1.26:206489; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

Topics reported in the proceedings are: (1) Liberalization of Asia-Pacific aviation; (2) Financial analysis of a British Airways/USAir Merger; (3) Strategic alliances in the airline industry; (4) Effect of strategic alliance on performance; (5) Advances, impediments and impacts in an international open skies regime; and (6) Canadian carrier strategies and the 1995 open skies agreement.
CASI
Air Transportation; Airline Operations; Conferences; International Cooperation; Government/Industry Relations; Commercial Aircraft; Information Transfer

19980009917 Japan Air Lines Co. Ltd., Tokyo, Japan

Initiatives for Liberalization in Asia-Pacific Aviation

Nagata, Koki, Japan Air Lines Co. Ltd., Japan; Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 1; 6p; In English; Also announced as 19980009916; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche

The report presents an overview of how Japan Airlines sees the current state of US/Japan aviation relations, in the light of the current ”Open Skies” policy of the USA with regard to Asia.

Derived from text

Airline Operations; Civil Aviation; Commercial Aircraft; Air Transportation; Passenger Aircraft; International Cooperation

19980009918 Dubuque Univ., Dubuque, IA USA

British Airways/USAir Merger: Financial and Traffic Analysis

Abraham, Edward H., Dubuque Univ., USA; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 1; 16p; In English; Also announced as 19980009916; No Copyright; Avail: CASI; A03, Hardcopy; A02, Microfiche

By late March 1993, the US Department of Transportation (DOT) and the Justice Department agreed to allow British Airways to purchase a 25% equity interest in USAir, with a 21 % voting interest and code-sharing rights. This paper previews the history and background of the involved carriers, rationale of mergers, and the consequences of airline mergers and alliances. Part H of this paper evaluates pre- and post-alliance traffic statistics and financial performance in great detail. This study examines the relative changes in traffic and profits on British Airways and USAir Group, Inc. Despite the consumer-led recession in 1988 and other social factors, it was found, subjectively, that USAir’s management achieved a successful implementation of the cost reduction program announced in late 1991, a new labor agreement was reached with major organized employee groups, and a significant accomplishment was achieved by reducing expenditure. The alliance between USAir and British Airways offered travelers the most benefits of any global airline partnership.

Author

Airline Operations; Cost Reduction; Air Traffic; Cost Analysis; Air Transportation

19980009919 Embry-Riddle Aeronautical Univ., Business Administration Dept., Daytona Beach, FL USA

A Typology of Strategic Alliances in the Airline Industry: Propositions for Stability and Duration

Rhoades, Dawna l., Embry-Riddle Aeronautical Univ., USA; Lush, Heather, Embry-Riddle Aeronautical Univ., USA; Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 1; 20p; In English; Also announced as 19980009916; No Copyright; Avail: CASI; A03, Hardcopy; A02, Microfiche

While strategic alliances have become commonplace in the airline industry, the stability and performance of these alliances remains questionable. In this article, the authors review the structure of recent alliances in the airline industry and propose a typology of alliances based on two key dimensions: commitment of resources and complexity of arrangement. Using this typology, the authors derive a series of propositions on the stability and duration of various types of alliances.

Author

Airline Operations; Industries; Agreements; Civil Aviation

19980009920 New York Univ., Dept. of International Business, New York, NY USA

The Effect of Strategic Alliance on Performance: A Study of International Airline Industry

Park, Namgyoo, New York Univ., USA; Cho, Dong-Sung, Seoul National Univ., Korea, Republic of; Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 1; 33p; In English; Also announced as 19980009916; No Copyright; Avail: CASI; A03, Hardcopy; A02, Microfiche

This study investigates codesharing alliances to see if they increase market shares of the carriers involved by analyzing a time-series data of fifty six airlines over the 1986-93 period. Our empirical results indicate: (a) codesharing, in fact, increases the carriers’ market shares; (b) codesharing between existing airlines increase market shares less than those between relatively new carriers; and (c) the market-share-increasing effect of codesharing alliances is higher in markets with fewer competing carriers.

Author

Airline Operations; Market Research; Industrial Management; Time Series Analysis

19980009921 Seattle Univ., Albers School of Business and Economics, WA USA

Towards an International Open Skies Regime: Advances, Impediments, and Impacts

Toh, Rex S., Seattle Univ., USA; Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 1; 23p; In English; Also announced as 19980009916; No Copyright; Avail: CASI; A03, Hardcopy; A02, Microfiche

The International Air Transportation Competition Act of 1979 heralded the era of open Skies in international aviation. This paper traces the post-war regulation and then deregulation of fares, rates, routes, and capacity all the way from Bermuda I through the partial dismantling of the IATA (International Air Transport Association) price fixing apparatus, discusses the impediments to Open Skies, and examines the impact on the IATA.

Author

Air Transportation; International Cooperation; Civil Aviation

19980009922 Kaduck (Raymon J.), Yellowknife, Northwest Territories Canada

Canadian Carrier Strategies and the 1995 Open Skies Agreement

Kaduck, Raymon J., Kaduck (Raymon J.), Canada; Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 1; 36p; In English; Also announced as 19980009916; No Copyright; Avail: CASI; A03, Hardcopy; A02, Microfiche

The Canada-US ”Open Skies’ negotiation took place during a brief period which spanned the fall of 1994 and early 1995. It was conducted first through personal representatives, and later in formal bargaining sessions. After nearly 30 years of acrimonious exchanges between the two governments, the 1995 agreement was concluded with surprisingly little difficulty, and has ushered in a new era in transborder air transport. This paper draws heavily on research presented in a longer paper entitled Break in Overcast. The Negotiation of the 1995 Canada-US Open Skies Agreement, which discussed the dynamics of the negotiations in 1991-92 and 1994 Elliot-Kaplan talks. The current paper focuses on Canadian carrier strategy before and after the agreement.

Author

Air Transportation; Agreements; Policies; Strategy

19980010040 General Accounting Office, Resources Community and Economic Development Div., Washington, DC USA

FAA Oversight of Repair Stations Needs Improvement

Oct. 1997; 95p; In English

Report No.(s): AD-A331829; GAO/RCED-98-21; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

As the size of the airline and air cargo industries has grown, so has the reliance on repair stations. In 1990, repair stations performed 37 percent of air carriers’ maintenance; by 1996, the figure was 46 percent. More than 2,500 domestic and 270 foreign repair stations do work for air carriers. FAA’s certification process establishes what the repair stations are qualified to do. While many repair stations have fewer than 15 employees and a limited range of activities that FAA has certified, some employ thousands of workers who completely overhaul engines and renovate aging airframes for additional years of service. FAA’S inspection activities are aimed at ensuring that repair stations are still meeting the certification requirements. FAA had about 3,000 inspectors in fiscal year 1997. About 600 of them were involved in repair station inspections. FAA’S guidelines require that each repair station be inspected at least once a year. These inspections involve checking such matters as whether repair station staff have the appropriate qualifications to do the work and whether repair procedures meet FAA regulations. About 550 inspectors oversee repair stations located in the USA, usually through inspections conducted by individual inspectors. For larger facilities, these inspections may take place over several visits. Most of the inspectors are responsible for several repair stations as well as other types of operations, such as helicopter operators and training schools for pilots and mechanics.

DTIC

Safety; Shops; Maintenance; General Aviation Aircraft

19980010259 Nebraska Univ., Aviation Inst., Omaha, NE USA

Journal of Air Transportation World Wide, Volume 2

Bowen, Brent, Editor, Nebraska Univ., USA; Journal of Air Transportation World Wide. Volume 2, Number 1; Nov. 1997; ISSN 1093-8826; 104p; In English; Also announced as 19980010260 through 19980010266

Report No.(s): NASA/TM-97-112609; NAS 1.15:112609; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

The Journal of Air Transportation World Wide’s (JATWW) mission is to provide the global community immediate key resource information in all areas of air transportation. Our goal is to be recognized as the preeminent scholarly journal in the aeronautical aspects of transportation. As an international and interdisciplinary journal, the JATWW will provide a forum for peer-re-

viewed articles in all areas of aviation and space transportation research, policy, theory, case study, practice, and issues. While maintaining a broad scope, a key focal point of the journal will be in the area of aviation administration and policy.
Derived from text
Information Systems; Air Transportation; Policies; Space Transportation; Transportation; Resources

19980010262 Maryland Univ., Princess Anne, MD USA
Safety Concerns of Startup Airlines
Wilson, Marc, Maryland Univ., USA; Journal of Air Transportation World Wide; Nov. 1997; Volume 2, No. 1, pp. 38-46; In English; Also announced as 19980010259; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche

Startup airlines which do not have sufficient capital are forced to acquire older aircraft and contract out maintenance, crew training, and operation management. These factors can contribute to the poorly supervised practices as illustrated in this case study of the crash of a ValuJet DC-9 on May 11, 1996. The areas of focus are aircraft age, maintenance, safety record, cargo handling, and crew resource management.
Author
Airline Operations; Aircraft Maintenance; Safety; Service Life; Resources Management; Maintenance Training; Crashes; Materials Handling

19980010264 Wichita State Univ., Wichita, KS USA
International Airline Quality Measurement
Headley, Dean E., Editor, Wichita State Univ., USA; Bowen, Brent D., Editor, Nebraska Univ., USA; Journal of Air Transportation World Wide; Nov. 1997; Volume 2, No. 1, pp. 55-63; In English; Also announced as 19980010259; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche

Historically, airline quality has been measured through the use of surveys that ask the consumers to make a comparison between expectations and outcomes. This method was informative but very cumbersome in a rapidly changing environment. This paper outlines the efforts of the consumer researchers to develop a weighted, consumer oriented rating scale for the U.S.A. domestic airline industry as an alternative to survey-based rating scales. The Airline Quality Rating (AQR) approach has been successfully employed in the United States by the major airlines and by the general public. Development considerations are offered for facilitating the adaptation of the AQR's weighted average approach to the world airline industry.
Author
Airline Operations; Consumers; Commercial Aircraft; Ratings; Civil Aviation

19980010783 Nebraska Univ., Aviation Inst., Omaha, NE USA
The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society, Volume 1
Oum, Tae Hoon, Editor, British Columbia Univ., Canada; Bowen, Brent D., Editor, Nebraska Univ., USA; Sep. 1997; 242p; In English; 1997 Air Transport Research Group Conference, 25-27 Jun. 1997, British Columbia, Vancouver, Canada; Sponsored by British Columbia Univ., Canada; Also announced as 19980010784 through 19980010794
Report No.(s): NASA/CR-97-206488; UNOAI-97-3; NAS 1.26:206488; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

Topics included in the proceedings are: The effect of liberalized air transport bilaterals; cost competitiveness of major airlines; economic effects of duopoly competition in Korea; transforming Canada's aviation regulations; liberalization in Europe; airline labor cost in a liberalized Europe; noncooperative collusion; European air transport deregulation; public ownership and deregulation in the Scandanavian airline industry; airline competition between London and Amsterdam; and a banker's view of the European airline industry.
CASI
Air Transportation; Airline Operations; Civil Aviation; Competition; Conferences; Labor; Regulations; Operating Costs

19980010784 Maryland Univ., College of Business and Mangement, College Park, MD USA
The Effect of Liberalized Air Transport Bilaterals on Foreign Visitor Volume and Traffic Diversion: The Case of Canada
Dresner, Martin, Maryland Univ., USA; Oum, Tae Hoon, British Columbia Univ., Canada; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society Vol.-1-2; Sep. 1997; Volume 1, No. 2; 34p; In English; Also announced as 19980010783; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This paper investigates the effects of Canada's 'facilitating' bilateral air agreements, with the UK, the Netherlands and Germany, on the volume of visitors from those countries to Canada, and the effects of the U.S. 'liberal' bilateral air agreements on diverting Canadian foreign visitors away from direct routes to routes that transit the U.S. These objectives are accomplished by

estimating visitor volume models (direct volume to Canada, and total volume including via-US routing) and direct-routing share models on a panel data of 22 countries for the 1975-94 period. The empirical results can be summarized as follows: Canadian facilitating bilaterals have had significant positive effects on increasing the number of DIRECT visitors to Canada. Although magnitudes of the effects vary between the alternative models, the most reliable empirical result indicates that Canada's facilitating bilaterals have increased both the DIRECT and TOTAL visitors by about 20% from those countries that signed these agreements with Canada. The US liberal bilaterals did not have statistically significant effects on the DIRECT or TOTAL volume of foreign visitors to Canada. However, the US liberal bilaterals have had a moderate but statistically significant negative effect on the share of DIRECT visitors to Canada. The average effect of the US liberal bilateral with a country was to reduce Canada's DIRECT visitor share from that country by 3.1%.
Author
Agreements; Air Transportation; Air Traffic

19980010785 British Columbia Univ., Faculty of Commerce and Business Administration, Vancouver, British Columbia Canada
Cost Competitiveness of Major Airlines: An International Comparison
Oum, Tae Hoon, British Columbia Univ., Canada; Yu, Chunyan, British Columbia Univ., Canada; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 2; 34p; In English; Also announced as 19980010783; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

This paper measures and compares the unit cost competitiveness of the world's major airlines, using the yearly panel data of 23 firms over the 1986-93 period. First, we develop a unit cost index for aggregate output which is computed via a multilateral index procedure. A translog variable cost function is estimated and used to decompose the unit cost differentials into potential sources: input prices, network and output attributes, and efficiency. The results of the unit cost decomposition are used to construct a cost competitiveness indicator after removing the effects of network and output attributes. This indicator allows one to compare the true cost competitiveness of airlines in a given market, especially in an inter-continental market, and shows what factors are contributing or harming a carrier's cost competitiveness. In addition, the effect of exchange rate fluctuation on unit cost is examined via case studies of JAL and Lufthansa. Our results for 1993 are: (a) Asian carriers (except JAL and ANA) are generally more cost competitive than the major US carriers, mostly due to their substantially lower input prices; (b) JAL and ANA are over 50% less cost competitive than AA mainly because of their high input prices; (c) major European carriers are 7% (BA) - 42% (SAS) less cost competitive than AA, because of higher input prices and lower efficiency; (d) among the U.S. carriers, AA, UA and Delta are similar in cost competitiveness, while NW and CO enjoy, respectively, 5% and 12% cost competitiveness over AA. US Air is least cost competitive among the North American carriers; (e) exchange rate fluctuation has had considerable effects on some carriers' costs. In particular, JAL, and, to a lesser degree, Lufthansa's less cost competitive position is largely attributable to appreciation of their home currencies.
Author
Airline Operations; Civil Aviation; Operating Costs; Cost Analysis; Competition; Air Transportation; Cost Effectiveness

19980010786 Korea Transport Inst., Seoul, Korea, Republic of
An Economic Effect of Duopoly Competition in Domestic Air Transport Markets in Korea
Kim, Jongseok, Korea Transport Inst., Korea, Republic of; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 2; 18p; In English; Also announced as 19980010783; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

This paper examines competition patterns in the domestic air transport industry and its performance in terms of consumer surpluses of passengers in Korea using suitable economic models.
Author
Air Transportation; Competition; Market Research; Civil Aviation; Aircraft Industry

19980010787 Transport Canada, Ottawa, Ontario Canada
Transforming Canada's Aviation Regulations
Rohr, Ray, Transport Canada, Canada; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 2; 6p; In English; Also announced as 19980010783; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Since 1991, Transport Canada's civil aviation regulation program has undergone a dramatic transformation. This has been achieved in partnership with its principal clients - Canada's aviation community. Working more closely with those in the aviation community to create a climate that enhances safety is not a revolutionary concept, but some of the philosophies and processes may be interesting to others involved in a similar endeavor. Historically, the primary role of the regulator has been one of "establisher

and enforcer" of regulations. This model is not conducive to innovation or change. Unforunately, it is one that is pervasive not only in government itself, but also in those it serves. The cornerstone of the new Canadian aviation regulation model is "mutual respect and trust" between Transport Canada Civil Aviation directorate and the aviation community. The impetus for transforming the aviation regulation program was, and continues to be, provided by both externally driven factors (i.e., international efforts to harmonize aviation regulations) and internally driven factors (i.e., an overall shift in the federal public service to a focus on client needs). Also, the impact of the recent Canadian government downsizing initiatives cannot be ignored. As a result of these initiatives, the Canadian air navigation system was commercialized and other structural changes were made to Transport Canada. Throughout the process, maintaining aviation safety was of paramount importance. This time of transition provided an ideal opportunity to find new ways to meet safety objectives.
Author
Civil Aviation; Regulations; Air Transportation

19980010788 Cranfield Univ., College of Aeronautics, Bedford, UK
Air Transport Liberalisation in Europe: The Progress So Far
Morrell, Peter, Cranfield Univ., UK; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 2; 20p; In English; Also announced as 19980010783; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

In April 1997, the final phase of a series of measures were implemented, which were aimed at liberalising air transport within the European Union (EU). These measures were introduced on a phased basis, the first package coming into force in 1988, the second in 1990, and the most significant third package in 1993 (which included a delayed 1997 lifting of cabotage protection). These applied on a multilateral basis within the European Community (with some exclusion clauses), and followed progress towards liberalisation on a bilateral basis between 1985 and 1988, most notably on routes between the UK and a number of EU countries. This paper examines the progress so far in the achievement of liberalisation and greater competition within Europe. It is based on extensive research carried out by the author and a team from Cranfield University over 1995 and 1996. This included desk research, a survey of and interviews with EU airlines and aviation authorities, and five more detailed airline case studies. This has been updated by the author to take into account more recent developments, especially regarding new entrant airlines. Some of the expectations following the introduction of EU liberalisation have not been met: there have been few serious challenges to the flag carrier duopolies, there has been a consolidation of the position of airlines the major airlines in their home markets, and business and fully flexible fares have continued to climb. However, many of the airlines' strategic changes were more in response to developments in global rather than EU markets. On the other hand, consumers have benefited from greater competition in promotional fares, and more dynamic pricing tactics overall have led to higher intra-EU traffic growth in the early 1990s than would have been the case without liberalisation. There was also a substantial growth in the number of EU cities served by non-stop services, and some encouraging trends from new entrant airlines in some countries. On balance, it is argued that the net result has been disappointing; but this is hardly surprising given the timing of the final stage of liberalisation in the middle of an economic recession, the concern of the larger airlines with more global events, and the time needed to change some of the more deep-seated structural barriers, such as airport slot availability, input market monopolies and state aids.
Author
Air Transportation; Airline Operations; Civil Aviation; Market Research

19980010789 Cranfield Univ., Coll. of Aeronautics, Bedford, UK
Airline Labour Cost in a Liberalised Europe
Alamdari, Fariba, Cranfield Univ., UK; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 2, No. 1; 20p; In English; Also announced as 19980010783; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

Following the liberalistion of air services in Europe since 1988, and more liberal agreements with countries outside Europe, mainly with the US, European carriers have become under an increasing pressure to reduce costs. This has been in response to the growing competition in their markets from fellow European carriers and the US airlines. The most obvious area of costs for airlines to tackle has been labour. This paper analyses trends in the numbers of employees, labour wages (labour costs per employee) and labour unit costs (labour expenses per available tonne kilometre) of European carriers from 1985 to 1995. In comparing the airlines' performance in relation to labour costs the analysis takes into account the differences in the costs of living in carriers' countries, and compares the employees' average take-home pay. It also compares airline and manufacturing labour pay. The results indicate that European airlines reduced unit labour costs by productivity increases, partially offset by increases in real wage levels. Once taxes and social costs are deducted from labour costs there appears to be a large difference in what employees take home, depending on which country they are based. It was also found that almost all the airlines in the sample pay

their employee on average more than those working in their respective countries' manufacturing industry but the gap between the two was narrowing. It is recommended that to achieve reduction in real wage levels and further improvements in productivity, incentives policies such as profit sharing or employee share ownership could perhaps become more effective.
Author
Airline Operations; Civil Aviation; Costs; Labor; Cost Analysis

19980010790 Geneva Univ., Geneva, Switzerland
Partial Versus Complete Liberalisation in the European Airline Industry: Which Scenario is More Likely to Facilitate Noncooperative Collusion?
Nero, Giovanni, Geneva Univ., Switzerland; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 2; 22p; In English; Also announced as 19980010783; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

This paper combines the strategic effects that arise from repeated interactions among airlines with specific features of the European airline industry. In particular, the paper gives some insights into why European flag-carriers seem reluctant to fully exploit the more liberal regulatory rules which provide larger entry opportunities into new intra-European maxkets. To this end, I present a model which shows under which conditions the European airline industry is more likely to sustain a noncooperative 'mutual forbearance' equilibrium.
Author
Airline Operations; Civil Aviation; International Cooperation; Regulations

19980010791 Universidad de Las Palmas de Gran Canaria, Dept. of Applied Economics, Las Palmas, Spain
European Air Transport Deregulation: A Panel Data Approach
Betancor, Ofelia, Universidad de Las Palmas de Gran Canaria, Spain; Campos, Javier, Universidad de Las Palmas de Gran Canaria, Spain; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 2; 20p; In English; Also announced as 19980010783; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

In this paper we present a first attempt of empirical analysis for the period 1986-1994 of the effects of the deregulation process carried out in the European air transport industry. Using individual data for 44 city-pair intra-EU scheduled routes, we estimate different price equations in order to assess the relevance both of the deregulation packages of 1987, 1990 and 1992 released by the European Commission and the liberal bilateral agreements that several countries had agreed upon before. We use panel data techniques to discard unobservable individual effects related to route-traffic characteristics. Our results support the idea that the effect on the fare level of the deregulation process pursued by the European Commission has been weaker than the corresponding effect of the bilateral agreements. As in the US case, another striking effect of the deregulation process has been the proliferation of discount tariffs.
Author
Air Transportation; Policies; Regulations; Economic Analysis; Data Reduction

19980010792 Agder Coll., Center for International Economics and Shipping, Kristiansand, Norway
The Effect of Public Ownership and Deregulation in the Scandanavian Airline Industry
Randoy, Trond, Agder Coll., Norway; Strandenes, Siri Pettersen, Norwegian School of Economics and Business Administration, Norway; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 2; 14p; In English; Also announced as 19980010783; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

We analyse why deregulation resulted in a temporary strong reduction in prices in Sweden, whereas in Norway the prices did not change significantly. SAS and Linjeflyg merged when the Swedish market was deregulated, whereas attempts to merge SAS and Braathens SAFE did not succeed. Upon deregulation in Sweden some of the carriers operating charter markets or regional secondary routes decided to enter the main routes. This put pressure on prices. Similar entries did not take place in the Norwegian market. We analyse whether the duopoly between SAS and Braathens SAFE is characterised by tacit collusion.
Author
Airline Operations; Market Research; Regulations; Cost Analysis; Civil Aviation

19980010793 Department of Civil Aviation, An Hoofddorp, Netherlands
Airline Competition on the Route Between Amsterdam and London
Uittenbogaart, Peter, Department of Civil Aviation, Netherlands; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 2; 13p; In English; Also announced as 19980010783; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

With granting all Airlines of the European Economic Area (EEA) cabotage rights, enabling them to fly between any two domestic points within the 17 EEA states, liberalization in European air transport business was formally completed in April 1997. However, the free market effects of abandoning the bilateral system are not yet very manifest today. Since the Third Package came into effect in 1992, the number of international routes in the European Union hardly changed. Until now, lifting barriers to market entry, did not cause a significant influx of new competitors on direct routes. The number of airport-to-airport routes served by more than two carriers increased from 4% at the beginning of 1992 to only 6% at the beginning of 1996. Remarkably the number of airport-to-airport routes where two carriers compete dropped from 40% at the beginning of 1992 to 30% at the beginning of 1996. The obvious conclusion is that since the third package entered into force, the number of monoply routes jumped from 56% at the beginning of 1992 to 64% at the beginning of 1996.
Author
Air Transportation; Airline Operations; Civil Aviation; Competition

19980010794 ABN AMRO Bank, Amsterdam, Netherlands
The European Airline Industry: A Banker's View
Smit, Hans G., ABN AMRO Bank, Netherlands; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 1, No. 2; 13p; In English; Also announced as 19980010783; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

For those institutions which finance the aerospace industries, it is useful to estimate what the consequences will be of the present liberalisation process which has beset the European airline industry. Consequently ABN AMRO Bank is in the process of developing a model which analyses those factors which are crucial to the survival of an airline. These so called critical success factors appeared to be: financial strength, cost structure, domestic market, size of operations, internationalisation and political support. When we applied these factors to the European airline industry, we found that only a limited number of airlines stand a fair chance of surviving the anticipated restructuring process as an independent carrier. Several carriers will either have to merge with stronger partners or they face bankruptcy. Based on the critical success factors, the larger northern carriers enjoy the strongest positions. From amongst the southern airlines, those with a large domestic market and strong political support have a chance to survive, provided they will be able to adjust their cost structure in time.
Author
Airline Operations; Civil Aviation; Air Transportation; Economic Analysis; Operating Costs

19980010795 Nebraska Univ., Aviation Inst., Omaha, NE USA
The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society, Volume 2
Bowen, Brent D., Nebraska Univ., USA; Oum, Tae Hoon, British Columbia Univ., Canada; Sep. 1997; 202p; In English; 1997 Air Transport Research Group of the WCTR Society, 25-27 Jun. 1997, Vancouver, British Columbia, Canada; Sponsored by British Columbia Univ., Canada; Also announced as 19980010796 through 19980010805
Report No.(s): NASA/CR-97-206486; UNOAI-97-5; NAS 1.26:206486; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

Topics considered in the proceedings include: (1) Airport policy, management and operations; (2) airport and air navigation policy, management and operations; and (3) airport performance.
CASI
Air Transportation; Airports; Conferences; Industrial Management; Airline Operations

19980010796 National Univ. of Singapore, Dept. of Economics and Statistics, Singapore
Open Skies between East Asia and the US: Implications on Airport Development and Strategy
Chin, Anthony T. H., National Univ. of Singapore, Singapore; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 2, No. 1; 18p; In English; Also announced as 19980010795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

Topics discussed in the conference paper include deregulation and liberalization in the Asia Pacific; budgetary constraints and reservations on "Big Bang Liberalization"; Open-skies and infrastructure development strategy for the Asia Pacific; international cooperation; and privatization and packaging of airport infrastructure development.
Derived from text
Airports; Airline Operations; Regulations; Civil Aviation; Strategy

19980010797 Osaka Univ., Ibaraki, Japan

How Did We Decide to Keep the Osaka International Airport?

Yasuo, Sakakibara, Osaka Univ., Japan; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 2, No. 1; 16p; In English; Also announced as 19980010795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

The report discusses the changes in the trilateral relations of airports, airlines and the government in Japan and their effects on airline operations, costs and the consumer.

CASI

Airline Operations; Airports; Civil Aviation; Government/Industry Relations

19980010798 Monash Univ., Dept. of Economics, Clayton, Australia

Price Regulation of Airports in Australia

Forsyth, Peter, Monash Univ., Australia; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 2, No. 1; 20p; In English; Also announced as 19980010795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

The Federal government is privatising the airports it owns through the Federal Airports Corporation. This corporation owns all the capital city airports, along with a range of airports, large and small in other centres. By May 1997, Melbourne, Brisbane and Perth airports had been privatised, through the sale of very long term leases. Other airports are due to be privatised later. Each of these airports has considerable local monopoly power, and formal price regulation, of the price-cap or CPI-X form, will be applied to them. Like other industries, airports have several distinctive features which pose problems for the design of price regulatory structures. These are considered in this paper. It begins With a brief empirical background on airports in Australia, and then it outlines the issues that can pose problems for price regulation. These include congestion, noise externalities, quality of service, and the choice of the initial level of prices. The nature of each of these problems is considered, and possible solutions to them are analysed. One conclusion is that pure price-caps are likely to be inferior to alternative regulatory structures which take the regulated firm's costs into account when setting the allowable prices.

Author

Airports; Operating Costs; Airline Operations; Economic Analysis

19980010799 Amsterdam Univ., Netherlands

Substitution and Complementarity in Aviation: Airports vs. Airlines

Pels, Eric, Amsterdam Univ., Netherlands; Nijkamp, Peter, Amsterdam Univ., Netherlands; Rietveld, Piet, Amsterdam Univ., Netherlands; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 2, No. 1; 26p; In English; Also announced as 19980010795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

In this paper a model concerning substitution and complementarity on the linkage between airport facilities and airlines from the viewpoint of pricing policy is formulated. This model is used to analyze whether airport pricing policies, e.g. to ensure cost recovery, are compatible with competition for transfer passengers. It is found that airports with a high volume of demand can pursue cost recovery and still be the most preferred hub. Airports with a low level of demand will not be the preferred hub, if the larger airport fixes its price at marginal costs.

Author

Airline Operations; Airports; Civil Aviation; Mathematical Models; Economic Analysis; Cost Analysis

19980010800 Calgary Univ., Dept. of Transportation Engineering, Alberta Canada

New Aircraft Characteristics Related to Airport Planning

deBarros, Alexandre Gomes, Calgary Univ., Canada; Wirasinghe, Sumedha Chandana, Calgary Univ., Canada; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 2, No. 1; 15p; In English; Also announced as 19980010795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

The compatibility of aircraft and airport facilities is of critical importance to the process of planning and design of airports. This becomes particularly true when manufacturers are carrying studies on the development of new aircraft which might have a heavy impact on airport operations. Examples of these new developments are the New Large Aircraft (NLA) for up to 800 passengers, and the new generation of supersonic aircraft for 250 passengers. This paper reviews the main issues regarding compatibility of airport and aircraft and discusses some implications of the introduction of new aircraft.

Author

Airport Planning; Compatibility; Commercial Aircraft; Passenger Aircraft; Civil Aviation

19980010801 Lincoln Coll., Dept. of Resource Management, Canterbury, New Zealand

Air Navigation: The New Zealand Experience

Kissling, Christopher C., Lincoln Coll., New Zealand; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 2, No. 1; 9p; In English; Also announced as 19980010795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Air navigation systems have historically been seen as a function of governments as part of their jurisdiction of sovereign air space and because of their responsibility as custodians of safety regulations (Proulx, 1994). The International Civil Aviation Organisation (ICAO) was set in place as the need for internationally agreed standards and procedures for air transport became more important given the post WWII growth in air travel markets. For safety reasons, there is need to have accepted procedures and rules for communications between pilots and air traffic controllers. For this, a common language is a necessity until such time as non voice communications can displace the spoken commands needed to maintain separation of aircraft. There is also the need for universal standards for instrumentation and navigation aids, both on the ground and in the aircraft. It would be most inefficient if different countries all had their own unique communication systems. It would require aircraft manufacturers to install all systems in their aircraft to enable planes to travel globally as is now commonplace. Control of sovereign airspace has been a closely guarded asset by most countries. It is not automatic for all countries to grant the first freedom of the air (right to overfly territory) to all comers. Security concerns have seen large areas denied to international commercial aviation mainly for military reasons. These areas can cause considerable additional costs to airlines who must eschew shortest great circle routes for more indirect routes to avoid the no-fly zones. As a consequence, most land areas are controlled air space, but there are large expanses of ocean outside territorial jurisdiction that were uncontrolled until ICAO accepted responsibility to apportion responsibility to states who had the ability to initiate air traffic control and flight information services.

Author

Air Navigation; Air Transportation; Airspace; Flight Paths; Air Traffic; Airline Operations

19980010802 New South Wales Univ., Dept. of Transport Engineering, Sydney, Australia

Airport Performance and Communication Strategies for Stakeholder Involvement

Black, J. A., New South Wales Univ., Australia; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 2, No. 1; 20p; In English; Also announced as 19980010795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

This paper provides a perspective on the performance of airport management in terms of their communication strategies and ways of involving the community when there are airport expansion programs underway. Research into communications strategy and stakeholder involvement is being undertaken for the Australian Federal Airports Corporation Sydney (Kingsford Smith) Airport. The background problems that lead to this study of Australian and other major international airports are explained and the current policy context for public participation in Australia is outlined. The main contribution of this paper is to describe benchmarking as a continuous analytical process for understanding the practices of airport management and to present a theoretical framework for interpreting the results of airport case study approaches to communication and public involvement. Preliminary results are given for the nine busiest Californian airports in terms of passenger traffic.

Author

Airports; Airline Operations; Performance; Airport Planning; Industrial Management

19980010803 Korea Transport Inst., Seoul, Korea, Republic of

A Methodology to Establish the Operational Standards at Airport Passenger Terminal

Park, Yonghwa, Korea Transport Inst., Korea, Republic of; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 2, No. 1; 21p; In English; Also announced as 19980010795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

A methodology to establish the operation standards of service performance of airport passenger terminals using a perception-response model is discussed here. The proposed approach is defined by the graphical representation of passengers collective attitudes towards the range of operational service at an airport passenger terminal. It adopts new concepts to establish service standards through a special survey to better interpret terminal operations and service level at each facility. It is expressed in terms of passengers' perception of various service levels and their response to the respective service conditions. The methodology may provide practical service standards of airport terminal and prove to be a practical and convenient technique to airport planners, designers, consultants, operators, and airport managers.

Author

Airports; Airline Operations; Models; Standards; Air Transportation; Services

19980010804 California Univ., Berkeley, CA USA

Developing Measures of Airport Productivity and Performance: An Application of Data Envelope Analysis

Gillen, David, California Univ., USA; Lall, Ashish, Nanyang Univ., Singapore; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 2, No. 1; 21p; In English; Also announced as 19980010795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

Since deregulation the measurement of productivity, performance and profitability of the air transport industry has attracted significant attention. Many studies have been undertaken on the financial and economic productivity of air transport systems, but few have concentrated on the productivity of airports, and how changes in the industry may have affected them. Airports have been quite traditional in their approach to assess their performance. Most measure it in strictly accounting terms by looking at only their total cost and revenue levels and at the resulting surpluses or deficits. A broader method of measuring the efficiency and productivity in both financial and physical terms is therefore needed. In this paper, a new approach to assessing the performance or productivity of airports is developed and estimated. Data envelope analysis is used to construct performance indices on the basis of the multiple outputs which airports produce and the multiple inputs which they utilize. In particular, we develop measures for terminals and airside operations. The performance measures are then used in a second stage to bit recognition in which environmental, structural and managerial variables are included. The regression results provide a ”net” performance index and also identify which variables the managers have some control over and what the relative importance of each variable is in affecting performance. The data set contains a panel of 21 U.S. airports over a five year period.

Author

Airports; Economics; Productivity; Airline Operations; Cost Analysis

19980010805 UCI Brazil, Rio de Janeiro, Brazil

Airport Performance Measurement: Review of Methods and Studies for Measuring Economic Efficiency and Productivity from the Policy Maker’s Perspective

Lemaitre, Anne, UCI Brazil, Brazil; The Conference Proceedings of the 1997 Air Transport Research Group (ATRG) of the WCTR Society; Sep. 1997; Volume 2, No. 1; 26p; In English; Also announced as 19980010795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

The measurement and comparison of airport economic efficiency is problematic. These difficulties in comparing airports are mainly due to differences in activities performed at airports, in service standards, and in the regulation of externalites. For the measurement and comparison of airport productivity a number of techniques have been used in the literature. These are the calculation of total factor productivity indexes, data envelopment analysis, the calculation of partial productivity indicators and cost functions. These techniques have been applied to airports by four main groups of researchers; the Institut du Transport Aeden Paris, the University of Berkeley/ U.BC, Cranfield University and the Australian Government. A major conclusion of these studies is the existence of economies of scale and economies of scope for airports. However, for a more comprehensive understanding of differences in airport efficiency, indicators of productivity should be supplemented with indicators of quality e.g., customer satisfaction, level of service provided, operational performance.

Author

Airports; Productivity; Performance; Efficiency; Economic Analysis; Airline Operations

19980010998 Royal Aeronautical Society, London, UK

Recording Aircraft Accident Data: Proceedings

Recording Aircraft Accident Data Proceedings; 1997; 103p; In English; Recording Aircraft Accident Data, 20-21 Oct. 1997, London, UK; Also announced as 19980010999 through 19980011007; ISBN 1-85768-0049; Copyright; Avail: Issuing Activity (The Royal Aeronautical Society, 4 Hamilton Place, London, W1V 0BQ, UK), Hardcopy, Microfiche

Topics considered include: Flight Recorders-ICAO to JAR OPS; Evolution of Flight Recorder Media and Protection Techniques; Combined CVR and FDR; The Deployable Solution-Past, Present and Future; Airborne CCTV Applications and ADVR; Recovering Data from Non-Volatile Memories; Analysing Accident Data-Are; Development of New Standards and Recommended Practices; Requirement Development-EUROCAE Working Group 50; Fire and Crash Protection; Data Analysis with Advanced Graphics; and Managing the Systems.

Derived from text

Aircraft Accidents; Flight Recorders; Fire Prevention; Crashes

19980011003 Department of Transport, Air Accident Investigation Branch, Farnborough, UK

Analysing Accident Data - Are the Systems Meeting the Need?

Sheppard, Peter F., Department of Transport, UK; Recording Aircraft Accident Data Proceedings; 1997, pp. 7.1-7.5; In English;

Also announced as 19980010998; Copyright; Avail: Issuing Activity (The Royal Aeronautical Society, 4 Hamilton Place, London, W1V 0BQ, UK), Hardcopy, Microfiche

This paper attempts to go through the stages of extracting, converting, and analysing the information from the accident protected recorders, after an accident has occured. It tries to point where the problems have been, and why some recorders have not functioned as expected. Losses have occured due the recorder not surviving an accident or by reason of it having failed before the event. A few suggestions are made as to what might be needed in the future, such as video recording or a sudden event detector. Author

Aircraft Accident Investigation; Data Processing; Error Analysis

19980011004 Bureau of Air Safety Investigation, Canberra, Australia

Development of New Standards and Recommended Practices

Mayes, Paul, Bureau of Air Safety Investigation, Australia; Recording Aircraft Accident Data Proceedings; 1997, pp. 9.1-10.7; In English; Also announced as 19980010998; Copyright; Avail: Issuing Activity (The Royal Aeronautical Society, 4 Hamilton Place, London, W1V 0BQ, UK), Hardcopy, Microfiche

The International Civil Aviation Organisation's (ICAO) Standards and Recommended Practices for flight recording and the carriage of flight recorders are contained in Annex 6 and Annex 13. Annex 13 specifically deals with accident investigation and in 1992 ICAO held a major divisional meeting in Montreal to discuss numerous issues dealing with accident investigation. The meeting raised many technical issues relating to flight recording which could not be addressed at the divisional meeting. The meeting therefore agreed to the formation of a panel of experts to deal with the flight recording matters which had been raised and to conduct a full review of the ICAO Standards and Recommended Practices. The panel (FLIRECP) of 34 participants from 17 States and Organisations met in March 1995 for ten days The panel began by reviewing the current ICAO regulations and comparing them with the current national regulations. Since the last update of the flight recorder Annexes, there had been several important technological advances in aircraft design and systems, and in flight recording technology, and the panel reviewed the impact of these advances. Specific issues which were considered in detail included video recording and data link communications associated with CNS/ATM (FANS). The panel developed thirty recommendations for changes to Standards and Recommended Practices (SARPs) which were submitted to the Air Navigation Commission. The ICAO States were invited to comment on the amendments in 1996 and the modified SARPS will be approved for application in 1998.
Author

Standards; Regulations; Procedures; Flight Recorders; Accident Investigation

19980011005 Penny and Giles Aerospace Ltd., Christchurch, UK

Fire and Crash Protection

Barr, David, Penny and Giles Aerospace Ltd., UK; Recording Aircraft Accident Data Proceedings; 1997, pp. 11.1-11.7; In English; Also announced as 19980010998; Copyright; Avail: Issuing Activity (The Royal Aeronautical Society, 4 Hamilton Place, London, W1V 0BQ, UK), Hardcopy, Microfiche

The objective of this paper is to give the reader who is not familiar with the subject a general insight into how vital cockpit voice and flight data information is protected from the effects of aircraft crashes. It discusses the requirements imposed by regulations for protection of cockpit voice and flight data recorders, the techniques employed to protect the recording medium from the effects of fire and crashes, and the methods used to demonstrate compliance with the regulations. The paper describes the techniques used in general terms only, because the details of the methods that companies use to protect their recorders vary, and the designs are often proprietary to the company and regarded as confidential.
Author

Aircraft Accidents; Flight Recorders; Fire Prevention; Data Recorders

19980011007 British Airways, Heathrow Airport, Middlesex, UK

Managing the Systems

Smith, Robert, British Airways, UK; Recording Aircraft Accident Data Proceedings; 1997, pp. 14.1-14.9; In English; Also announced as 19980010998; Copyright; Avail: Issuing Activity (The Royal Aeronautical Society, 4 Hamilton Place, London, W1V 0BQ, UK), Hardcopy, Microfiche

With this paper I hope to provide readers with an insight into some of the problems encountered in managing the flight data recorder systems installed across an airline fleet. An outline of the installed system types on the British Airways fleets is given. This combined with an overview of ongoing regulation changes may help in understanding some of the complexities of managing flight data and cockpit voice recording system upgrades, and the corresponding changes to the data recovery systems used to transcribe recorders. Maintenance techniques for flight data recorder systems can be difficult to define and implement in a cost effec-

tive manner. After a recent accident involving a DC8 cargo aircraft it was found that only three of eleven parameters were working. This is not the first time that mandatory parameters have been found inoperative after an accident. It has even been the case that a new aircraft has been delivered with parameters inoperative. A well thought out maintenance policy is required if the operator is to minimise aircraft downtime whilst satisfying itself that all parameters are being recorded correctly. Control of flight recorder data after any reportable incident is an area where an operator needs to ensure that adequate procedures exist in order to ensure that things happen rapidly and to known procedures. There are areas in which the design and support of FDR and CVR systems could be improved in the future, and suggestions are made at the end of the paper.
Author
Data Recording; Data Management; Flight Recorders; Cockpits

19980011519 Advisory Group for Aerospace Research and Development, Fluid Dynamics Panel, Neuilly-Sur-Seine, France
Ice Accretion Simulation ***La Simulation de l'Accumulation de Glace***
Dec. 1997; 184p; In English
Report No.(s): AGARD-AR-344; ISBN 92-836-1067-9; Copyright Waived; Avail: CASI; A09, Hardcopy; A02, Microfiche

Ice Accretion Simulation is an important issue for flight safety. Every year several incidents happen which can be associated with severe icing problems. Although the bulk of them may be due to human mistakes during flight in icing conditions, some cases remain which are consequences of icing conditions never observed before or of failures not foreseen. Therefore, icing has always attracted great interest from aircraft manufacturers, authorities responsible for certification, and many researchers. The overall goal of the work presented in this report is to improve reliability, to reduce efforts and costs in civil and military aircraft certification/qualification procedures, and to improve civil and military aircraft flight safety. This report covers the effects of ice accretion on wings, tail surfaces, engine inlets, and rotary wings. Experimentally, besides the capability of icing wind tunnel facilities, the problems of spray tanker aircraft experiments are considered, the related similarity laws are examined, and the techniques for measuring droplet size and distribution are reviewed. The basic factors influencing computational predictions are discussed in detail, especially factors such as surface roughness and surface heat transfer. In addition to the 2D prediction methodology, the status of extensions to 3D is presented. An essential aim of a planned follow-on activity should be to establish some well-documented reference cases by suitable in-flight experiments, and to calibrate prediction tools and experimental facilities and techniques for those reference cases.
Author
Ice Formation; Simulation; Flight Safety; Reliability; Costs; Civil Aviation; Prediction Analysis Techniques; Attack Aircraft

19980011540 European Organization for the Safety of Air Navigation, Experimental Centre, Bretigny-sur-Orge, France
Space System Safety Case. Supporting Information, Volume 3
Cottam, M. P., European Organization for the Safety of Air Navigation, France; Jun. 1997; 66p; In English
Report No.(s): PB98-114853; EEC-312-Vol-3; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

Volume III of this report forms the third deliverabole of the Impact Study on the introduction of a Space System Safety Case into the Safety Regulation of radio navigation services. This volume presents supporting material addressing background aspects to the application of the Safety Case methodology, its history, its status world-wide, lessons learned from previous experience, a collection of relevant references, etc.
NTIS
Radio Navigation; Satellite Navigation Systems; Civil Aviation; Safety Management; Safety Factors

19980011610 Federal Aviation Administration, Washington, DC USA
Notices to Airmen: Domestic/International
May 22, 1997; 236p; In English
Report No.(s): PB97-173116; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

Contents include the following: Airport Data; Airport Operating Restrictions; Runway Data: (Hard Surface Only); Runway Edge Light Systems; Navigational Facilities; Airport Traffic Control Towers; Flight Service Stations; and Weather.
NTIS
Air Navigation; Runways; Airports; National Airspace System

19980011686 Texas Univ., Center for Transportation Research, Austin, TX USA

Evaluating the Feasibility of Reliever and Floating Hub Concepts When a Primary Airline Hub Experiences Excessive Delays ***Topical Report***

Meyer, E., Texas Univ., USA; Rice, C., Texas Univ., USA; Jaillet, P., Texas Univ., USA; McNerney, M., Texas Univ., USA; Sep. 1997; 136p; In English; Sponsored in part by Southwest Region Univ., Transportation Center, College Station, TX.

Report No.(s): PB98-110745; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

This study intends to evaluate strategies to reassign and optimize airport and airline schedules when experiencing a disruptive disturbance at a major hub airport and still maintain a reasonable service. One such option is to temporarily use a nearby airport to act as a connecting hub, which can help reduce delays caused by a major hub's closure. This airport would be known as a reliever or alternate hub. Another option would be over-flying of the hub and swapping larger aircraft onto other routings throughout the system enabling passengers to connect through alternative hubs. Such a scheme is referred to as a 'floating hub' concept. A network-flow approach is used for the schedule allocation and to quantify the costs of the various operating strategies. Operating decisions such as flight cancellation and aircraft rotation options are optimized using a Generic Algorithm approach. Costs for potential weather delays, additional fuel consumption, infrastructure investment and passenger-delay costs are then compared for all scenarios to evaluate the feasibility of the proposed strategies.

NTIS

National Aviation System; Airports; Hubs; Airline Operations; Alternatives; Evaluation; Feasibility Analysis

19980011982 Ecole Nationale de l'Aviation Civile, Dept. MI, Toulouse, France

Experimentation Results on the ENAC Traffic Simulator, ***1994-1996***

Bosc, J. F., Ecole Nationale de l'Aviation Civile, France; Jul. 1997; 70p; In Mixed; In French

Report No.(s): PB98-114820; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The Team developed a realistic traffic simulator in order to test various algorithms developed by the Team, that deal mainly with AFTM and medium- or short-term conflict resolution. This simulator has been used to study the influence of various parameters on traffic conditions (number of conflicts and clusters), and to evaluate the performance of some automated conflicts resolution methods. The results of these experiments are presented. Some differences with mathematical models have been observed, and some explanations have been proposed.

NTIS

Air Traffic Controllers (Personnel); Simulators; Collision Avoidance; Experimentation

04
AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

19980010263 Tartu Aviation Coll., Tartu, Estonia

Initial Air Traffic Control Training at Tartu Aviation College

Kulbas, Tanel, Editor, Tartu Aviation Coll., Estonia; Journal of Air Transportation World Wide; Nov. 1997; Volume 2, No. 1, pp. 47-54; In English; Also announced as 19980010259; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche

A well developed air traffic control training system is vitally important for guaranteeing flight safety and the efficient provision of air traffic control services. This article provides an overview of the development of an initial air traffic control training program at Tartu Aviation College. Lessons learned from the first two classes of students provide the basis for future improvements in the training program.

Author

Air Traffic Control; Education; Flight Safety

19980010827 Naval Research Lab., Washington, DC USA

Quantic Global Positioning System Timing Receiver Live Static Test

Powers, Edward D., Naval Research Lab., USA; Jone, Edward C., Naval Research Lab., USA; Brad, Jimmie, Naval Research Lab., USA; Dec. 02, 1997; 31p; In English

Report No.(s): AD-A332332; NRL/MR/8150--97-8117; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The GPS Program Offices, Los Angeles Air Force Base, California, has established a Center of Expertise (COE) comprised of several agencies, each providing unique GPS test capabilities for the purpose of developing a Commercial Receiver Test Program (CRTP). The Responsible Test Organization (RTO) for the COE is the 746th Test Group, 46th Guidance Test Squadron,

Holloman Air Force Base, New Mexico. The Naval Research Laboratory (NRL) has been designed as a COE with the responsibility of testing the time output characteristics and accuracy of the commercial receivers. The NRL clock testing facility has time traceable to the U.S. Naval Observatory and the procedure used are taken from the CORE INS/GR/EGI TEST PLAN prepared by RTO.
DTIC
Global Positioning System; Static Tests; Radio Receivers

19980010830 Army Test and Evaluation Command, Aberdeen Proving Ground, MD USA
Test Operations Procedure (TOP) 3-2-046, Land Navigation and Positioning Systems ***Final Report***
Jul. 31, 1997; 45p; In English
Report No.(s): AD-A332563; TOP-3-2-046; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This Test Operation Procedure (TOP) describes procedures tor conducting technical performance tests of land navigation and positioning systems. It is modeled around the Modular Azimuth Positioning System Hybrid (MAPS Hybrid) but is applicable to all land based navigation systems including those using the Global Position System (GPS). This TOP incorporates procedures that require automated data collection instrumentation and a reference system that will provide medium to high position/attitude accuracy.
DTIC
Global Positioning System; Performance Tests; Position Errors; Positioning; Attitude (Inclination)

19980010925 Federal Aviation Administration, Technical Center, Atlantic City, NJ USA
Mode S Beacon System Enroute Configuration Interim Beacon Initiative (IBI) Mode Operational Test and Evaluation (OT&E) Test Report
Starkman, Joseph J., Federal Aviation Administration, USA; Karitis, Paul, Federal Aviation Administration, USA; Sep. 1997; 82p; In English
Report No.(s): AD-A331655; DOT/FAA/CT-TN95/61; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
This document reports the findings of the operational evaluation tests conducted on the Interim Beacon Initiative (IBI) mode, enroute configuration of the Mode Select Beacon System (Mode S) . The tests were conducted at the Parker radar facility in Denver, Colorado, site of the first enroute Mode S system delivery. The Mode S system under test was a fully configured, dual-channel sensor having all required external interfaces connected to actual National Airspace System (NAS) equipment. A combination of system optimization, surveillance performance evaluation, and operational suitability testing were performed as part of this Operational Test and Evaluation (OT&S) effort. Test goals were to ensure proper operation of the Mode S sensor in IBI mode for an enroute configuration, while integrated with appropriate NAS equipment. The tests were conducted in accordance with procedures for OT&E stated in FAA Order 1810.4B. The format of this test report is in accordance with FAA-STD-024b.
DTIC
Search Radar; Radar Beacons; Evaluation; Performance Tests; Air Traffic Control

19980011321
Long baseline testing of a GPS based, autonomous event time-tagging system
Pryke, Clement L., Univ. of Leeds, UK; Nuclear Instruments & Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment; July 21, 1997; ISSN 0168-9002; Volume 394, no. 3, pp. 420-422; In English; Copyright; Avail: Issuing Activity
Testing of two prototype event time-tagging systems over a baseline of 11 km is described. The systems make use of commercial, low-cost Global Positioning Satellite (GPS) receiver modules. An L-band, bi-directional phase transfer system was used to generate test signals.
Author (EI)
Global Positioning System; Radio Receivers; Equipment

19980011486
Distributed computation of dynamic traffic equilibria
Wisten, M. B., Univ. of York, UK; Smith, M. J.; Transportation Research Part C: Emerging Technologies; April, 1997; ISSN 0968-090X; Volume 5, no. 2, pp. 77-93; In English; Copyright; Avail: Issuing Activity
The dynamic traffic assignment problem is formulated in the space of splitting rates rather than link and route flows. A distributed algorithm for computation of dynamic user-equilibria is specified. The algorithm has been implemented on a Meiko Comput-

ing Surface with 32 T800 processors and some numerical results are given. We do not yet have a general proof of convergence for the algorithm but we have been able to demonstrate convergence with all test networks used.
Author (EI)
Transportation; Traffic Control; Algorithms; Computers; Distributed Processing

19980011487
Design and implementation of parallel time-dependent least time path algorithms for Intelligent Transportation Systems applications
Ziliaskopoulos, A., Northwestern Univ., USA; Kotzinos, D.; Mahmassani, H. S.; Transportation Research Part C: Emerging Technologies; April, 1997; ISSN 0968-090X; Volume 5, no. 2, pp. 95-107; In English; Copyright; Avail: Issuing Activity

The development of Intelligent Transportation Systems (ITS) and the resulting need for real-time traffic management and route guidance models require fast shortest-path algorithms that can account for the dynamics of traffic networks. The objective of this paper is to introduce parallel designs for time-dependent shortest-path algorithms that can be used in real-time ITS applications. In this paper, two shared-memory and one message-passing algorithms are designed, implemented, coded and computationally tested on actual and random networks. The reported tests are performed on CRAY supercomputers, but the algorithms can be readily ported to lower-end multiprocessor machines.
Author (EI)
Time Dependence; Transportation; Traffic Control; Algorithms; Mathematical Models; Supercomputers

19980011488
Parallel tabu search heuristic for the vehicle routing problem with time windows
Badeau, Ph., Universite Blaise Pascal, France; Guertin, F.; Gendreau, M.; Potvin, J. -Y.; Taillard, E.; Transportation Research Part C: Emerging Technologies; April, 1997; ISSN 0968-090X; Volume 5, no. 2, pp. 109-122; In English; Copyright; Avail: Issuing Activity

The vehicle routing problem with time windows models many realistic applications in the context of distribution systems. In this paper, a parallel tabu search heuristic for solving this problem is developed and implemented on a network of workstations. Empirically, it is shown that parallelization of the original sequential algorithm does not reduce solution quality, for the same amount of computations, while providing substantial speed-ups in practice. Such speed-ups could be exploited to quickly produce high quality solutions when the time available for computing a solution is reduced, or to increase service quality by allowing the acceptance of new requests much later, as in transportation on demand systems.
Author (EI)
Heuristic Methods; Transportation; Computers; Distributed Processing; Workstations; Algorithms

19980012000 Naval Postgraduate School, Monterey, CA USA
Asynchronous Data Fusion for AUV Navigation Using Extended Kalman Filtering
Thorne, Richard L., Naval Postgraduate School, USA; Mar. 1997; 166p; In English
Report No.(s): AD-A331863; NPS-ME-97-003; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

A truly Autonomous Vehicle must be able to determine its global position in the absence of external transmitting devices. This requires the optimal integration of all available organic vehicle attitude and velocity sensors. This thesis investigates the extended Kalman filtering method to merge asynchronous heading, heading rate, velocity, and DGPS information to produce a single state vector. Different complexities of Kalman filters, with biases and currents, are investigated with data from Florida Atlantic's Ocean Explorer 2 surface run. This thesis used a simulated loss of DGPS data to represent the vehicle's submergence. All levels of complexity of the Kalman filters are shown to be much more accurate then the basic dead reckoning solution commonly used aboard autonomous underwater vehicles.
DTIC
Multisensor Fusion; Kalman Filters; Underwater Vehicles

05
AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

19980009628 Air Command and Staff Coll., Maxwell AFB, AL USA
Strikestar 2025 ***Topical Report***
Carmichael, Bruce W., Air Command and Staff Coll., USA; Devne, Troy E., Air Command and Staff Coll., USA; Kaufman, Robert J., Air Command and Staff Coll., USA; Pence, Patrick E., Air Command and Staff Coll., USA; Wilcox, Richard S., Air Command and Staff Coll., USA; Aug. 1996; 90p; In English
Report No.(s): AD-A332349; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

We examined unmanned aerial vehicles (UAV), knowing that similar research had produced naysayers and even some active hostility. However, we are genuinely concerned for future modernization efforts as budgets and manpower decrease. We came to an early conclusion that manned vehicles provide a flexibility and level of accountability far beyond that of unmanned vehicles. But considering our changing world, the use of unmanned vehicles for missions beyond reconnaissance is both technically feasible and cost-attractive. We envision the UAV proposed here to be a force multiplier for the air and space warrior - a new tool in the warrior's arsenal.
DTIC
Unmanned Spacecraft; Pilotless Aircraft; Military Technology

19980009825 SRI International Corp., Menlo Park, CA USA
Advanced Armor Technology: Application Potential for Engine Fragment Barriers for Commercial Aircraft ***Final Report***
Shockey, D. A., SRI International Corp., USA; Giovanola, J. H., SRI International Corp., USA; Simons, J. W., SRI International Corp., USA; Erich, D. C., SRI International Corp., USA; Klopp, R. W., SRI International Corp., USA; Sep. 1997; 78p; In English; Original contains color illustrations
Report No.(s): PB98-108418; SRI-PYU-7412; No Copyright; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

On rare occasions, aircraft turbine engines fail catastrophically and send into the aircraft fragments that disrupt control, fuel, and propulsion systems and jeopardized the ability of the aircraft to land safely. to enhance the survivability of commercial aircraft in the event of an uncontained turbine engine failure, the Federal Aviation Administration (FAA) is sponsoring a research program aimed at protecting components of the aircraft that are critical to continued safe flight and landing. As a member of the FAA contractor team, SRI International is attempting to identify technology transfer opportunities for aircraft engine fragment barriers by surveying the recent advances in Department of Defense (DOD) armor structures. This report reviews the current state of military armor technology and identifies concepts, materials, and designs that may be useful in developing engine fragment barriers with low added weight and cost. Based on the findings, fragment barrier designs are postulated. Their feasibility has begun to be evaluated by performing fragment impact calculations and experiments. This work has confirmed high-strength polymer fibers as the advanced material most appropriate for protecting aircraft from engine fragments and has identified three particular polymers (fibers of aramids, polyethylenes, and polybenzodazole) as having the prerequisite of low density and high strength. Furthermore, these materials appear to have sufficient flame resistance, water absorption resistance, and thermal and acoustic insulation properties to serve as building blocks for barriers. The next step is to design practical barriers from these fibers.
NTIS
Commercial Aircraft; Aircraft Engines; Aircraft Safety; Gas Turbine Engines; Technology Transfer; Aramid Fibers; Polyethylenes

19980010024 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA
Cost Per Flying Hour Analysis of the C-141
Omlor, Christopher J., Air Force Inst. of Tech., USA; Sep. 1997; 82p; In English
Report No.(s): AD-A329936; AFIT/GTM/LAL/97S-7; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This paper sought to examine if DoD's current transfer pricing method places AMC in a price competitive position with the government commercial rates and promotes managers to make the best decisions. Attention was paid to the stated customer concerns that current transfer pricing methods incorporate overhead and sunk costs that are not attributable to routine movement of peacetime cargo and could make AMC non price competitive with commercial vendors. The findings are that AMC currently uses full cost transfer pricing, as required by DoD policy, that includes significant overhead and sunk costs associated with its wartime responsibilities. The full cost method of transfer pricing is not in congruence with the generally accepted accounting practices and the private sector position that, with excess capacity and no outside market, a unit should transfer price at variable cost. The

current cost per flying hour is inflated by fixed costs, primarily overhead and sunk cost, by 6O.47 percent. This means the CPFH is 2.5 times greater than the cost that AMO in curs for operating a peacetime mission.
DTIC
C-141 Aircraft; Congruences; Cargo; Costs

19980010422 NASA Washington, Washington, DC USA
X-33 Development History ***Progress Report No. 4***
Butrica, Andrew J., NASA Washington, USA; Dec. 15, 1997; 7p; In English
Contract(s)/Grant(s): NASw-97005
Report No.(s): NASA/CR-97-206438; NAS 1.26:206438; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
The problem of dealing with various types of proprietary documents, whether from the Lockheed Martin, the Skunk Works, McDonnell Douglas, Rockwell, and other corporations extant or extinct, remains unresolved. The computerized archive finding aid has over 100 records at present. These records consist of X-33 photographs, press releases, media clippings, and the small number of X-33 project records collected to date.
Author
Computer Storage Devices; Computer Systems Programs; Data Processing

19980010900 Naval Postgraduate School, Monterey, CA USA
Development of a Dynamic Model for a UAV
Papageorgiou, Evangelos C., Naval Postgraduate School, USA; Mar. 1997; 116p; In English
Report No.(s): AD-A331969; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche
Moments of inertia were experimentally determined and the longitudinal and lateral/directional static and dynamic stability and control derivatives were estimated for a fixed wing Unmanned Air Vehicle (UAV). High fidelity, non-linear equations of motion were derived and tailored for use on the specific aircraft. Computer modeling of these resulting equations w as employed both in Matlab/Simulink and in Matrix(sub x)/Systembuild. The resulting computer model was linearized at a specific flight condition, and the dynamics of the aircraft were predicted. Several flight tests were conducted at a nearby airfield and the behavior of the aircraft was compared to that of the computer model. The longitudinal dynamics as depicted by the short period mode were found to be almost identical with those predicted by the non-linear computer model. The phugoid mode was also observed and found to be in close agreement. In the lateral/directional dynamics, flight test was employed to improve the model and the parameters were modified to obtain a better math. Ultimately a reasonably accurate non-linear model was achieved as required for purposes of control and navigation system design.
DTIC
Moments of Inertia; Mathematical Models; Static Stability; Dynamic Stability; Flight Tests; Pilotless Aircraft; Directional Stability

19980010907 Washington Univ., Dept.of Mechanical Engineering, Saint Louis, MO USA
Multidisciplinary Rotorcraft Analysis and Simulation, ***1 Sep. 1994 - 31 Aug. 1997***
Peters, David A., Washington Univ., USA; Nov. 03, 1997; 7p; In English
Contract(s)/Grant(s): DAAHO4-94-G-0351
Report No.(s): AD-A332119; ARO-33853.12-EG-DPS; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
This three-year grant is now completed, although an augmentation grant is still continuing the work along new lines. In this grant, we developed the analysis and simulation tools necessary to treat rotorcraft design problems when the rotorcraft has unsteady or unknown RPM. The tools developed include a Fast Floquet theory that can be applied to rotorcraft with multiple rotors and unknown RPM, a new spatially based Fourier Series Method, several types of auto pilots and discrete auto pilots, and hybrid combinations of methods. The work also developed a mathematical theory of trim that includes unsteady and unknown RPM in the development as well as numerical and experimental test beds on which to test new methods.
DTIC
Rotary Wing Aircraft; Design Analysis; Computerized Simulation; Rotary Wings

19980010947 Pennsylvania State Univ., University Park, PA USA
Vibration, Stability, and Transient Response of Helicopters with Elastically Tailored Composite Rotor Blades ***Final Report, Jun. 1994 - 31 May 1997***
Smith, Edward C., Pennsylvania State Univ., USA; Sep. 29, 1997; 5p; In English
Contract(s)/Grant(s): DAAH04-94-C-0206

Report No.(s): AD-A331972; ARO-32145.4-EG-YIP; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Aeroelastically tailored composite rotor blades offer significant potential for improved stability, reduced vibration, simplified hub design, and improved handling qualities of rotorcraft. Development of new analytical tools to predict the complex dynamic behavior of these rotor systems is essential to the integration of tailored blade technology into next generation rotorcraft systems. The focus of the present work has been: (1) Advancements in analysis methods for open section composite beams, subject to warping restraint effects, (2) Advancement in cross-sectional modeling of thick-walled composite blade sections, (3) Development and application of an aeroelastic analysis for investigation of composite elastic tailoring for stall alleviation and vibration reduction.
DTIC

Stability; Transient Response; Dynamic Characteristics; Vibration Damping; Rotary Wings

19980010971 Army Command and General Staff Coll., Fort Leavenworth, KS USA

Is There a Role for Modern Day Seaplanes in Open Ocean Search and Rescue?

Brown, David R., Army Command and General Staff Coll., USA; Jun. 07, 1997; 86p; In English

Report No.(s): AD-A331533; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This thesis reviews the use of the amphibious airplane in open ocean search and rescue, and examines the applicability of a seaplane to future ocean rescue operations. The author examines the history of amphibious aircraft and why they are no longer in use by the U.S. military, including the Coast Guard. Then a comprehensive review of open ocean search and rescue missions conducted by the U.S. Coast Guard between 1993 and 1995 is used to analyze and predict whether the use of seaplanes by U.S. search and rescue agencies would save additional lives over the current methods in the open ocean environment.
DTIC

Seaplanes; Rescue Operations; Amphibious Aircraft

19980011657 Naval Postgraduate School, Monterey, CA USA

Analysis of Potential Structural Design modifications for the Tail Section of the RAH-66 Comanche Helicopter

Tobin, Vincent M., Naval Postgraduate School, USA; Jun. 1997; 117p; In English

Report No.(s): AD-A331748; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

The Army RAH-66 Comanche Helicopter made its first flight in January of 1996. Its current structural configuration, however, does not meet the Army's requirements for radar signature. Structural configurations of the tailcone that meet radar cross-section requirements tend to lack sufficient structural stiffness due to the presence of Kevlar in place of graphite on the outer mold line. This thesis investigates potential structural design modifications to the Comanche tailcone that would move the design closer to meeting both its structural and radar signature requirements. Structural geometry modifications with baseline (current configuration) materials increased torsional stiffness by nine percent. Geometry modifications using radar signature-compliant materials reduced torsional stiffness by 10 percent. The geometry changes analyzed produce structural performance improvements insufficient to allow the use of radar-compliant materials without further geometry changes.
DTIC

Structural Analysis; Helicopters; Structural Design; Tail Assemblies

07
AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft.

19980009416 Illinois Inst. of Tech., Fluid Dynamics Research Center, Chicago, IL USA

Application of Micro Electro-Mechanical Sensors and Activators in the Investigation of Supersonic Jet Screech *Final Report, 1 Sep. 1995 - 30 Jul. 1997*

Nagib, Hassan, Illinois Inst. of Tech., USA; Papp, Joe, Illinois Inst. of Tech., USA; Naguib, Ahmed, Illinois Inst. of Tech., USA; Jul. 30, 1997; 14p; In English

Contract(s)/Grant(s): F49620-93-I-0459

Report No.(s): AD-A330601; AFOSR-TR-97; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

An investigation aimed at examining the usability of MEMS based actuators for controlling supersonic jet screech has been conducted. First, documentation of the screech phenomenon in the newly constructed high speed jet facility (HSJF) at IIT has been completed. Results from microphone measurements complemented with earlier shadowgraph and schlieren visualization have shown that the screech characteristics in the HSJF conforms with that published in the literature. Second, detailed investigation

of the first generation MEMS actuators showed that the actuators could not operate for speeds higher than 70 m/s while maintaining contact with the jet shear layer. This was attributed to the bending moment acting on the actuator due to flow loading on the overhanging head portion of the device. This observation was confirmed utilizing a special headless actuator design. The outcome of the tests of the first generation devices guided the development of a second generation of actuators. Those actuators, which are also described within this report, are currently being evaluated.
DTIC
Electromechanical Devices; Shadowgraph Photography; Shear Layers; Supersonic Jet Flow; Bending Moments

19980009645 International Trade Administration, Washington, DC USA
Industry and Trade Summary: Aircraft and Reaction Engines, Other Gas Turbines and Parts
Mar. 1994; 29p; In English
Report No.(s): PB97-211692; USITC/PUB-2746; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This summary will discuss key aspects of the global industry that produced aircraft and reaction (rocket) engines, nonaircraft gas turbines, and parts of these engines during 1988-92. The reports is organized into three major sections: U.S. and foreign industry profiles; U.S. and foreign tariffs and nontariff measures; and U.S. performance in domestic and foreign markets. In addition, appendices provide information explaining tariff and trade agreements and highlight trade statistics. The products covered by this summary include aircraft and nonaircraft gas turbines, piston engines designed for aircraft, reaction engines, and parts for all these engines. An aircraft engine, which may be either piston-type or gas-turbine, is used to create forward movement in aircraft. The reaction engines covered here include engines other than turbojets design principally for use in rockets. The nonaircraft gas turbines covered herein are used for stationary power needs, such as the generation of electricity, industrial cogeneration, and mechanical drive applications.
NTIS
Aircraft Engines; Rocket Engines; Turbojet Engines; Piston Engines; Gas Turbines; Mechanical Drives

19980010521 Williams International, Walled Lake, MI USA
General Aviation Propulsion (GAP) Program, Turbine Engine System Element, *2 Dec. 1996 - 30 Sep. 1997*
Oct. 06, 1997; 12p; In English
Contract(s)/Grant(s): NCC3-514
Report No.(s): NASA/CR-97-206730; NAS 1.26:206730; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The goal of the General Aviation Propulsion (GAP) Program Turbine Engine System Elements is to conduct a shared resource project to develop an affordable gas turbine engine for use on 4 to 6 place, light aircraft that will lead to revitalization of the general aviation industry in the USA, creating many new, high-quality jobs.
Author
Gas Turbine Engines; Product Development; Propulsion System Performance

19980010718
Optimization of air-breathing propulsion engine concept
Patnaik, S. N., Ohio Aerospace Inst., USA; Lavelle, T. M.; Hopkins, D. A.; Communications in Numerical Methods in Engineering; August, 1997; ISSN 1069-8299; Volume 13, no. 8, pp. 635-641; In English; Copyright; Avail: Issuing Activity
The design optimization of air-breathing propulsion engine concepts has been accomplished by soft-coupling the NASA Engine Performance Program (NEPP) analyser with the NASA Lewis multidisciplinary optimization tool COMETBOARDS. Engine problems, with their associated design variables and constraints, were cast as non-linear optimization problems with thrust as the merit function. Because of the large number of mission points in the flight envelope, the diversity of constraint types, and the overall distortion of the design space, the most reliable optimization algorithm available in COMETBOARDS, when used by itself, could not produce satisfactory, feasible, optimum solutions. However, COMETBOARDS' unique features - which include a cascade strategy, variable and constraint formulations, and scaling devised especially for difficult multidisciplinary applications- successfully optimized the performance of subsonic and supersonic engine concepts. Even when started from different design points, the combined COMETBOARDS and NEPP results converged to the same global optimum solution. This reliable and robust design tool eliminates manual intervention in the design of air-breathing propulsion engines and eases the cycle analysis procedures. It is also much easier to use than other codes, which is an added benefit. This paper describes COMETBOARDS and

its cascade strategy and illustrates the capabilities of the combined design tool through the optimization of a high-bypass-turbofan wave-rotor-topped subsonic engine and a mixed-flow-turbofan supersonic engine.
Author (EI)
Air Breathing Engines; Engine Design; Turbofan Engines; Life Support Systems; Spacecraft Environments; Ventilation; Fans; Spacecraft Propulsion

19980010882 Virginia Polytechnic Inst. and State Univ., Dept. of Mechanical Engineering, Blacksburg, VA USA
Experimental and Numerical Studies of Unsteady Heat Transfer in a Transonic Turbine ***Final Report, 1 Jul. 1994 - 30 Jun. 1997***
Ng, Wing, Virginia Polytechnic Inst. and State Univ., USA; Sep. 1997; 182p; In English
Contract(s)/Grant(s): F49620-94-I-0367
Report No.(s): AD-A332574; AFOSR-97-0590TR; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

The effects of a shock wave passing through a blade passage on surface heat transfer to turbine blades were measured experimentally. The experiments were performed in a transonic linear cascade which matched engine Reynolds number, Mach number, and shock strength. Unsteady heat flux measurements were made with Heat Flux Microsensors on both the pressure and suction surfaces of a single blade passage. Unsteady static pressure measurements were made using Kulite pressure transducers on the blade surface and end wails of the cascade. The experiments were conducted in a stationary linear cascade of blades with heated transonic air flow using a shock tube to introduce shock waves into the cascade. A time-resolved model based on conduction in the gas was found to accurately predict heat transfer due to shock heating measured during experimental tests without flow. The model under-predicted the experimental results with flow, however, by a factor of three. The heat transfer increase resulting from shock passing in heated flow averaged over 200 us (typical blade passing period) was found to be a maximum of 60% on the pressure surface near the leading edge. Based on experimental results at different flow temperatures, it was determined that shock heating has the primary effect on heat transfer, while heat transfer increase due to boundary layer disturbance is small.
DTIC
Shock Waves; Turbine Blades; Transonic Flow; Gas Turbines; Shock Heating; Boundary Layer Stability; Experimentation; Turbulent Heat Transfer

19980010887 Ecole Centrale de Lyon, Ecully, France
Boundary Layer Measurements on the Pressure and Suction Sides of an Inlet Guide Vane Turbine Blade
Bario, F., Ecole Centrale de Lyon, France; Beral, C., Ecole Centrale de Lyon, France; 1996; 12p; In English
Report No.(s): PB96-175179; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Though numerous gas turbines have been used worldwide for over half a century, the flow on the turbine blades is not yet completely understood and consequently difficult to predict. In a first approximation, the heat transfer depends on the boundary layer state. Its calculation is one of the main objectives of a turbine designer. Precise calculation is needed to achieve high efficiency engines. If it is now possible to compute laminar or turbulent boundary layers with good accuracy (except in particular cases such as strong separation...), transition is always difficult to compute as it is the birth of turbulence. Laser Doppler measurements of shear stress, normal and streamwise mean and fluctuating velocities of the pressure and suction side boundary layers on an inlet guide vane turbine blade have been made for two turbulence levels.
NTIS
Gas Turbines; Turbine Blades; Laminar Boundary Layer; Turbulent Boundary Layer; Shear Stress; Heat Transfer

08
AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

19980010110 Duke Univ., Dept. of Mechanical Engineering and Materials Science, Durham, NC USA
Control of Nonlinear Behavior: Experiments ***Final Report, 10 Jun. 1993 - 9 Sep. 1996***
Virgin, L. N., Duke Univ., USA; Dowell, E. H., Duke Univ., USA; Aug. 1997; 7p; In English
Contract(s)/Grant(s): F49620-93-I-0382
Report No.(s): AD-A329707; AFOSR-97-0441TR; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The full effects of the problem of control surface freeplay in an aeroelastic system are examined in the context of a three degree of freedom aeroelastic typical section. A computationally efficient numerical model of the nonlinear system is presented, in which the control surface freeplay is modeled as a system of piecewise linear state space models. The system response is determined

by time marching of the governing equations using a standard Runge Kutta algorithm in conjunction with Henon's method for integrating a system of equations to a prescribed surface of phase space section. An experimental model which closely approximates the three degree of freedom typical section in two-dimensional, incompressible flow has been created to validate the theoretical model. Consideration is also given to modeling realistically the structural damping present in the experimental system. Limit cycle oscillations are studied numerically and experimentally. The numerical model ca ptures the full range of nonlinear behavior present in the physical system, including decaying oscillations, limit cycles, quasiperiodicity, nonperiodicity, possible chaos and divergent flutter.
DTIC
Aeroelasticity; Control Surfaces; Degrees of Freedom; Dynamic Structural Analysis; Incompressible Flow; Mathematical Models; Nonlinear Systems; Structural Vibration; Two Dimensional Flow

19980010835 University of Southern California, Los Angeles, CA USA
ASSERT Supplement: Robust Control Methods ***Final Report, 1 Sep. 1993 - 31 Aug. 1997***
Safonov, Michael G., University of Southern California, USA; Sep. 30, 1997; 7p; In English
Contract(s)/Grant(s): F49620-93-I-0505
Report No.(s): AD-A332156; AFOSR-97-0617TR; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
This is the final report for research supported under AASERT Grant F49620-93-1-0505 during the period September 1, 1993 through August 31, 1997. This grant supplemented AFOSR Grant F49620-92-J-0014 by providing support for U.S. citizen graduate research assistants. This report summarizes the research achievements that have been made possible by this additional support during the period September 1, 1993 through August 31, 1997. The goal of the research has been to develop theory and engineering methods to facilitate the design of aerospace control systems with a robust tolerance to modeling uncertainty, including nonlinearity, disturbances and unmodelled dynamical perturbations. During the period of the AASERT grant, research effort was broadly focused on developing the theory of extending class of solvable robust control problems and on developing a theory to accommodate the issues that arise in going from experimental data to robust control designs. Significant progress was achieved in advancing the Bilinear Matrix Inequality (BMI) and the Unfalsified Control formulations of robust control problems. Missile and spacecraft design studies demonstrated the potential of these methods.
DTIC
Control Systems Design; Aerospace Systems

19980010875 Naval Postgraduate School, Monterey, CA USA
Nonlinear Analysis of Coupled Roll/Sway/Yaw Stability Characteristics of Submersible Vehicles
Tsamilis, Sotirios E., Naval Postgraduate School, USA; Mar. 1997; 84p; In English
Report No.(s): AD-A331440; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
The problem of coupled roll, sway, and yaw stability analysis of submersible vehicles is analyzed, with particular emphasis on nonlinear studies. Previous results had indicated that a primary loss of stability is through the development of limit cycles. This loss of stability is due to the coupling of roll into sway and yaw and cannot be predicted by considering the uncoupled dynamics. In this study, it is shown that the mechanism of loss of stability is through bifurcations to periodic solutions. These are characterized as either subcritical or supercritical, depending on the sign of a certain nonlinear coefficient. Implications of these results to vehicle performance and operations are discussed.
DTIC
Stability; Stability Tests; Symbols; Underwater Vehicles; Yaw

19980010888 Wright Lab., Air Force Materiel Command, Wright-Patterson AFB, OH USA
Progress and New Techniques in Buffet Alleviation ***Final Report, Oct. 1994 - Sep. 1997***
Calarese, Wladimiro, Wright Lab., USA; Turner, Elijah, Wright Lab., USA; Sep. 1997; 76p; In English
Contract(s)/Grant(s): AF Proj. 2402
Report No.(s): AD-A331987; WL-TM-97-3084; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche
Research for twin-tail buffet alleviation is centered on ground tests, wind tunnel tests, and computational fluid dynamics (CFD) analysis. The objective of the research is to improve present technology to obtain a significant reduction in vibration due to buffet. One of the techniques for active control of buffet is the use of smart structures with piezoelectric actuators. The actuators are embedded in the vertical tails in the most advantageous locations to reduce the response of the various structural modes of vibration due to buffet excitation. Ground and wind tunnel tests are necessary to ascertain the piezoelectric actuator's authority at full loads. It is also necessary to evaluate the increase in weight compared with the increase in damping. The results using two different types of piezoelectric actuators are encouraging. In-house wind tunnel tests on a 4.7% scale model of an F-15C aircraft

were also conducted to ascertain the effects of tangential blowing and piezoelectric actuators. The tests were performed in the SARL (Subsonic Aerodynamics Research Laboratory) wind tunnel. Tangential blowing had some effect at lower angles of attack. A numerical investigation was conducted simultaneously. This report presents an overview of the buffet research at various organizations, results of the in-house wind tunnel test, and a summary of the computational effort.
DTIC
Aerodynamic Stability; Wind Tunnel Tests; Technologies; Ground Tests; Computational Fluid Dynamics; Vibration; Buffeting; Drag Reduction

19980011314
Similitude relations for buffet and wing rock on delta wings
Mabey, D. G., Imperial Coll., UK; Progress in Aerospace Sciences; 1997; ISSN 0376-0421; Volume 33, no. 7-8, pp. 481-511; In English; Copyright; Avail: Issuing Activity

Vortex flow phenomena at high angles of incidence are of great interest to the designers of advanced combat aircraft. The steady phenomena (such as steady lift and pitching moments) are understood fairly well, whereas the unsteady phenomena are still uncertain. This paper addresses two important unsteady phenomena on delta wings. With regard to the frequency parameter of the quasi-periodic excitation caused by vortex bursting, a new correlation is established covering a range of sweep back from 60 to 75 deg. With regard to the much lower frequency parameter of limit-cycle rigid-body wing-rock, a new experiment shows conclusively that although the motion is non-linear, the frequency parameter can be predicted by quasi-steady theory. As a consequence, for a given sweep angle, the frequency parameter is inversely proportional to the square root of the inertia in roll. This is an important observation when attempting to extrapolate from model tests in wind tunnels to predict the wing-rock characteristics of aircraft.
Author (EI)
Delta Wings; Wing Rock; Wings; Vortices; Aircraft Configurations; Correlation; Parameter Identification

19980011665 Naval Surface Warfare Center, Dahlgren, VA USA
Terminal Guidance with a Side-Mounted Sensor against a Stationary Target
Groves, G. W., Naval Surface Warfare Center, USA; Khodary, A., Naval Surface Warfare Center, USA; Dec. 1997; 31p; In English
Report No.(s): AD-A332816; NSWCDD/TN-97/190; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Terminal guidance under the constraints that (i) the heading error must be greater than a specified angle (in order that the sensor see the target), and (ii) the magnitude of the lateral acceleration is limited, is studied. Only the kinematic features of flight are considered. It is demonstrated that a planar trajectory is as good as any for the purpose of hitting a stationary target on the ground. In order to hit, or come close to the target, the final segment of terminal flight must violate the heading-error constraint, during which time the target is invisible. If there is an additional condition (iii) that the missile must remain above the target (e.g., for imaging) during terminal descent, the optimum trajectory is a conic spiral. As in the previous case, there is a final segment of blind flight. The miss distance depends on the constraints and other parameters of the problem, as well as on the sensor measurement errors. Monte Carlo simulation was used to estimate the miss distance under various conditions.
DTIC
Terminal Guidance; Trajectories; Trajectory Optimization; Missiles

09
RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

19980009320 Florida Univ., Gainesville, FL USA
Control of the NASA Langley 16-Foot Transonic Tunnel with the Self-Organizing Feature Map
Motter, Mark A., Florida Univ., USA; 1998; 143p; In English
Report No.(s): NASA/TM-98-206722; NAS 1.15:206722; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

A predictive, multiple model control strategy is developed based on an ensemble of local linear models of the nonlinear system dynamics for a transonic wind tunnel. The local linear models are estimated directly from the weights of a Self Organizing Feature Map (SOFM). Local linear modeling of nonlinear autonomous systems with the SOFM is extended to a control framework where the modeled system is nonautonomous, driven by an exogenous input. This extension to a control framework is based on the consideration of a finite number of subregions in the control space. Multiple self organizing feature maps collectively model

the global response of the wind tunnel to a finite set of representative prototype controls. These prototype controls partition the control space and incorporate experimental knowledge gained from decades of operation. Each SOFM models the combination of the tunnel with one of the representative controls, over the entire range of operation. The SOFM based linear models are used to predict the tunnel response to a larger family of control sequences which are clustered on the representative prototypes. The control sequence which corresponds to the prediction that best satisfies the requirements on the system output is applied as the external driving signal. Each SOFM provides a codebook representation of the tunnel dynamics corresponding to a prototype control. Different dynamic regimes are organized into topological neighborhoods where the adjacent entries in the codebook represent the minimization of a similarity metric which is the essence of the self organizing feature of the map. Thus, the SOFM is additionally employed to identify the local dynamical regime, and consequently implements a switching scheme than selects the best available model for the applied control. Experimental results of controlling the wind tunnel, with the proposed method, during operational runs where strict research requirements on the control of the Mach number were met, are presented. Comparison to similar runs under the same conditions with the tunnel controlled by either the existing controller or an expert operator indicate the superiority of the method.
Author
Transonic Wind Tunnels; Models; Technologies; Sequential Control

19980009934 NERAC, Inc., Tolland, CT USA
Blowdown Wind Tunnels: Latest Citations from the Aerospace Database
Feb. 1996; In English; Page count unavailable.
Report No.(s): PB96-862792; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche

The bibliography contains citations concerning the design, construction, operation, and performance of blowdown wind tunnels. The use of compressed gas, mechanical piston, or combustion exhaust to provide continuous or short-duration operation from transonic to hypersonic approach velocities is discussed. Also covered are invasive and non-invasive aerothermodynamic instrumentation, data acquisition and reduction techniques, and test reports on aerospace components. Comprehensive coverage of wind tunnel force balancing systems and supersonic wind tunnels are covered in separate bibliographies.
NTIS
Bibliographies; Wind Tunnels; Design Analysis; Performance Prediction

19980009938 NERAC, Inc., Tolland, CT USA
Hypersonic Wind Tunnels: Latest Citations from the Aerospace Database
Feb. 1996; In English; Page count unavailable.
Report No.(s): PB96-862883; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)); US Sales Only, Microfiche

The bibliography contains citations concerning the design, construction, operation, performance, and use of hypersonic wind tunnels. References cover the design of flow nozzles, diffusers, test sections, and ejectors for tunnels driven by compressed air, high-pressure gases, or cryogenic liquids. Methods for flow calibration, boundary layer control, local and freestream turbulence reduction, and force measurement are discussed. Intrusive and non-intrusive instrumentation, sources of measurement error, and measurement corrections are also covered. The citations also include the testing of inlets, nozzles, airfoils, and other components of hypersonic aerospace vehicles. Comprehensive coverage of supersonic and blowdown wind tunnels, and force balance systems for wind tunnels are covered in separate bibliographies.
NTIS
Bibliographies; Wind Tunnels; Hypersonic Wind Tunnels; Design Analysis; Construction; Operations Research; Performance Prediction

19980010230 Naval Surface Warfare Center, Indian Head Div., Indian Head, MD USA
Development of an Electrochemical Waste Treatment Facility
Nauflett, George W., Naval Surface Warfare Center, USA; Farncomb, Robert E., Naval Surface Warfare Center, USA; Second Aerospace Environmental Technology Conference; Mar. 1997, pp. 429-436; In English; Also announced as 19980010184; No Copyright; Avail: CASI; A02, Hardcopy; A06, Microfiche

Electrochemical Oxidation can offer a viable alternative to incineration, landfill, and deep well injection for disposal of harmful chemicals. The U.S. Navy generates about one million pounds of Otto Fuel II waste per year. About two thirds of the waste is liquid and one third of it is solid waste contaminated with the fuel. Otto Fuel II is a three component liquid monopropellant used for torpedo propulsion. The Indian Head Division, Naval Surface Warfare Center has been tasked to conduct a feasibility study

utilizing an indirect electrochemical oxidation process for the destruction of Otto Fuel II waste, and provide technical and engineering support for construction of a full scale disposal facility at the Naval Undersea Warfare Center, Keyport, WA. Indirect electrochemical oxidation of organic materials is facilitated by using metal ions in a mineral acid electrolyte as a regenerative catalyst or mediator. Silver, cobalt, nickel, cerium, magnesium, and iron have been used as regenerative oxidants. Catalyzed Electrochemical Oxidation (CFO), a low temperature and low pressure electrochemical oxidation process developed by Battelle Pacific Northwest Laboratories (PNL) is being examined for use in the destruction of Otto Fuel II Waste. The CEO process uses the regenerative oxidant cerium (Ce(3+) / Ce(4+)) for the treatment of organic waste. Laboratory and bench scale studies showed that Otto Fuel II is readily destroyed by the CEO process. Pilot scale CEO studies are planned to determine the operational requirements for a full scale CEO plant to treat Otto Fuel II waste. A summary of this work will be presented in this paper. The primary focus of the paper centers around the establishment of requirements for a full scale CEO facility.
Author
Electrochemical Oxidation; Waste Treatment; Monopropellants; Waste Disposal; Oxidizers; Metals

19980010614 NERAC, Inc., Tolland, CT USA
Force Balance Systems for Wind Tunnels (Latest Citations from the Aerospace Database)
Feb. 1996; In English; Page count unavailable
Report No.(s): PB96-862735; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the design, installation, and use of force balance systems to measure forces on wind tunnels, test models, or related hardware. External and internal balance systems for subsonic, transonic, supersonic, and hypersonic facilities that operate continuously or intermittently are discussed. Calibration, monitoring, and control of force balances, and the acquisition and reduction of force, load, and moment data during testing are covered. Error sources and measurement corrections are also included. The citations also examine the use of sting-mounted sensors to measure force components, and the effects of stings on the force measurements. Blowdown, supersonic, and hypersonic wind tunnel facilities are covered in separate bibliographies.(Contains 50-250 citations and includes a subject term index and title list.)
NTIS
Bibliographies; Wind Tunnels; Force Distribution

19980010902 Air Command and Staff Coll., Maxwell AFB, AL USA
Automated Civil Engineer Planning and Execution System (ACEPES) ***Topical Report***
Bodner, Bryan J., Air Command and Staff Coll., USA; Bridgewater, Aaron C., Air Command and Staff Coll., USA; Hutchison, Michael W., Air Command and Staff Coll., USA; Myers, Michael K., Air Command and Staff Coll., USA; Scott, Paul L., Air Command and Staff Coll., USA; Scott, Paul L., Air Command and Staff Coll., USA; Apr. 1996; 140p; In English
Report No.(s): AD-A331520; ACSC/DEA/217/96-04; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This research furthers the state of knowledge of automation applications for civil engineering air base planning. Although Air Force Civil Engineers (CE) have historically used new technologies to improve their effectiveness, CE combat support has not yet fully benefited from improvements in automation technology. This study provides facts and recommendations necessary to field automation tools that will enable CE to accomplish beddown planning faster, more accurately, and as an integrated player in C41 battle space operations.
DTIC
Planning; Structural Engineering; Armed Forces

19980011286
Airport paving quality
Mass, Gary R.; Concrete International; September, 1997; ISSN 0162-4075; Volume 19, no. 9, pp. 46-53; In English; Copyright; Avail: Issuing Activity

Concrete control by compressive strength was applied to the Vancouver International Airport expansion project. A quality control/quality assurance program and technical specifications that met the design and construction needs were developed. The flexural-compressive strength relationship and actual concrete production were monitored. Quality control data analysis showed that excellent construction control was achieved and that concrete mix proportions met specification criteria. The coefficient of variation was the same for flexural and compressive strength testing and a 20 percent overdesign factor on compressive strength was advisable in the selection of mix proportions from flexural-compressive strength relationship.
EI
Concretes; Pavements; Airports; Quality Control; Compression Tests; Compressive Strength

19980011609 Naval Surface Warfare Center, Dahlgren Div., Dahlgren, VA USA

Graphite Heating Element Operating Temperature Measurements in the NSWC Hypervelocity Wind Tunnel 9 ***Final Report***

Metzger, Michael A., Naval Surface Warfare Center, USA; Sep. 1997; 51p; In English

Report No.(s): AD-A329681; NSWCDD/TR-97/174; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report documents real-time temperature measurements of a graphite heating element operating in the Naval Surface Warfare Center, Dahlgren Division (NSWCDD) Hypervelocity Wind Tunnel No. 9 facility. Tunnel 9 uses a large graphite element to heat nitrogen gas to 3100 F prior to releasing this gas to the test section, where it achieves hypersonic speeds to Mach 16.5. The present effort focused on obtaining the operating temperature of an uncoated heating element with a view to determine if an oxidation-resistant, silicon-carbide coated, graphite element, of the same size now used in the facility, might be used to batch-heat air in the heating vessel. The reported results appear promising in that the measured peak surface temperature of the element could be held to below 4000 F during a standard heating cycle. The measured temperatures, which were well below the predicted service limits given in this report for the silicon-carbide coating system, suggest that a silicon-carbide coated element concept warrants further study.

DTIC

Graphite; Heating; Temperature Measurement; Hypervelocity Wind Tunnels; Real Time Operation

11
CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; propellants and fuels; and materials processing.

19980009859 NERAC, Inc., Tolland, CT USA

Protection of Aerospace Components: Latest Citations from METADEX

Feb. 1996; In English; Page count unavailable.

Report No.(s): PB96-862727; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning the protection of aerospace components against surface wear and corrosion. Citations focus on surface coatings, including spray, vapor deposition, vacuum, and diffusion coatings technologies. Electrical and chemical plating of surfaces are also covered. Coverage includes pre-treatment of new and corroded surfaces to promote adhesion and bonding, testing of protected surfaces to assess their durability, wear, and corrosion resistance, and effects of surface protection on the component's mechanical properties. Components include frames, empennages, skins, and landing gear of aircraft and helicopters.(Contains 50-250 citations and includes a subject term index and title list.)

NTIS

Protective Coatings; Bibliographies; Corrosion Prevention; Aircraft Structures

19980010232 Armstrong Lab., Environics Directorate, Tyndall AFB, FL USA

An Air Force Pollution Prevention Initiative: 'Demonstration of a Non-Chromate Conversion Coating for Ion Vapor Deposition (IVD) Aluminum'

Smith, Anthony Ray, Armstrong Lab., USA; Singer, Carl, Acurex Corp., USA; Hall, Brent, Acurex Corp., USA; Jozewicz, Wojciech, Acurex Corp., USA; Second Aerospace Environmental Technology Conference; Mar. 1997, pp. 455-460; In English; Also announced as 19980010184; No Copyright; Avail: CASI; A02, Hardcopy; A06, Microfiche

The goal of this project is to demonstrate a non-chromate alternative to chromate conversion coatings currently used for IVD aluminum-coated parts. When successful, this effort will improve the work environment at Air Force Air Logistics Centers (ALCs), reduce hazardous waste production from the IVD aluminum/conversion coating process, and virtually eliminate the need for expensive pollution control equipment. This alternative technology will replace the chromate conversion coating, comply with ML C83488, and reduces hazardous waste generation and disposal. Stringent environmental and occupational health regulations for Air Force electroplating facilities are restricting pollutant discharges from the ALCs and have escalated the cost of waste disposal. Chromate conversion coatings contain hexavalent chrome, a known human carcinogen. Demonstration and validation of alternative conversion coatings for IVD aluminum are needed to ensure that coatings for Air Force aircraft parts will meet performance criteria in military specifications in an environmentally friendly manner. The Air Force ALCs are eliminating the use of cadmium processing for aircraft maintenance and overhaul in order to eliminate hazardous cadmium wastestreams. With the exception of a sacrificial, corrosion-resistant barrier, the replacement process, ion vapor deposition (IVD) of aluminum, elimi-

nates many of the environmental problems associated with cadmium processing. The traditional corrosion barrier used with the IVD process uses a chromate conversion coating to provide additional corrosion protection and an improved base for paint or primer adhesion. The Air Force (Armstrong Laboratory, Environics Directorate) entered a contract with McDonnell Douglas Aerospace-East (MDA-E) in 1993 to identify a non-chromate coating alternative to traditional chromate conversion coating for IVD aluminum. A number of conversion coating candidates were tested for adhesion and corrosion protection. In addition, the candidate coatings were subjected to a number of performance tests which included electrical resistance, adhesion, corrosion, humidity resistance, and fluid resistance. Results were then compared with a baseline chromate conversion coated panel. Following the full test cycle, the best candidate non-chromate conversion coatings were selected for the Armstrong Laboratory's demonstration and validation project which began in May, 1996. Acurex Environmental Corp. is the contractor performing the demonstration and WR-ALC, Robins Air Force Base, Georgia is the demonstration facility.
Author
Aircraft Parts; Chromates; Coatings; Hazardous Wastes; Environment Effects; Vapor Deposition; Aluminum Coatings

19980010251 Pratt and Whitney Aircraft, Government Engines and Space Propulsion, West Palm Beach, FL USA
Elimination/Reduction of Ozone Depleting Substances and 'EPA 17' Materials in F100 Worldwide Maintenance Manuals
Privett, Mal, Pratt and Whitney Aircraft, USA; Gehron, Mike, Pratt and Whitney Aircraft, USA; Second Aerospace Environmental Technology Conference; Mar. 1997, pp. 644-646; In English; Also announced as 19980010184
Contract(s)/Grant(s): F41608-95-D-0082; No Copyright; Avail: CASI; A01, Hardcopy; A06, Microfiche

The maintenance manuals (Technical Orders) for the F100 family of military jet engines comprises approximately 163 series of volumes with approximately 118,000 pages of instructions. A program to eliminate all ozone depleting chemicals (ODC) and reduce or eliminate large use quantities of EPA 17 materials from these Technical Orders was performed. A database was developed to manage the program status and material usage and replacement documentation for each applicable usage within the manuals, as well as generate many of the formal contractual reports. The review process efficiency was dramatically increased by digitizing the manual pages, using keywords to locate the ODC and EPA 17 materials, and categorizing the technical application parameters. This database permitted multiple substitutions, eliminated redundancy, and led to a better understanding of the process based on how the information about the material usage was grouped. As an example, greater than 1800 locations of ODC materials were originally identified; ultimately it was found, using the database, that all of the uses could be categorized into less than 30 different applications. It was generally found that most of the ODC material uses were substituted without testing of alternatives, since substitutions could often be based on similar uses of the alternative in other applications.
Author
Jet Engines; Aircraft Maintenance; Ozone Depletion; Alternatives; Manuals; Chemical Compounds

19980010254 Pratt and Whitney Aircraft, Government Engines and Space Propulsion, West Palm Beach, FL USA
Replacement of Hazardous Solvents for Handwiping Operations in Gas Turbine Engine Manufacturing
Privett, Mal, Pratt and Whitney Aircraft, USA; Second Aerospace Environmental Technology Conference; Mar. 1997, pp. 673-678; In English; Also announced as 19980010184; No Copyright; Avail: CASI; A02, Hardcopy; A06, Microfiche

A substantial amount of hazardous solvents, primarily methyl ethyl ketone (MEK) and isopropyl alcohol (IPA) are used in the manufacturing of components used in gas turbine engines. Although many cleaners have been approved for general tooling and fixture cleaning, specialty applications still consume a significant quantity of the solvents. This is especially significant since the hazardous waste volume is much greater than the solvent itself, because a large amount of applicators and disposable shaping implements are used in removal of un-cured rubber and are also discarded as hazardous waste. A program was performed which eliminated the need for these solvents in hand wiping operations during manufacturing of stator airfoil assemblies. Both an aqueous and a non-hazardous hydrocarbon solvent were identified for operations involving braze surface preparation, preparation of surfaces prior to bonding of various rubber materials, removal of excess un-cured rubber, and general cleaning. The aqueous hand wiping operation is used in preparation for brazing and also bonding of several types of rubber to both metallic and non-metallic substrates. The hydrocarbon cleaner is used to shape un-cured rubber for aerodynamic sealing of shroud and airfoil interfaces. The substitutions resulted in no material property or performance debit, no additional cost to the process, substantial reductions in hazardous waste disposal volume and costs, and reduced worker exposure to hazardous solvents.
Author
Gas Turbine Engines; Engine Parts; Environment Effects; Manufacturing; Hazardous Wastes; Solvents; Cleaners; Chemical Cleaning; Hydrocarbons; Aqueous Solutions

19980010601

Supercharging of Zircaloy-4

Domizzi, G., Centro Atomico Constituyentes, Argentina; Lanzani, L.; Coronel, P.; Bruzzoni, P.; Journal of Nuclear Materials; August 11, 1997; ISSN 0022-3115; Volume 246, no. 2-3, pp. 247-251; In English; Copyright; Avail: Issuing Activity

During service, nuclear components of low thickness made of Zr alloys may reach hydrogen contents above the terminal solid solubility, being the excess hydrogen precipitated as uniformly distributed particles (supercharging). This phenomenon can produce alloy embrittlement. to evaluate the behavior of the hydrided material, it is necessary to obtain similar hydride distributions in the laboratory. In the present work, two hydriding methods have been tested: (1) corrosion in LiOH solution; (2) gas phase charging on samples coated with Cu. The latter requires a relatively short hydriding time, does not affect the microstructure and allows a simultaneous measurement of hydrogen content.

Author (EI)

Zircaloys (Trademark); Zirconium Alloys; Hydrogen; Hydrogen Embrittlement; Superchargers; Corrosion

19980011625 Georgia Inst. of Tech., Atlanta, GA USA

Nonlinear Aeroelastic Effects in Damaged Composite Aerospace Structures ***Final Report, 1 Apr. 1995 - 31 Mar. 1997***

BAuchau, O. A., Georgia Inst. of Tech., USA; Loewy, R. G., Georgia Inst. of Tech., USA; Oct. 27, 1997; 40p; In English

Contract(s)/Grant(s): F49620-95-I-0241

Report No.(s): AD-A332139; AFOSR-97-0683TR; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Matrix micro-cracking affects the stiffness properties of composite laminates and the corresponding sectional stiffnesses, most prominantly laminates exhibiting elastic coupling. Matrix micro-cracking gives rise to nonlinear materials behavior in the presence of nonuniformly distributed crack densities. Such matrix damage appears to have little effect on basic bending-torsion flutter speed. However, this damage can induce a limit cycle behavior at airspeeds somewhat below the flutter speed. The effect of damage on the aeroelastic behavior of wing-aileron systems is found to be more pronounced. Here again flutter speeds were found to be slightly lower in the presence of damage. However, in this case, a limit cycle behavior was observed for a significant range of airspeeds below the flutter speed. Reduced fatigue life could result from this limit cycle behavior, since much higher cyclic stresses are generated thereby in the wing-aileron structure.

DTIC

Aeroelasticity; Composite Structures; Microcracks; Aircraft Structures

19980011655 Warner Robins Air Logistics Center, Robins AFB, GA USA

F-15 Fuel Tank Sealant ***Final Report***

Apr. 30, 1993; 10p; In English

Report No.(s): AD-A331724; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The F-15 wing is a source of constant maintenance because of chronic, recurring leaks from the integral fuel tank. F-15 engineering has evaluated several different concepts, in parallel with this PRAM project, to determine the most effective methods in eliminating this problem. This PRAM project involved applying an Improved Sealing Process (ISP), developed by McDonnell Douglas, to the inside of the integral wing tank. The process applied a sprayable sealant barrier along with the existing channel groove seal. Unlike a bladder, this sealing process covers only potential leak paths such as fasteners and structural joints. The total project cost was $152,300. Other efforts initiated in conjunction with the PRAM project included implementing a similar sealant barrier applied with a brush, specifying an improved channel groove sealant, and completely revising the integral wing fuel tank sealing technical data. The ISP process was prototyped at Warner Robins on four programmed depot maintenance (PDM) wings. The ISP was successfully prototyped, and the wings were placed in service on four separate aircraft. The aircraft were evaluated in the field for approximately 1 year, and the results indicated leaks on all wings. There was no conclusive evidence showing that the ISP was significantly better than conventional sealing methods. With the test results being less than desired, implementation is not recommended due to the limited benefits of the ISP being greatly outweighed by the cost of equipment, facility allocation, environmental concerns, and PDM schedule impact.

DTIC

F-15 Aircraft; Fuel Tanks; Sealers

12
ENGINEERING

Includes engineering (general); communications and radar; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.

19980009882 NERAC, Inc., Tolland, CT USA
Cavitation Flow. (Latest citations from the NTIS Bibliographic Database)
Apr. 1996; In English; Page count unavailable.
Report No.(s): PB96-867957; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning theoretical investigations and applications of cavitation phenomena. Cavitation dynamics and mechanisms, detection and measurement, and acoustic studies are among the topics included. Applications include cavitating jets for rock drilling and cleaning, and marine engineering. Citations also include investigations of cavitation problems in power plant systems. Citations pertaining to turbines, propellers, rudders, cavities, hydrofoils, and cavitation erosion and corrosion are excluded.
NTIS
Cavitation Corrosion; Cavitation Flow; Cavities; Corrosion; Data Bases; Propellers; Rocks; Rudders; Turbines

19980010260 NASA Langley Research Center, Hampton, VA USA
Culture and Workplace Communications: A Comparison of the Technical Communications Practices of Japanese and U.S. Aerospace Engineers and Scientists
Pinelli, Thomas E., Editor, NASA Langley Research Center, USA; Sato, Yuko, Editor, Pittsburgh Univ., USA; Barclay, Rebecca O., Editor, Knowledge Management Associates, USA; Kennedy, John M., Editor, Indiana Univ., USA; Journal of Air Transportation World Wide; Nov. 1997; Volume 2, No. 1, pp. 1-21; In English; Also announced as 19980010259; No Copyright; Avail: CASI; A03, Hardcopy; A02, Microfiche

The advent of global markets elevates the role and importance of culture as a mitigating factor in the diffusion of knowledge and technology and in product and process innovation. This is especially true in the large commercial aircraft (LCA) sector where the production and market aspects are becoming increasingly international. As firms expand beyond their national borders, using such methods as risk-sharing partnerships, joint ventures, outsourcing, and alliances, they have to contend with national and corporate cultures. Our focus is on Japan, a program participant in the production of the Boeing Company's 777. The aspects of Japanese culture and workplace communications will be examined: (1) the influence of Japanese culture on the diffusion of knowledge and technology in aerospace at the national and international levels; (2) those cultural determinants-the propensity to work together, a willingness to subsume individual interests to a greater good, and an emphasis on consensual decision making-that have a direct bearing on the ability of Japanese firms to form alliances and compete in international markets; (3) and those cultural determinants thought to influence the information-seeking behaviors and workplace communication practices of Japanese aerospace engineers and scientists. In this article, we report selective results from a survey of Japanese and U.S. aerospace engineers and scientists that focused on workplace communications. Data are presented for the following topics: importance of and time spent communicating information, collaborative writing, need for an undergraduate course in technical communication, use of libraries, use and importance of electronic (computer) networks, and the use and importance of foreign and domestically produced technical reports.
Author
Market Research; Commercial Aircraft; Organizations; Communicating; Decision Making; Risk; Culture (Social Sciences)

19980010434 Purdue Univ., School of Aeronautics and Astronautics, West Lafayette, IN USA
Materials Degradation and Fatigue in Aerospace Structures ***Final Report, 1 Jul. 1993 - 30 Jun. 1997***
Grandt, A. F., Jr., Purdue Univ., USA; Aug. 1997; 331p; In English
Contract(s)/Grant(s): F49620-93-I-0377
Report No.(s): AD-A329663; AFOSR-TR-97-0449; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

This report summarizes research conducted by the Purdue University Schools of Engineering and Science during a four year AFOSR University Research Initiative focused on basic issues dealing with aging aircraft. The coordinated goals of the program fall into four main categories: damage development, prediction of crack growth and interaction failure prevention techniques, and advanced analysis methods. The damage development goals addressed the failure mechanisms of corrosion, fatigue crack forma-

tion, and fretting. The general objective of the crack growth and interaction tasks was to develop techniques to predict the growth of service induced cracks and to determine the impact of widespread cracking on damage tolerance. The theme of the failure prevention projects was to develop procedures to extend the operational life of older aircraft by delaying service induced damage. repairing cracked structure, and employing fleet tracking methods to prioritize maintenance actions within a fleet of aircraft. Finally, research was directed at developing advanced analysis methods used in other research tasks. These projects dealt with adding statistical components to various materials evaluations and structural analyses, and developing ductile fracture criteria relative to aircraft materials and structures.
DTIC
Aircraft Structures; Fatigue Life; Aircraft Maintenance; Commercial Aircraft; Military Aircraft

19980010494 NASA Langley Research Center, Hampton, VA USA
Government-Sponsored Programs on Structures Technology
Noor, Ahmed K., Compiler, Virginia Univ., USA; Malone, John B., Compiler, NASA Langley Research Center, USA; Government-Sponsored Programs on Structures Technology; Nov. 1997; 290p; In English; Proceedings of Workshops, 6 Apr. 1997, Kissimmee, FL, Hampton, VA, USA, USA; Sponsored by NASA Washington, USA; Also announced as 19980010495 through 19980010507
Contract(s)/Grant(s): RTOP 522-31-21-33
Report No.(s): NASA/CP-97-206241; NAS 1.55:206241; L-17670; No Copyright; Avail: CASI; A13, Hardcopy; A03, Microfiche

This document contains the presentations from the joint UVA/AIAA workshops on Government-Sponsored Programs on Structures Technology, held on April 6, 1997 in Kissimmee, Florida and on September 4, 1997 in Hampton, Virginia. Workshop attendees were the Members and Friends of the AIAA Structures Technical Committee. The objectives of the workshops were to: (a) provide a forum for discussion of current government-sponsored programs in the structures area; (b) identify high-potential research areas for future aerospace systems; and (c) initiate suitable interaction mechanisms with the managers of structures programs.
Author
Aerospace Systems; Government/Industry Relations; Research and Development; Technology Transfer; Conferences; Spacecraft Structures; Aircraft Structures; Smart Structures

19980010495 NASA Langley Research Center, Hampton, VA USA
Airframe Systems: Research and Technology Base Program
Whitlow, Woodrow, Jr., NASA Langley Research Center, USA; Government-Sponsored Programs on Structures Technology; Nov. 1997, pp. 19-40; In English; Also announced as 19980010494; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

The author argues that the aeronautics research and technology base has shifted from a discipline focus to a program focus. The program planning is progressing as Level I is complete and Level II plans are under development, while there is significant inter-center planning and coordination taking place. These programs are addressing problems that are important to the nation namely, ”the three pillars to success” which are; access to space, global civil aviation and revolutionary technology leaps.
CASI
Coordination; Project Planning; Research and Development; Project Management; Government/Industry Relations; Airframes; NASA Programs

19980010496 NASA Lewis Research Center, Cleveland, OH USA
An Overview-NASA LeRC Structures Program
Zaretsky, Erwin V., NASA Lewis Research Center, USA; Government-Sponsored Programs on Structures Technology; Nov. 1997, pp. 41-73; In English; Also announced as 19980010494; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

The Structures and Acoustics Division of the NASA Lewis Research Center has its genesis dating back to 1943. It has been an independent Division at Lewis since 1979. Its two primary capabilities are performance and life analysis of static and dynamic systems such as those found in aircraft and spacecraft propulsion systems and experimental verification of these analyses. Research is conducted in-house, through university grants and contracts, and through cooperative programs with industry. Our work directly supports NASA’s Advanced Subsonic Technology (AST), Smart Green Engine, Fast Quiet Engine, High-Temperature Materials and Processing (HiTEMP), Hybrid Hyperspeed Propulsion, Rotorcraft, High-Speed Research (HSR), and Aviation

Safety Program (AvSP). A general overview is given discussing these programs and other technologies that are being developed at NASA LeRC.
Derived from text
General Overviews; Research and Development; Technology Assessment; Technology Utilization; NASA Programs; Aircraft Structures; Spacecraft Structures

19980010498 Department of the Air Force, Flight Dynamics Directorate, Wright-Patterson AFB, OH USA
Structures Technology Development
Paul, Donald B., Department of the Air Force, USA; Government-Sponsored Programs on Structures Technology; Nov. 1997, pp. 97-140; In English; Also announced as 19980010494; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

The Flight Dynamics Directorate develops Air Force structures technology by integrating new or state-of-the-art technologies in design requirements, manufacturing techniques, materials, and processes with requirements for propulsion, flight controls, aeromechanics, low observables, subsystems, weapons and avionics. The results are advanced structural concepts and design methods for new and improved aerospace vehicles (FATE & TAFT). A general overview of the topics above is presented.
CASI
Aerodynamics; General Overviews; Flight Mechanics; Research and Development

19980010501 Advanced Research Projects Agency, Arlington, VA USA
The DARPA Smart Materials and Structures Program
Crowe, C. Robert, Advanced Research Projects Agency, USA; Government-Sponsored Programs on Structures Technology; Nov. 1997, pp. 173-183; In English; Also announced as 19980010494; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

An overview of the Defense Advanced Research Projects Agency's (DARPA's) Smart Materials and Structures Program is presented. Objectives, funding, project reviews such as shape adaptive structures, smart wing and structures development and manufacturing issues are discussed.
CASI
Smart Structures; Aircraft Structures; Actuators; Sensors; Manufacturing

19980010502 Army Research Office, Research Triangle Park, NC USA
Structural Dynamics Program
Anderson, Gary L., Army Research Office, USA; Government-Sponsored Programs on Structures Technology; Nov. 1997, pp. 185-199; In English; Also announced as 19980010494; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

A general overview of the structural dynamics program at the Army Research Office (ARO) is presented. Topics include: Land vehicle and multibody dynamics; structural damping; smart structures and structural control; statics and dynamics of inflatable structures; integrated aeromechanics analysis; rotorcraft numerical analysis; projectile aeroelasticity; dynamic control systems for projectiles and parachute inflation aeromechanics.
CASI
Dynamic Structural Analysis; General Overviews; Aerodynamics; Armed Forces (USA); Military Technology

19980010504 Federal Aviation Administration, Atlantic City, NJ USA
Overview of FAA Structural Integrity Program for Large Transport Airport
Tan, Paul W., Federal Aviation Administration, USA; Government-Sponsored Programs on Structures Technology; Nov. 1997, pp. 209-235; In English; Also announced as 19980010494; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

On April 28, 1988, multiple fatigue cracks caused an Aloha Airlines Boeing 737-200 aircraft to lose part of its upper fuselage. Although the aircraft was able to land safely, the accident resulted in the death of one flight attendant and injury to many passengers. The aircraft, which entered service in April 1969, had accumulated 35,496 hours and 89,690 flight cycles. Less than five weeks after the Aloha Airlines accident, the FAA convened an international conference to discuss the issue of aging aircraft in the world-wide fleet. of particular concern was the fact that many airplanes were approaching or had exceeded the manufacturers' design operational life. The conference included operations, maintenance, manufacturing and regulatory representatives. A general consensus was reached that, with proper maintenance and structural modifications and with attention to service-related damage such as fatigue and corrosion, the design operational lives of airplanes could be safely exceeded. The resulting issues, initiatives and recommendations later became the basis for the FAA's National Aging Aircraft Research Program (NAARP). The NAARP is a multidisciplinary program and this overview of one sub-program covers the research in the structural integrity of large transport aircraft (SITA). There are three major elements within this sub-program: (a) methodologies to predict the onset

of widespread fatigue damage, (b) structural integrity of repairs, and (c) probabilistic methodologies for widespread fatigue damage.
Derived from text
Civil Aviation; Commercial Aircraft; Fatigue (Materials); Structural Failure; Transport Aircraft; Fatigue Life; Damage Assessment

19980010507 General Electric Co., Aircraft Engines, Cincinnati, OH USA
Aircraft Engine Materials: Recent Trends and Future Directions
Williams, Jim C., General Electric Co., USA; Government-Sponsored Programs on Structures Technology; Nov. 1997, pp. 293-306; In English; Also announced as 19980010494; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

The general overview includes an introduction to aircraft engine materials; an engine performance discussion; the role of materials in engine design, i.e. disks and airfoils; a summary and future directions in aircraft engines.
CASI
Aircraft Engines; Engine Design; Research and Development; Technology Assessment

19980010681
Mathematical treatment of point sources in a flow through porous media governed by Darcy's law
Slodicka, M., Univ. of the Federal Armed Forces Munich, Germany; Transport in Porous Media; July, 1997; ISSN 0169-3913; Volume 28, no. 1, pp. 51-67; In English; Copyright; Avail: Issuing Activity

Abstractive consider stationary air flow in a porous medium caused by extraction wells and governed by Darcy's law. Point sinks are described by Dirac functions. We distinguish two different situations: locally continuous and discontinuous conductivity near the wells. In both cases, well-posedness is proved. We propose a finite-element scheme in the general case and show the convergence of the approximated solution to the exact one.
Author (EI)
Air Flow; Point Sources; Aerodynamics; Fluid Flow; Porous Materials; Finite Element Method; Convergence; Numerical Analysis

19980010752 NASA Langley Research Center, Hampton, VA USA
Transpiration Cooling Experiment
Song, Kyo D., Norfolk State Univ., USA; Ries, Heidi R., Norfolk State Univ., USA; Scotti, Stephen J., NASA Langley Research Center, USA; Choi, Sang H., NASA Langley Research Center, USA; Standard Experiments in Engineering Materials Science and Technology; Jul. 1997, pp. 163-182; In English; Also announced as 19980010742
Contract(s)/Grant(s): NAG1-1513; No Copyright; Avail: CASI; A03, Hardcopy; A04, Microfiche

The transpiration cooling method was considered for a scram-jet engine to accommodate thermally the situation where a very high heat flux (200 Btu/sq. ft sec) from hydrogen fuel combustion process is imposed to the engine walls. In a scram-jet engine, a small portion of hydrogen fuel passes through the porous walls of the engine combustor to cool the engine walls and at the same time the rest passes along combustion chamber walls and is preheated. Such a regenerative system promises simultaneously cooling of engine combustor and preheating the cryogenic fuel. In the experiment, an optical heating method was used to provide a heat flux of 200 Btu/sq. ft sec to the cylindrical surface of a porous stainless steel specimen which carried helium gas. The cooling efficiencies by transpiration were studied for specimens with various porosity. The experiments of various test specimens under high heat flux have revealed a phenomenon that chokes the medium flow when passing through a porous structure. This research includes the analysis of the system and a scaling conversion study that interprets the results from helium into the case when hydrogen medium is used.
Author
Cooling; Heat Flux; Jet Engines; Fuel Combustion

19980010999 Civil Aviation Authority, Safety Regulation Group, Gatwick, UK
Flight Recorders-ICAO to JAR OPS
Moore, Pippa, Civil Aviation Authority, UK; Recording Aircraft Accident Data Proceedings; 1997, pp. 1.1-1.15; In English; Also announced as 19980010998; Copyright; Avail: Issuing Activity (The Royal Aeronautical Society, 4 Hamilton Place, London, W1V 0BQ, UK), Hardcopy, Microfiche

Flight recorders are mandatory pieces of equipment principally intended to assist air accident investigators, although aircraft operators are beginning to use them to determine how their aircraft are being flown and how to improve the performance of the aircraft. The requirements for flight recorders can be traced back to ICAO which specifies the basic need for them and this paper

uses the ICAO requirements as a starting point in the definition of the current UK and Joint Aviation Authorities' documentation on this subject.
Author
Aircraft Accidents; Flight Recorders; Documentation

19980011001 British Aerospace Systems and Equipment Ltd., Plymouth, UK
Combined CVR and FDR
Malvern, A. R., British Aerospace Systems and Equipment Ltd., UK; Recording Aircraft Accident Data Proceedings; 1997, pp. 3.1-3.7; In English; Also announced as 19980010998; Copyright; Avail: Issuing Activity (The Royal Aeronautical Society, 4 Hamilton Place, London, W1V 0BQ, UK), Hardcopy, Microfiche

The recording of voice and flight data has significantly improved flight safety over many years, so that the carriage of recorders has been mandated for a large range of aircraft for all ICAO states. For large transport aircraft this is normally in the form of two boxes, an Flight Data Recorder (FDR) and a Cockpit Voice Recorder (CVR). There is ever a need for improved safety as the volume of flights increases steadily. This paper discusses the use of combined recorders, which include both the CVR and FDR in a single box, for a range of applications ,either to enhance flight safety by dual redundancy, or to improve operational efficiency by Flight Operation Quality Assurance (FOQA). Applications for military will also be discussed, where there is an enthusiasm for Commercial Off The Shelf Equipment (COTSC).
Author
Data Recorders; Flight Recorders; Flight Safety

19980011163
Inviscid and viscous flow computations by means of a lambda methodology: A review
Fortunato, B., Politecnico di Bari, Italy; Progress in Aerospace Sciences; 1997; ISSN 0376-0421; Volume 33, no. 7-8, pp. 513-538; In English; Copyright; Avail: Issuing Activity

The present paper provides a review of the more important results obtained by the author, sometimes with co-authors, solving inviscid and viscous compressible flows by means of a lambda methodology. In particular, an implicit numerical algorithm, called fast solver, has always been applied. This methodology separately integrates the compatibility conditions, written in terms of generalized Riemann variables, along appropriate bicharacteristic lines. The multi-dimensional flow problem is, thus, reduced to a sequence of simple quasi one-dimensional problems. The merits of this approach are demonstrated by means of the application of the method to the solution of three dimensional (3-D) subsonic and transonic inviscid flows, of two-dimensional (2-D) and 3-D viscous flows and of the 2-D flow around a vertical axis wind turbine. In the transonic case the shock wave is computed by means of a shock fitting technique, which enforces the proper shock jumps by an explicit use of the Rankine-Hugoniot equations; in the wind turbine case the blades are represented in a time-averaged sense by means of an actuator porous cylinder, having the turbine radius. The results are then compared with other numerical results and with experimental results.
Author (EI)
Compressible Flow; Computational Fluid Dynamics; Inviscid Flow; Transonic Flow; Viscous Flow; Aerodynamics; Algorithms

19980011226
Onboard digital recorders improve flight vibration tests
Fling, Scott, Sverdrup Technology Inc., USA; Hoshal, Greg; Test Engineering & Management; August-September, 1997; ISSN 0193-4120; Volume 59, no. 4, pp. 14-16; In English; Copyright; Avail: Issuing Activity

This article discusses a new approach to acquiring random vibration environment data during aircraft flight tests, and for using these data to improve random vibration test specifications. Traditionally, flight vibration data have been acquired using telemetry systems or tape recorders, which have many disadvantages. Recently, engineers at Eglin AFB have used state-of-the-art digital recorders developed by Instrumented Sensor Technology (IST) to measure vibration data on 'Smart' bomb racks during F-16 flight tests (Figure 1). The aircraft was flown through a series of harsh maneuvers at speeds approaching Mach One. Tri-axial vibration time history data were recorded continuously during the 80-minute flight tests using the onboard recorders. The data were then post-processed to generate Power Spectral Density profiles for the various flight maneuvers. The analysis results were compared against MIL-STD-7743, which provides a conventional vibration test profile for bomb racks. The results show that MIL-STD-7743 frequency ranges, while under-testing in others.
Author (EI)
Data Recording; Digital Systems; Flight Tests; Vibration Tests; Vibration Measurement; Digital Techniques; Measuring Instruments; Fighter Aircraft; Aircraft Instruments

19980011697 Army Research Lab., Aberdeen Proving Ground, MD USA
Fluid Dynamics Assessments of Deposition and Infiltration Models ***Final Report, Jun. 1996 - Mar. 1997***
Soln, Josip Z., Army Research Lab., USA; Oct. 1997; 40p; In English
Report No.(s): AD-A332747; ARL-TR-1525; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The fluid dynamics assessments of deposition and infiltration models, such as the chemical-agent deposition analysis for rotorcraft surfaces (CADARS) and the aerosol and vapor infiltration analysis (AVIA) models, are carried out. Although these models address different needs of the Army and deal with enclosures surrounded by a toxic environment, we believe that there are enough similarities between them to be given the same type of fluid dynamics analysis.
DTIC
Fluid Dynamics; Chemical Analysis; Deposition; Infiltration; Rotary Wing Aircraft; Aerosols

19980011745
Drag coefficient of fluidized particles at high Reynolds numbers
Xie, H. -Y., Dalian Univ. of Technology, China; Chemical Engineering Science; September, 1997; ISSN 0009-2509; Volume 52, no. 17, pp. 3051-3052; In English; Copyright; Avail: Issuing Activity

The method of measuring bed expansion is applied to investigate the drag coefficient of fluidized particles at high Reynolds numbers up to 1500. The existing experimental results on bed expansion curves of different particles fluidized with water are used.
Author (revised by EI)
Aerodynamic Coefficients; Aerodynamic Drag; High Reynolds Number; Fluidized Bed Processors; Reynolds Number; Drag; Fluid Dynamics

19980011979 Helsinki Univ. of Technology, Espoo, Finland
Simulation of Viscous Flow in a Centrifugal Compressor
Pitkaenen, H., Helsinki Univ. of Technology, Finland; Siikonen, T., Helsinki Univ. of Technology, Finland; Sep. 11, 1995; 46p; In English
Report No.(s): PB96-169701; SER-B-46; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

A numerical simulation of a steady three-dimensional viscous flow in a centrifugal compressor is described. The simulation is based on a solution of thin-layer Navier-Stokes equations, which are solved using an implicit time integration method with a multigrid acceleration of convergence. The effects of turbulence are evaluated employing an algebraic turbulence model. Simulations are performed for the Krain impeller at three different inlet mass flows, and for a high-speed compressor at design conditions.
NTIS
Centrifugal Compressors; Viscous Flow; Computational Fluid Dynamics; Three Dimensional Flow; Steady Flow; Navier-Stokes Equation; Mathematical Models; Turbulence Effects; Simulation

13
GEOSCIENCES

Includes geosciences (general); earth resources and remote sensing; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.

19980009641 Naval Facilities Engineering Command, Atlantic Div., Norfolk, VA USA
Draft Environmental Impact Statement: Realignment of F/A-18 Aircraft and Operational Functions from Naval Air Station (NAS) Cecil Field, Florida, to Other East Coast Installations
Jan. 1997; 1036p; In English
Report No.(s): AD-A329792; No Copyright; Avail: CASI; A99, Hardcopy; A10, Microfiche

This Draft Environmental Impact Statement (DEIS) addresses the environmental issues associated with the realignment of F/A-18 aircraft (i.e., fleet squadrons and the Fleet Replacement Squadron FRS) and operational functions from Naval Air Station (NAS) Cecil Field, Florida, which is scheduled to close, to other Navy and Marine Corps air stations on the East Coast. This proposed realignment is associated with the Navy's implementation of the 1995 mandated list of realignments prepared by the Defense Base Closure and Realignment Commission. The proposed action consists of the transfer of 11 F/A-18 fleet squadrons (132 aircraft) and the FRS (48 aircraft) (180 total aircraft) from NAS Cecil Field. The DEIS assesses five reasonable alternative realignment scenarios (ARSs) for the transfer of F/A-18 aircraft and personnel: ARS 1: Realignment of 11 F/A-18 fleet squadrons (132 aircraft) and the F/A- 18 FRS (48 aircraft) (180 total aircraft) to NAS Oceana, Virginia Beach, Virginia; ARS 2: Realignment of two F/A-18 fleet squadrons (24 aircraft) to Marine Corps Air Station (MCAS) Beaufort, South Carolina, and realignment of

nine fleet squadrons and the FRS (156 total aircraft) to NAS Oceana; ARS 3: Realignment of three F/A-18 fleet squadrons (36 aircraft) to MCAS Cherry Point, North Carolina, and realignment of eight fleet squadrons and the FRS (144 total aircraft) to NAS Oceana; ARS 4: Realignment of five F/A-18 fleet squadrons (60 aircraft) to MCAS Beaufort; and realignment of six fleet squadrons and the FRS (120 total aircraft) to NAS Oceana; and ARS 5: Realignment of five F/A-18 fleet squadrons (60 aircraft) to MCAS Cherry Point and realignment of six fleet squadrons and the FRS (120 total aircraft) to NAS Oceana.
DTIC
Attack Aircraft; Jet Aircraft; Military Aircraft; Navy

19980010214 Naval Air Warfare Center, Aircraft Div., Lakehurst, NJ USA
V-22 Aircraft Environmental Program
Kim, Cathy, Naval Air Warfare Center, USA; Second Aerospace Environmental Technology Conference; Mar. 1997, pp. 253-262; In English; Also announced as 19980010184; No Copyright; Avail: CASI; A02, Hardcopy; A06, Microfiche

Since February 1991, the Department of Defense (DoD) has required that weapon system acquisition programs incorporate environmental considerations into the development of the weapon system, including the design, test, operation, maintenance and disposal. Prior to this date, DoD's policies were oriented towards operation of facilities and installation, with the focus on the pollution control devices required for compliance, and the cleanup or restoration of problems created by past activities. Studies done by the DoD and individual services, have resulted in the conclusion that a major portion of the environmental problems experienced by the facilities and installations are a direct result of the weapon system being operated and maintained at these sites. Additional environmental policy and regulations, e.g., Executive Orders, have further specified environmental requirements for weapon system acquisition programs. The resulting problem was that there was no method established for implementing this environmental policy into an already complicated, expensive, and time consuming acquisition process. The V-22 Osprey Aircraft Program innovatively integrated the environmental requirements into the acquisition process. The Program established a multi-disciplinary team to coordinate and implement environmental requirements. This team consists of program management personnel, environmental and materials engineers, legal counsel, and U.S. Marine Corps aircraft maintenance personnel. The team developed an environmental strategy by analyzing the aircraft system and identifying specific technical and environmental issues. The environmental team educated as many people within the V-22 acquisition team as possible, and worked closely with the program's prime contractors - Bell Helicopter Textron, Boeing Helicopters and Allison Engine Company. Through the efforts of the government and the prime contractors, the V-22 program was able to establish and implement an effective environmental program. This program assures compliance with all environmental regulations and policies, but also provides a product that reduces the operating, support and disposal cost of the aircraft and decreases potential risk to personnel and the environment by reducing the use and generation of hazardous materials and wastes.
Author
V-22 Aircraft; Weapon Systems; Environment Effects; Hazardous Materials; Pollution Control; Environment Management; Aircraft Design

19980010229 Lockheed Martin Tactical Aircraft Systems, Fort Worth, TX USA
Lockheed Martin Tactical Aircraft Systems Impliments Computerized System to Monitor Water Quality
Obert, Stephen V., Lockheed Martin Tactical Aircraft Systems, USA; Second Aerospace Environmental Technology Conference; Mar. 1997, pp. 419-428; In English; Also announced as 19980010184; No Copyright; Avail: CASI; A02, Hardcopy; A06, Microfiche

The ever increasing environmental regulations/requirements facing industries and municipalities over the last several years have resulted in these organizations dedicating considerable resources to keep pace. Lockheed Martin Tactical Aircraft Systems (LMTAS) is committed to meet and exceed the regulatory requirements. A fundamental element of a successful environmental program is dependable, accurate and timely monitoring of the facility's outfalls. Lockheed Martin Tactical Aircraft Systems operates Air Force Plant No. 4, a government owned, contractor operated facility. The facility is a conglomeration of buildings spread over 650 acres, bounded by Lake Worth to the north and Naval Air Station Fort Worth, Joint Reserve Base to the east. The primary activity is the design, fabrication, assembly and testing of tactical fighter aircraft. In support of the water discharge monitoring requirements, and in support of a proactive monitoring program, The Environmental Resources Management group(ERM) at LMTAS saw a need to develop an automated water quality monitoring system. The original design concept was to: monitor water quality parameters; notify LMTAS personnel in the event of an alarm condition; and perform various sampling requirements. Radio frequency communication is used to link the field sites to the office-based control center. A pilot test was initiated in March of 1993, with system installation completed in may of 1993. The system was designed to integrate basically "off-the-shelf" components. This allows proven, reliable components to be integrated at low cost and with minimal design and engineering effort. Due to the numerous requirements, designing and developing a water quality monitoring system versatile enough to meet present

and future needs is challenging. An Integrated Remote Monitoring and Notification System (IRMNS) was designed. It is built around a Geomation, Inc. control system which provides the platform for various instrument interfaces. The Measurement and Control Units (MCU's) are located at the field sites which accept and process numerous instrument outputs including 4-20 mA and RS 232. Once programmed, the MCU operates independently from the office based Monitoring Station (NMS) for extended periods of time. System programming is performed at the monitoring station and information is downloaded to the MCU's. The NMS is PC based, utilizing manufacturers designed software. The network controller also activates a auto dialer unit, which can auto dial multiple lines and deliver multiple messages when triggered. Alarm conditions at a monitoring site will activate the notification option. LMTAS has modified the network control station tying in a second PC which is used for data management functions. The system is capable of hosting multiple PC's through phone modems. Monitoring is accomplished with the use of multi sensor probes. Upon implementation of the final project phase, IRMNS will be monitoring between 65 and 75 inputs (channels) from the ten water discharge sites.
Author
Environment Management; Water Quality; Remote Control; Aircraft Industry; Environmental Monitoring; Computer Techniques

19980010242 Sikorsky Aircraft, Stratford, CT USA
Environmentally Friendly Cleaning Improvements for Overhaul Operations
Johnson, Peter H., Sikorsky Aircraft, USA; Melnick, Robert M., Sikorsky Aircraft, USA; Second Aerospace Environmental Technology Conference; Mar. 1997, pp. 543-573; In English; Also announced as 19980010184; No Copyright; Avail: CASI; A03, Hardcopy; A06, Microfiche

The Sikorsky Aircraft Overhaul and Repair Center (O&R) is committed to providing a safe and healthy work environment for all of its employees by upholding the highest safety and environmental standards. In recent years, a joint team from Manufacturing Engineering, Manufacturing, Design Engineering, and Environmental Health and Safety has implemented a number of initiatives that have resulted in dramatic environmental improvements at this facility. These efforts have led to significant reductions in hazardous waste and SARA reportable air emissions as well as providing a safer, more environmentally friendly working environment. This report summarizes the O&R process improvements associated with changes in part cleaning methodology. These projects have included: the elimination of perchlorethylene vapor degreasing through the introduction of a power washer and a hot oil / alkaline cleaning line; substitution of a high molecular weight alcohol for Freon in printed wiring board operations incorporation of an ultrasonic bearing cleaning line using an alkaline cleaner as a replacement for a dip tank system containing hazardous materials: and development of an innovative combination flush/cleaning booth for gearbox housings and assemblies to eliminate the use of 1-1-1 trichlorethane. Along with the environmental and health benefits gained through the introduction of these projects, each has been shown to provide additional benefits in the areas of cost savings, labor reduction, waste minimization, and increases in process efficiency.
Author
Chemical Cleaning; Cleaners; Environment Effects; Hazardous Wastes; Aircraft Maintenance; Ultrasonic Cleaning

19980010250 Modern Technologies Corp., Cleveland, OH USA
Implementation of Delta Air Lines' Environmental Management Information System (EMIS)
Balzer, Todd, Modern Technologies Corp., USA; Kinney, Robert W., Modern Technologies Corp., USA; Craig, Myles R., Delta Air Lines, Inc., USA; Johnson, Terry, Delta Air Lines, Inc., USA; Second Aerospace Environmental Technology Conference; Mar. 1997, pp. 631-641; In English; Also announced as 19980010184; No Copyright; Avail: CASI; A03, Hardcopy; A06, Microfiche

In our changing business environment, Chemical Management becomes the infrastructure and the corner stone of environmental compliance assurance for the future of the aerospace industry. With well planned, well defined system requirements, extensive data quality assurance and strong coordination, great benefits can be achieved through implementation of a Hazardous Chemical Management Program in the aerospace industry. With strict regulatory assurance and cost effective Material Safety Data Sheets (MSDS) access, enhanced employee safety and operation cost benefits can be obtained. Delta Air Lines Inc.'s experience in moving to this goal is outlined in this paper. Please remember that the steps that Delta Air Lines took to obtain these goals were unique to Delta Air Lines; however, the basic methods that were used to meet these objectives can be used by any company in the aerospace industry.
Author
Commercial Aircraft; Aircraft Maintenance; Environment Management; Management Methods

19980011520 NASA Dryden Flight Research Center, Edwards, CA USA

Atmospheric Considerations for Uninhabited Aerial Vehicle (UAV) Flight Test Planning

Teets, Edward H., Jr., Analytical Services and Materials, Inc., USA; Donohue, Casey J., Analytical Services and Materials, Inc., USA; Underwood, Ken, AeroVironment, Inc., USA; Bauer, Jeffrey E., NASA Dryden Flight Research Center, USA; Jan. 1998; 18p; In English; 36th; Aerospace Sciences Meeting and Exhibit, 12-15 Jan. 1998, Reno, NV, USA; Sponsored by American Inst. of Aeronautics and Astronautics, USA

Contract(s)/Grant(s): RTOP 242-33-02-00-23

Report No.(s): NASA/TM-98-206541; H-2220; NAS 1.15:206541; AIAA Paper 98-0748; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Atmospheric considerations are a key element in support of uninhabited aerial vehicle (UAV) flight testing. The local atmospheric environment (wind speed and direction, wind shear, temperature, precipitation, and turbulence) must be characterized and understood. The primary objective is to ensure safety of the vehicle, test range, and ground assets. The generalized atmospheric behavior for any potential flight operations site is best described by combining the local seasonal climatology, daily upper atmospheric wind and temperature profiles, and hourly surface and low-level wind observations. This paper describes a continuous forecast update process based on monitoring atmospheric turbulence with surface and low-level wind for the support of UAV flights. Updates ensure the most current available data needed for mission planning. Each mission plan is developed so as not to exceed operation limits because of weather conditions. This paper also discusses climatology, weather forecasts, and day-of-flight weather monitoring for planning of uninhabited aerial vehicle missions.

Author

Pilotless Aircraft; Atmospheric Turbulence; Mission Planning; Climatology; Weather Forecasting

19980011696 Naval Research Lab., Stennis Space Center, MS USA

Digital Map Requirements Study in Support of Advanced Cockpit Moving Map Displays ***Final Report***

Lohrenz, Maura C., Naval Research Lab., USA; Trenchard, Michael E., Naval Research Lab., USA; Myrick, Stephanie A., Naval Research Lab., USA; VanZuyle, Paul, California Univ., USA; Perniciaro, Ralph E., Planning Systems, Inc., USA; Gendron, Marlin L., Planning Systems, Inc., USA; Brown, Clare, Tulane Univ., USA; Oct. 10, 1997; 74p; In English

Report No.(s): AD-A332745; NRL/FR/7441--96-9652; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report documents the results of a digital map requirements study that the Naval Research Laboratory (NRL) performed for the Tactical Aircraft Moving Map Capability (TAMMAC) Integrated Program Team (IPT) at NAVAIR (PMA 209) in August 1995. The objective of the study was to establish the map data requirements for a new digital moving map system being built for the F/A-18, AV-8B, AH-lW, UH-1N, V-22, and potentially other aircraft. A primary NAVAIR goal in specifying the new system was to enhance situational awareness (SA) and aircrew mission effectiveness, without further burdening pilot task workload. To ensure that the end-users' explicit map needs were considered, NRL investigators elicited one-on-one aircrew evaluations of a wide variety of map data types (both topographic and tactical) and map display parameters, including feature size, orientation, color, symbology, etc., to help define an optimum map design for cockpit displays. NRL presented these map variations as a series of 16 demonstrations (on a Silicon Graphics workstation) to 30 pilots and aircrew at the Naval Air Warfare Center in Pax River, MD.

DTIC

Digital Data; Maps; Cockpits; Display Devices; Pilot Performance; Workstations

14
LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and space biology.

19980010019 Armstrong Lab., Wright-Patterson AFB, OH USA

The Effect of Menstrual Phase and Oral Contraceptives on Female Adaptation and Performance at High G ***Final Report, 22 Dec. 1995 - 31 Mar. 1997***

Chelette, Tamara, Armstrong Lab., USA; Mar. 1997; 38p; In English

Contract(s)/Grant(s): MIPR-96MM6647

Report No.(s): AD-A330011; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Females are now flying combat aircraft in the Air Force. Questions of gender differences regarding adaptation and performance in the high-G environment (9G) must be studied scientifically. The Dynamic Environment Simulator, a three-axis centrifuge with closed-loop flight simulation, provides the laboratory to investigate these issues. The eight women in this high-G

performance study did not show cardiovascular adaptation to high-G, whereas the eight men d id. Both genders showed increased leg calf compliance indicating possible chronic vascular effects. No echocardiographic evidence of heart damage was found. The women demonstrated half the strength of the men, but displayed similar G tolerance and endurance. The women showed less oxygen desaturation of brain tissue than the men during high-G exposure. The women did not perform the simulated air-to-air combat sortie quite as well as the men, though there was no effect of menstrual cycle on their ability to complete the mission. There was also no effect of high-G exposure on the length of the female monthly cycle, regardless of oral contraceptive use. Women demonstrated acceptable tolerance to and performance during simulated high-G aerial combat, without menstrual effect, even in light of their reduced muscular strength and cardiovascular adaptation as compared to men.
DTIC
Gravitational Effects; Feedback Control; Flight Simulation; Females; Fighter Aircraft; Muscular Strength; Oxygen; Echocardiography; Desaturation

19980011992 General Accounting Office, Washington, DC USA
Human Factors: FAA's Guidance and Oversight of Pilot Crew Resource Management Training Can Be Improved
Nov. 1997; 27p; In English
Report No.(s): AD-A332641; GAO/RCED-98-7; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Airline travel is one of the safest modes of public transportation in the USA. The current level of airline safety has been achieved, in part, because the airline industry and government regulatory agencies have implemented rigorous pilot training and evaluation programs. The major airlines have training programs for pilots that focus on, among other things, maintaining flying skills, qualifying to fly new types of aircraft, and acquiring skills in dealing with emergencies. FAA'S original regulations for the airlines' general training programs-referred to in this report as part 121-spell out the number of hours of training required in particular areas, such as the time spent practicing emergency procedures. Effective for 1996, FAA instituted a requirement for CRM training under part 121 that states the following: 'After March 19, 1998, no certificate holder AIRLINE may use a person as a flight crewmember, and after March 19, 1999, no certificate holder may use a person as a flight attendant or aircraft dispatcher unless that person has completed approved crew resource management or dispatcher resource management initial training, as applicable, with that certificate holder or with another certificate holder.' FAA believes that this training should improve flight crews' performance.
DTIC
Aircraft Safety; Airline Operations; Commercial Aircraft; Flight Crews; Human Factors Engineering; Pilot Training; Civil Aviation

15
MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

19980009804 NERAC, Inc., Tolland, CT USA
Vector Processing and Processors. (Latest Citations from the NTIS Bibliographic Database)
Apr. 1996; In English; Page count unavailable.
Report No.(s): PB96-866876; Copyright Waived; Avail: Issuing Activity (Natl Technical Information Service (NTIS)), Microfiche

The bibliography contains citations concerning development and evaluation of high speed and high performance vector processing and processors. Topics include computer architecture, vector computers, vector algorithms, Monte Carlo techniques, and Cray processors. Applications in high speed scientific computations, vectorization of nuclear codes, and aerodynamic flow analysis are discussed.
NTIS
Aerodynamic Characteristics; Architecture (Computers); Cray Computers; High Speed; Monte Carlo Method; Vector Processing (Computers)

19980011006 Transportation Safety Board of Canada, Ottawa, Ontario Canada
Data Analysis With Advanced Graphics
Poole, Michael R., Transportation Safety Board of Canada, Canada; Recording Aircraft Accident Data Proceedings; 1997, pp. 13.1-13.7; In English; Also announced as 19980010998; No Copyright; Avail: Issuing Activity (The Royal Aeronautical Society,

4 Hamilton Place, London, W1V 0BQ, UK), Hardcopy, Microfiche

The objective of this paper is to give the reader who is not familiar with the subject a general insight into how vital cockpit voice and flight data information is protected from the effects of aircraft crashes. It discusses the requirements imposed by regulations for protection of cockpit voice and flight data recorders, the techniques employed to protect the recording medium from the effects of fire and crashes, and the methods used to demonstrate compliance with the regulations. The paper describes the techniques used in general terms only, because the details of the methods that companies use to protect their recorders vary, and the designs are often proprietary to the company and regarded as confidential.

Author

Aircraft Accidents; Flight Recorders; Data Recorders; Protection

17
SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law, political science, and space policy; and urban technology and transportation.

19980010265 Nebraska Univ., Omaha, NE USA

Aviation Education: Perceptions of Airport Consultants

Bowen, Brent, Editor, Nebraska Univ., USA; Journal of Air Transportation World Wide; Nov. 1997; Volume 2, No. 1, pp. 64-80; In English; Also announced as 19980010259; No Copyright; Avail: CASI; A03, Hardcopy; A02, Microfiche

The necessity for advanced training in aviation has prompted a few universities to establish graduate programs in aviation. Although several masters aviation programs are now well established, they do not have a common core curriculum. This article reports the findings of a study designed to learn more about the educational needs of one segment of the aviation industry - the airport consulting business. Airport consultants were first asked to evaluate the relevance of courses offered in an existing MPA program. They were then asked to evaluate sixteen fields of academic study in terms of importance in preparing entry-level employees for a career in airport consulting

Author

Aircraft Industry; Airports; Education; Personnel; Occupation; Commerce

19980010266 Bowling Green State Univ., OH USA

Curriculum Design Issues in Developing a Doctor of Philosophy Program in Aeronology

Johnson, Jeffrey A., Editor, Bowling Green State Univ., USA; Journal of Air Transportation World Wide; Nov. 1997; Volume 2, No. 1, pp. 81-92; In English; Also announced as 19980010259; No Copyright; Avail: CASI; A03, Hardcopy; A02, Microfiche

A Ph.D. degree program in the non-engineering aeronautical/aerospace sciences (aeronology) will likely be required in the near future to meet the increasing demands for qualified faculty, administrators, and industry representatives within the aviation/aerospace field. Since there is no known Ph.D. degree program dedicated exclusively to a non-engineering aeronautical/aerospace science discipline worldwide, a study was conducted to design and propose a Ph.D. curriculum model based upon two curriculum models a research/practitioner model and a practitioner model. A survey questionnaire was sent to 105 U.S. University Aviation Association (UAA) institutional members to solicit their professional expertise. The study found that support for each of the two curriculum models was approximately equal although overall support for both models was not overwhelmingly high. However, a majority of the respondents did support several curriculum design attributes in developing a new Ph.D program. These attributes included a computer science requirement, an oral communication requirement, a core program requirement, and a global education awareness requirement.

Author

Aerospace Engineering; Aeronautics; Education; Aircraft Industry; Universities

19980010527 Logistics Management Inst., McLean, VA USA

Using Sorties vs. Flying Hours to Predict Aircraft Spares Demand *Final Report*

Sherbrooke, Craig C., Logistics Management Inst., USA; Apr. 1997; 103p; In English

Contract(s)/Grant(s): DASW01-95-C-0019

Report No.(s): AD-A331910; LMI-AF501LN1; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

In Operation Desert Shield/Desert Storm, while tactical aircraft flew much longer sorties than planned, the demand for aircraft spares was substantially less than expected. The war plans were based on the standard assumption that spares demand is proportional to flying hours. Since wartime demand is predicted from peacetime data, and the peacetime training missions are mostly

short sorties, it is critical to know whether spares demand is driven by the number of sorties, by flying hours, or by some combination. The U.S. Air Force has now accepted the results of our analysis, which show that demand is much more closely related to the number of sorties than it is to the number of flying hours. We recommended that the Air Force use a slope of about 10 percent, meaning that for each additional hour of sortie length after the initial hour, demands increase 10 percent. The data comprise over 700,000 sorties for 24 major aircraft types. The analysis controlled for a number of explanatory variables, including deferred maintenance, mission type, and location, as well as sortie length.
DTIC
Aircraft Maintenance; Aircraft Equipment; Spare Parts

19980010772 Boeing Commercial Airplane Co., Boeing Materials Technology, Seattle, WA USA
National Educators' Workshop 1997 Preview
Smith, Brian, Boeing Commercial Airplane Co., USA; Standard Experiments in Engineering Materials Science and Technology; Jul. 1997, pp. 371-405; In English; Also announced as 19980010742; No Copyright; Avail: CASI; A03, Hardcopy; A04, Microfiche

The overview of this presentation includes: A brief background on Boeing; An overview of the share materials and process focus areas; and share and collect inputs for 1997 plenary sessions and workshops.
Derived from text
Education; Aircraft Industry

Subject Term Index

A

ACCIDENT INVESTIGATION, 17
ACTUATORS, 36
AERODYNAMIC CHARACTERISTICS, 43
AERODYNAMIC COEFFICIENTS, 39
AERODYNAMIC DRAG, 4, 39
AERODYNAMIC STABILITY, 28
AERODYNAMICS, 36, 37, 38
AEROELASTICITY, 27, 33
AERONAUTICS, 44
AEROSOLS, 39
AEROSPACE ENGINEERING, 44
AEROSPACE SYSTEMS, 27, 35
AGREEMENTS, 7, 8, 10
AIR BREATHING ENGINES, 26
AIR FLOW, 37
AIR NAVIGATION, 15, 18
AIR TRAFFIC, 7, 10, 15
AIR TRAFFIC CONTROL, 6, 19, 20
AIR TRAFFIC CONTROLLERS (PERSONNEL), 6, 19
AIR TRANSPORTATION, 6, 7, 8, 9, 10, 11, 12, 13, 15
AIRCRAFT ACCIDENT INVESTIGATION, 17
AIRCRAFT ACCIDENTS, 16, 17, 38, 44
AIRCRAFT COMMUNICATION, 2
AIRCRAFT CONFIGURATIONS, 28
AIRCRAFT DESIGN, 40
AIRCRAFT ENGINES, 22, 25, 37
AIRCRAFT EQUIPMENT, 45
AIRCRAFT INDUSTRY, 10, 41, 44, 45
AIRCRAFT INSTRUMENTS, 38
AIRCRAFT MAINTENANCE, 1, 2, 9, 32, 35, 41, 45
AIRCRAFT PARTS, 32
AIRCRAFT SAFETY, 22, 43
AIRCRAFT STRUCTURES, 31, 33, 35, 36
AIRFRAMES, 35
AIRLINE OPERATIONS, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 19, 43
AIRPORT PLANNING, 14, 15
AIRPORTS, 13, 14, 15, 16, 18, 19, 30, 44
AIRSPACE, 15
ALGORITHMS, 21, 38
ALTERNATIVES, 19, 32
ALUMINUM COATINGS, 32
AMPHIBIOUS AIRCRAFT, 24
ANGLE OF ATTACK, 4
AQUEOUS SOLUTIONS, 32
ARAMID FIBERS, 22
ARCHITECTURE (COMPUTERS), 43
ARMED FORCES, 30
ARMED FORCES (UNITED STATES), 36
ATMOSPHERIC TURBULENCE, 42
ATTACK AIRCRAFT, 18, 40
ATTITUDE (INCLINATION), 20
AVIONICS, 2
AXISYMMETRIC BODIES, 5

B

BENDING MOMENTS, 25
BIBLIOGRAPHIES, 29, 30, 31
BODY-WING CONFIGURATIONS, 5
BOLTZMANN TRANSPORT EQUATION, 5
BOUNDARY LAYER STABILITY, 26
BOUNDARY LAYER TRANSITION, 4
BOUNDARY LAYERS, 5
BUFFETING, 28

C

C-141 AIRCRAFT, 23
CARGO, 23
CAVITATION CORROSION, 34
CAVITATION FLOW, 34
CAVITIES, 34
CENTRIFUGAL COMPRESSORS, 39
CHEMICAL ANALYSIS, 39
CHEMICAL CLEANING, 32, 41
CHEMICAL COMPOUNDS, 32
CHROMATES, 32
CIVIL AVIATION, 7, 8, 9, 10, 11, 12, 13, 14, 18, 37, 43
CLEANERS, 32, 41
CLIMATOLOGY, 42
COATINGS, 32
COCKPITS, 18, 42
CODE DIVISION MULTIPLE ACCESS, 2
COLLISION AVOIDANCE, 19
COMMERCE, 44
COMMERCIAL AIRCRAFT, 6, 7, 9, 14, 22, 34, 35, 37, 41, 43
COMMUNICATING, 34
COMMUNICATION NETWORKS, 2
COMPATIBILITY, 14
COMPETITION, 9, 10, 13
COMPOSITE STRUCTURES, 2, 33
COMPRESSIBLE FLOW, 1, 38
COMPRESSION TESTS, 30
COMPRESSIVE STRENGTH, 30
COMPUTATION, 3
COMPUTATIONAL FLUID DYNAMICS, 1, 3, 5, 6, 28, 38, 39
COMPUTER STORAGE DEVICES, 23
COMPUTER SYSTEMS PROGRAMS, 23
COMPUTER TECHNIQUES, 41
COMPUTERIZED SIMULATION, 23
COMPUTERS, 21
CONCRETES, 30
CONFERENCES, 1, 6, 9, 13, 35
CONFIGURATION INTERACTION, 5
CONGRUENCES, 23
CONSTRUCTION, 29
CONSUMERS, 9
CONTINGENCY, 1
CONTRACTORS, 1
CONTROL SURFACES, 27
CONTROL SYSTEMS DESIGN, 27
CONVERGENCE, 37
COOLING, 37
COORDINATION, 35
CORRELATION, 28
CORROSION, 33, 34
CORROSION PREVENTION, 31
COST ANALYSIS, 7, 10, 12, 14, 16
COST EFFECTIVENESS, 1, 10
COST REDUCTION, 7
COSTS, 12, 18, 23
CRASHES, 9, 16
CRAY COMPUTERS, 43
CULTURE (SOCIAL SCIENCES), 34

D

DAMAGE ASSESSMENT, 37
DATA BASES, 34
DATA MANAGEMENT, 6, 18
DATA PROCESSING, 17, 23
DATA RECORDERS, 17, 38, 44
DATA RECORDING, 18, 38
DATA REDUCTION, 12
DECISION MAKING, 34
DEGREES OF FREEDOM, 27
DELTA WINGS, 28
DEPOSITION, 39

DESATURATION, 43
DESIGN ANALYSIS, 2, 23, 29
DIGITAL DATA, 42
DIGITAL SYSTEMS, 38
DIGITAL TECHNIQUES, 38
DIRECTIONAL STABILITY, 23
DISPLAY DEVICES, 42
DISTRIBUTED PROCESSING, 21
DOCUMENTATION, 38
DRAG, 39
DRAG REDUCTION, 28
DYNAMIC CHARACTERISTICS, 24
DYNAMIC STABILITY, 23
DYNAMIC STRUCTURAL ANALYSIS, 27, 36

E

ECHOCARDIOGRAPHY, 43
ECONOMIC ANALYSIS, 12, 13, 14, 16
ECONOMICS, 16
EDUCATION, 19, 44, 45
EFFICIENCY, 16
ELECTROCHEMICAL OXIDATION, 30
ELECTROMECHANICAL DEVICES, 25
ELECTRON BEAMS, 5
ENGINE AIRFRAME INTEGRATION, 4
ENGINE DESIGN, 26, 37
ENGINE PARTS, 32
ENVIRONMENT EFFECTS, 32, 40, 41
ENVIRONMENT MANAGEMENT, 40, 41
ENVIRONMENTAL MONITORING, 41
EQUILIBRIUM FLOW, 5
EQUIPMENT, 20
ERROR ANALYSIS, 17
EVALUATION, 19, 20
EXPERIMENTATION, 19, 26

F

F-15 AIRCRAFT, 33
FANS, 26
FATIGUE (MATERIALS), 37
FATIGUE LIFE, 35, 37
FEASIBILITY ANALYSIS, 19
FEEDBACK CONTROL, 43
FEMALES, 43
FIBER OPTICS, 2
FIGHTER AIRCRAFT, 38, 43
FINITE ELEMENT METHOD, 37
FIRE PREVENTION, 16, 17
FLIGHT CREWS, 43
FLIGHT MANAGEMENT SYSTEMS, 6
FLIGHT MECHANICS, 36
FLIGHT PATHS, 15
FLIGHT RECORDERS, 16, 17, 18, 38, 44
FLIGHT SAFETY, 18, 19, 38
FLIGHT SIMULATION, 43
FLIGHT TESTS, 23, 38
FLOW DISTRIBUTION, 4
FLOW VELOCITY, 3
FLUID DYNAMICS, 39
FLUID FLOW, 37
FLUIDIZED BED PROCESSORS, 39
FLUORESCENCE, 5
FORCE DISTRIBUTION, 30
FUEL COMBUSTION, 37
FUEL TANKS, 33

G

GAS TURBINE ENGINES, 22, 25, 32
GAS TURBINES, 25, 26
GENERAL AVIATION AIRCRAFT, 8
GENERAL OVERVIEWS, 36
GLOBAL POSITIONING SYSTEM, 20
GOVERNMENT/INDUSTRY RELATIONS, 6, 14, 35
GRAPHITE, 31
GRAVITATIONAL EFFECTS, 43
GROUND TESTS, 28

H

HAZARDOUS MATERIALS, 40
HAZARDOUS WASTES, 32, 41
HEAT FLUX, 37
HEAT TRANSFER, 26
HEATING, 31
HELICOPTERS, 24
HEURISTIC METHODS, 21
HIGH REYNOLDS NUMBER, 3, 39
HIGH SPEED, 2, 43
HUBS, 19
HUMAN FACTORS ENGINEERING, 43
HYDROCARBONS, 32
HYDROGEN, 33
HYDROGEN EMBRITTLEMENT, 33
HYPERSONIC FLOW, 4, 5
HYPERSONIC VEHICLES, 5
HYPERSONIC WIND TUNNELS, 29
HYPERSONICS, 5
HYPERVELOCITY WIND TUNNELS, 31

I

ICE FORMATION, 18
INCOMPRESSIBLE FLOW, 1, 27
INDUSTRIAL MANAGEMENT, 7, 13, 15
INDUSTRIES, 7
INFILTRATION, 39
INFORMATION SYSTEMS, 9
INFORMATION TRANSFER, 6
INTERNATIONAL COOPERATION, 6, 7, 8, 12
INVISCID FLOW, 38

J

JET AIRCRAFT, 6, 40
JET ENGINES, 32, 37

K

KALMAN FILTERS, 21

L

LABOR, 9, 12
LAMINAR BOUNDARY LAYER, 26
LAMINAR FLOW, 5
LATERAL STABILITY, 6
LIFE SUPPORT SYSTEMS, 26
LIGHT (VISIBLE RADIATION), 5
LOCAL AREA NETWORKS, 2
LONGITUDINAL STABILITY, 6

M

MAINTENANCE, 8
MAINTENANCE TRAINING, 9
MANAGEMENT METHODS, 41
MANUALS, 32
MANUFACTURING, 32, 36
MAPS, 42
MARKET RESEARCH, 7, 10, 11, 12, 34
MATERIALS HANDLING, 9
MATHEMATICAL MODELS, 14, 21, 23, 27, 39
MEASURING INSTRUMENTS, 5, 38
MECHANICAL DRIVES, 25
METALS, 30
MICROCRACKS, 33
MILITARY AIRCRAFT, 35, 40
MILITARY AVIATION, 2
MILITARY TECHNOLOGY, 22, 36
MISSILES, 28
MISSION PLANNING, 42
MIXING LAYERS (FLUIDS), 1

MODELS, 3, 15, 29
MOMENTS OF INERTIA, 23
MONOPROPELLANTS, 30
MONTE CARLO METHOD, 43
MULTIPLE ACCESS, 2
MULTISENSOR FUSION, 21
MUSCULAR STRENGTH, 43

N

NASA PROGRAMS, 35, 36
NATIONAL AIRSPACE SYSTEM, 18
NATIONAL AVIATION SYSTEM, 19
NAVIER-STOKES EQUATION, 39
NAVY, 40
NONLINEAR SYSTEMS, 27
NUMERICAL ANALYSIS, 37
NUMERICAL FLOW VISUALIZATION, 1

O

OBJECT-ORIENTED PROGRAMMING, 6
OCCUPATION, 44
OPERATING COSTS, 9, 10, 13, 14
OPERATIONS RESEARCH, 29
OPTICAL COMMUNICATION, 2
ORGANIZATIONS, 34
OXIDIZERS, 30
OXYGEN, 43
OZONE DEPLETION, 32

P

PANEL METHOD (FLUID DYNAMICS), 5
PARACHUTES, 3
PARAMETER IDENTIFICATION, 28
PARTICLE IMAGE VELOCIMETRY, 3
PASSENGER AIRCRAFT, 7, 14
PAVEMENTS, 30
PERFORMANCE, 15, 16
PERFORMANCE PREDICTION, 29
PERFORMANCE TESTS, 20
PERSONNEL, 44
PILOT PERFORMANCE, 42
PILOT TRAINING, 43
PILOTLESS AIRCRAFT, 22, 23, 42
PISTON ENGINES, 25
PLANNING, 30
POINT SOURCES, 37
POLICIES, 8, 9, 12
POLLUTION CONTROL, 40
POLYETHYLENES, 22
POROUS MATERIALS, 37
POSITION ERRORS, 20
POSITIONING, 20
POTENTIAL FLOW, 5
PREDICTION ANALYSIS TECHNIQUES, 18
PROCEDURES, 17
PRODUCT DEVELOPMENT, 25
PRODUCTIVITY, 16
PROJECT MANAGEMENT, 35
PROJECT PLANNING, 35
PROPELLERS, 5, 34
PROPULSION SYSTEM PERFORMANCE, 25
PROTECTION, 44
PROTECTIVE COATINGS, 31

Q

QUALITY CONTROL, 30

R

RADAR BEACONS, 20
RADIO NAVIGATION, 18
RADIO RECEIVERS, 20
RATINGS, 9
REAL TIME OPERATION, 31
REGULATIONS, 9, 11, 12, 13, 17
RELIABILITY, 18
RELIABILITY ANALYSIS, 2
REMOTE CONTROL, 41
RESCUE OPERATIONS, 24
RESEARCH, 4
RESEARCH AND DEVELOPMENT, 35, 36, 37
RESOURCES, 9
RESOURCES MANAGEMENT, 9
REYNOLDS NUMBER, 5, 39
REYNOLDS STRESS, 5
RISK, 34
ROCKET ENGINES, 25
ROCKS, 34
ROTARY WING AIRCRAFT, 4, 23, 39
ROTARY WINGS, 23, 24
RUDDERS, 34
RUNWAYS, 18

S

SAFETY, 8, 9
SAFETY FACTORS, 18
SAFETY MANAGEMENT, 18
SATELLITE NAVIGATION SYSTEMS, 18
SEALERS, 33
SEAPLANES, 24
SEARCH RADAR, 20
SENSORS, 36
SEPARATED FLOW, 4
SEQUENTIAL CONTROL, 29
SERVICE LIFE, 9
SERVICES, 15
SHADOWGRAPH PHOTOGRAPHY, 25
SHEAR LAYERS, 25
SHEAR STRESS, 26
SHOCK HEATING, 26
SHOCK WAVES, 26
SHOPS, 8
SIGNAL PROCESSING, 3
SIMULATION, 18, 39
SIMULATORS, 19
SINGLE ENGINE AIRCRAFT, 6
SMART STRUCTURES, 35, 36
SOLVENTS, 32
SPACE TRANSPORTATION, 9
SPACECRAFT ENVIRONMENTS, 26
SPACECRAFT PROPULSION, 26
SPACECRAFT STRUCTURES, 35, 36
SPARE PARTS, 45
STABILITY, 24, 27
STABILITY TESTS, 27
STANDARDS, 15, 17
STATIC STABILITY, 23
STATIC TESTS, 20
STEADY FLOW, 39
STRATEGY, 8, 13
STRUCTURAL ANALYSIS, 24
STRUCTURAL DESIGN, 24
STRUCTURAL ENGINEERING, 30
STRUCTURAL FAILURE, 37
STRUCTURAL RELIABILITY, 2
STRUCTURAL VIBRATION, 27
SUPERCHARGERS, 33
SUPERCOMPUTERS, 21
SUPERSONIC JET FLOW, 25
SYMBOLS, 27

T

TAIL ASSEMBLIES, 24
TECHNOLOGIES, 2, 3, 28, 29
TECHNOLOGY ASSESSMENT, 36, 37
TECHNOLOGY TRANSFER, 22, 35
TECHNOLOGY UTILIZATION, 36
TEMPERATURE MEASUREMENT, 31
TERMINAL GUIDANCE, 28
THERMODYNAMICS, 5
THREE DIMENSIONAL FLOW, 39
TIME DEPENDENCE, 21

TIME SERIES ANALYSIS, 7
TRAFFIC CONTROL, 21
TRAJECTORIES, 28
TRAJECTORY OPTIMIZATION, 28
TRANSIENT RESPONSE, 24
TRANSONIC FLOW, 26, 38
TRANSONIC WIND TUNNELS, 29
TRANSPORT AIRCRAFT, 37
TRANSPORTATION, 9, 21
TURBINE BLADES, 26
TURBINES, 34
TURBOFAN ENGINES, 26
TURBOJET ENGINES, 25
TURBULENCE EFFECTS, 39
TURBULENT BOUNDARY LAYER, 26
TURBULENT FLOW, 1, 5
TURBULENT HEAT TRANSFER, 26
TWO DIMENSIONAL FLOW, 3, 27

U

ULTRASONIC CLEANING, 41
UNDERWATER VEHICLES, 21, 27
UNIVERSITIES, 44
UNMANNED SPACECRAFT, 22

V

V-22 AIRCRAFT, 40
VAPOR DEPOSITION, 32
VECTOR PROCESSING (COMPUTERS), 43
VELOCITY MEASUREMENT, 3
VENTILATION, 26
VIBRATION, 28
VIBRATION DAMPING, 24
VIBRATION MEASUREMENT, 38
VIBRATION TESTS, 38
VISCOUS FLOW, 38, 39
VORTICES, 4, 5, 28

W

WAKES, 5
WASTE DISPOSAL, 30
WASTE TREATMENT, 30
WATER QUALITY, 41
WEAPON SYSTEMS, 40
WEATHER FORECASTING, 42
WIND TUNNEL TESTS, 28
WIND TUNNELS, 29, 30
WING FLAPS, 4
WING ROCK, 28
WINGS, 28
WORKSTATIONS, 21, 42

Y

YAW, 27

Z

ZIRCALOYS (TRADEMARK), 33
ZIRCONIUM ALLOYS, 33

Personal Author Index

A

Abraham, Edward H., 7
Alamdari, Fariba, 11
Anderson, Gary L., 36
Ansari, Amid, 6

B

Badeau, Ph., 21
Balzer, Todd, 41
Barclay, Rebecca O., 34
Bario, F., 26
Barr, David, 17
BAuchau, O. A., 33
Bauer, Jeffrey E., 42
Benney, Richard J., 3
Beral, C., 26
Betancor, Ofelia, 12
Black, J. A., 15
Bodner, Bryan J., 30
Bosc, J. F., 19
Bowen, B. D., 6
Bowen, Brent, 8, 44
Bowen, Brent D., 9, 13
Brad, Jimmie, 19
Bridgewater, Aaron C., 30
Brown, Clare, 42
Brown, David R., 24
Bruzzoni, P., 33
Butrica, Andrew J., 23

C

Calarese, Wladimiro, 27
Campos, Javier, 12
Carmichael, Bruce W., 22
Chelette, Tamara, 42
Chin, Anthony T. H., 13
Cho, Dong-Sung, 7
Choi, Sang H., 37
Coronel, P., 33
Cottam, M. P., 18
Craig, Myles R., 41
Crowe, C. Robert, 36

D

deBarros, Alexandre Gomes, 14
Denny, G. A., 4
Devne, Troy E., 22
Domizzi, G., 33
Donohue, Casey J., 42
Dowell, E. H., 26
Dresner, Martin, 9

E

Erich, D. C., 22
Evans, Samuel S., 1

F

Fabris, Drazen, 3
Farncomb, Robert E., 29
Faure, T., 4
Fling, Scott, 38
Forsyth, Brian A., 2
Forsyth, Peter, 14
Fortunato, B., 38

G

Gary, P. M., 1
Gehron, Mike, 32
Gendreau, M., 21
Gendron, Marlin L., 42
Gillen, David, 16
Giovanola, J. H., 22
Gochberg, Lawrence A., 5
Grandt, A. F., Jr., 34
Groves, G. W., 28
Guertin, F., 21

H

Hall, Brent, 31
Headley, Dean E., 9
Hopkins, D. A., 25
Hoshal, Greg, 38
Hutchison, Michael W., 30

J

Jaillet, P., 19
Johnson, Jeffrey A., 44
Johnson, Peter H., 41
Johnson, Terry, 41
Jone, Edward C., 19
Jozewicz, Wojciech, 31

K

Kaduck, Raymon J., 8
Karitis, Paul, 20
Kaufman, Robert J., 22
Kennedy, John M., 34
Khodary, A., 28
Kim, Cathy, 40
Kim, Jongseok, 10
Kinney, Robert W., 41
Kissling, Christopher C., 15
Klopp, R. W., 22
Kotzinos, D., 21
Kreins, Alois F., 4
Kulbas, Tanel, 19

L

Lall, Ashish, 16
Lanzani, L., 33
Lavelle, T. M., 25
Lemaitre, Anne, 16
Loewy, R. G., 33
Lohrenz, Maura C., 42
Lu, X. Y., 4
Lush, Heather, 7

M

Mabey, D. G., 28
Mahmassani, H. S., 21
Malone, John B., 35
Malvern, A. R., 38
Mass, Gary R., 30
Mayes, Paul, 17
McNerney, M., 19
Melnick, Robert M., 41
Metzger, Michael A., 31
Meyer, E., 19
Moore, Pippa, 37
Morrell, Peter, 11
Motter, Mark A., 28
Myers, Michael K., 30
Myrick, Stephanie A., 42

N

Nagata, Koki, 7
Nagib, Hassan, 3, 24
Naguib, Ahmed, 3, 24
Nauflett, George W., 29
Nero, Giovanni, 12
Ng, Wing, 26
Nijkamp, Peter, 14
Noor, Ahmed K., 35

O

Obert, Stephen V., 40
Omlor, Christopher J., 22
Oum, Tae Hoon, 9, 10, 13
Oum,Tae Hoon, 6

P

Papageorgiou, Evangelos C., 23
Papp, Joe, 24

Park, Namgyoo, 7
Park, Yonghwa, 15
Patnaik, S. N., 25
Paul, Donald B., 36
Pels, Eric, 14
Pence, Patrick E., 22
Perniciaro, Ralph E., 42
Peters, David A., 23
Pinelli, Thomas E., 34
Pitkaenen, H., 39
Poole, Michael R., 43
Potvin, J. -Y., 21
Powers, Edward D., 19
Privett, Mal, 32
Pryke, Clement L., 20

R

Ramakrishnan, Sekaripuram V., 3
Randoy, Trond, 12
Reed, Helen L., 5
Rhoades, Dawna l., 7
Rice, C., 19
Ries, Heidi R., 37
Rietveld, Piet, 14
Riskalla, M. G., 1
Robert, G., 4
Rohr, Ray, 10

S

Safonov, Michael G., 27
Sahu, Jubaraj, 3
Sato, Yuko, 34
Scott, Paul L., 30
Scotti, Stephen J., 37
Sheppard, Peter F., 16
Sherbrooke, Craig C., 44
Shockey, D. A., 22
Siikonen, T., 39
Simons, J. W., 22
Singer, Carl, 31
Slodicka, M., 37
Smit, Hans G., 13
Smith, Anthony Ray, 31
Smith, Brian, 45
Smith, Edward C., 23
Smith, M. J., 20
Smith, Robert, 17
Soln, Josip Z., 39
Song, Kyo D., 37
Starkman, Joseph J., 20
Strandenes, Siri Pettersen, 12

T

Taillard, E., 21
Tan, Paul W., 36
Teets, Edward H., Jr., 42
Thorne, Richard L., 21
Tobin, Vincent M., 24
Toh, Rex S., 8
Trenchard, Michael E., 42
Tsamilis, Sotirios E., 27
Turner, Elijah, 27

U

Uittenbogaart, Peter, 12
Underwood, Ken, 42

V

vanDam, C. P., 5
VanZuyle, Paul, 42
Virgin, L. N., 26

W

Walden, A. B., 5
Wark, Candace, 3
Whitlow, Woodrow, Jr., 35
Wilcox, Richard S., 22
Williams, Jim C., 37
Wilson, Marc, 9
Wirasinghe, Sumedha Chandana, 14
Wisten, M. B., 20
Wortmann, J., 6
Wu, J. M., 4
Wu, J. Z., 4
Wurtzler, Kenneth, 6

X

Xie, H. -Y., 39

Y

Yasuo, Sakakibara, 14
Yu, Chunyan, 10

Z

Zaretsky, Erwin V., 35
Zhang, Jian-Guo, 2
Ziliaskopoulos, A., 21

Report Documentation Page

1. Report No. NASA/SP—1998-7037/SUPPL369	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Aeronautical Engineering A Continuing Bibliography (Supplement 369)		5. Report Date March 6, 1998 6. Performing Organization Code
7. Author(s)		8. Performing Organization Report No. 10. Work Unit No.
9. Performing Organization Name and Address NASA Scientific and Technical Information Program Office		11. Contract or Grant No.
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Langley Research Center Hampton, VA 23681		13. Type of Report and Period Covered Special Publication 14. Sponsoring Agency Code
15. Supplementary Notes		

16. Abstract

This report lists reports, articles and other documents recently announced in the NASA STI Database.

17. Key Words (Suggested by Author(s)) Aeronautical Engineering Aeronautics Bibliographies	18. Distribution Statement Unclassified – Unlimited Subject Category – 01

19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 68	22. Price A04/HC

For sale by the NASA Center for AeroSpace Information, 800 Elkridge Landing Road, Linthicum Heights, MD 21090-2934