

**NASA  
Technical  
Memorandum**

NASA TM-103567

11N-82  
70340  
P-69

**FY 1991 SCIENTIFIC AND TECHNICAL REPORTS,  
ARTICLES, PAPERS, AND PRESENTATIONS**

Compiled by Joyce E. Turner  
Management Operations Office

October 1991

(NASA-TM-103567) FY 1991 SCIENTIFIC AND  
TECHNICAL REPORTS, ARTICLES, PAPERS, AND  
PRESENTATIONS (NASA) 69 p CSCL 05B

N92-17586

Unclas  
G3/82 0070340



National Aeronautics and  
Space Administration

George C. Marshall Space Flight Center

SCREEN IMAGE USER=\*PNF SESSION=T20BRO6 2/27/92-09:10:16-AM

DISPLAY 03/2/9

90N19916\*# ISSUE 12 PAGE 1725 CATEGORY 82 RFT#: NASA-TM-100384 NAS

1.15:100384 89/10/00 63 PAGES UNCLASSIFIED DOCUMENT

UTTL: FY 1989 scientific and technical reports, articles, papers, and presentations

AUTH: A/TURNER, JOYCE E. PAT: A/comp.

CORP: National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

SAP: Avail: NTIS HC A04/MF A01

CIO: UNITED STATES

MAJS: /\*AERONAUTICS/\*AEROSPACE ENGINEERING/\*AEROSPACE SCIENCES/\*ASTRONAUTICS/\* BIBLIOGRAPHIES

MINS: / AIRCRAFT DESIGN/ ASTRONOMY/ LAUNCH VEHICLES/ PAPERS/ SPACECRAFT DESIGN

AEA: Author

ABS: A compendium of bibliographic references to papers presented by Marshall Space Flight Center (MSFC) personnel and contractors during FY 1989 is provided. The papers included in formal NASA technical reports, memoranda, papers which were published in technical journals, and presentations by MSFC personnel. The formal NASA technical reports and memoranda have abstracts included. Sources for obtaining these documents are also included.

ENTER:

**REPORT DOCUMENTATION PAGE**Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

<b>1. AGENCY USE ONLY (Leave blank)</b>		<b>2. REPORT DATE</b> October 1991	<b>3. REPORT TYPE AND DATES COVERED</b> Technical Memorandum	
<b>4. TITLE AND SUBTITLE</b> FY 1991 Scientific and Technical Reports, Articles, Papers, and Presentations			<b>5. FUNDING NUMBERS</b>	
<b>6. AUTHOR(S)</b> Compiled by Joyce E. Turner				
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> George C. Marshall Space Flight Center Marshall Space Flight Center, Alabama 35812			<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
<b>9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> National Aeronautics and Space Administration Washington, DC 20546			<b>10. SPONSORING/MONITORING AGENCY REPORT NUMBER</b>  NASA TM-103567	
<b>11. SUPPLEMENTARY NOTES</b> Prepared by Management Operations Office, Administrative Operations Office				
<b>12a. DISTRIBUTION / AVAILABILITY STATEMENT</b>  Unclassified - Unlimited			<b>12b. DISTRIBUTION CODE</b>	
<b>13. ABSTRACT (Maximum 200 words)</b>  This document presents formal NASA technical reports, papers published in technical journals, and presentations by MSFC personnel in FY91. It also includes papers of MSFC contractors.  After being announced in STAR, all of the NASA series reports may be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.  The information in this report may be of value to the scientific and engineering community in determining what information has been published and what is available.				
<b>14. SUBJECT TERMS</b>			<b>15. NUMBER OF PAGES</b> 69	
			<b>16. PRICE CODE</b> NTIS	
<b>17. SECURITY CLASSIFICATION OF REPORT</b> Unclassified	<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b> Unclassified	<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b> Unclassified	<b>20. LIMITATION OF ABSTRACT</b> Unlimited	

## FOREWORD

In accordance with the NASA Space Act of 1958, the MSFC has provided for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.

Since July 1, 1960, when the George C. Marshall Space Flight Center was organized, the reporting of scientific and engineering information has been considered a prime responsibility of the Center. Our credo has been that "research and development work is valuable, but only if its results can be communicated and made understandable to others."

The N number shown for the reports listed is assigned by the Center for AeroSpace Information (CASI), Baltimore, Maryland, indicating that the material is unclassified and unlimited and is available for public use. These publications can be purchased from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161. The N number should be cited when ordering.

GEORGE C. MARSHALL SPACE FLIGHT CENTER  
Marshall Space Flight Center, Alabama

FY 1991 SCIENTIFIC AND TECHNICAL REPORTS,  
ARTICLES, PAPERS, AND PRESENTATIONS

TABLE OF CONTENTS

	Page
NASA TECHNICAL MEMORANDA .....	1
NASA TECHNICAL PAPERS .....	12
MSFC CONFERENCE PUBLICATIONS .....	15
NASA REFERENCE PUBLICATIONS .....	16
NASA CONTRACTOR REPORTS .....	17
MSFC PAPERS CLEARED FOR PRESENTATION .....	28



## NASA TECHNICAL MEMORANDUM

Furthermore, using an established weighted scheme for comparing computational effort involved in an algorithm, a comparison of this algorithm is made to the more established and rigorous branch-and-bound method. A computer implementation of the procedure, in PC-compatible Pascal, is also presented and discussed. This procedure for finding optimal solutions to integer-type problems may be applied to various systems engineering situations in the conceptual, preliminary, and detail design phases of the system development cycle.

TM-103518 November 1990  
Dendritic Morphology and Microsegregation in Directionally Solidified Superalloy, PWA-1480, Single Crystal: Effect of Gravity—Center Director's Discretionary Fund Report. S.N. Tewari, M.V. Kumar, J.E. Lee, and P.A. Curreri. Materials and Processes Laboratory. N91-15391

Primary dendrite spacings, secondary dendrite spacings, and microsegregation have been examined in PWA-1480 single crystal specimens which were directionally solidified during parabolic maneuvers on the KC-135 aircraft. Experimentally observed growth rate and thermal gradient dependence of primary dendrite spacings are in good agreement with predictions from dendrite growth models for binary alloys. Secondary dendrite coarsening kinetics show a reasonable fit with the predictions from an analytical model proposed by Kirkwood for a binary alloy. The partition coefficients of tantalum, titanium, and aluminum are observed to be less than unity; while that for tungsten and cobalt are greater than unity. This is qualitatively similar to their nickel base binaries. Microsegregation profiles experimentally observed for PWA-1480 superalloy show a good fit with Bower, Brody, and Flemings models developed for binary alloys. Transitions in gravity levels do not appear to affect primary dendrite spacings. A trend of decreased secondary arm spacings with transition from high gravity to the low gravity period was observed at a growth speed of  $0.023 \text{ cm s}^{-1}$ . However, definite conclusions can only be drawn by experiments at lower growth speeds which make it possible to examine the side-branch coarsening kinetics over a longer duration. Such experiments, not possible due to

the insufficient low-gravity time of the KC-135, may be carried out in the low-gravity environment of space.

TM-103519 October 1990  
Engineering Design Based on Risk—An Alternate Criterion to the Engineering Safety Factor. D.R. Moore. Materials and Processes Laboratory. X91-10073

The design of engineering structures can be based on risk when enough information about the structure is available. This report compares designing by risk to the more commonly used approach of designing by an engineering factor of safety. The safety factor concept of providing structural assurance is challenged within this report. New methods are developed to assist in determining structural risk in an engineering design when the design is based on the interference of two normally distributed engineering phenomena. The risk factor ( $R_F$ ) approach is offered as an alternate method of establishing engineering design criteria. The engineering risk equation is developed which allows a simple determination of risk when coefficients of variation are known. Several curves were developed that relate  $R_F$  to coefficients of variation for various reliabilities. The author concluded that designs and redesigns should be based on risk whenever possible.

TM-103520 October 1990  
FY 1990 Scientific and Technical Reports, Articles, Papers, and Presentations. Compiled by Joyce E. Turner. Management Operations Office. N91-15926

This document presents formal NASA technical reports, papers published in technical journals, and presentations by MSFC personnel in FY90. It also includes papers of MSFC contractors.

After being announced in STAR, all of the NASA series reports may be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

The information in this report may be of value to the scientific and engineering community in determining what information has been published and what is available.



## NASA TECHNICAL MEMORANDUM

ones made of silicon nitride in 57-mm HPOTP bearings. The bearings were then installed in a test rig and run at near turbopump operating conditions. The results from this test series have been encouraging, with silicon nitride showing good wear resistance and thermal stability.

TM-103525 November 1990  
Atmospheric Environment for Space Shuttle  
(STS-41) Launch. G.L. Jasper and G.W.  
Batts. Space Science Laboratory.  
N91-19529

This report presents a summary of selected atmospheric conditions observed near space shuttle STS-41 launch time on October 6, 1990, at Kennedy Space Center, Florida. Values of ambient pressure, temperature, moisture, ground winds, visual observations (cloud), and winds aloft are included. The sequence of prelaunch Jimsphere-measured vertical wind profiles is given in this report. The final atmospheric tape, which consists of wind and thermodynamic parameters versus altitude, for STS-41 vehicle ascent has been constructed. The STS-41 ascent atmospheric data tape has been constructed by Marshall Space Flight Center's Earth Science and Applications Division to provide an internally consistent data set for use in postflight performance assessments and represents the best estimate of the launch environment to the 400,000-ft altitude that was traversed by the STS-41 vehicle.

TM-103526 February 1991  
A Damage Tolerance Comparison of  
IM7/8551 and IM8G/8553 Carbon/Epoxy  
Composites. D.G. Lance and A.T. Nettles.  
Materials and Processes Laboratory.  
N91-18222

A damage tolerance study of two new toughened carbon fiber/epoxy resin systems was undertaken as a continuation of ongoing work into screening new opposites for resistance to foreign object impact. This report is intended to be a supplement to NASA TP 3029 in which four new fiber/resin systems were tested for damage tolerance. Instrumented drop weight impact testing was used to inflict damage to 16-ply quasi-isotropic specimens. Instrumented output data and cross-sectional examination of the damage zone were utilized to quantify the damage. It was found that the two fiber/resin

systems tested in this study were much more impact resistant than an untoughened composite such as T300/934, but were not as impact resistant as other materials previously studied.

TM-103527 March 1991  
Evaluation of Bearing Configurations Using  
the Single Bearing Tester in Liquid Nitrogen.  
T. Jett, P. Hall, and R. Thom. Materials and  
Processes Laboratory. N91-21532

Various bearing configurations were tested using the Marshall Space Flight Center single bearing tester with LN<sub>2</sub> as the cryogenic coolant. The baseline was one Rocketdyne phase I high pressure oxidizer turbopump (HPOTP) pump end 45-mm bore bearing. The bearing configurations that were tested included a Salox/M cage configuration, a silicon nitride ball configuration, an elongated cage configuration, and a Bray 601 grease configuration.

TM-103528 February 1991  
GEOSIM—A Numerical Model for Geo-  
physical Fluid Flow Simulation. Karen A.  
Butler, Timothy L. Miller, and Huei-lin Lu.  
Space Science Laboratory. N91-21450

A numerical model which simulates geophysical fluid flow in a wide range of problems is described in detail, and comparisons of some of the model's results are made with previous experimental and numerical studies. The model is based upon the Boussinesq Navier-Stokes equations in spherical coordinates, which can be reduced to a cylindrical system when latitudinal walls are used near the pole and the ratio of latitudinal length to the radius of the sphere is small. The equations are approximated by finite differences in the meridional plane and spectral decomposition in the azimuthal direction. The user can specify a variety of boundary and initial conditions, and there are five different spectral truncation options. The results of five validation cases are presented: (1) the transition between axisymmetric flow and baroclinic wave flow in the side-heated annulus; (2) the steady baroclinic wave of the side-heated annulus; (3) the wave-amplitude vacillation of the side-heated annulus; (4) transition to baroclinic wave flow in a bottom-heated annulus; and (5) the Spacelab Geophysical Fluid Flow Cell (spherical) experiment.

## NASA TECHNICAL MEMORANDUM

TM-103529

March 1991

An Evaluation of GTAW-P Versus GTA Welding of Alloy 718. W.R. Gamwell, C. Kurgan, and T.W. Malone. Materials and Processes Laboratory. N91-21287

Mechanical properties have been evaluated to determine statistically whether the pulsed current gas tungsten arc welding (GTAW-P) process produces welds in alloy 718 with room temperature structural performance equivalent to current space shuttle main engine (SSME) welds manufactured by the constant current gas tungsten arc welding (GTAW) process. Evaluations were conducted on two base metal lots, two filler metal lots, two heat input levels, and two welding processes. The material form was 0.125-inch (3.175-mm) alloy 718 sheet. Prior to welding, sheets were heat treated to either the ST or STA-1 condition. After welding, panels were left as welded or heat treated to the STA-1 condition, and weld beads were left intact or machined flush. Statistical analyses were performed on yield strength (YS), ultimate tensile strength (UTS), and high cycle fatigue (HCF) properties for all the post welded material conditions. Analyses of variance (ANOVA) were performed on the data to determine if there were any significant effects on UTS or HCF life due to variations in base metal, filler metal, heat input level, or welding process.

Statistical analyses have shown that the GTAW-P process does produce welds with room temperature structural performance equivalent to current SSME welds manufactured by the GTAW process, regardless of prior material condition or post welding condition.

TM-103530

February 1991

Atmospheric Environment for Space Shuttle (STS-38) Launch. G.L. Jasper and G.W. Batts. Space Science Laboratory. N91-21633

This report presents a summary of selected atmospheric conditions observed near space shuttle STS-38 launch time on November 15, 1990, at Kennedy Space Center, Florida. STS-38 carried a Department of Defense payload and the flight azimuth in this report will be denoted by a reference flight azimuth, since the actual flight azimuth is not known. Values of ambient pressure, temperature, moisture, ground winds, visual observations (cloud), and winds aloft are

included. The sequence of prelaunch Jimsphere-measured vertical wind profiles is given in this report. The final atmospheric tape, which consists of wind and thermodynamic parameters versus altitude, for STS-38 vehicle ascent has been constructed. The STS-38 ascent atmospheric data tape has been constructed by Marshall Space Flight Center's Earth Science and Applications Division to provide an internally consistent data set for use in postflight performance assessments and represents the best estimate of the launch environment to the 400,000-ft altitude that was traversed by the STS-38 vehicle.

TM-103531

April 1991

NASA Marshall Space Flight Center Solar Observatory Report—July–September 1990. James E. Smith. Space Science Laboratory. N91-22951

This report provides a description of the NASA Marshall Space Flight Center's Solar Vector Magnetograph Facility and gives a summary of its observations and data reduction during July–September 1990. The systems that make up the facility are a magnetograph telescope, an H-alpha telescope, a Questar telescope, and a computer code. The data are represented by longitudinal contours with azimuth plots.

TM-103532

April 1991

NASA Marshall Space Flight Center Solar Observatory Report—October–December 1990. James E. Smith. Space Science Laboratory. N91-22952

This report provides a description of the NASA Marshall Space Flight Center's Solar Vector Magnetograph Facility and gives a summary of its observations and data reduction during October–December 1990. The systems that make up the facility are a magnetograph telescope, an H-alpha telescope, a Questar telescope, and a computer code. The data are represented by longitudinal contours with azimuth plots.

TM-103533

May 1991

An Evaluation of the Total Quality Management (TQM) Implementation Strategy for the Advanced Solid Rocket Motor Project at NASA's Marshall Space Flight

# NASA TECHNICAL MEMORANDUM

Center. Harry F. Schramm and Kenneth W. Sullivan.  
N91-24599

This document represents an evaluation of the NASA's Marshall Space Flight Center (MSFC) strategy to implement total quality management (TQM) in the advanced solid rocket motor (ASRM) project. The evaluation of the implementation strategy reflected the Civil Service personnel perspective at the project level. The external and internal environments at MSFC were analyzed for their effects on the ASRM TQM strategy. Organizational forms, cultures, management systems, problem solving techniques and training were assessed for their influence on the implementation strategy. The influence of ASRM's effort was assessed relative to its impact on mature projects as well as future projects at MSFC.

TM-103534 April 1991  
Parametric Study in Weld Mismatch of Longitudinally Welded SSME HPFTP Inlet. J.B. Min, K.L. Spanyer, and R.M. Brunair. Structures and Dynamics Laboratory.  
N91-23502

Welded joints are an essential part of pressure vessels such as the space shuttle main engine (SSME) turbopumps. Defects produced in the welding process can be detrimental to weld performance. Recently, review of the SSME high pressure fuel turbopump (HPFTP) titanium inlet x rays revealed several weld discrepancies such as penetrometer density issues, film processing discrepancies, weld width discrepancies, porosity, lack of fusion, and weld offsets. Currently, the sensitivity of welded structures to defects is of concern. From a fatigue standpoint, weld offset may have a serious effect since local yielding, in general, aggravates cyclic stress effects. Therefore, the weld offset issue is considered in this report. Using the finite element method and mathematical formulations, parametric studies were conducted to determine the influence of weld offsets and a variation of weld widths in longitudinally welded cylindrical structures with equal wall thicknesses on both sides of the joint. From the study, the finite element results and theoretical solutions are presented.

TM-103535 April 1991  
Effects of Water on the Strength of Zerodur. D. Tucker and A. Setzer. Materials and Processes Laboratory.  
N91-24430

An experimental design matrix was constructed to determine the effects of time and temperature water soak on the strength of Zerodur glass-ceramic. It was found that strength does increase in a nonlinear manner which is consistent with existing theories of crack tip blunting and residual stress reduction.

TM-103536 May 1991  
Effect of Flange Bolt Preload on Space Shuttle Main Engine High Pressure Oxidizer Turbopump Housing Analysis. J.B. Min, L.M. Johnston, and B. Czekalski. Structures and Dynamics Laboratory.  
N91-24584

Cracks at the seal fillet flange and the strut pilot groove of primary turbine drain passage of the space shuttle main engine (SSME) high pressure oxidizer turbopump (HPOTP) have been observed and reported. Stress information for critical structural components in the SSME under actual conditions is necessary for design and life prediction analysis. However, little information is available about the stress distribution at this location under various combinations of loadings and environments. Thus, a stress analysis was conducted to determine an influence of the various operation and installation loads on the stresses of the HPOTP main mounting flange. To do this, a three-dimensional (3-D) finite element model of the HPOTP housing was generated. A fairly comfortable margin of stresses at the flange fillet with respect to the yield stress of Inconel 718 is shown in this analysis. However, it was revealed that the bending stress arising from the housing flange bolt preloads could significantly affect the stress distribution at the strut pilot groove of primary turbine drain passage in the HPOTP housing. Consequently, the information obtained from the present 3-D analysis results should be useful in guiding the development of the SSME HPOTP.

TM-103537 May 1991  
The Effect of Stress on Hydrogen Uptake and Desorption by A-286. M.D. Danford. Materials and Processes Laboratory.  
N91-28341

## NASA TECHNICAL MEMORANDUM

The uptake and desorption of hydrogen by A-286 as a function of stress has been studied using electrochemical methods. It was found that the apparent surface hydrogen concentration  $C_o$ , the mean hydrogen concentration  $C$ , and the hydrogen distribution uniformity all increased up to a stress level 50-percent of yield and decreased thereafter. The value of the hydrogen diffusion coefficient  $D$  was relatively unaffected by stress while the percent of trapped hydrogen appeared to decrease with increasing stress.

TM-103538 June 1991  
Atmospheric Environment for Space Shuttle  
(STS-35) Launch. G.L. Jasper and G.W.  
Batts. Space Science Laboratory.  
N91-25550

This report presents a summary of selected atmospheric conditions observed near space shuttle STS-35 launch time on December 2, 1990, at Kennedy Space Center, Florida. Values of ambient pressure, temperature, moisture, ground winds, visual observations (cloud), and winds aloft are included. The sequence of prelaunch Jimsphere-measured vertical wind profiles is given in this report. The final atmospheric tape, which consists of wind and thermodynamic parameters versus altitude, for STS-35 vehicle ascent has been constructed. The STS-35 ascent atmospheric data tape has been constructed by Marshall Space Flight Center's Earth Science and Applications Division to provide an internally consistent data set for use in postflight performance assessments and represents the best estimate of the launch environment to the 400,000-ft altitude that was traversed by the STS-35 vehicle.

TM-103539 April 1991  
Analysis of Lightning Field Changes  
Produced by Florida Thunderstorms. W.J.  
Koshak. Space Science Laboratory.  
N91-25555

A new method is introduced for inferring the charge deposited in a lightning flash. Previous nonlinear least-squares methods have used simple point charge ( $Q$ ) and point dipole ( $P$ ) models to describe ground-based observations of lightning-caused field changes ( $\Delta E$ 's). In the new approach, the  $\Delta E$ 's are described by a more general volume charge distribution that is defined on a large cartesian grid system centered above

the measuring network. We show that a linear system of equations can be used to relate the  $\Delta E$ 's at the ground to the values of charge on this grid. With this approach, it is possible to apply more general physical constraints to the charge solutions, and it is possible to access the information content of the  $\Delta E$  data. Computer-simulated  $\Delta E$  inversions show that the location and symmetry of the charge retrievals are usually consistent with the known test sources. Analyses of three natural lightning events show that the linear method provides source distributions that are in reasonable agreement with  $Q$ - and  $P$ -model results.

TM-103540 June 1991  
The Corrosion Protection of 2219-T87  
Aluminum by Anodizing. M.D. Danford.  
Materials and Processes Laboratory.  
N91-26312

Various types of anodized coatings have been studied for 2219-T87 aluminum. These include both type II and type III anodize coats which have been water sealed and a newly developed and proprietary Magnaplate HCR™ coat. Results indicate that type III anodizing is not much superior to type II anodizing as far as corrosion protection for 2219-T87 aluminum is concerned. Magnaplate HCR™ coatings should provide superior corrosion protection over an extended period of time using a coating thickness of 51 microns (2.0 mils).

TM-103541 June 1991  
Illuminance and Luminance Distributions of a  
Prototype Ambient Illumination System for  
Space Station *Freedom*. R.C. Mullican and  
B.C. Hayes. Mission Operations Laboratory.  
N91-26193

Preliminary results of research conducted in the late 1970's indicate that perceptual qualities of an enclosure can be influenced by the distribution of illumination within the enclosure. Subjective impressions such as spaciousness, perceptual clarity, and relaxation or tenseness, among others, appear to be related to different combinations of surface luminance. A prototype indirect ambient illumination system was developed which will allow crew members to alter surface luminance distributions within an enclosed module, thus modifying perceptual cues to match crew preferences. A traditional lensed

## NASA TECHNICAL MEMORANDUM

direct lightning system was compared to the prototype utilizing the full-scale mockup of Space Station *Freedom* developed by Marshall Space Flight Center. The direct lensed system was installed in the habitation module with the indirect prototype deployed in the U.S. laboratory module. Analysis centered on the illuminance and luminance distributions resultant from these systems and the implications of various luminaire spacing options. All test configurations were evaluated for compliance with NASA Standard 3000, "Man-System Integration Standards."

TM-103542 June 1991  
Vacuum Vapor Deposition—A Spinoff of  
Space Welding Development. R.M. Poorman.  
Materials and Processes Laboratory.  
N91-27330

A vapor deposition process has been defined through a spinoff effort of space welding development. In this development for welding in a space environment, a hollow electrode was used to add gas precisely at the welding arc. This provides gas for ionization which carries the welding arc current. During this welding development metal vapor coatings were observed. These coatings are unique in that they are produced by a new process. This report characterizes some coatings produced and the potential of this new and innovative vapor deposition process. Advantages over prior art are discussed.

TM-103543 June 1991  
Proof Test Diagrams for Zerodur Glass-  
Ceramic. D.S. Tucker. Materials and  
Processes Laboratory. N91-27332

Proof test diagrams for Zerodur glass-ceramic are calculated from available fracture mechanics data. It is shown that the environment has a large effect on minimum time-to-failure as predicted by proof test diagrams.

TM-103544 June 1991  
Applications of Low Lift to Drag Ratio  
Aerobrakes Using Angle of Attack Variation  
for Control. J.A. Mulqueen. Preliminary  
Design Office. N91-28189

This report investigates several applications of low lift to drag ratio aerobrakes which use

angle-of-attack variation for control. These applications are: return from geosynchronous or lunar orbit to low Earth orbit and planetary aerocapture at Earth and Mars. A number of aerobrake design considerations are reviewed. It was found that the flow impingement behind the aerobrake and the aerodynamic heating loads are the primary factors that control the sizing of an aerobrake. The heating loads and other loads, such as maximum acceleration, are determined by the vehicle ballistic coefficient, the atmosphere entry conditions, and the trajectory design. Several formulations for defining an optimum trajectory are reviewed, and the various performance indices that can be used are evaluated. The "nearly grazing" optimal trajectory was found to provide the best compromise between the often conflicting goals of minimizing the vehicle propulsive requirements and minimizing vehicle loads. The relationship between vehicle and trajectory design is investigated further using the results of numerical simulations of trajectories for each aerobrake application. The data show the sensitivity of the trajectories to several vehicle parameters and atmospheric density variations. The results of the trajectory analysis show that low lift to drag ratio aerobrakes, which use angle-of-attack variation for control, can potentially be used for a wide range of aerobrake applications.

TM-103546 July 1991  
BATSE-GRO Observations of Bremsstrahlung  
from Electron Precipitation Events. J.M.  
Horack and G.J. Fishman. Space Science  
Laboratory.

The Burst and Transient Source Experiment (BATSE) on the Gamma Ray Observatory (GRO) has detected a large number of terrestrial electron precipitation events. Bremsstrahlung is generated as the precipitating electrons interact in the atmosphere, or at the spacecraft, and this radiation is detected by the gamma ray detectors onboard. Several examples of such events are presented here, and the different classes of events are described. A correlation of events to strong magnetospheric activity is presented, and the association of a subset of events to a powerful VLF transmitter on the western coast of Australia is described.

## NASA TECHNICAL MEMORANDUM

TM-103547

July 1991

A Simulation of the Instrument System for the Astro-1 Mission. M. Whorton, M. West, and J. Rakoczy. Structures and Dynamics Laboratory. N91-30061

NASA has recently completed a shuttle-borne stellar ultraviolet astronomy mission known as Astro-1. A three-axis instrument pointing system (IPS) was employed to accurately point the science instruments. In order to analyze the pointing control system and verify pointing performance, a simulation of the IPS has been developed using the multibody dynamics software TREETOPS. The TREETOPS IPS simulation is capable of accurately modeling the multibody IPS system undergoing large angle, nonlinear motion. This report documents the simulation and presents example cases demonstrating disturbance rejection, fine pointing operations, and multiple target pointing and slewing of the IPS.

TM-103548

July 1991

STS-35 Scrub 3 Hydrogen Leak Analysis. D. Seymour. Propulsion Laboratory.

During the summer of 1990, space shuttle *Columbia* experienced both an external tank/orbiter disconnect hydrogen leak and multiple internal aft compartment hydrogen leaks. After the third scrub of STS-35, a leak investigation team was organized. In support of this team, an analysis of the data obtained during scrub 3 was performed. Based on this analysis, the engine 2 prevalve was concluded to be the most likely leak location and to account for most of the observed leakage.

TM-103549

July 1991

Evaluation of Chemical Conversion and Sulfuric Acid Type II Anodize Coatings on 7075-T73 and 2219-T87 Aluminum Alloys. V.C. McMillan. Materials and Processes Laboratory.

Corrosion evaluation studies were conducted on chemical conversion coated and anodized 7075-T73 and 2219-T87 aluminum alloys. The corrosive environments ranged from a 95-percent relative humidity combined with 35 °C (95 °F) to a 5-percent salt fog environment at 35 °C (95 °F). An evaluation of the effect of temperature on corrosion protection and adhesion prop-

erties was conducted by exposing test samples to various temperatures for specified time periods followed by environmental exposure and adhesion testing.

TM-103550

July 1991

Empirical Predictions of Hypervelocity Impact Damage to the Space Station. W.K. Rule and K.B. Hayashida. Structures and Dynamics Laboratory.

This report describes a family of user-friendly, DOS PC based, Microsoft BASIC programs written to provide spacecraft designers with empirical predictions of space debris damage to orbiting spacecraft. The spacecraft wall configuration is assumed to consist of multilayer insulation (MLI) placed between a Whipple style bumper and the pressure wall. Predictions are based on data sets of experimental results obtained from simulating debris impacts on spacecraft using light gas guns on Earth. A module of the program facilitates the creation of the data base of experimental results that are used by the damage prediction modules of the code. The user has the choice of three different prediction modules to predict damage to the bumper, the MLI, and the pressure wall. One prediction module is based on fitting low order polynomials through subsets of the experimental data. Another prediction module fits functions based on *nondimensional parameters* through the data. The last prediction technique is a unique approach that is based on weighting the experimental data according to the distance from the design point.

TM-103551

July 1991

Electrodeposited Zinc-Nickel as an Alternative to Cadmium Plating for Aerospace Application. V.C. McMillan. Materials and Processes Laboratory.

Corrosion evaluation studies were conducted on 4130 alloy steel samples coated with electrodeposited zinc-nickel and samples coated with electrodeposited cadmium. The zinc-nickel was deposited by the selectron electrochemical metallizing process. These coated samples were exposed to a 5-percent salt fog environment at 35±2 °C (95±5 °F). The exposure period ranged from 96 to 240 hours. An evaluation of the effect of dichromate coatings on the performance of each plating was conducted. The protection

## NASA TECHNICAL MEMORANDUM

afforded by platings with a dichromate seal was compared to platings without the seal. During the later stages of testing, deposit adhesion and potential for hydrogen entrapment were also evaluated.

TM-103552 August 1991  
Multiplexing Readout Channels in Proportional Counters. J. Caristi. Space Science Laboratory.

Proportional counters are important instruments used in sensing "hard" x rays. This document describes the possibility of doubling the number of readout channels in the detector without increasing the electronics needed to amplify channel signals. This suggests that it should be possible, conversely, to reduce the number of amplifiers, thereby reducing the weight and energy budget of the instrument. Various numerical multiplexing schemes are analyzed, and a computer program is presented that can reconstruct multiplexed channel outputs with very good accuracy.

TM-103553 September 1991  
Materials and Processes Laboratory Composite Materials Characterization Task, Part I. Damage Tolerance. A.T. Nettles, D.S. Tucker, W.J. Patterson, S.W. Franklin, G.H. Gordon, L. Hart, A.J. Hodge, D.G. Lance, and S.S. Russel. Materials and Processes Laboratory.

In an effort to best utilize all areas of expertise within the Materials and Processes Laboratory, a Composite Materials Characterization Task Team was developed to help bring together the various branches within the Laboratory to develop a comprehensive data base on composite materials. A "test run" was performed on IM6/3501-6 carbon/epoxy in which the material was processed, machined into specimens, and tested for damage tolerance capabilities. Nondestructive test data played a major role in this element of composite characterization. A time chart was produced showing the time the composite material spent within each Branch or Division in order to identify those areas which produce a long turnaround time. Instrumented drop weight testing was performed on the specimens with nondestructive evaluation (NDE) being performed before and after the impacts. Destructive testing in the form of cross-

sectional photomicrography and compression-after-impact (CAI) testing were used. Results show that the processing and machining steps needed to be performed more rapidly if data on a composite material is to be collected within a reasonable timeframe. The results of the damage tolerance testing showed that IM6/3501-6 is a brittle material that is very susceptible to impact damage.

TM-4268, Part I April 1991  
The NASA/MSFC Global Reference Atmospheric Model—1990 Version (GRAM-90), Part I: Technical/Users Manual. C.G. Justus, F.N. Alyea, D.M. Cunnold, W.R. Jeffries III, and D.L. Johnson. Space Science Laboratory.  
N91-26654

A new (1990) version of the NASA/MSFC Global Reference Atmospheric Model (GRAM-90) is presented and discussed. GRAM-90 incorporates extensive new data, mostly collected under the Middle Atmosphere Program (MAP), to produce a completely revised middle atmosphere model (20 to 120 km). Because of earlier data sparseness in this altitude region, previous versions of GRAM relied on a 6-month displacement of Northern Hemisphere data to represent the Southern Hemisphere. GRAM-90 alleviates this shortcoming by utilizing actual data from the Southern Hemisphere for each month. The NASA Marshall Engineering Thermosphere (MET) model has also been incorporated into the GRAM-90 program, at all orbital altitudes greater than 120 km. Part I of this report serves as a technical description of the GRAM-90 program, with extensive documentation on the program operation and usage. Sample results are presented, in the form of height-latitude and latitude-longitude plots. Comparisons are made between the empirically based GRAM-90 model and results from a "first principles" stratospheric circulation model (SCM) in the 20- to 80-km height region. Specific areas of improvement of GRAM-90 over the earlier GRAM model results are also noted. A test case example is also included. Part II of this report presents the entire GRAM-90 program listing along with the major data base listings.

TM-4268, Part II April 1991  
The NASA/MSFC Global Reference Atmospheric Model—1990 Version (GRAM-90),

## NASA TECHNICAL MEMORANDUM

Part II: Program/Data Listings. C.G. Justus, F.N. Alyea, D.M. Cunnold, W.R. Jeffries III, and D.L. Johnson. Space Science Laboratory. N91-27697

A new (1990) version of the NASA/MSFC Global Reference Atmospheric Model (GRAM-90) has been completed and the program and key data base listings are presented in this document. GRAM-90 incorporates extensive new data, mostly collected under the Middle Atmosphere Program (MAP), to produce a completely revised middle atmosphere model (20-120 km). At altitudes greater than 120 km, GRAM-90 uses the NASA Marshall Engineering Thermosphere (MET) model. This report (part II) serves as a supplementary report to the technical document of GRAM-90 (part I). Complete listings of all program and major data bases are presented herein. Also, a test case example is included.

TM-4289 May 1991  
Atmospheric Turbulence Review of Space Shuttle Launches. M. Susko. Space Sciences Laboratory. N91-23215

The primary objective of this paper is to report on the research and analysis on identifying turbulent regions from the surface to 16 km for space shuttle launches. This research has demonstrated that the results from the FPS-16 radar/jimsphere balloon system in measuring winds can indeed indicate the presence or conditions ripe for turbulence in the troposphere and lower stratosphere. It is further demonstrated that atmospheric data obtained during the shuttle launches by the rawinsonde in conjunction with the jimsphere provides the necessary meteoro-

logical data to compute aerodynamic parameters to identify turbulence, such as Reynolds number, drag coefficient, turbulent stresses, total energy, stability parameter, vertical gradient of kinetic energy, Richardson number, and the turbulence probability index. There is no magic fool-proof criteria in atmospheric turbulent probability of occurrence. However, enhanced temperature lapse rates and inversion rates, strong vector wind shears, and large changes in wind direction identify the occurrence of turbulence at the tropopause. When any two of the above conditions occur simultaneously, a significant probability of turbulence can occur as shown in this paper.

TM-4301 June 1991  
The QDP/PLT User's Guide. A.F. Tennant. Space Science Laboratory. N91-25682

PLT is a high level plotting package. A Programmer can create a default plot suited for the data being displayed. At run times, users can then interact with the plot overriding any or all of these defaults. The user is also provided the capability to fit functions to the displayed data. This ability to display, interact with, and to fit the data make PLT a useful tool in the analysis of data. The Quick and Dandy Plotter (QDP) program will read ASCII text files that contain PLT commands and data. Thus, QDP provides an easy way to use the PLT software. QDP files provide a convenient way to exchange data. The QDP/PLT software is written in standard Fortran 77 and has been ported to VAX VMS, SUN UNIX, IBM AIX, NeXT NextStep, and MS-DOS systems.

## NASA TECHNICAL PAPERS

TP-3066 November 1990  
Electrochemical Studies of Corrosion Inhibitors. M.D. Danford. Materials and Processes Laboratory. N91-17208

The effect of single salts, as well as multi-component mixtures, on corrosion inhibition has been studied for type 1010 steel; for 5052, 1100, and 2219-T87 aluminum alloys; and for copper. Molybdate-containing inhibitors exhibit an immediate, positive effect for steel corrosion, but an incubation period may be required for aluminum before the effect of a given inhibitor can be determined. The absence of oxygen was found to provide a positive effect (smaller corrosion rate) for steel and copper, but a negative effect for aluminum. This is attributed to the two possible mechanisms by which aluminum can oxidize. Corrosion inhibition is generally similar for oxygen-rich and oxygen-free environments. The results of this study show that the electrochemical method is an effective means of screening inhibitors for the corrosion of single metals, with caution to be exercised in the case of aluminum.

TP-3075 January 1991  
Plate and Butt-Weld Stresses Beyond Elastic Limit, Material and Structural Modeling. V. Verderaine. Space Science Laboratory. N91-16413

Ultimate safety factors of high performance structures depend on stress behavior beyond the elastic limit—a region not too well understood. An analytical modeling approach was developed to gain fundamental insights into inelastic responses of simple structural elements. Nonlinear material properties were expressed in engineering stresses and strains variables and combined with strength of material stress and strain equations similar to numerical piece-wise linear method. Integrations are continuous which allows for more detailed solutions. Included with interesting results are the classical combined axial tension and bending load model and the strain gauge conversion to stress beyond the elastic limit. Material discontinuity stress factors in butt-welds were derived. This is a working-type document with analytical methods and results applicable to all industries of high reliability structures.

TP-3108 March 1991  
A Novel Method of Testing the Shear Strength of Thick Honeycomb Composites. A.J. Hodge and A.T. Nettles. Materials and Processes Laboratory. N91-21242

Sandwich composites of aluminum and glass/phenolic honeycomb core were tested for shear strength before and after impact damage. The assessment of shear strength was performed in two ways; by four-point bend testing of sandwich beams and by a novel "double lap shear" (DLS) test. This novel testing technique was developed so smaller specimens could be used thus making the use of common laboratory scale fabrication and testing possible. The two techniques yielded similar data. The DLS test gave slightly lower shear strength values of the two methods but were closer to the supplier's values for shear strength.

TP-3123 June 1991  
A Scheme for Bandpass Filtering Magnetometer Measurements to Reconstruct Tethered Satellite Skoprop Motion. M.E. Polites. Structures and Dynamics Laboratory. N91-25629

This paper presents a unique scheme for reconstructing tethered satellite skoprop motion by ground processing of satellite magnetometer measurements. The measurements are modified based on ground knowledge of the Earth's magnetic field and passed through bandpass filters tuned to the skoprop frequency. Simulation results are presented which verify the scheme and show it to be quite robust. The concept is not just limited to tethered satellites. Indeed, it can be applied wherever there is a need to reconstruct the coning motion of a body about a known axis, given measurements of a known vector in body-fixed axes.

TP-3128 August 1991  
The Interaction of Hydrogen With Metal Alloys. M.D. Danford and J.W. Montano. Materials and Processes Laboratory. N91-29318

Hydrogen diffusion coefficients have been measured for several alloys, and these have been determined to be about the same at 25 °C for all alloys investigated. The relation of structure, both metallurgical and crystallographic, to

the observed hydrogen distribution on charging has been investigated, as well as the role of hydride formation in the hydrogen resistance of metal alloys. An attempt has been made to correlate the structures and compositions of metals alloys as well as other parameters with the ratios of their notched tensile strengths in hydrogen to that in helium,  $R(H_2/He)$ , which are believed to represent a measure of their hydrogen resistance. Evidence supports the belief that hydrogen permeability and hydrogen resistance are increased by smaller grain sizes for a given alloy composition.

TP-3138 July 1991  
 Nonlinear Viscoelastic Characterization and Analysis Verification Program for SRM Propellant and Polymer Materials. C.J. Moore, R.F. Landel, S.T.J. Peng, and B. Marsh. Structures and Dynamics Laboratory.  
 X91-10616

The test program discussed in this report has potentially wide application to the testing and structural analysis of polymer materials and other materials generally characterized as being made of viscoelastic materials. A joint National Aeronautics and Space Administration, Jet Propulsion Laboratory, and Army program of test and analysis has been established in order to provide the nonlinear, viscoelastic biaxial characterization of the structural and mechanical properties of the space shuttle solid rocket motor (SRM) propellant and the advanced solid rocket motor (ASRM) propellant. This investigation will also endeavor to obtain a consistent and complete set of propellant materials failure data. The data base and accompanying theoretical characterization will be used to improve and revise finite element modeling for shuttle and ASRM-propellant motors.

TP-3139 August 1991  
 Resource Envelope Concepts for Mission Planning. K.Y. Ibrahim, J.D. Weiler, and J.C. Tokaz. Missions Operations Laboratory.  
 N91-29209

This document details seven proposed methods for creating resource envelopes for Space Station *Freedom* mission planning. Four reference science activity models are used to illustrate the effect of adding operational flexibility to mission timelines. For each method, a

brief explanation is given along with graphs to illustrate the application of the envelopes to the power and crew resources. The benefits and costs of each method are analyzed in terms of resource utilization. In addition to the effect on individual activities, resource envelopes are analyzed at the experiment level.

TP-3148 September 1991  
 Stress Corrosion Study of Carburized AISI 9310 and Carburized M-50 NiL Steels. P.D. Torres. Materials and Processes Laboratory.

A stress corrosion cracking (SCC) evaluation of carburized AISI 9310 and carburized M-50 NiL steels was undertaken. AISI 9310 is a candidate substitute to 440C for the bearing inner race in the space shuttle main engine alternate turbopump development program, and M-50 NiL may also find applications as a bearing alloy. Round tensile specimens of these alloys at several stress levels, as well as corrosion samples of AISI 9310, were exposed to 100-percent relative humidity at 38 °C (100 °F). The maximum tensile stresses that produced no SCC failures in 1 year of exposure were 172 MPa (25 ksi) for AISI 9310 and 345 MPa (50 ksi) for M-50 NiL. Each AISI 9310 steel fracture showed a circumferential crack between the case and the core. Both alloys developed rust on the surface and pitting; however, AISI 9310 rusted to a greater extent than M-50 NiL. Thin, dense chrome (TDC) was also evaluated in this program as a corrosion barrier alternative; however, its protection was minimal. Corrosion spots visible to the naked eye appeared in less than 5 days of exposure. Although TDC plating on test specimens prevented the intensive corrosion attack which occurred in bare samples after a long time exposure, the TDC plating did not offer sufficient protection to avoid failures. The results obtained in this evaluation must be carefully considered when designing bearing components made of these materials.

TP-3161 September 1991  
 Automating a Spacecraft Electrical Power System Using Expert Systems. L.F. Lollar. Information and Electronic Systems Laboratory.

Since Skylab, Marshall Space Flight Center (MSFC) has recognized the need for large electrical power systems (EPS's) in upcoming

## NASA TECHNICAL PAPERS

spacecraft. The operation of the spacecraft depends on the EPS. Therefore, it must be efficient, safe, and reliable. In 1978, as a consequence of having to supply a large number of EPS personnel to monitor and control Skylab, the Electrical Power Branch of MSFC began the autonomously managed power system (AMPS) project. This project resulted in the assembly of a 25-kW high-voltage dc test facility and provided the means of getting man out of the loop as much as possible. AMPS includes several embedded controllers which allow a significant level of autonomous operation. More recently, the

Electrical Division at MSFC has developed the space station module power management and distribution (SSM/PMAD) breadboard to investigate managing and distributing power in the Space Station *Freedom* habitation and laboratory modules. Again, the requirement for a high level of autonomy for efficient operation over the lifetime of the station and for the benefits of enhanced safety has been demonstrated. This paper describes the two breadboards and the hierarchical approach to automation which was developed through these projects.



NASA REFERENCE PUBLICATIONS

RP-1262

Methods of Applied Dynamics. M.H. Rheinforth and H.B. Wilson. Structures and Dynamics Laboratory.

May 1991

N91-25303

RP-1268

Development of the Burst and Transient Source Experiment (BATSE). J.M. Horack. Space Science Laboratory.

August 1991

NASA CONTRACTOR REPORTS  
(Abstracts for these reports may be obtained from STAR)

- |   |                |   |                |
|---|----------------|---|----------------|
| CR-4343   | January 1991   | CR-184029   | September 1990 |
| Hypervelocity Impact Physics. W.P. Schonberg, A.J. Bean, and K. Darzi. NAS8-36955. University of Alabama in Huntsville. N91-19164   |                | Space Shuttle Development Motor No. 9 (DM-9) Final Test Report Volume 1. NAS8-30490. Thiokol Corp. N91-12747  |                |
| CR-4347   | March 1991     | CR-184030   | June 1990      |
| Theory of CW Lidar Aerosol Backscatter Measurements and Development of a 2.1- $\mu$ m Solid-State Pulsed Laser Radar for Aerosol Backscatter Profiling. M.J. Kavaya, S.W. Henderson, and R.G. Frehlich. NAS8-37580. Coherent Technologies, Inc. N91-19498 |                | Summary of Jaygo Mixing and FSM-1 Application of Castable Inhibitor and Liner Final Report. NAS8-30490. Thiokol Corp. N91-13569   |                |
| CR-184022   | July 1990      | CR-184031   | August 1990    |
| Single Crystal/Hollow Core Blades and Nozzles for the SSME HPFTP—Final Report. NAS8-40000. Rockwell International. N90-91427  |                | Nova 201 Ultrasonic Thickness Gauge (Nova Gauge) Final Test Report. NAS8-30490. Thiokol Corp. N91-14581   |                |
| CR-184023   | August 1990    | CR-184032   | July 1990      |
| Final Report for the M-52 Spray Booth Qualification Test. NAS8-30490. Thiokol Corp. N90-91432   |                | Tethering Sockets and Wrenches Final Report. NAS8-30490. Thiokol Corp. N91-13675  |                |
| CR-184024   | June 1990      | CR-184033   | October 1990   |
| Infrastructure Study Phase I Review (BASIC + TD001-TD005). NAS8-37588. General Dynamics. X91-10060  |                | Microbial Ecology Laboratory Procedures Manual NASA/MSFC. NAS8-37814. Sverdrup Technology. N91-13856  |                |
| CR-184025   | July 1990      | CR-184034   | July 1990      |
| Real-Time Failure Control (SAFD)—Final Report. NAS8-40000. Rockwell International. N91-11233  |                | Space Station Common Module Network Topology and Hardware Development—Final Report. NAS8-36583. Martin Marietta. N91-14373  |                |
| CR-184026   | September 1990 | CR-184035   | July 1990      |
| Flight Set 360L007 (STS-33R) Field Joint Protection System, Thermal Protection System, and Systems Tunnel Components, Final Report—Volume VII. NAS8-30490. Thiokol Corp. N91-10115  |                | Space Station Automation of Common Module Power Management and Distribution, Interim Final Report. NAS8-36433. Martin Marietta. N91-12748   |                |
| CR-184027   | September 1990 | CR-184036   | August 1990    |
| Flight Motor Set 360H005 (STS-28R) Final Report, Volume V, (Nozzle Component). NAS8-30490. Thiokol Corp. N91-12746  |                | Geostationary Platform Study Advanced Geostationary Platform/Evolutionary Space Station Accommodation Study—Final Report. NAS8-36103. Lockheed Missiles & Space Co., Inc. N91-12738 |                |
| CR-184028   | May 1990       | CR-184037   | August 1990    |
| SEPA Data Analysis in Support of the Environmental Interaction Program—Interim Report. NAS8-32488. Southwest Research Institute. N91-13807  |                | Geostationary Platform Study Advanced ESGP/Evolutionary S.S. <i>Freedom</i> Accommodation Study. NAS8-36103. Lockheed Missiles & Space Co., Inc. N91-12737                          |                |
|   |                | CR-184038   | June 1990      |
|   |                | Effect of Boron on Intergranular Hot Cracking in Ni-Cr-Fe Superalloys Containing  |                |

**NASA CONTRACTOR REPORTS**  
(Abstracts for these reports may be obtained from STAR)

- Niobium—Final Report. NAS8-38084. University of Alabama in Birmingham. N90-26115
- CR-184039 July 1990  
Modeling Limitations and Fine Structure in the Neutral Upper Atmosphere, Final Report. NAS8-36405. Smithsonian Institution. X90-10076
- CR-184040 March 1990  
Evaluation of Raytek Infrared Pyrometer for Continuous Propellant Temperature Measurement—Final Report. NAS8-30490. Thiokol Corp. N91-13570
- CR-184041 September 1990  
Flight Motor Set 360L009 (STS-36) Final Report Volume I—System Overview. NAS8-30490. Thiokol Corp. N91-12749
- CR-184042 September 1990  
Space Transportation Engine Program (STEP) Phase B Design Concept Review Minutes. NAS8-38160. Rockwell International.
- CR-184043 September 1990  
Complete the Development and Construction of a Spaceborne Hydrogen Maser Clock, for Period August 11, 1988 Through July 31, 1990. NAS8-37752. Smithsonian Institution. N91-31688
- CR-184044 October 1990  
Research Reports—1990 NASA/ASEE Summer Faculty Fellowship Program, Final Report. NGT-01-002-099. The University of Alabama in Tuscaloosa and The University of Alabama in Huntsville. N91-18967
- CR-184045 September 1990  
Tropical Pacific Moisture Variability: Its Detection, Synoptic Structure, and Consequences in the General Circulation. NAS8-37284. Texas A&M University. N91-13832
- CR-184046 December 1989  
Application of Dynamical Systems Theory to Global Weather Phenomena—Final Report September 30, 1985 to December 1, 1989. NAS8-36356. Yale University. N91-91591
- CR-184047 February 1990  
Annual Report for Work Completed Under NAS8-36718 for the Period October–September 1988/89. NAS8-36718. University of Alabama in Huntsville.
- CR-184048 October 1990  
Material STE Process Protocol and Checklist, Final Report Task Area 4.1 Design Methodology Shortfall, NASA SPIP Bondlines. NAS8-37802. Science Applications International Corp. X91-10063
- CR-184049 August 1990  
Solid Rocket Motor (SRM) Bondline Initial Integrated Process Failure Modes and Effects Analysis (PFMEA) Report (Generic Version) Task Area 4.2. NAS8-37802. Science Applications International Inc. X91-10062
- CR-184050 August 1990  
Flight Set 360L006 STS-34 Field Joint Protection System, Thermal Protection System, and Systems Tunnel Components Volume IV, Final Report. NAS8-30490. Thiokol Corp. N91-14415
- CR-184051 August 1990  
Space Shuttle Redesigned Solid Rocket Motor Certificate of Qualification (COQ) Data Report. NAS8-30490. Thiokol Corp. N91-14416
- CR-184052 September 1990  
Telerobotic On-Orbit Remote Fluid Resupply System Final Report. NAS8-37743. SRS Technologies. N91-13474
- CR-184053 September 1990  
Rocketdyne Phase III Verification Tests—Final Report for Task P315 for Period 3 January 1990–1 September 1990. NAS8-38258. Metallurgy Research Facilities. N91-70122
- CR-184054 September 1990  
ATD Bearings—Final Report for Task P363 Covering the Period 16 March 1990–1 September 1990. NAS8-38258. IIT Research Institute/MRF. N91-70126

NASA CONTRACTOR REPORTS  
(Abstracts for these reports may be obtained from STAR)

- |   |                                     |   |                                  |
|---|-------------------------------------|---|----------------------------------|
| <p>CR-184055<br/>Quarterly Report for Period 1 February to 30 April 1990. NAS8-38258. IIT Research Institute/MRF.</p>                             | <p>April 1990<br/>N91-90290</p>     | <p>Data Bases VF1MAX and VF1MIN. NAS8-37916. Science Applications International Corp.</p>   | <p>N91-90902</p>                 |
| <p>CR-184056<br/>Quarterly Report IITRI-P06150-Q3, for Period May-July 1990. NAS8-38258. IIT Research Institute/MRF.</p>                          | <p>July 1990<br/>N91-90291</p>      | <p>CR-184066<br/>The Evaluation of Uncured RTV in RSRM Flight Nozzle 10B, Final Report. NAS8-30490. Thiokol Corp.</p>   | <p>July 1990<br/>N91-70263</p>   |
| <p>CR-184057<br/>Operation and Maintenance of Metallurgy Research Facility Period 11-1-89-03-01-90. NAS8-38258. IIT Research Institute/MRF.</p>   | <p>July 1990<br/>N91-90289</p>      | <p>CR-184067<br/>Qualification of Flex Bearing Using Altax, Methyl Tuads, and Zinc Oxide From New Sources—Final Test Report. NAS8-30490. Thiokol Corp.</p>                                  | <p>August 1990<br/>N91-70308</p> |
| <p>CR-184058<br/>Summary of Non-Asbestos Liner Development for NMASAM Propellant Cartridge—Interim Report. NAS8-30490. Thiokol Corp.</p>          | <p>October 1990<br/>N91-70083</p>   | <p>CR-184068<br/>Laser Atmospheric Wind Sounder (LAWS)—Final Study Report (Phase I) Volume I, Executive Summary. NAS8-37590. Lockheed Missiles &amp; Space Co., Inc.</p>                    | <p>April 1990<br/>N91-17351</p>  |
| <p>CR-184059<br/>Vulcanized Repair of Asbestos NBR Insulation—Final Report. NAS8-30490. Thiokol Corp.</p>   | <p>October 1990<br/>N91-70089</p>   | <p>CR-184069<br/>Laser Atmospheric Wind Sounder (LAWS) Final Study Report (Phase I) Volume II, Final Report. NAS8-37590. Lockheed Missiles &amp; Space Co., Inc.</p>                        | <p>April 1990<br/>N91-17352</p>  |
| <p>CR-184060<br/>Asbestos Floats Characterization—Final Report. NAS8-30490. Thiokol Corp.</p>   | <p>September 1990<br/>N90-70088</p> | <p>CR-184070<br/>Laser Atmospheric Wind Sounder (LAWS) Final Study Report (Phase I) Volume III, Project Cost Estimates. NAS8-37590. Lockheed Missiles &amp; Space Co., Inc.</p>             | <p>April 1990<br/>N91-17353</p>  |
| <p>CR-184061<br/>Characteristics of Trapped Proton Anisotropy at Space Station <i>Freedom</i> Altitudes. NAS8-37916. SAIC.</p>                    | <p>October 1990<br/>N91-15953</p>   | <p>CR-184071<br/>Definition and Preliminary Design of the Laser Atmospheric Wind Sounder (LAWS) Phase I Final Report, Volume I, Executive Summary. NAS8-37589. GE Astro Space Division.</p> | <p>May 1990<br/>N91-16332</p>    |
| <p>CR-184062<br/>Space Transportation Engine Program (STEP) Phase BE Progress Report July-September 1990. NAS8-38160. Rockwell International.</p> | <p>October 1990<br/>X91-10061</p>   | <p>CR-184072<br/>Definition and Preliminary Design of the Laser Atmospheric Wind Sounder (LAWS) Phase I Final Report, Volume II. NAS8-37589. GE Astro Space Division.</p>                   | <p>May 1990<br/>N91-16333</p>    |
| <p>CR-184063<br/>User's Manual for SCOOT. NAS8-37850. Dynetics, Inc.</p>  | <p>October 1990<br/>X91-10086</p>   | <p>CR-184073<br/>Definition and Preliminary Design of the Laser Atmospheric Wind Sounder (LAWS) Phase I Final Report, Volume III, Program</p>   | <p>May 1990</p>                  |
| <p>CR-184064<br/>Final Report Under Contract Number NAS8-37098. Uwohali, Inc.</p>   | <p>October 1990<br/>N91-90731</p>   |   |                                  |
| <p>CR-184065<br/>Data Base Description and Retrieval Program for the Trapped Proton Vector Flux</p>   | <p>October 1990</p>                 |   |                                  |

NASA CONTRACTOR REPORTS  
(Abstracts for these reports may be obtained from STAR)

- Cost Estimates. NAS8-37589. GE Astro Space Division. N91-16334
- CR-184074 September 1990  
Scoping Estimates of the LDEF Satellite Induced Radioactivity. NAS8-38427. Science Applications International Corp. N91-16056
- CR-184075 May 1990  
Results of the Evaluation Effort for Extruding DL-1375 (Silica Filled EPDM) Factory Joint Weatherseal Rubber Using a 6-inch Extruder Configuration. NAS8-30490. Thiokol Corp. N91-70273
- CR-184076 November 1990  
Failure and Unsatisfactory Condition Summary Report for the Space Shuttle Solid Rocket Booster—Information Requirements Document. NAS8-36300. USBI. N91-90901
- CR-184077 October 1990  
Technical Evaluation Motor No. 6 (TEM-6) Nozzle Final Test Report. NAS8-30490. Thiokol Corp. N91-70262
- CR-184078 November 1990  
Space Shuttle Flight Support Motor No. 1 (FSM-1) Final Test Report. NAS8-30490. Thiokol Corp. N91-16064
- CR-184079 October 1990  
Masking of Inhibitor Inside Diameter Forward Surface During Liner Application. NAS8-30490. Thiokol Corp. N91-70450
- CR-184080 November 1990  
Final Results of the 17A Nose Cap LDI Investigation—Final Report. NAS8-30490. Thiokol Corp. N91-70261
- CR-184081 November 1990  
Management and Display of Four-Dimensional Environmental Data Sets Using McIDAS, Final Report for Period 02-28-86-08-31-90. NAS8-36292. University of Wisconsin-Madison. N91-17579
- CR-184082 February 1989  
An Inventory of Four-Dimensional Data Sets for the Earth Sciences. NAS8-36292. University of Wisconsin-Madison. N91-17434
- CR-184083 November 1990  
Pressure Fed Thrust Chamber Technology Program. NAS8-37365. GenCorp Aerojet. N91-17135
- CR-184084 November 1990  
Analysis of Wind Profile Measurements From an Instrumented Aircraft—Interim Final Report. NAS8-37377. FWG Associates, Inc. N91-16523
- CR-184085 September 1990  
Final Report on the Characterization of Weld Radiograph Enigma in 2219-T87 Aluminum. NAS8-37232. Auburn University. N91-70311
- CR-184086 December 1990  
Final Report for NAS8-35918. Universities Space Research Association. X91-91074
- CR-184087 November 1990  
MNASA Evaluation of NARC-Supplied CCP Rayon Precursor Material and Nonasbestos Insulation and Liner Final Test Report. NAS8-30490. Thiokol Corp. N91-90903
- CR-184088 March 1989  
Examination of Cracks in S/N 0000051 of the 1U75161 Igniter Chamber—Final Report. NAS8-30490. Thiokol Corp. N91-71674
- CR-184089 November 1990  
Investigation Team Final Report—11AAFT Poor Liner Coverage—Final Report. NAS8-30490. Thiokol Corp. N91-90909
- CR-184090 November 1990  
Verification of the Improved M-52 Asbestos Sifter/Shaker Final Report. NAS8-30490. Thiokol Corp. N91-90910
- CR-184091 August 1990  
Flight Set 360L007 (STS-33) Insulation Component Final Report Volume III Final Release. NAS8-30490. Thiokol Corp. N91-21230
- CR-184092 December 1990  
RSRM-13 (360Q013) Final Report Ballistics Mass Properties Flight Designation STS-41. NAS8-30490. Thiokol Corp. N91-17139

NASA CONTRACTOR REPORTS  
(Abstracts for these reports may be obtained from STAR)

- CR-184093 December 1990  
Horizontal Field Joint Separation Fixture  
(H77-0450) Qualification Final Test Report.  
NAS8-30490. Thiokol Corp. N91-90908
- CR-184094 December 1990  
The Design and Development of the Hubble  
Space Telescope Neutral Buoyancy Trainer.  
NAS8-35318. Essex Corp. N91-17068
- CR-184095 January 1991  
Rotating Reactor Studies—Final Report  
Period Covered 03-27-89–09-27-90. H-  
80505B. Roberts Associates Inc. N91-15421
- CR-184096 July 1987  
Final Report on the Structural Assembly  
Demonstration Experiment (SADE). NAS8-  
34959. MIT Space Systems Laboratory.
- CR-184097 August 1986  
Selected Tether Applications in Space—  
Work Breakdown Structure (WBS) and  
WBS Dictionary (BASICS). NAS8-36616.  
Martin Marietta. N91-90907
- CR-184098 August 1989  
Tether Deployment Monitoring System—  
SBIR Phase II Final Report. NAS8-37336.  
Anco Engineers. Inc.
- CR-184099 February 1991  
Large Liquid Rocket Engine Transient  
Performance Simulation System—Final  
Report. NAS8-36994. United Technologies  
Corp. Pratt & Whitney. N91-21232
- CR-184100 January 1991  
Blade Tip Rubbing Stress Prediction—Final  
Report. NAS8-36361. Rockwell Interna-  
tional. N91-18435
- CR-184101 January 1991  
Analysis of Rolling Contact Spall Life in  
440C Steel Bearing Rims—Final Report.  
NAS8-37764. Vanderbilt University.  
N91-21526
- CR-184102 December 1990  
Technology Development Program Plan for  
ALS Liquid Fuel Turbopump Advanced  
Development Program Plan—Final Report.  
NAS8-37594. Rockwell International.  
X91-10338
- CR-184103 December 1990  
Spacelab System Analysis Advanced Solid  
Rocket Motor (ASRM) Communications  
Networks Analysis—Final Report. NAS8-  
36717. Mississippi State University.  
N91-18209
- CR-184104 October 1990  
Flight Motor Set 360T010 (STS031R) Final  
Report Volume I—System Overview.  
NAS8-30490. Thiokol Corp. N91-21231
- CR-184105 December 1990  
Space Shuttle Production Verification Motor  
1 (PV-1) Field Joint Protection System Final  
Report Volume VII. NAS8-30490. Thiokol  
Corp. N91-18208
- CR-184106 November 1990  
TP-H1148 Knitline Integrity Evaluation  
Final Report. NAS8-30490. Thiokol Corp.  
N91-18288
- CR-184107 January 1991  
RSRM-11 (360W011) Final Report  
Ballistics Mass Properties (STS-34).  
NAS8-30490. Thiokol Corp. N91-20203
- CR-184108 January 1991  
Environmental Data Recorder (EDR)  
Qualification Final Test Report. NAS8-  
30490. Thiokol Corp. N91-18406
- CR-184109 July 1990  
RSRM Top Hat Cover Simulator Lightning  
Test Final Report—Volume 1. NAS8-30490.  
Thiokol Corp. N91-22303
- CR-184110 January 1991  
The Full-Scale Process and Design Changes  
for Elimination of Insulation Edge  
Separations and Voids in the Tang Flap  
Area Final Report. NAS8-30490. Thiokol  
Corp. N91-19172
- CR-184111 July 1990  
RSRM Top Hat Cover Simulator Lightning  
Test Final Report—Volume II, Appendix.  
NAS8-30490. Thiokol Corp. N91-22304
- CR-184112 December 1990  
Satellite Servicing Economic Study—  
Executive Summary. NAS8-38142. Space  
Systems/Loral. N91-19162

NASA CONTRACTOR REPORTS  
(Abstracts for these reports may be obtained from STAR)

- CR-184113 December 1990  
Final Technical Report Satellite Servicing  
Economic Study. NAS8-38142. Space  
Systems/Loral. N91-19163
- CR-184114 January 1991  
Influence of a Magnetic Field During  
Directional Solidification of MAR-M 246+Hf  
Superalloy—Final Report. NAS8-36461.  
University of Alabama at Birmingham.  
N91-22416
- CR-184115 December 1990  
LDEF Experiment P0006 Linear Energy  
Transfer Spectrum Measurement (LETSME)  
Quick Look Report—Final Report. NAS8-  
38188. Eril Research Inc. N91-19223
- CR-184116 July 1988  
Space Transportation Main Engine Reduced-  
Cost Configuration Study Phase A Interim  
Report. NAS8-36868. United Technologies  
Pratt & Whitney. X91-71839
- CR-184117 March 1987  
Space Transportation Booster Engine  
Configuration Study Preliminary Final Report  
(DR4) Executive Summary. NAS8-36857.  
United Technologies Pratt & Whitney.
- CR-184118 March 1987  
Space Transportation Booster Engine  
Configuration Study Preliminary Final Report  
(DR4) Includes Design Definition Document  
(DR8) and Environmental Analysis (DR10).  
NAS8-36857. United Technologies Pratt &  
Whitney.
- CR-184119 March 1987  
Space Transportation Booster Engine  
Configuration Study Preliminary Final Report  
(DR4) Program Cost Estimates (DR6) and  
Work Breakdown Structure and WBS  
Dictionary (DR5). NAS8-36857. United  
Technologies Pratt & Whitney.
- CR-184120 July 1987  
Space Transportation Main Engine  
Configuration Study Preliminary Final Report  
(DR4) Includes Design Definition Document  
(DR8) and Environmental Analysis (DR10).  
NAS8-36868. United Technologies Pratt &  
Whitney. X91-10284
- CR-184121 July 1987  
Space Transportation Main Engine  
Configuration Study—Preliminary Final  
Report (DR-4) Program Cost Estimates  
(DR6) and Work Breakdown Structure and  
WBS Dictionary (DR5). NAS8-36868.  
United Technologies Pratt & Whitney.
- CR-184122 January 1991  
Evaluation of the M-52 Dry Filter Spray  
Booth Final Report. NAS8-30490. Thiokol  
Corp. N91-70847
- CR-184123 October 1990  
Follow-On Cable Coupling Lightning Test  
Final Test Report Volume I. NAS8-30490.  
Thiokol Corp. N91-28192
- CR-184124 October 1990  
Follow-On Cable Coupling Lightning Test  
Final Report Volume II—Appendixes A, B,  
C, and D. NAS8-30490. Thiokol Corp.  
N91-26195
- CR-184125 October 1990  
Follow-On Cable Coupling Lightning Test  
Final Test Report Volume III—Appendixes  
E and F. NAS8-30490. Thiokol Corp.  
N91-27203
- CR-184126 January 1991  
An Investigation of the Detection of Tornadoic  
Thunderstorms by Observing Storm Top  
Features Using Geosynchronous Satellite  
Imagery. NAS8-38135. North Carolina State  
University. N91-20589
- CR-184127 August 1990  
Liquid Rocket Booster Study Addendum to  
Final Report. NAS8-37137. General  
Dynamics. N91-22368
- CR-184128 February 1990  
Liquid Rocket Booster (LRB) for the Space  
Transportation System (STS) Systems  
Study, Volume II—Final Report Addendum  
1. NAS8-37136. Martin Marietta.  
N91-22366
- CR-184129 October 1990  
High Resolution Microwave Spectrometer  
Sounder (HIMSS) Instrument Program—  
Final Report, Volume I, Book I, Executive

NASA CONTRACTOR REPORTS  
(Abstracts for these reports may be obtained from STAR)

- Summary and Technical. NAS8-38175. Hughes Space and Communications Group. N91-22542
- CR-184130 October 1990  
High Resolution Microwave Spectrometer Sounder (HIMSS) Instrument Program Volume I, Book 2, Preliminary Program Plans, CEI Specification Instrument Interface Description Document. NAS8-38175. Hughes Space and Communications Group. N91-22541
- CR-184131 February 1991  
Flight Set 360L008 (STS-32) Case and Seals Final Report. NAS8-30490. Thiokol Corp. N91-71170
- CR-184132 January 1991  
Turbopump Technology Validation Task Definitions—Final Report. NAS8-37593. GenCorp Aerojet. X91-10583
- CR-184133 February 1991  
Addendum to Liquid Rocket Booster Study Final Report. NAS8-37137. General Dynamics. N91-71042
- CR-184134 December 1990  
Spacelab Rack Lessons Learned—Final Report. NAS8-32350. McDonnell Douglas. N91-71034
- CR-184135 February 1991  
Solid Propulsion Integrity Program Nozzle Second Annual Review "The Year of Focusing the Thrust," Final Report Volume I. NAS8-37801. Hercules Aerospace Co. X91-10451
- CR-184136 February 1991  
Solid Propulsion Integrity Program Nozzle Second Annual Review "The Year of Focusing the Thrust," Final Report Volume II. NAS8-37801. Hercules Aerospace Co. X91-10452
- CR-184137 January 1991  
Cosmic Ray Nuclei (CRN) Detector Investigation—Final Report. NAS8-32828. The University of Chicago. N91-22063
- CR-184138 February 1991  
Engineering Support for an Ultraviolet Imager for the ISTP Mission—Final Report. NAS8-37586. The University of Alabama in Huntsville. N91-22364
- CR-184139 February 1991  
Physical Phenomena in Containerless Glass Processing—Final Report. NAS8-32944. Clarkson University. N91-71157
- CR-184140 March 1991  
<sup>3</sup>Helium/<sup>4</sup>Helium Dilution Cryocooler for Space—Final Report for July 12, 1989–February 12, 1991. NAS8-37437. Alabama Cryogenic Engineering, Inc. N91-20327
- CR-184141 March 1991  
Solid Rocket Booster Internal Flow Analysis by Highly Accurate Adaptive Computational Methods—Final Report. NAS8-37682. Computational Mechanics Co., Inc. N91-21239
- CR-184142 March 1991  
Center Segment Tang Bulb Region Proposed Change Demonstration—Final Report. NAS8-30490. Thiokol Corp. N91-71169
- CR-184143 March 1991  
Early Focus Development Effort, Ultrasonic Inspection of Fixed Housing Metal-to-Adhesive Bondline Final Report. NAS8-30490. Thiokol Corp. N91-22573
- CR-184144 October 1990  
Propellant Tank Pressurization System Technology Program—Volume I Executive Summary. NAS8-37666. Martin Marietta. N91-71037
- CR-184145 October 1990  
Propellant Tank Pressurization System Technology Program—Volume II, Technical Report. NAS8-37666. Martin Marietta. N91-71041
- CR-184146 October 1990  
Propellant Tank Pressurization System Technology Program Appendix A, Propellant Tank Pressurization System Flight Article Preliminary Requirements. NAS8-37666. Martin Marietta. N91-71153

NASA CONTRACTOR REPORTS  
(Abstracts for these reports may be obtained from STAR)

- |  |               |  |               |
|--|---------------|--|---------------|
| CR-184147  | October 1990  | CR-184155  | March 1991    |
| Propellant Tank Pressurization System Technology Program Volume II, Appendix B, PTPSTP Technology Acquisition Plan. NAS8-37666. Martin Marietta. N91-71036   |               | Liquid Rocket Booster (LRB) for the Space Transportation System (STS) Systems Study Volume II—Final Report Addendum 2. NAS8-37136. Martin Marietta. N91-22374  |               |
| CR-184148  | October 1990  | CR-184156  | October 1990  |
| Propellant Tank Pressurization System Technology Program Volume II, Appendix C, Task 1 Report: Catalytic Heating of Pressurant. NAS8-37666. Martin Marietta. N91-71306                                     |               | The Ultra High Resolution XUV Spectroheliograph an Attached Payload for the Space Station <i>Freedom</i> —Final Report. NAS8-38666. Stanford University. N91-22365   |               |
| CR-184149  | October 1990  | CR-184157  | January 1991  |
| Propellant Tank Pressurization System Technology Program Volume II, Appendix D, Aerojet Propulsion Division PTPSTP Final Report. NAS8-37666. Martin Marietta. N91-71152                                    |               | Feasibility Study of the Superconducting Gravity Gradiometer (SGG) Flight Test on the European Retrievable Carrier (EURECA)—Final Report. NAS8-38138. General Electric Co. N91-23229                                       |               |
| CR-184150  | October 1990  | CR-184158  | March 1991    |
| Propellant Tank Pressurization System Technology Program Volume II, Appendix E, Flight Systems Trade Studies Summary. NAS8-37666. Martin Marietta. N90-71038   |               | Final Report NAS8-37592. Intersonics Inc. N91-24558  |               |
| CR-184151  | October 1990  | CR-184159  | October 1990  |
| Propellant Tank Pressurization System Technology Program Volume II, Appendix F, Flight Systems Optimization Studies Summary. NAS8-37666. Martin Marietta. N91-71039  |               | RSRM Reliability Demonstration Report for the Third Quarter 1990. NAS8-30490. Thiokol Corp. N91-71388  |               |
| CR-184152  | October 1990  | CR-184160  | February 1991 |
| Propellant Tank Pressurization System Technology Program Volume II, Appendix G, Tank Pressurization Control System Study, Honeywell Space and Strategic Operations. NAS8-37666. Martin Marietta. N91-71040 |               | Management Quarterly Review, Final. NAS8-37802. Science Applications International Corp. X91-10511   |               |
| CR-184153  | April 1991    | CR-184161  | April 1991    |
| MLIBLAST—A Program to Empirically Predict Hypervelocity Impact Damage to the Space Station. NAG8-123(10). University of Alabama Tuscaloosa. N91-22363  |               | Heavy Hydrocarbon Main Injector Technology Program—Final Report. NAS8-36369. Rockwell International. N91-21235   |               |
| CR-184154  | February 1991 | CR-184162  | April 1991    |
| Evaluation of Carbon-Carbon for Space Engine Nozzles, Phase II Final Report for September 1988 to February 1991. NAS8-37684. GenCorp Aerojet. X91-10283  |               | High Resolution Microwave Spectrometer Sounder (HIMSS) Instrument Program Appendix: TRMM Study (A Radiometer for NASA's Tropical Rainfall Measuring Mission). NAS8-38175. Hughes Space and Communications Group. N91-25548 |               |
|  |               | CR-184163  | April 1991    |
|  |               | Technical Evaluation Motor No. 7 (TEM-7) Final Test Report. NAS8-30490. Thiokol Corp. N91-26203  |               |
|  |               | CR-184164  | April 1991    |
|  |               | Final Report on NAS8-38436. TRW.   |               |

NASA CONTRACTOR REPORTS  
(Abstracts for these reports may be obtained from STAR)

- CR-184165 December 1990  
Advanced Microwave Precipitation Radiometer (AMPR) for Remote Observation of Precipitation Final Report for Period 31 December 1987–31 December 1990. NAS8-37142. Georgia Institute of Technology.  
N91-26655
- CR-184166 May 1991  
U.S. and Foreign Alloy Cross-Reference Data Base. NAS8-36166. Fisk University.  
N91-26313
- CR-184167 April 1991  
Marshall Space Flight Center Microgravity Strategic Plan—A Planning Exercise, Final Report. NAS8-38669. Center for Space and Advanced Technology.  
N91-24463
- CR-184168 June 1990  
Surface Evaluation of HPOTP Bearing Test Set With Salox-M Cage. H-06865D. Wedeven Associates, Inc.  
X91-10584
- CR-184169 March 1991  
Chemical Waste Disposal in Space by Plasma Discharge. NAS8-37195. The University of Alabama in Huntsville.  
N91-29737
- CR-184170 July 1991  
Activation Calculations for Trapped Protons Below 200 MeV Appendix—Final Technical Report. NAS8-36649. Eastern Kentucky University.  
N91-29865
- CR-184171 July 1991  
Study of Activation of Metal Samples From LDEF-1 and Spacelab-2—Final Technical Report. NAS8-36649. Eastern Kentucky University.  
N91-29297
- CR-184172 July 1990  
Space-Based Doppler Lidar Sampling Strategies—Algorithm Development and Simulated Observation Experiments—Final Report. NAS8-37770. Simpson Weather Associates, Inc.  
N91-29554
- CR-184173 October 1990  
Microgravity Science and Applications Visiting Scientist Program—Final Report. NAS8-37366. Universities Space Research Association.
- CR-184174 December 1989  
Final Report for Contract NAS8-36362 March 4, 1987–September 15, 1989. NAS8-36362. The University of Alabama in Huntsville.
- CR-184175 January 1990  
A Finite Element Solver for 3-D Compressible Viscous Flows. NAS8-36555. The University of Tennessee Space Institute.  
N91-29488
- CR-184176 February 1990  
Process Validation for Lot AAF Nozzle LSC's from JRC's North Carolina Facility, Final Test Report. NAS8-30490. Thiokol Corp.  
N91-71675
- CR-184177 January 1990  
Lifting Beam Paint Investigation Final Report. NAS8-30490. Thiokol Corp.  
N91-71646
- CR-184178 March 1991  
Space Transfer Concepts and Analysis for Exploration Missions—Final Report. NAS8-37857. Boeing Defense & Space Group.
- CR-184179 April 1989  
Systems Engineering Studies—Final Report on NAS8-36955, Delivery Order No. 6. The University of Alabama in Huntsville.  
N91-71676
- CR-184180 April 1991  
Solid Propulsion Integrity Program Nozzle Quarterly Management Review (Final Report). NAS8-37801. Hercules Aerospace Co.
- CR-184181 July 1991  
Studies in Remote Sensing of the Earth's Atmosphere—Research Study: Final Report, Report Period October 6, 1987—March 15, 1991. NAS8-37135. Universities Space Research Association.
- CR-184182 October 1990  
Design of a Large Subscale Solid Rocket Combustion Simulator (LSSRCS) For Testing SRM Nozzles. NAS8-37801. Hercules Aerospace Co.

**NASA CONTRACTOR REPORTS**  
(Abstracts for these reports may be obtained from STAR)

- |  |                |  |                |
|--|----------------|--|----------------|
| CR-184183  | January 1991   | CR-184194  | April 1991     |
| Attitude Profile Design Program—Final Report. NAS8-37850. Dynetics, Inc.   |                | Solid Propulsion Integrity Program Nozzle Work Package—Evaluation of High Temperature Cements—Final Report. NAS8-37801. Hercules Aerospace Co.                           |                |
| CR-184184  | February 1991  | CR-184195  | October 1988   |
| Flight Set 360L007 (STS-33R) Case and Seal Final Report Volume II. NAS8-30490. Thiokol Corp.                       |                | Carbon Deposition Model for Oxygen-Hydrocarbon Combustion. NAS8-34715. Aerojet TechSystems Co.   |                |
| CR-184185  | March 1991     | CR-184196  | April 1989     |
| Aft Segment Dome-to-Stiffener Factory Joint Insulation Void Elimination—Final Report. NAS8-30490. Thiokol Corp.    |                | Attachment 1 to Systems Engineering Studies Report, NASA Reliability Manual Study, Volume 1, Component Reliability. NAS8-36955. The University of Alabama in Huntsville. |                |
| CR-184186  | February 1991  | CR-184197  | April 1990     |
| Technical Evaluation Motor No. 7 (Tem-07) Interim Report (60 Day). NAS8-30490. Thiokol Corp.                       |                | Design and Analysis of Multilayer X-Ray/XUV Microscope—Final Report. H-80589B. The University of Alabama in Birmingham.  |                |
| CR-184187  | September 1989 | CR-184198  | June 1991      |
| Flight Motor Set 360T004 (STS-30R) Final Report Volume I (System Overview). NAS8-30490. Thiokol Corp.              |                | Optimization Techniques Applied to Passive Measures for In-Orbit Spacecraft Survivability: Interim Report. NAS8-37378. Science Applications International Corp.          |                |
| CR-184188  | July 1991      | CR-184199  | June 1989      |
| SRB Seawater Corrosion Project—Final Report. NAS8-38800. Auburn University.  |                | Utilization of Satellite Cloud Information to Diagnose the Energy State and Transformations in Extratropical Cyclones, Final Report. NAS8-34009. Purdue University.      |                |
| CR-184189  | July 1991      | CR-184200  | September 1990 |
| Mechanism Test Bed Flexible Body Model Report. NAS8-38771. Control Dynamics Co.                                    |                | A Study of Fracture Mechanisms in ATD Roller Bearing Final Report. NAS8-38083. Auburn University.  |                |
| CR-184190  | May 1991       | CR-184201  | March 1991     |
| Space Transportation Engine Program (STEP) Phase B—March Through April 1991. NAS8-38160. Rockwell International.   |                | SEPAC Data Analysis in Support of the Environmental Interaction Program—Final Report. NAS8-32488. Southwest Research Institute.  |                |
| CR-184191  | March 1991     | CR-184202  | March 1990     |
| Survey of Pressure Sensors for High-Temperature and High-Acoustic Environments. NAS8-37801. Hercules Aerospace Co. |                | Advanced Program Development Management Software System Final Report Software Description and User's Manual. NAS8-36643. SRS Technologies.                               |                |
| CR-184192  | April 1991     |  |                |
| Solid Rocket Combustion Simulator Numerical Studies. NAS8-37801. Hercules Aerospace Co.                            |                |  |                |
| CR-184193  | January 1991   |  |                |
| Add-On to Nozzle Task 3.3.3.2 for "DX" Formulation Regression Rate Testing. NAS8-37801. Hercules Aerospace Co.     |                |  |                |

NASA CONTRACTOR REPORTS  
(Abstracts for these reports may be obtained from STAR)

- |  |               |   |             |
|--|---------------|---|-------------|
| CR-184203  | March 1990    | CR-184207   | August 1991 |
| Interactive Office User's Manual. NAS8-36643. SRS Technologies.  |               | Engineering Cost Analysis and Techniques Development—Final Report. NAS8-36931. PRC, Inc.  |             |
| CR-184204  | March 1990    | CR-184208   | May 1991    |
| Evaluation of Advanced Propulsion Options for the Next Manned Transportation System Propulsion Evolution Study—Final Report. NAS8-36643. SRS Technologies. |               | Aero/Fluids Data Base System—Final Report. NAS8-37463. Remtech.   |             |
| CR-184205  | March 1990    | CR-184209   | June 1991   |
| Evaluation of Undeveloped Rocket Engine Cycle Applications to Advanced Transportation Final Report. NAS8-36643. SRS Technologies.                          |               | Flow Induced Vibrations in the SSME Injector Heads. NAS8-36195. Rockwell International.   |             |
| CR-184206  | December 1988 | CR-184210   | July 1991   |
| Process Heat Energy for Lunar and Mars Applications—Task Final Report. NAS8-36643. SRS Technologies.   |               | South Pacific Convergence Zone and Global-Scale Circulations, Final Report for Period 20 July 1987–19 July 1991. NAS8-37127. Purdue University. |             |

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- |   |                 |  |      |
|---|-----------------|--|------|
| ABBAS, M.M.   | ES55            | APPLETON, P.N.   | ES65 |
| KUNDE, V.G.   |                 | MARCUM, P.M.   |      |
| BRASUNAS, J.C.  |                 | JOY, M.K.  |      |
| HERMAN, J.R.  |                 | Near-IR Observations of the Cartwheel Ring Galaxy. For publication in ESO Messenger, Garching, Germany.  |      |
| MASSIE, S.T.  |                 |  |      |
| Nighttime Reactive Nitrogen Measurements From Stratospheric Infrared Thermal Emission Observations. For publication in Journal of Geophysical Research, Washington, DC.                               |                 | ASAKIMORI, K.  | ES62 |
|   |                 | BURNETT, T.H.  |      |
|   |                 | CHERRY, M.L.   |      |
|   |                 | CHRISTL, M.J.  |      |
|   |                 | DAKE, S.   |      |
| ABDELHAKIEM, W.   | ES75            | DERRICKSON, J.H.   |      |
| PATTERSON, J.D.   |                 | FOUNTAIN, W.F.   |      |
| LEHOCZKY, S.L.  |                 | et al.   |      |
| A Comparison Between Electron Mobility in N-Type $Hg_{1-x}Cd_xTe$ and $Hg_{1-x}Zn_xTe$ . For publication in Materials Letters/Materials Research Society, The Netherlands.                            |                 | Three-Dimensional Simulations of Calorimeter X-Ray Film Spots for Determining $\langle P_T \rangle$ . For presentation at the 22nd International Cosmic Ray Conference, Dublin, Ireland, August 11-23, 1991. |      |
| ADAMS, A.M.   | PT41            |  |      |
| Evolutionary Nuclear Thermal Rocket for Manned Mars Missions. For presentation at AAS/AIAA Astrodynamics Specialist Conference, Durango, CO, August 19-22, 1991.                                      |                 | ASAKIMORI, K.  | ES62 |
|   |                 | BURNETT, T.H.  |      |
|   |                 | CHERRY, M.L.   |      |
|   |                 | CHRISTL, M.J.  |      |
|   |                 | DERRICKSON, J.H.   |      |
|   |                 | FOUNTAIN, W.F.   |      |
|   |                 | GREGORY, J.C.  |      |
|   |                 | PARNELL, T.A.  |      |
|   |                 | et al.   |      |
|   |                 | Energy Spectra of Proton and Helium Nuclei Above 5 TeV/Nucleon. For presentation at the 22nd International Cosmic Ray Conference, Dublin, Ireland, August 11-12, 1991.                                       |      |
| ANDERSON, D.M.  | EP55            |  |      |
| MOBLEY, T.B.  | Martin Marietta |  |      |
| Shuttle MPS—Test Simulator Project. For presentation at the AIAA 27th Joint Propulsion Conference, Sacramento, CA, June 24, 1991.   |                 |  |      |
| ANDERSON, J.B.  | ED73            |  |      |
| Modal Survey Testing of the Lidar In-Space Technology Experiment (LITE), a Space Shuttle Payload. For presentation at the International Modal Analysis Conference, San Diego, CA, February 3-6, 1992. |                 | AUSTIN, R.E.   | PT01 |
|   |                 | SUMRALL, J.P.  |      |
|   |                 | HORSEWOOD, J.L.  |      |
|   |                 | NEP Options for the Early Phases of Manned Mars Exploration. For presentation at the Advanced SEI Technologies Conference, Cleveland, OH, September 4-6, 1991.   |      |
| ANDREWS, R.N.   | ES75            |  |      |
| PRICE, M.W.   |                 |  |      |
| SU, C-H.  |                 |  |      |
| SZOFRAN, F.R.   |                 |  |      |
| LEHOCZKY, S.L.  |                 |  |      |
| The Effect of a Transverse Magnetic Field on the Microstructure of Directionally Solidified CdTe. For presentation at the Gordon Conference, Plymouth, NH, July 15-19, 1991.                          |                 | BABAI, M.K.  | EH44 |
|   |                 | Mobile Robotic Hydroblast System. For presentation at the Sixth International Conference on CAD/CAM Robotics and Factories of the Future, London, U.K., August 19-22, 1991.                                  |      |

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- BACSKAY, A.S. ED62  
Space Station *Freedom* ECLSS Design Configuration: A Post Restructure Update. For presentation at the 21st Intersociety Conference on Environmental Systems, San Francisco, CA, July 15-18, 1991. Applications of Containerless Processing in the Studies of Metals and Alloys. For presentation at the IKI/AIAA Microgravity Science Symposium, Moscow, USSR, May 1991.
- BAILEY, M. ED72  
BOWER, M.  
Wings of the Sun: Long Duration Flight at High Altitude. For presentation at the Society of Women Engineers 1991 National Convention and Student Conference, San Diego, CA, June 24-29, 1991. Modeling a Constant Power Load for Nickel-Hydrogen Battery Testing Using SPICE. For publication in 1990 IECEC Proceedings, Reno, NV, August 1990.
- BALASUBRAMANIAM, K.S. ES52  
Blending Influence of Fe I 5250.6 A Spectral Line on the Fe I 5250.2 A Spectral Line and Its Implication for Polarization Measurements. For presentation at the AAS-Solar Physics Division and MAX '91 Meeting, Huntsville, AL, April 9-12, 1991. Automated Fluid Interface System. For presentation at the JANNAF Propulsion Conference, Anaheim, CA, October 3-5, 1990.
- BARBEE, T.W., JR. ES52  
HOOVER, R.B.  
et al.  
The Multispectral Solar Telescope Array II: Soft X-Ray/EUV Reflectivity of the Multilayer Mirrors. For publication in Optical Engineering, Bellingham, WA. Navier-Stokes Analysis of a Liquid Rocket Engine Disk Cavity. For presentation at the AIAA/ASME/SAE 27th Joint Propulsion Conference and Exhibit, Sacramento, CA, June 24-27, 1991.
- BAYGENTS, J.C. ES76  
SAVILLE, D.A.  
The Electrophoresis of Small Particles and Fluid Globules in Weak Electrolytes. For publication in *Journal of Colloid Interface Science*, Potsdam, NY. Containerless Processing and Rapid Solidification of Nb-Si Alloys of Hyper-Eutectic Composition. For publication in *Metallurgical Transactions A*, Warrendale, PA.
- BAYGENTS, J.C. ES76  
SAVILLE, D.A.  
Electrophoresis of Drops and Bubbles. For publication in *Journal of Chemical Society (London) Faraday Transaction*, Cambridge, England.
- BAYLESS, E.O. EH42  
Variable Polarity Plasma Arc Welding. For presentation at Technology 2000, Washington, DC, November 27, 1990.
- BAYUZICK, R.J. ES75  
HOFMEISTER, W.H.  
ROBINSON, M.B.  
Reconstruction of Magnetosonic Mode k-Space Spectral Density From Observed Equatorial Waves. For presentation at the 1991 Spring Meeting of the American
- BEARDEN, D.B. EB12  
LOLLAR, L.F.
- BECHTEL, T.D. EP63  
TYLER, T.R.
- BENJAMIN, T.G. ED32  
McCONNAUGHEY, P.K.
- BERTERO, G.A. ES75  
HOFMEISTER, W.H.  
ROBINSON, M.B.  
BAYUZICK, R.J.
- BILBRO, J.W. EB23  
JAYROE, R.  
BAKER, W.  
Status of Laser Atmospheric Wind Sounder (LAWS). For presentation at the 6th Topical Meeting on Coherent Laser Radar, Optical Society of America, Snowmass, CO, July 8-12, 1991.
- BOARDSSEN, S.A. ES53  
GALLAGHER, D.L.  
GURNETT, D.A.

**MSFC PAPERS CLEARED FOR PRESENTATION**  
(Available only from authors. Dates are presentation dates.)

- Geophysical Union, Baltimore, MD, May 28–June 1, 1991.
- BOOK, M.L. EB24
- DABNEY, R.
- HOWARD, R.  
Automated Rendezvous and Docking Video Sensor. For presentation at the Space Operations, Applications, and Research Symposium, Houston, TX, July 9–11, 1991.
- BRAINERD, J.J. ES65  
X-Ray Suppression in Gamma-Ray Bursts Through Resonant Compton Scattering. For publication in Proceedings of the Los Alamos Gamma-Ray Burst Workshop, Cambridge, MA.
- BRAINERD, J.J. ES65  
MESZAROS, P.  
Dynamic Effects on Cyclotron Scattering in Pulsar Accretion Columns. For publication in the *Astrophysical Journal*, Chicago, IL.
- BRAINERD, J.J. ES65  
The Inability of the Resonant Compton Upscattering Model of Gamma-Ray Bursts to Produce a Third Cyclotron Harmonic. For publication in *Astrophysical Journal Letters*, Cambridge, MA.
- BRAINERD, J.J. ES65  
Multiple Resonant Scattering in the Compton Upscatter Model of Gamma-Ray Bursts. For publication in *Astrophysical Journal*, Chicago, IL.
- BREWER, J.C. EB12  
Hubble Space Telescope Ground-Based Battery/Cell Testing at MSFC. For presentation at the Aerospace Space Power Workshop, El Segundo, CA, April 16–18, 1991.
- BROWN, D.G. ES53  
WILSON, G.R.  
HORWITZ, J.L.  
GALLAGHER, D.L.  
Self-Consistent Production of Ion Conics on Return Current Region Auroral Field Lines: A Time-Dependent, Semikinetic Model. For publication in *GRL*, Washington, DC.
- BROWN, N.S. PD24  
Lunar Transportation System Options. For presentation at AAS/AIAA Astrodynamics Conference, Durango, CO, August 19–22, 1991.
- BUECHLER, D.E. (USRA)  
GOODMAN, S.J. ES44  
Radar Characteristics of Lightning Producing Storms in Florida. For presentation at the 25th International Conference on Radar Meteorology, Paris, France, June 24–28, 1991.
- BUKKAPATNAM, S. ED63  
BATTISTA, B.  
MAJUMDAR, A.K. (Sverdrup)  
PIERCE, F.E.  
PATTERSON, W.C.  
Boiling Heat Transfer Analysis During Loss of Coolant in Material Processing Furnace for Spacelab. For presentation at the 7th International Conference on Numerical Methods for Thermal Problems, Stanford, CA, July 8–12, 1991.
- BUKLEY, A.P. ED12  
A Study of D-Characteristic Equations for Time-Varying Linear Systems Using Coordinate Transformations. For presentation at the Southeastern Symposium on System Theory, Columbia, SC, March 10–12, 1991.
- BUKLEY, A.P. ED12  
JONES, V.L.  
PATTERSON, A.F. ED12  
NASA/MSFC Large Space Structures Ground Test Facility. For presentation at the AIAA Navigation, Guidance, and Control Conference, New Orleans, LA, August 12–14, 1991.
- BURDINE, R.V. AB35  
BUSHMAN, D.M.  
Instrumentation and Calibration Issues for Space Station *Freedom* and Future Space Projects. For presentation at the AIAA/SOLE 4th Space Logistics Symposium, Cocoa Beach, FL, November 4–6, 1991.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- |   |                            |   |
|---|----------------------------|---|
| BURNS, D.H.<br>McKECHNIE, T.N.<br>LIAW, Y.  | EH43                       | AIAA 27th Joint Propulsion Conference,<br>Sacramento, CA, June 24, 1991.  |
| Near Net Shape Fabrication of Structural Rocket Engine Components Utilizing Vacuum Plasma Spray. For presentation at the ASM National Thermal Spray Conference, Pittsburg, PA, May 6-10, 1991.                          |                            |   |
| BURNS, R.E.   | EL58                       | CARDELINO, B. ES74<br>MOORE, C.   |
| Flight Mechanics Expert Systems. For presentation at the AIAA Computing in Aerospace Conference, Baltimore, MD, October 22-24, 1991.  |                            | Static Second-Order Polarizabilities of Disubstituted Fused Aromatic Compounds. For presentation at the American Chemical Society Southeast-Southwest Regional Meeting, New Orleans, LA, December 5-7, 1990.                      |
| BUSH, J.R., JR.<br>LANIER, J.R., JR.  | EB12                       | CARLSON, G.S. ES43<br>JEDLOVEC, G.J.<br>SUGGS, R.   |
| Prelaunch Self Discharge and Charge Acceptance Characteristics of the Hubble Space Telescope Nickel Hydrogen Batteries. For presentation at the IECEC and publication in the Proceedings, Boston, MA, August 4-9, 1991. |                            | Remote Sensing of Ozone Variability Using an Airborne Scanning Infrared Spectrometer. For presentation at the 5th Topical Meeting of Optical Remote Sensing, Williamsburg, VA, November 18-21, 1991.                              |
| CACIOPPO, E.<br>PUSEY, M.L.   | ES76                       | CARPENTER, D. ES53<br>GILES, B.<br>CHAPPELL, C.<br>DECREAU, P.M.E.<br>CANU, P.<br>ANDERSON, R.<br>CORCUFF, Y.<br>SMITH, A.  |
| The Solubility of the Tetragonal Form of Hen Egg White Lysozyme From pH4.0 to 5.4. For publication in The Journal of Biological Chemistry, Baltimore, MD.   |                            | A Satellite/Ground Study of Thermal Plasma Structure and Dynamics in the Dusk Bulge Sector of the Magnetosphere. For presentation at the 1991 Fall Meeting American Geophysical Union, San Francisco, CA, December 9-13, 1991.    |
| CAMPBELL, J.W.<br>DAVIS, J.M.<br>EMSLIE, A.G.   | ES52                       | CARPENTER, D.L. ES53<br>SMITH, A.J.<br>GILES, B.L.<br>CHAPPELL, C.R.<br>DECREAU, P.M.E.   |
| Imaging the Sun In Hard X-Rays: Spatial and Rotating Modulation Collimators. For presentation at the SPIE 36th Annual International Symposium, San Diego, CA, July 21-26, 1991.   |                            | A Sunward Taillike Extension of the Duskside Plasmasphere, Scanned by Whistler Ground Stations. For presentation at the 20th General Assembly International Union of Geodesy and Geophysics, Vienna, Austria, August 11-24, 1991. |
| CAMPBELL, J.W.<br>DAVIS, J.M.<br>EMSLIE, A.G.   | ES52                       | CARPENTER, D.L. ES53<br>SMITH, A.J.<br>GILES, B.L.<br>CHAPPELL, C.R.<br>DECREAU, P.M.E.   |
| Results From the MSFC Solar Hard X-Ray Imaging Fourier Telescope Numerical Models. For presentation at the AAS-Solar Physics Division and MAX '91 Meeting, Huntsville, AL, April 9-12, 1991.                            |                            |   |
| CANFIELD, A.<br>ARMOUR, W.<br>CLINTON, R.G., JR.  | Thiokol<br>Aerojet<br>EH34 | CARPENTER, D.L. ES53<br>SMITH, A.J.<br>GILES, B.L.<br>CHAPPELL, C.R.<br>DECREAU, P.M.E.   |
| Development of Improved Ablative Materials for ASRM. For presentation at the  |                            |   |

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- A Case Study of Plasma Structure in the Dusk Sector Associated With Enhanced Magnetospheric Convection. For presentation at the 1990 Fall AGU Meeting, San Francisco, CA, December 3-7, 1990.
- CARPENTER, D.L. ES53  
SMITH, A.L.  
GILES, B.L.  
CHAPPELL, C.R.  
DECREAU, P.M.E.  
A Case Study of Plasma Structure in the Dusk Sector Associated With Enhanced Magnetospheric Convection. For publication in *Journal of Geophysical Research*, Washington, DC.
- CARRINGTON, C.K. PD12  
DAVIS, B.G.  
The Application of Linear Actuators for Telescope Pointing Control. For presentation at the 1991 AAS/AIAA Astrodynamics Conference, Durango, CO, August 19-22, 1991.
- CARRUTH, M.R., JR. EH12  
VAUGHN, J.A.  
BECHTEL, R.T.  
Electrical Breakdown of Space Station *Freedom* Surfaces. For presentation at the 26th Annual Intersociety Energy Conversion Engineering Conference, Boston, MA, August 4-9, 1991.
- CARTER, D. ES76  
et al.  
Modeling Antibody Combining Sites: A Method for Prediction of the Entire Variable Domain Structure. For publication in *Science*, Washington, DC.
- CARTER, D.C. ES76  
HE, X-M.  
TWIGG, P.D.  
CASALE, E.  
Progress on the Structure of Human Serum Albumin. For presentation at the Pittsburgh Diffraction Conference, Huntsville, AL, October 20-November 2, 1990.
- CARTER, D.C. ES76  
HECHT, D.  
WITHEROW, W.K.
- NOMAD I: An Imaging Phosphor Detector for Application in X-Ray Crystallography, Medical Radiography, and Molecular Biology. For presentation at the Pittsburgh Diffraction Conference, Huntsville, AL, October 30-November 2, 1990.
- CARTER, D.L. ED62  
HOLDER, D.W.  
HAYASE, J.K.  
SHAW, R.G.  
ALEXANDRE, K. Boeing  
Preliminary ECLSS Waste Water Model. For presentation at the 20th International Conference on Environmental Systems, San Francisco, CA, July 15-18, 1991.
- CHOU, L.C. ED31  
LIAW, G.S.  
MO, J.D.  
Low Thrust Viscous Nozzle Flow Field Prediction. For presentation at the 27th Joint Propulsion Conference and Exhibition, Sacramento, CA, June 24-26, 1991.
- CHOU, S-H. ES42  
MILLER, T.L.  
Symmetric Instability in a Growing Baroclinic Wave. For presentation at the Eighth Conference on Atmospheric and Oceanic Waves and Stability, Denver, CO, October 14-18, 1991.
- CHOW, A.S. EP54  
Modeling Flow at the Nozzle of a Solid Rocket Motor. For presentation at the Joint Propulsion Conference, Sacramento, CA, June 24-27, 1991.
- CHOW, A.S. EP54  
Adaptive Grid Generation for Numerical Modeling Rocket Nozzle Flow. For presentation at the IBM Large Scale Analysis and Modeling Conference, Park City, UT, April 24-26, 1991.
- CHRISTIAN, H.J. ES43  
Lightning Observations From Space. For presentation at the Conference on Atmospheric Electricity, Alberta, Canada, October 22-26, 1990.

**MSFC PAPERS CLEARED FOR PRESENTATION**  
(Available only from authors. Dates are presentation dates.)

- |  |             |  |             |
|--|-------------|--|-------------|
| <p>CHUBB, S.<br/>BRYANT, B.<br/>RAY, J.<br/>Advanced X-Ray Astrophysics Facility (AXAF) Ground Systems Support. For presentation at the AIAA 29th Aerospace Science Meeting and Exhibit, Reno, NV, January 7, 1991.</p>  | <p>EO33</p> | <p>COFFEY, V.N.<br/>The Effect of Induced Charges on Low Energy Particle Trajectories Near Conducting and Semiconducting Surfaces. For publication in Review of Scientific Instruments, New York, NY.</p>  | <p>ES53</p> |
| <p>CHUBB, W.B.<br/>In-Flight Experience and Lessons Learned in the Attitude Control of a Large Space Structure, The Skylab Story. For presentation at the International Federation of Automatic Control Workshop, Huntsville, AL, April 2-4, 1991.</p>                                 | <p>EL01</p> | <p>COLE, H.<br/>HABERCOM, M.<br/>CRENSHAW, M.<br/>JOHNSON, S.<br/>MANUEL, S.<br/>MARTINDALE, B.<br/>WHITMAN, G.<br/>TRAWEEK, M.<br/>Characterization of Organic Contaminants in Space Station Recycled Water. For presentation at the SAE Intersociety Conference on Environmental Systems, San Francisco, CA, July 15-18, 1991.</p> | <p>ED62</p> |
| <p>CIUCCI, A.<br/>JENKINS, R.M.<br/>FOSTER, W.A.<br/>Numerical Analysis of Ignition Transients in Solid Rocket Motors. For presentation at the AIAA/SAE/ASME/ASEE 27th Joint Propulsion Conference, Sacramento, CA, June 24-27, 1991.</p>  | <p>ED33</p> | <p>COMFORT, R.H.<br/>HORWITZ, J.L.<br/>CRAVEN, P.D.<br/>CHAPPELL, C.R.<br/>Characteristic Refilling Rates in the Plasmatrough From Observations by DE-1/RIMS. For presentation at the 20th General Assembly of the International Union of Geodesy and Geophysics, Vienna, Austria, August 11-24, 1991.</p>                           | <p>ES53</p> |
| <p>CIUCCI, A.<br/>FOSTER, W.A.<br/>JENKINS, R.<br/>Experimental Investigation of the Flow Field in the Head-End Star Slot Section of a Solid Rocket Motor. For presentation at the AIAA/SAE/ASME/ASEE 27th Joint Propulsion Conference, Sacramento, CA, June 24-27, 1991.</p>          | <p>ED33</p> | <p>COMFORT, R.H.<br/>CRAVEN, P.D.<br/>GALLAGHER, D.L.<br/>CHAPPELL, C.R.<br/>WEST, R.L.<br/>Survey of Thermal O+ Temperatures Observed In and Near the Plasmasphere by DE-1/RIMS. For presentation at the 20th General Assembly of the International Union of Geodesy and Geophysics, Vienna, Austria, August 11-24, 1991.</p>       | <p>ES53</p> |
| <p>CLAYTON, J.L.<br/>COLBERT, R.F.<br/>GHAFFARIAN, B.<br/>MAJUMDAR, A.K.<br/>Prediction of the RSRM Field Joint Thermal Environment and Correlation With Test Data. For presentation at the AIAA/ASME/SAE/ASEE 27th Joint Propulsion Conference, Sacramento, CA, June 24-27, 1991.</p> | <p>ED64</p> | <p>COOPER, A.E.<br/>Preliminary Analysis of SSME Plume Emissions. For presentation at the Conference on Health Monitoring for Space Propulsion Systems, Cincinnati, OH, November 14-15, 1990.</p>  | <p>EB22</p> |
| <p>CLEARY, D.D.<br/>BOSSERMAN, J.L.<br/>TORR, M.R.<br/>Analysis of Middle Ultraviolet Dayglow Spectra From the Spacelab 1 Shuttle Mission. For publication in Journal of Geophysical Research, Washington, DC.</p>   | <p>ES51</p> | <p>COSTES, N.C.<br/>LAYMON, C.A.<br/>MACARI, E.J.</p>  | <p>ES42</p> |

**MSFC PAPERS CLEARED FOR PRESENTATION**  
(Available only from authors. Dates are presentation dates.)

Small-Scale Field Experiment of Land Surface-Atmosphere Interactions With EOS Implications. For presentation at SPACE 92, 3rd International Conference on Engineering, Construction, and Operations in Space, Denver, CO, May 31-June 4, 1992.

Space Station *Freedom* Water Recovery Test Total Organic Carbon Accountability. For presentation at the 21st Intersociety Conference on Environmental Systems, San Francisco, CA, July 15-18, 1991.

COSTES, N.C. ES42  
MACARI, E.J.  
McDONNELL, J.J.

Experimental Techniques for Assessing Vegetation-Induced Moisture Flux. For presentation at the AGU Fall Meeting, San Francisco, CA, December 3-7, 1990.

DAVIS, H.W. ED12  
BUKLEY, A.P.  
Structural Control Sensors for the CASES GTF. For presentation at the ADPA/AIAA/ASME/SPIE Conference on Active Materials and Adaptive Structures, Alexandria, VA, November 5-7, 1991.

COWAN, J.R. EP64  
Design of High Power Electromechanical Actuator for Thrust Vector Control. For presentation at the AIAA/SAE/ASME 27th Joint Propulsion Conference, Sacramento, CA, June 24-26, 1991.

DeFOREST, C.E. ES52  
HOOVER, R.B.  
et al.  
Performance of the Multispectral Solar Telescope Array V: Temperature Diagnostic Response to the Optically Thin Solar Plasma. For publication in Optical Engineering, Bellingham, WA.

CRAVEN, P.D. ES53  
COMFORT, R.H.  
RICHARDS, P.G.  
A Study of Plasmaspheric N+. For presentation at the 1991 Spring Meeting American Geophysical Union, Baltimore, MD, May 28-June 1, 1991.

DEL COURT, D.C. ES53  
MOORE, T.E.  
Precipitation of Ions Induced by Magnetotail Collapse. For publication in Journal of Geophysical Research, Washington, DC.

CRONISE, R.J. ES76  
NOEVER, D.A.  
Gravity Effects on Three-Dimensional Froths. For presentation at the Fifth Annual Alabama Materials Research Conference, Birmingham, AL, September 25-26, 1991.

DEL COURT, D.C. ES53  
SAUVAUD, J.A.  
MOORE, T.E.  
Gyro-Phase Effects Near the Storm-Time Boundary of Energetic Plasma. For publication in Geophysical Research Letters, Washington, DC.

CUMMINGS, R.O. ED63  
Passively Cooled Infrared Telescope Thermal Math Model Parametric Study. For presentation at the Workshop on the Next Generation Infrared Space Observatory, Edinburgh, Scotland, May 22-24, 1991.

DeMAR, P. ES01  
PORTER, L.  
The Science DECnet Internet and Phase V. For publication in Digital News, Boston, MA.

CURRERI, P.A. ES75  
The Effectiveness of Coriolis Dampening of Convection During Aircraft High-G Arcs. For publication in Journal of Crystal Growth, North-Holland, Amsterdam.

DENNIS, H. EP62  
HUTT, J.  
NESMAN, T.  
Stability Testing of a Modified Space Shuttle Main Engine. For presentation at the AIAA/SAE/ASME/ASEE 27th Joint Propulsion Conference and Exhibit, Sacramento, CA, June 24-26, 1991.

DAVIDSON, M. ION  
TRAWEEK, M. ED62  
SLIVON, L. Battelle  
SHELDON, L. Research Triangle

**MSFC PAPERS CLEARED FOR PRESENTATION**  
(Available only from authors. Dates are presentation dates.)

- |  |   |
|--|---|
| <p><b>DEWBERRY, B.S.</b> EB42<br/>The ECLSS Advanced Automation Project. For presentation at The Space Station Evolution Symposium, Houston, TX, August 6-8, 1991.</p>   | <p><b>EBY, P.B.</b> ES63<br/>Cross Section for Production of Low-Energy Electron-Positron Pairs by Relativistic Heavy Ions. For publication in Physical Review A, Ridge, NY.</p>  |
| <p><b>DEXTER, C.E.</b> EP62<br/>ALS LOX/H<sub>2</sub> Subscale Coaxial Injector Testing. For presentation at the AIAA/SAE/ASME/ASEE 27th Joint Propulsion Conference, Sacramento, CA, June 24-27, 1991.</p>  | <p><b>ELAM, S.K.</b> EP62<br/>Subscale Lox/Hydrogen Testing With a Modular Chamber and a Swirl Coaxial Injector. For presentation at the AIAA/SAE/ASME 27th Joint Propulsion Conference, Sacramento, CA, June 24-27, 1991.</p>  |
| <p><b>DOLLMAN, T.</b> EB44<br/><b>WEBSTER, K.</b><br/>Monitoring and Analysis of Data From Complex Systems. For presentation at Technology 2000, Washington, DC, November 27, 1990.</p>  | <p><b>ELGES, M.R.</b> EB12<br/><b>ASHWORTH, B.R.</b><br/>Priority Scheme Planning for the Robust SSM/PMAD Testbed. For presentation at the IECEC Proceedings 1991, Boston, MA, August 3-9, 1991.</p>  |
| <p><b>DOWDY, J.F., JR.</b> ES52<br/>Observational Evidence for EUV Loops Within the Supergranular Network. For publication in The Astrophysical Journal, Cambridge, MA.</p>  | <p><b>ELSNER, R.F.</b> ES65<br/><b>O'DELL, S.L.</b><br/><b>WEISSKOPF, M.C.</b><br/>Effective Area of the AXAF X-Ray Telescope—Dependence Upon Dielectric Constants of Coating Materials. For publication in Journal of X-Ray Science and Technology, San Diego, CA.</p>   |
| <p><b>DOWDY, J.F., JR.</b> ES52<br/>Observational Evidence for EUV Loops Within the Network. For presentation at the AAS-Solar Physics Division and MAX '91 Meeting, Huntsville, AL, April 9-12, 1991.</p>   | <p><b>FARR, R.</b> ED33<br/><b>NESMAN, T.</b> ED33<br/><b>CHASMAN, D.</b> Rockwell<br/><b>BURNETTE, D.</b> Rockwell<br/>Time-Accurate Navier Stokes Computations of Low Speed Flow Over Cavities: No Slip Versus Blowing Walls. For presentation at the Fourth International Symposium on Computational Fluid Dynamics, Davis, CA, September 9-12, 1991.</p>            |
| <p><b>DRISCOLL, K.T.</b> ES43<br/><b>BLAKESLEE, R.J.</b><br/><b>BAGINSKI, M.E.</b><br/>Time-Averaged Electric Currents in the Vicinity of Isolated Thunderstorms. For publication in Journal of Geophysical Research, Washington, DC.</p>                        | <p><b>FARR, R.</b> ED33<br/><b>NESMAN, T.</b> ED33<br/><b>CHASMAN, D.</b> Rockwell<br/><b>BURNETTE, D.</b> Rockwell<br/>Time-Accurate Navier Stokes Computations: Dynamics of Pressure Oscillations in the RSRM 80 Seconds After Ignition. For presentation at the Fourth International Symposium on Computational Fluid Dynamics, Davis, CA, September 9-12, 1991.</p> |
| <p><b>DRISKILL, T.</b> ED73<br/>Free-Free and Fixed Base Modal Survey Tests of the Space Station Common Module Prototype. For presentation at the International Modal Analysis Conference, San Diego, CA, February 3-6, 1991.</p>                                | <p><b>FARR, R.</b> ED33<br/><b>NESMAN, T.</b> ED33<br/><b>CHASMAN, D.</b> Rockwell<br/><b>BURNETTE, D.</b> Rockwell<br/>Time-Accurate Navier Stokes Computations: Dynamics of Pressure Oscillations in the RSRM 80 Seconds After Ignition. For presentation at the Fourth International Symposium on Computational Fluid Dynamics, Davis, CA, September 9-12, 1991.</p> |
| <p><b>DUGAL-WHITEHEAD, N.R.</b> EB12<br/><b>JOHNSON, Y.</b><br/>A Study of Fault Injection in Multichannel Spacecraft Power Systems. For presentation at the Intersociety Energy Conversion Engineering Conference (IECEC) 91, Boston, MA, August 4-9, 1991.</p> | <p><b>FARR, R.</b> ED33<br/><b>NESMAN, T.</b> ED33<br/><b>CHASMAN, D.</b> Rockwell<br/><b>BURNETTE, D.</b> Rockwell<br/>Time-Accurate Navier Stokes Computations: Dynamics of Pressure Oscillations in the RSRM 80 Seconds After Ignition. For presentation at the Fourth International Symposium on Computational Fluid Dynamics, Davis, CA, September 9-12, 1991.</p> |

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- FARR, R. ED33 FINESCHI, S. ES52  
O'FARRELL, J.M. Rockwell HOOVER, R.B.  
BURNETT, D. FONTENLA, J.M.  
HOLT, J. et al.  
FARRIS, T. Polarimetry of EUV Lines in Solar  
KRISHNASAMI, Z. Time-Accurate Fluid Flow Studies Using Astronomy. For publication in Optical  
Rockwell International's USA CFD Code. Engineering, Bellingham, WA.  
For presentation at the Technology and  
Business Exposition/Symposium, Huntsville,  
AL, May 14, 1991.
- FAY, J.F. Sverdrup FINESCHI, S. ES52  
SEAFORD, M. ED33 HOOVER, R.B.  
Aerothermodynamic Environment Predic- WALKER, A.B.C., JR.  
tions in Support of the Aeroassist Flight The H-Lyman  $\alpha$  Coronagraph/Polarimeter.  
Experiment. For presentation at the Seventh For presentation at the AAS-Solar Physics  
Annual Technical and Business Exhibition Division and MAX '91 Meeting, Huntsville,  
(TABES), Huntsville, AL, May 14-15, 1991. AL, April 9-12, 1991.
- FEARS, S.D. EP62 FINESCHI, S. ES52  
Evaluation of the High Pressure Oxidizer HOOVER, R.B.  
Turbopump (HPOTP) Drying Procedures. WALKER, A.B.C., JR.  
For presentation at the 27th AIAA/SAE/ H-Lyman  $\alpha$  Coronagraph/Polarimeters  
ASME Joint Propulsion Conference, for Solar Coronal Magnetic Field Measure-  
Sacramento, CA, June 24, 1991. ments. For presentation at SPIE's Multilayer  
and Grazing Incidence X-Ray EUV Optics,  
San Diego, CA, July 21-26, 1991.
- FICHTL, G.H. ES01 FISHER, M.F. EP53  
1991 Atmospheric Environment Highlights. Analysis of Cryogenic Propellant Behavior in  
For publication in Aerospace America, Microgravity and Low Thrust Environments.  
Washington, DC. For presentation at the AIAA/ASME/SAE  
27th Joint Propulsion Conference,  
Sacramento, CA, June 24-27, 1991.
- FIKES, W.K. PD01 FISHMAN, G.J. ES62  
Requirements and Approaches for the Space The BATSE Experiment on the Gamma-Ray  
Exploration Initiative Earth to Orbit Observatory: Capabilities and Early Results.  
Transportation. For presentation at the For presentation at the Gamma-Ray  
AIAA 1991 International Aerospace Observatory Science Workshop, Annapolis,  
Engineering Conference and Show, Los MD, September 23-25, 1991.
- FINCKENOR, J. ED52 FISHMAN, G.J. ES62  
Design News Excellence in Design MEEGAN, C.A.  
Competition—Grip Joint. For publication in WILSON, R.B.  
Design News, Newton, MA. PACIESAS, W.S.  
PENDLETON, G.N.  
The BATSE Experiment on the Gamma Ray  
Observatory: Early Results. For  
presentation at the 178th Meeting of the  
American Astronomical Society, Seattle,  
WA, May 26-30, 1991.
- FINCKENOR, M.M. EH15  
Meteoroid/Space Debris Impacts on A0171  
Materials. For presentation at the LDEF  
Investigators Working Group, Orlando, FL,  
June 2-8, 1991.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- FITZJARRALD, D.E. ES42  
ROBERTSON, F. ES74  
Modification of Atmospheric Response by Interactive Surface Hydrology. For presentation at the 5th Conference on Climate Variations, Denver, CO, October 14-18, 1991.
- FLOWERS, G.T. ED14  
RYAN, S.G. ED14  
Disk Flexibility Effects on Rotordynamical Analyses. For presentation at the 36th ASME International Gas Turbine and Aeroengine Congress and Exposition, Orlando, FL, June 3-6, 1991.
- FOGLE, F.R. EL56  
An Improved Exploratory Search Technique for Pure Integer Linear Programming Problems. For presentation at the IEEE Conference on Systems, Man, and Cybernetics, Charlottesville, VA, October 13-16, 1991.
- FOSTER, C.L. ED12  
TINKER, M.L.  
NURRE, G.S.  
TILL, W.A.  
The Solar Array-Induced Disturbance of the Hubble Space Telescope Pointing System. For presentation at the 61st Shock and Vibration Symposium, Pasadena, CA, October 16-18, 1990.
- FOUNTAIN, J.A. PS05  
Capabilities for Accommodating Protein Crystal Growth and X-Ray Diffraction on Space Station *Freedom*. For presentation at Future Directions for the Measurement of X-Ray Intensities From Crystals of Macromolecules, Gulf Shores, AL, May 17-20, 1991.
- FRANCK, C.G. ED25  
LEE, H.M.  
Analysis of a Single Crystal Turbine Blade for the Space Shuttle Main Engines. For presentation at the Fifth International ANSYS Conference and Exhibition 1991, Pittsburgh, PA, May 20-24, 1991.
- FRAZIER, D. ES74  
PENN, B.  
WITHEROW, W.  
MOORE, C.  
DOWNEY, J.  
PALEY, M.  
CARDELINO, B.  
Some Shortfalls in Organic Nonlinear Optical Crystal Studies. For presentation at SPIE's 36th Annual International Symposium, San Diego, CA, July 21-26, 1991.
- FREEMAN, S.E. Sverdrup  
DEATON, A.W. EL58  
Mission Analysis of System Architecture Concepts for the Space Exploration Initiative. For presentation at the Seventh Annual Technical and Business Exhibition (TABES), Huntsville, AL, May 14-15, 1991.
- GADDIS, S. ED35  
HUDSON, S.  
JOHNSON, P.D.  
Cold Flow Testing of the Space Shuttle Main Engine Alternate Turbopump Development. For presentation at the 37th ASME International Gas Turbine and Aeroengine Congress and Exposition, Cologne, Germany, June 1-4, 1992.
- GAGLIANO, L.S. EP63  
MITCHELL, B.K.  
Space Station *Freedom* Seal Development. For presentation at the AIAA 29th Aerospace Sciences Meeting and Exhibit, Reno, NV, January 7-10, 1991.
- GALLAGHER, D.L. ES53  
CRAVEN, P.D.  
COMFORT, R.H.  
A Composite Empirical Model of Magnetospheric Plasma. For presentation at the 20th General Assembly of the International Union of Geodesy and Geophysics, Vienna, Austria, August 16-22, 1991.
- GALLAGHER, D.L. ES53  
ASHOUR-ABDALLA, M.  
Broadening of Lower-Hybrid Waves by Nonlinear Landau Damping. For presentation at the 1991 Cambridge Workshop, Cambridge, MA, June 24-28, 1991.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- GARCIA, R. ED32  
Pseudo Three-Dimensional Viscous Volute Analysis for the Prediction of Radial Loads. For presentation at the Fourth International Symposium on Computational Fluid Dynamics, Davis, CA, June 24, 1991.
- GARD, M.Y. ED62  
GEDKE, J.P. McDonnell Douglas  
Computer Simulation of the CO<sub>2</sub> Fire Suppressant Distribution System for Space Station *Freedom*. For presentation at the 20th International Conference on Environmental Systems, San Francisco, CA, July 15-18, 1991.
- GARY, G.A. ES52  
MUSIELAK, Z.E. UAH  
A Regularization Method for the Extrapolation of the Solar Potential Magnetic Fields. For publication in *Astrophysical Journal*, Chicago, IL.
- GARY, G.A. ES52  
A Regularization Method for the Extrapolation of Solar Magnetic Fields. For presentation at the Department of Mathematical Sciences at UAH Colloquium, Huntsville, AL, May 10, 1991.
- GARY, G.A. ES52  
MUSIELAK, Z.  
A Regularization Method for the Extrapolation of Solar Magnetic Fields. For presentation at the AAS-Solar Physics Division and MAX '91 Workshop, Huntsville, AL, April 9-12, 1991.
- GENGE, G. EP62  
Developing Acceptance Limits for Measured Bearing Wear of the SSME HPOTP. For presentation at the 27th AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Sacramento, CA, June 24-27, 1991.
- GERMANY, G.A. ES51  
TORR, M.R.  
TORR, D.G.  
RICHARDS, P.G.  
The Use of VUV Auroral Emissions as Diagnostic Indicators. For publication in *Journal of Geophysical Research*, Washington, DC.
- GERMANY, G.A. ES51  
TORR, D.G.  
RICHARDS, P.G.  
TORR, M.R.  
Determination of Ionospheric Conductivities from VUV Auroral Emissions. For publication in *Journal of Geophysical Research*, Washington, DC.
- GILL, M.S. EH44  
Flexible Agricultural Robotics Manipulator System (FARMS). For presentation at the Sixth International Conference on CAD/CAM, Robotics, and Factories of the Future, London, U.K., August 19-22, 1991.
- GILLIES, D.C. ES75  
LEHOCZKY, S.L.  
SZOFRAN, F.R.  
PERRY, G.L.E.  
SU, C-H.  
Interface Demarcation in Bridgman-Stockbarger Crystal Growth of 11-VI Compounds. For presentation at the SPIE Symposia on Growth and Characterization of Materials for Infrared Detectors and Nonlinear Optical Switches, Orlando, FL, April 1-5, 1991.
- GOBBA, W. ES75  
PATTERSON, J.D.  
LEHOCZKY, S.L.  
Electron Mobility in Mercury Zinc Telluride Alloys. For presentation at the Indianapolis Meeting of the American Physical Society, Indianapolis, IN, March 16-20, 1992.
- GOLDBERG, B.E. EP54  
Hybrid Rocket Technology for Space Launch Vehicles. For publication in *Aerospace America*, June 1991.
- GOODLOE, C.C. EL56  
GIUDICI, R.J. Sverdrup  
Lightning Protection for Shuttle Propulsion Elements. For presentation at the 1991 International Conference on Lightning and Static Electricity, Cocoa Beach, FL, April 16-19, 1991.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- GOODMAN, S.J. ES44  
WRIGHT, P.D.  
SCHARFEN, G.R. Effects of Long Term Exposure of Polyimide  
Development of a Global Nighttime Films to the Space Environment. For  
Lightning Climatology Using DMSP publication in AIAA Journal of Spacecraft and  
Satellites. For presentation at the AGU Fall Rockets, Washington, DC.
- GOODMAN, S.J. ES44  
BUECHLER, D.E.  
WRIGHT, P.D. GREGORY, J.C. ES63  
PETERS, P.N.  
Measurement of the Passive Attitude  
Control Performance of a Recovered  
Spacecraft. For publication in AIAA Journal  
of Guidance Control and Dynamics,  
Washington, DC.
- GOODMAN, S.J. ES44  
BUECHLER, D.E.  
WRIGHT, P.D. GREGORY, J. EB42  
DEWBERRY, B.  
LANFEAR, T.  
McKINNEY, K.  
GUILLEBEAU, M.  
TROY, J.  
Lightning-Rainfall Relationships. For Development of a Pilot Project Following the  
presentation at the Third Conference on Spiral Model of Software Development. For  
Modeling of Rainfall Fields: Hydrologic and presentation at The Strategic Software  
Meteorological Aspects, College Station, Systems Conference, Huntsville, AL, March  
TX, February 27-March 1, 1991. 10-11, 1992.
- GOODMAN, S.J. ES44  
KNUPP, K.R. GRINER, C.S. EO01  
Tornadogenesis via Squall Line and Space Station *Freedom* Payload Operations  
Supercell Interaction Revisited: The 15 in the 21st Century. For presentation at the  
November 1989 Huntsville Tornado. For 42nd International Astronautical Congress,  
presentation at the Tornado Symposium III, Montreal, Canada, October 7-11, 1991.  
Norman, OK, April 2-5, 1991.
- GOODMAN, S.J. ES44  
Sensor Fusion Techniques for Predicting  
Thunderstorm Evolution Using Lightning and  
Radar Networks. For presentation at the  
25th Conference on Radar Meteorology,  
Paris, France, June 24-28, 1991.
- GOODRICK, T.F. PD33  
Methodology and Critical Performance  
Characteristics of Aerobrake Maneuvers for  
Earth Return. For presentation at the 42nd  
IAF Congress, Montreal, Canada, October  
5-11, 1991.
- GRANT, R. Boeing  
HOPSON, G. KA01  
AARON, J. A Practical Approach to Astronomy Mission  
Space Station *Freedom* Pressurized Element Replanning. For presentation at the AIAA  
Interior Design Process. For presentation at Space Programs and Technologies  
the 41st International Astronautical Conference, Huntsville, AL, March 24-27,  
Congress, Dresden, Germany, October 6-13, 1992.  
1990.
- GREGORY, J.C. ES63  
LEGER, L.J.  
KOONTZ, S.C.  
VISENTINE, J.  
PETERS, P.N. GUILLORY, A.R. ES43  
A Physical Split Window Technique for the  
Retrieval of Precipitable Water From  
Satellite Measurements. For presentation at  
the Sixth Conference on Satellite  
Meteorology and Oceanography, Atlanta,  
GA, January 5-10, 1992.

**MSFC PAPERS CLEARED FOR PRESENTATION**  
(Available only from authors. Dates are presentation dates.)

- |   |                    |   |
|---|--------------------|---|
| <p><b>GULLORY, A.</b><br/>A Physical Split Window Technique for Deriving Precipitable Water Utilizing VAS Data. For presentation at the Topical Meeting on Optical Remote Sensing, Williamsburg, VA, November 18-21, 1991.</p>  | <p><b>ES43</b></p> | <p>Topical Meeting on Coherent Laser Radar, Snowmass, CO, July 8-12, 1991.</p>  |
| <p><b>HAGYARD, M.J.</b><br/><b>WEST, E.A.</b><br/><b>KENNY, E.G.</b><br/>Magnetic Field Configuration Associated With Gamma-Ray Flares in June 1991. For presentation at the Gamma-Ray Observatory Science Workshop, Annapolis, MD, September 25, 1991.</p>           | <p><b>ES52</b></p> | <p><b>HAN, S.</b><br/><b>BAI, S.D.</b><br/><b>SCHAFER, C.F.</b><br/>Ignition Transient Analysis of Solid Rocket Motor. For presentation at the AIAA 22nd Fluid Dynamics Plasma Division, Waikiki, HI, June 24-26, 1991.</p>   |
| <p><b>HAGYARD, M.J.</b><br/><b>HEYVAERTS, J.</b><br/>On the Energy Storage in Solar Flares. For publication in Flares 22 Workshop Proceedings, Chantilly, France.</p>   | <p><b>ES52</b></p> | <p><b>HANSON, J.M.</b><br/>Use of Multiple Lunar Swingby for Departure to Mars. For presentation at the AAS/AIAA Astrodynamics Conference, Durango, CO, August 19-22, 1991.</p>   |
| <p><b>HAGYARD, M.J.</b><br/><b>GARY, G.A.</b><br/><b>MOORE, R.L.</b><br/>The MSFC Solar GRO Guest Investigation. For presentation at AAS-Solar Physics Division and MAX '91 Meeting, Huntsville, AL, April 9-12, 1991.</p>  | <p><b>ES52</b></p> | <p><b>HARMON, B.A.</b><br/><b>WILSON, R.B.</b><br/><b>FINGER, M.H.</b><br/><b>PACIESAS, W.S.</b><br/><b>FISHMAN, G.J.</b><br/><b>MEEGAN, C.A.</b><br/>Occultation Analysis of BATSE Data—Operational Aspects. For presentation at the Gamma-Ray Observatory Science Workshop, Annapolis, MD, September 23-25, 1991.</p> |
| <p><b>HAGYARD, M.J.</b><br/><b>WEST, E.A.</b><br/><b>GARY, G.A.</b><br/><b>SMITH, J.E.</b><br/>Magnetic Field Changes Associated With a Subflare and Surge. For presentation at AAS-Solar Physics Division and MAX '91 Meeting, Huntsville, AL, April 9-12, 1991.</p> | <p><b>ES52</b></p> | <p><b>HARMON, B.A.</b><br/><b>FISHMAN, G.J.</b><br/><b>PARNELL, T.A.</b><br/><b>LAIRD, C.E.</b><br/>Induced Radioactivity in LDEF Components. For presentation at the First LDEF Post-Retrieval Symposium, Orlando, FL, June 2-8, 1991.</p>   |
| <p><b>HAMMOND, M.</b><br/><b>LACKEY, J.</b><br/><b>MYERS, W.N.</b><br/>Design of Vacuum Plasma Spray Handler. For presentation at the 26th Aerospace Mechanisms Symposium, Greenbelt, MD, May 13-15 1992.</p>   | <p><b>EP64</b></p> | <p><b>HARRIS, T.L.</b><br/><b>DICKERSON, T.D.</b><br/><b>GERRY, M.D.</b><br/>Aerobrake Concepts and Schedules for Lunar and Mars Missions. For presentation at the 28th Space Congress, Cocoa Beach, FL, April 23-26, 1991.</p>   |
| <p><b>HAMPTON, D.</b><br/><b>JONES, W.</b><br/><b>ROTHERMEL, J.</b><br/>Development and Performance of a Digital Signal Processing System for Coherent Laser Radar. For presentation at the Sixth</p>   | <p><b>EB23</b></p> | <p><b>HARSH, M.</b><br/><b>BENNER, J.</b><br/><b>GARABETIAN, A.</b><br/><b>BURG, R.</b><br/>Shuttle-C Auxiliary Propulsion System Certification Approach and Low-Cost Evolution Concepts. For presentation at the</p>   |

**MSFC PAPERS CLEARED FOR PRESENTATION**  
(Available only from authors. Dates are presentation dates.)

AIAA Joint Propulsion Conference,  
Sacramento, CA, June 24-26, 1991.

HASTINGS, L.J. EP53  
HUFFAKER, F.  
TUCKER, S.

Lunar Mission Scenarios, Transfer Vehicle Concepts, and Cryogenic Fluid Management Needs. For presentation at the AIAA Conference on Advanced SEI Technologies, Cleveland, OH, September 3-6, 1991.

HATHAWAY, D.H. ES52  
Spherical Harmonic Analysis of Steady Photospheric Flows II. For publication in Solar Physics, Hingham, MA.

HATHAWAY, D.H. ES52  
RHODES, E.J., JR.  
et al.

The Supergranulation Spectrum. For publication in Proceedings of the "Conference on Challenges to Theories of the Structure of Moderate Mass Stars," Santa Barbara, CA.

HATHAWAY, D.H. ES52  
RHODES, E.J.  
KORZENNIK, S.  
CACCIANI

Rotation Rate of the Supergranulation Pattern. For presentation at the AAS-Solar Physics Division and MAX '91 Meeting, Huntsville, AL, April 9-12, 1991.

HE, X-M. ES76  
RUKER, F.  
CARTER, D.C.

The Structure of a Human Monoclonal Antibody Against GP-41 of Human Immunodeficiency Virus Type I. For publication in Science, Washington, DC.

HE, X-M. ES76  
CARTER, D.C.  
CASALE, E.

Structure of a Fab From a Human Monoclonal Antibody Against GP-41 of the Human Immunodeficiency Virus Type I (HIV-1) and Antigen Complex. For presentation at the Pittsburgh Diffraction Conference, Huntsville, AL, October 30-November 2, 1990.

HE, X-M. ES76  
CARTER, D.C.  
TWIGG, P.D.

Progress on the Structure of a Novel Fungal Lysozyme From Chalariopsis. For presentation at the Pittsburgh Diffraction Conference, Huntsville, AL, October 30-November 2, 1990.

HEAMAN, J.P. ED35  
Performance and Calibration Results of the MSFC Cold Flow Turbine Test Facility. For presentation at the 75th Semiannual Meeting of the Supersonic Tunnel Association, Austin, TX, April 29-30, 1991.

HEAMAN, J.P. ED35  
A Directional Probe Calibration Facility. For presentation at the 75th Semiannual Meeting of the Supersonic Tunnel Association, Austin, TX, April 29-30, 1991.

HEDIGER, L.H. EH13  
An Assessment of Artifact Discrimination Techniques for Homogeneous Materials. For presentation at the Nondestructive Evaluation for Aerospace Requirements, Huntsville, AL, June 4-6, 1991.

HEDIGER, L. EH13  
BROWN, R.  
A Reliability Assessment for the Advanced Computed Tomography Inspection System (ACTIS). For presentation at the American Society for NDE-CT Topical, San Diego, CA, May 28, 1991.

HERREN, B.J. JA84  
Patent No. 4,919,899 "Crystal Growth Apparatus." For presentation at the Crystal Growth of Biological Materials Conference, Freiburg, FRG, August 18-24, 1991.

HINMAN, E.M. EB24  
Robosim, A Simulator for Robotic Systems. For presentation at Technology 2000, Washington, DC, November 27-28, 1990.

HINMAN, E.M. EB24  
WORKMAN, G.  
Characterizing Microgravity Performance of a Laboratory Robot. For presentation at the International Robots and Vision Automation

**MSFC PAPERS CLEARED FOR PRESENTATION**  
(Available only from authors. Dates are presentation dates.)

Show and Conference, Detroit, MI, October  
22-24, 1991.

HO, C.W. ES53  
HORWITZ, J.L.  
SINGH, N.  
WILSON, G.R.  
MOORE, T.E.  
Effects of Magnetospheric Electrons on Polar  
Plasma Outflow: A Semikinetic Model. For  
publication in Journal of Geophysical  
Research, Washington, DC.

HOLDEN, C., JR. EB44  
SAVAGLIO, C.  
Math Model Partitioning in Advanced Engine  
Design Simulations. For presentation at  
ADIUS '91 12th Annual Conference,  
Burlington, VT, June 23-27, 1991.

HOODLESS, R.M. HA01  
MONK, J.C.  
CIKANEK, H.A., III  
Advanced Launch System Space  
Transportation Main Engine. For  
presentation at the 42nd International  
Astronautical Congress, Montreal, Canada,  
October 5-11, 1991.

HOOVER, R.B. ES52  
et al.  
The Multispectral Solar Telescope Array IV:  
The Soft X-Ray and Extreme Ultraviolet  
Filters. For publication in Optical  
Engineering, Bellingham, WA.

HOOVER, R.B. ES52  
et al.  
Development of the Water Window Imaging  
X-Ray Microscope Utilizing Normal  
Incidence Multilayer Optics. For publication  
in Optical Engineering, Bellingham, WA.

HOOVER, R.B. ES52  
FINESCHI, S.  
FONTENLA, J.M.  
et al.  
Imaging Polarimeters for Solar EUV  
Astronomy. For publication in Optical  
Engineering, Bellingham, WA.

HOOVER, R.B. ES52  
BAKER, P.C.  
et al.

Water Window Imaging X-Ray Microscope  
for Cancer Research. For presentation at  
Technology 2000, Washington, DC,  
November 27-28, 1990.

HOOVER, R.B. ES52  
et al.  
Fabrication and Testing of an Imaging  
Multilayer X-Ray Microscope. For  
presentation at the Multilayer and Grazing  
Incidence X-Ray EUV Optics, SPIE, San  
Diego, CA, July 21-26, 1991.

HOOVER, R.B. ES52  
et al.  
Design and Analysis of a Multimirror Soft X-  
Ray Imaging Microscope. For presentation  
at SPIE's Multilayer and Grazing Incidence  
X-Ray/EUV Optics, San Diego, CA, July 21-  
26, 1991.

HOOVER, R.B. ES52  
et al.  
Development of a Water Window Imaging  
X-Ray Microscope. For presentation at  
SPIE's Multilayer and Grazing Incidence X-  
Ray EUV Optics, San Diego, CA, July 21-26,  
1991.

HOOVER, R.B. ES52  
et al.  
Solar Observations With the Multispectral  
Solar Telescope Array. For presentation at  
SPIE's Multilayer and Grazing Incidence X-  
Ray EUV Optics, San Diego, CA, July 21-26,  
1991.

HOOVER, R.B. ES52  
et al.  
Optical Configurations of H-Lyman  $\alpha$   
Coronagraph/Polarimeter Instruments. For  
presentation at SPIE's Multilayer and  
Grazing Incidence X-Ray EUV Optics, San  
Diego, CA, July 21-26, 1991.

HOOVER, R.B. ES52  
WALKER, A.B.C., JR.  
LINDBLOM, J.  
BARBEE, T.W., JR.  
The Multispectral Solar Telescope Array.  
For presentation at AAS-Solar Physics  
Division and MAX '91 Meeting, Huntsville,  
AL, April 9-12, 1991.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- HOOVER, R.B. ES52 HUBER, W.G. PA01  
WALKER, A.B.C., JR. SUMRALL, J.P.  
LINDBLOM, J. Space Transportation Options for the Space  
BARBEE, T.W., JR. Exploration Initiative. For presentation at  
The Multispectral Solar Telescope Array. the 42nd IAF Congress, Montreal, Canada,  
For presentation at AAS-Solar Physics October 5-11, 1991.  
Division and MAX '91 Meeting, Huntsville,  
AL, April 9-12, 1991.
- HOPPE, D. EH44 HUDSON, S. ED35  
BABAI, M.K. BOYNTON, J.L.  
High Pressure Waterjet Cutting and TABIBZADEH, R.  
Stripping. For presentation at Technology Investigation of the Effect of Rotor Blade  
2000, Washington, DC, November 27, 1990. Roughness on Turbine Performance. For  
presentation at the 37th ASME International  
Gas Turbine and Aeroengine Congress and  
Exposition, Cologne, Germany, June 1-4,  
1992.
- HOPSON, G.D. KA01 HUDSON, S. ED35  
Verification of Space Station *Freedom* GADDIS, S.  
Elements and Systems. For presentation at TRAN, K.  
the 42nd IAF Congress, Montreal, Canada, CHAN, D.  
October 5-11, 1991. CHEN, S.
- HORWITZ, J.L. ES53 Analysis of the Space Shuttle HPFTP  
POLLOCK, C.J. Turbine and Comparison With Air Test Data.  
MOORE, T.E. For presentation at the 37th ASME  
PETERSON, W.K. International Gas Turbine and Aeroengine  
BURCH, J.L. Congress and Exposition, Cologne,  
WINNINGHAM, J.D. Germany, June 1-4, 1992.
- CARVEN, J.D. HUDSON, S.T. ED35  
FRANK, L.A. GADDIS, S.W.  
PERSON, A. JOHNSON, P.D.  
On Outflowing O+ Beams in the Polar Cap BOYNTON, J.L.  
Regions. For publication in Journal of Cold Flow Testing of the Space Shuttle Main  
Geophysical Research, Washington, DC. Engine High Pressure Fuel Turbine Model.  
For presentation at the AIAA/  
SAE/ASME/ASEE 27th Joint Propulsion  
Conference, Sacramento, CA, June 24-27,  
1991.
- HOWARD, S. ES62 HUETER, U. PT21  
The GRO/BATSE Data Analysis System. BRADY, H.  
For presentation at the Astronomical Data EVANS, R.  
Analysis Software and System Annual NASA's Heavy-Lift Cargo Launch Vehicle  
Conference, Tucson, AZ, November 6-8, Needs and Options for the Post-2000 Period,  
1991. For presentation at the 28th Space  
Congress, Cocoa Beach, FL, April 23-26,  
1991.
- HOWARD, S. ES62 HUBER, W.G. PA01  
Gamma-Ray Observatory/BATSE Status. SUMRALL, J.P. PT41  
For presentation at the 22nd DDA Meeting Establishing the Infrastructure: An  
of AAS, Key Biscayne, FL, May 16-18, Integrated Space Transportation System.  
1991. For presentation at the Mars Exploration—  
Past, Present, and Future (AIAA Meeting),  
Williamsburg, VA, July 16-19, 1991.
- HUMPHRIES, W.R. ED61  
Spacecraft Thermal and Manned Design  
Environments. For presentation at the  
IDEES Conference, Houston, TX, November  
12-15, 1991.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- HUMPHRIES, W.R. ED61 Maximum Entropy and Bayesian Methods  
BAGDIGIAN, R.M. For Processing LIDAR/LAWS Data. For  
Water Purification and Standards. For presentation at the Sixth Topical Meeting on  
presentation at the Technology 2000 Coherent Laser Radar, Snowmass, CO, July  
Conference, Washington, DC, November 27, 8-12, 1991.  
1990.
- HUMPHRIES, W.R. ED61 IYONO, A. ES62  
TAKAHASHI, Y.  
A Survey of Spacecraft Thermal Design GREGORY, J.C.  
Solutions. For presentation at the Fourth CHRISTL, M.J.  
European Symposium for Space Station DERRICKSON, J.H.  
Environmental Control Systems, Florence, FOUNTAIN, W.F.  
Italy, October 21-25, 1991. PARNELL, T.A.  
et al.
- HUMPHRIES, W.R. ED61 Rapidity and Transverse Momentum  
PERRY, J.L. Distributions in 6.4 TeV S + Pb Interactions  
Monitoring and Control of Atmosphere in a From Cern EMU05 Experiments. For  
Closed Environment. For presentation at the presentation at the 22nd International  
Technology 2000 Conference, Washington, Cosmic Ray Conference, Dublin, Ireland,  
DC, November 27, 1990. August 11-23, 1991.
- HUNG, R.J. ES42 JAKSTAS, L.M. EB12  
LEE, C.C. RIEDESEL, J.D.  
LESLIE, F. MYERS, C.J.  
Slosh Wave Excitation in a Partially Filled User Interface Design Principles for the  
Rotating Tank Due to Gravity-Jitters in a SSM/PMAD Automated Power System. For  
Microgravity Environment. For publication at the presentation at the IECEC Proceedings  
Acta Astronautica, Paris, France. 1991, Boston, MA, August 3-9, 1991.
- HUNG, R.J. ES44 JEDLOVEC, G.J. ES43  
LEE, C.C. ATKINSON, R.J.  
JOHNSON, D.L. Variability of Geophysical Parameters from  
CHEN, A.J. Aircraft Radiance Measurements (for FIFE).  
Remote Sensing Density Perturbations For publication in Journal of Geophysical  
Induced by Subtropical Rainfalls for Research, Washington, DC.  
Spacecraft Environment Study. For  
presentation at the Seventh Annual TABES  
91, Huntsville, AL, May 14-15, 1991.
- HUNG, R.J. ES44 JEDLOVEC, G.J. ES43  
LEE, C.C. JAMES, M.W.  
JOHNSON, D.L. SMITH, M.  
CHEN, A.J. ATKINSON, R.  
Remote Sensing of Mesospheric and A PC-Based Multispectral Scanner Data  
Thermospheric Density Perturbations Evaluation Workstation: Application to  
Induced by Subtropical Heavy Rainfalls for Daedalus Scanners. For presentation at the  
Spacecraft Environment Study. For Fourth Airborne Geoscience Workshop,  
publication in Acta Astronautica Volume 23, LaJolla, CA, January 29-February 1, 1991.  
1991.
- INGUVA, R. EB23 JOHNSON-COLE, H. EB23  
JOHNSON, S.C. Variable Sensitivity Moire Interferometry.  
JONES, W.D. For presentation at the Society for  
BILBRO, J.W. Experimental Mechanics Spring Conference,  
Milwaukee, WI, June 10-13, 1991.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- JOHNSON, C.L. PS02  
Space Exploration Initiative Lunar-Based Space Physics Missions. For presentation at the 28th Space Congress, Cocoa Beach, FL, April 23-26, 1991.
- JOHNSON, C.L. PS02  
DIETZ, K.L.  
Effects of the Lunar Environment on Optical Telescopes and Instruments. For presentation at the Space Astronomical Telescopes and Instruments, sponsored by SPIE, Orlando, FL, April 1-5, 1991.
- JOHNSON, D.L. ES44  
Overview of the X-30 Natural Environment. For presentation at the 10th National Aerospace Plane Symposium, Monterey, CA, April 23-26, 1991.
- JOHNSON, S.C. EB23  
Shuttle Wind Profiler. For presentation at the Sixth Topical Meeting on Coherent Laser Radar, Snowmass, CO, July 8-12, 1991.
- JOLLY, C.D. ED62  
SCHUSSEL, L.  
CARTER, D.L.  
Advanced Development of Immobilized Enzyme Reactors. For presentation at the 20th International Conference on Environmental Systems, San Francisco, CA, July 15-18, 1991.
- JONES, C.S. EH42  
BREWER, W.V.  
Mechanisms for Robotic Assembly of Welded Truss Structures in Space. For presentation at the 26th Aerospace Mechanisms Symposium, GSFC, Greenbelt, MD, May 13-15, 1992.
- JONES, C.S. EH42  
In-Space Welding for Assembly, Construction, and Repair. For presentation at the In-Space Assembly/Service Facility Workshop, LaRC, Hampton, VA, July 25, 1991.
- JONES, C.S., III EH42  
Robotics in Space-Age Manufacturing. For presentation at Technology 2000, Washington, DC, November 27, 1990.
- JONES, C.S., III EH42  
Robotics in Aerospace Manufacturing. For presentation at the IEEE Society Chapter, Huntsville, AL, January 18, 1991.
- JONES, L.W. EP53  
FISHER, M.F.  
McCOOL, A.A.  
McCARTY, J.P.  
Propulsion at the Marshall Space Flight Center: A Brief History. For presentation at the AIAA/ASME/SAE 27th Joint Propulsion Conference, Sacramento, CA, June 24-27, 1991.
- JOY, M. ES65  
WEISSKOPF, M.C.  
Development of Hard X-Ray Optics. For presentation at SPIE's 1991 International Symposium, San Diego, CA, July 21-26, 1991.
- KAARET, P. ES65  
WEISSKOPF, M.  
ELSNER, R.  
RAMSEY, B.  
et al.  
The Stellar X-Ray Polarimeter for the Spectrum-X-Gamma Mission. For publication in Proceedings IAU No. 123, Boston, MA.
- KARR, L.J. ES76  
DONNELLY, D.L.  
KOSLOWSKY, A.  
HARRIS, J.M.  
Comparisons of Reagents for Immunoaffinity Partition. For presentation at Advances in Separations in Biochemistry, Cell Biology, and Biotechnology, New Orleans, LA, June 2-7, 1991.
- KAVAYA, M.J. EB23  
FREHLICH, R.G.  
Single Particle Mode Coherent Lidar Measurements of Aerosol Backscatter: Error Sources and Calibration. For presentation at the Sixth Topical Meeting on Coherent Laser Radar, Optical Society of America, Snowmass, CO, July 8-12, 1991.
- KAVAYA, M.J. EB23  
SUNI, P.J.M.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- Analytic Solution for the Location and Volume of CW Coherent Lidar Atmospheric Measurements. For presentation at the Sixth Topical Meeting on Coherent Laser Radar, Optical Society of America, Snowmass, CO, July 8–12, 1991.
- KIEFLING, L.A. ED22  
MULLER, G.  
SAXON, J.  
VIALI, W.  
PRICKETT, T.  
FARRIS, T.  
KRISHNASAMI, Z.  
Modeling Structural Dynamic Behavior of SSME Components. For presentation at the Technology and Business Exposition/Symposium, Huntsville, AL, May 14, 1991.
- KING, D.T. ES62  
DERRICKSON, J.H.  
EBY, P.B.  
FOUNTAIN, W.F.  
GREGORY, J.C.  
MOON, K.H.  
OGATA, T.  
PARNELL, T.A.  
et al.  
Energy Dependence for Direct Pair Production Using Relativistic Oxygen Ions. For presentation at the 22nd International Cosmic Ray Conference, Dublin, Ireland, August 11–23, 1991.
- KING, M.S. EB14  
A Map-to-Data Highway Implementation Using MMS. For presentation at IEEE Southeastcon '91, Williamsburg, VA, April 7–10, 1991.
- KIRKINDALL, A.S. JA83  
Space Station Furnace Facility—A Multi-purpose, High Temperature Microgravity Research Facility. For presentation at the 42nd International Astronautical Congress, Montreal, Canada, October 5–11, 1991.
- KOCZOR, R.J. ES41  
NASA's Geostationary Earth Observatory (GEO). For presentation at the SPIE 1991 International Symposium on Optical Applied Science and Engineering, San Diego, CA, July 21–26, 1991.
- KOSHAK, W. ES43  
A Numerical Model for Lightning Radiative Transfer. For presentation at the 1991 American Geophysical Union Fall Meeting, San Francisco, CA, December 9–13, 1991.
- KUMAR, G.N. Sverdrup  
GRIFFITH, D.O.  
RUF, J. ED32  
SSME Engine 0209 Hot Gas Leak Flow CFD Analysis. For presentation at the AIAA 30th Aerospace Sciences Meeting, Reno, NV, January 6–9, 1992.
- KUSUNOSE, M. ES65  
MINESHIGE, S.  
Pair Density Transitions in Accretion Disk Coronae. For publication in The Astrophysical Journal, Chicago, IL.
- KUSUNOSE, M. ES65  
MINESHIGE, S.  
A Limit-Cycle Behavior of Pair Density in Accretion-Disk Coronae. For presentation at the 28th Yamada Conference on Frontiers of X-Ray Astronomy, Nagoya, Japan, April 8–12, 1991.
- KYNARD, M.H. EE23  
DILL, G.A.  
SSME Testing Technology at Stennis Space Center. For presentation at the 1991 Aerospace Atlantic Conference, Society of Automotive Engineers, Dayton, OH, April 22–26, 1991.
- LANIER, G.D. PD34  
VIZZIER, B.  
ESDOTS, An Object Oriented Knowledge Based System for Space Vehicle Processing Analysis. For presentation at the 1991 Summer Computer Simulation Conference, Baltimore, MD, July 22–24, 1991.
- LAPENTA, W.M. ES42  
The Role of SST Distributions in Modulating PBL Structure and Surface Energy Fluxes During ERICA: Numerical Simulations. For presentation at the Fifth Conference on Mesoscale Processes, Atlanta, GA, January 5–10, 1992.
- LAPENTA, W.M. ES42  
SEAMAN, N.L.

MSFC PAPERS CLEARED FOR PRESENTATION  
 (Available only from authors. Dates are presentation dates.)

- A Numerical Investigation of East-Coast Cyclogenesis During the Cold-Air Damming Event of 27-28 February 1982, Part II: Importance of Physical Mechanisms. For publication in Monthly Weather Review, Boston, MA.
- LAPENTA, W.M. ES42  
 PERKEY, D.J.  
 KREITZBERG, C.  
 ROBERTSON, F.  
 The Role of SST Distributions in Modulating PBL Structure and Surface Energy Fluxes During ERICA: Numerical Solutions. For presentation at the Ninth Conference on Numerical Weather Prediction, Denver, CO, October 14-18, 1991.
- LAWLESS, K.G., III EH42  
 Marshall Automated Weld System Presentation. For presentation at the Aeromat '91 Conference—ASM, Long Beach, CA, May 20-24, 1991.
- LAWSON, L.M. Auburn  
 PEREZ, J.D.  
 MOORE, T.E. ES53  
 CHAPPELL, C.R.  
 O+ Phase Space Densities From RIMS on DE 1. For presentation at the 1991 Fall AGU Meeting, San Francisco, CA, December 9-13, 1991.
- LÉE, S.C. EB12  
 RATLIFF, M.  
 PETERSON, C. UTSI  
 LOLLAR, L.  
 Amperes: A Real Time Monitoring and Diagnosis KBS for Space Power Systems. For publication in Applied AI: An International Journal, New York, NY, May 30, 1991.
- LESLIE, F.W. ES42  
 HUNG, R.J.  
 LEE, C.C.  
 Gravity Probe-B Spacecraft Attitude Control Based on the Dynamics of Slosh Wave-Induced Fluid Stress Distribution on Rotating Dewar Container of Cryogenic Propellant. For presentation at the 42nd Congress of the IAF, Montreal, Canada, October 5-11, 1991.
- LESLIE, F.W. ES42  
 HUNG, R.J.  
 LEE, C.C.  
 Longitudinal and Transverse Modes of Slosh Wave Excitation in Rotating Dewar Associated with Gravity Jitters. For presentation at the 42nd Congress of the International Astronautical Federation, Montreal, Canada, October 5-11, 1991.
- LESLIE, F.W. ES42  
 HUNG, R.J.  
 LEE, C.C.  
 Spacecraft Dynamical Distribution of Fluid Stresses Activated by Gravity Jitter Induced Slosh Waves. For publication in Journal of Guidance, Control, and Dynamics, Washington, DC.
- LIN, N. ES53  
 ENGBRETSON, M.J.  
 REINLEITNER, L.A.  
 OLSON, J.V.  
 GALLAGHER, D.L.  
 CAHILL, L.J.  
 SLAVIN, J.A.  
 PERSON, A.M.  
 Field and Thermal Plasma Observations of ULF Pulsations During a Magnetically Disturbed Interval. For publication in Journal of Geophysical Research, Washington, DC.
- LINTON, R.C. EH12  
 REYNOLDS, J.M.  
 LDEF Experiment A0034: Interim Results. For presentation at the LDEF First Post-Retrieval Symposium, Kissimmee, FL, June 2-8, 1991.
- LIU, C. Auburn  
 PEREZ, J.D.  
 MOORE, T.E. ES53  
 CHAPPELL, C.R.  
 H+ Phase Space Densities From RIMS on DE 1. For presentation at the 1991 Fall Meeting/AGU, San Francisco, CA, December 9-13, 1991.
- LOLLAR, L.F. EB12  
 Automating a Spacecraft Electrical Power System Using Expert Systems. For presentation at IEA/AIE-91, Kauai, HI, June 2-5, 1991.

**MSFC PAPERS CLEARED FOR PRESENTATION**  
(Available only from authors. Dates are presentation dates.)

- |  |              |   |             |
|--|--------------|---|-------------|
| LOLLAR, L.F.<br>HALL, D.K.<br>DORESWAMY, R.<br>The Space Station Module Power Management and Distribution Automation Test Bed. For presentation at the Intersociety Energy Conversion Engineering Conference (IECEC), Boston, MA, August 3-9, 1991.                        | EB12         | MOORE, T.E.<br>POLLOCK, C.J.<br>Temporal Evolution of Auroral Electron Distribution Functions From the ARCS4 Sounding Rocket. For presentation at the 1991 Spring AGU Meeting, Baltimore, MD, May 28-June 1, 1991.  |             |
| LOMAS, J.J.<br>DEATON, A.W.<br>Autonomous Rendezvous Targeting Techniques for National Launch Systems Applications. For presentation at the Automatic Rendezvous and Capture Review, Williamsburg, VA, November 19-21, 1991.   | EL58<br>EL58 | McCARLEY, K.S.<br>BAER-PECKHAM, M.S.<br>The Integration of Microgravity Science Experiments Into Shared or Previously Existing Experiment Facilities. For presentation at the AIAA National Aerospace Sciences Conference, Reno, NV, January 7, 1991.                     | EL53        |
| LOONEY, A.<br>Welding Technology Transfer Task for Copeland Corporation. For presentation at the Huntsville Chapter of American Welding Society, Madison, AL, January 24, 1991.  | EH42         | McCARTY, J.P.<br>Rocket Propulsion for NASA's Earth to Orbit Launchers. For presentation at the Launcher Propulsion Towards the Year 2010 Symposium, Bordeaux, France, June 10-11, 1991.  | EP01        |
| LOWERY, J.E.<br>MAI, J.<br>Nickel Hydrogen LEO Cycling at 20-50 Percent Depth of Discharge. For presentation at the IECEC, Boston, MA, August 4-9, 1991.   | EB12         | McCONNAUGHEY, H.<br>LYLES, G.M.<br>Space Transportation Engine Cycle Selection Process. For presentation at the AIAA/SAE/ASME/ASEE 27th Joint Propulsion Conference, Sacramento, CA, June 24-26, 1991.  | EP01        |
| LU, H-I.<br>MILLER, T.L.<br>FITZJARRALD, D.<br>Interannual Variability in a 3-D Baroclinic Flow Model With Periodic Changes of Thermal Forcing. For presentation at the Eighth Conference on Atmospheric and Oceanic Waves and Stability, Denver, CO, October 14-18, 1991. | ES42         | McGRIFF, C.F.<br>CARTER, D.L.<br>CARRASQUILLO, R.L.<br>OGLE, K.<br>HOLDER, D.W., JR.<br>ECLSS Regenerative Systems Comparative Testing and Selection. For presentation at the 21st Intersociety Conference on Environmental Systems, San Francisco, CA, July 15-18, 1991. | ED62        |
| LU, H-I.<br>MILLER, T.L.<br>Wave-Mean Flow Interactions During an Amplitude Vacillation. For presentation at the Eighth Conference on Atmospheric and Oceanic Waves and Stability, Denver, CO, October 14-18, 1991.  | ES42         | McINTYRE, S.<br>FADDOUL, J.R.<br>The NASA Cryogenic Fluid Management Technology Program Plan. For presentation at the AIAA/NASA/OAI Advanced Exploration Initiative Conference, Cleveland, OH, September 4-6, 1991.   | EP53        |
| LYNCH, K.A.<br>ARNOLDY, R.L.<br>POPECKI, M.<br>KINTNER, P.M.<br>CAHILL, L.J., JR.  | ES53         | McKINNEY, K.<br>SHACKELFORD, K.   | GDI<br>EB42 |

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- An Approach to Developing User Interfaces for Advanced Space System. For presentation at the International Space Year Conference on Earth and Space Science Information Systems, Pasadena, CA, February 10-13, 1992.
- MACHADO, M.E. ES52  
MOORE, R.L.  
Magnetic Energy Storage and Conversion in Transient Solar Activity-Observations. For publication in Proceedings of SCOSTEP International Solar-Terrestrial Physics Symposium, The Netherlands.
- MARTINEZ, L.F.  
McCLURE, J.C.  
NUNES, A.C., JR. EH42  
The Effect of Gas Contamination During Welding of Aluminum-Lithium Alloys. For presentation at and publication in the 1991 ASME Winter Annual Meeting ASME Journal of Engineering for Industry, Atlanta, GA, December 1-6, 1991.
- MILLER, T. ES42  
Microgravity Experiments and Numerical Simulations of Rotating Convection in a Hemispherical Layer. For presentation at the Southeastern Conference on Theoretical and Applied Mechanics, Nashville, TN, April 12-14, 1992.
- MILLER, T.L. ES42  
REYNOLDS, N.D.  
A Laboratory and Numerical Study of Baroclinic Instability in a Cylindrical Annulus With the Temperature Gradient Imposed on the Lower Surface. For publication in Journal of Fluid Mechanics, Cambridge, UK.
- MILLER, T.L. ES42  
LU, H-I.  
BUTLER, K.A.  
A Fully Nonlinear, Mixed Spectral and Finite Difference Model for Thermally Driven Rotating Flows. For publication in Journal of Computational Physics, Duluth, MN.
- MILLER, T.L. ES42  
Comments on "Convection in a Rotating, Laterally Heated Annulus: Transition to Lower Symmetry." For publication in Geophysical and Astrophysical Fluid Dynamics, New York, NY.
- MIN, J. ED25  
Submodeling Approach for SSME HPOTP Housing Stress Analysis. For presentation at the Fifth International ANSYS Conference and Exhibition 1991, Pittsburgh, PA, May 20-24, 1991.
- MITCHELL, B.K. EP63  
Internally Replaceable Seals for Outerspace Habitats. For presentation at the AIAA 29th Aerospace Sciences Meeting and Exhibit, Reno, NV, January 7-10, 1991.
- MITCHELL, R.E. SA61  
The Advanced Solid Rocket Motor for the Space Shuttle. For presentation at the 42nd IAF Congress, Montreal, Canada, October 5-11, 1991.
- MOON, K.H. ES62  
DERRICKSON, J.H.  
EBY, P.B.  
FOUNTAIN, W.F.  
PARNELL, T.A.  
TAKAHASHI, Y.  
et al.  
Measurements of Direct Electron Pairs Along Oxygen and Sulfur Ion Tracks at 200 GeV/n. For presentation at the 22nd International Cosmic Ray Conference, Dublin, Ireland, August 11-23, 1991.
- MOORE, R.L. ES52  
Triggering of Eruptive Flares: Destabilization of the Preflare Magnetic Field. For presentation at the IAU Colloquium No. 133 on Eruptive Solar Flares, Iguazu, Argentina, August 2-6, 1991.
- MOORE, R.L. ES52  
MUSIELAK, Z.E.  
SUESS, S.T.  
AN, C.-H.  
Alfven Wave Trapping in Coronal Holes and Subsequent Heating. For presentation at the Solar Wind Seven, Goslar, Germany, September 16-20, 1991.

**MSFC PAPERS CLEARED FOR PRESENTATION**  
(Available only from authors. Dates are presentation dates.)

- |   |   |
|---|---|
| <p>MOORE, R.L. ES52<br/>HAGYARD, M.J.<br/>DAVIS, J.M.<br/>PORTER, J.G.<br/>The MSFC Vector Magnetograph, Eruptive Flares, and the Solar-A X-Ray Images. For presentation at the IAU General Assembly Solar Sessions, Buenos Aires, Argentina, July 23–August 1, 1991.</p>   | <p>CURRERI, P.A.<br/>The Role of Gravity in Microstructural Development in Particular Reinforced Metal Matrix Composites. For presentation at the 23rd International SAMPE Technical Conference, Kiamesha Lake, NY, October 22–24, 1991.</p>  |
| <p>MOORE, R.L. ES52<br/>A Novel Way to Convert Alfvén Waves to Heat in Coronal Holes: Reflective Damping. For presentation at the AAS-Solar Physics Division and MAX '91 Meeting, Huntsville, AL, April 9–12, 1991.</p>   | <p>MORTON, C. ES75<br/>HOFMEISTER, W.H.<br/>BAYUZICK, R.J.<br/>ROBINSON, M.B.<br/>Statistical Analysis of Nucleation Temperatures From Two Containerless Processing Methods. For presentation at the Fourth International Symposium on Experimental Methods for Microgravity Materials Science, Research, San Diego, CA, March 1–5, 1992.</p> |
| <p>MOORE, R.L. ES52<br/>HAGYARD, M.J.<br/>DAVIS, J.M.<br/>PORTER, J.G.<br/>The MSFC Vector Magnetograph, Eruptive Flares, and the Solar-A X-Ray Images. For publication in Proceedings of Solar-A Science Meeting, Tokyo, Japan.</p>  | <p>MUSIELAK, Z.E. ES52<br/>FONTENLA, J.M.<br/>MOORE, R.L.<br/>Klein-Gordon Equation and Reflection of Alfvén Waves in Nonuniform Media. For publication in Physics of Fluids B, Woodbury, NY.</p>   |
| <p>MOORE, R.L. ES52<br/>MUSIELAK, Z.E.<br/>SUESS, S.T.<br/>AN, C.-H.<br/>Alfvén Wave Trapping, Network Microflaring and Heating in Solar Coronal Holes. For publication in The Astrophysical Journal, Chicago, IL.</p>  | <p>NEAL, V. ES63<br/>FISHMAN, G.<br/>KNIFFEN, D.<br/>Gamma-Ray Observatory: The Next Great Observatory in Space. For publication in Mercury, San Francisco, CA.</p>   |
| <p>MOORE, T.E. ES53<br/>POLLOCK, C.J.<br/>ARNOLDY, R.L.<br/>CAHILL, L.J., JR.<br/>KINTNER, P.M.<br/>ARCS4 Experiment: Plasma Heating and Flow Observations. For presentation at the 1991 Spring Meeting American Geophysical Union, Baltimore, MD, May 28–June 1, 1991.</p> | <p>NEIN, M.E. PS02<br/>DAVIS, B.<br/>System Concepts for a Large UV/Optical/IR Telescope on the Moon. For presentation at the Space Astronomical Telescopes and Instruments sponsored by SPIE, Orlando, FL, April 1–5, 1991.</p>  |
| <p>MOORE, T.E. ES53<br/>Origins of Magnetospheric Plasma. For publication in Reviews of Geophysics, Washington, DC.</p>   | <p>NEIN, M.E. PS02<br/>DAVIS, B.<br/>A Large UV/Optical/IR Telescope on the Moon. For presentation at the 28th Space Congress, Cocoa Beach, FL, April 23–26, 1991.</p>  |
| <p>MOREL, D.E. ES75<br/>STEFANESCU, D.M.<br/>DIAMOND, S.<br/>RUSSELL, K.C.</p>  | <p>NERNEY, S. ES52<br/>SUESS, S.T.<br/>Correction to "Flow Downstream of the Heliospheric Terminal Shock, 1: Irrotational</p>   |

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- Flow." For publication in The Journal of Geophysical Research, Washington, DC.
- NERNEY, S. ES52  
SUESS, S.  
SCHMAHL, E.J.  
Flow Downstream of the Heliospheric Terminal Shock: Magnetic Field Kinematics. For publication in Astronomy and Astrophysics, Meudon, France.
- NETTLES, A.T. EH33  
LANCE, D.G.  
A Study of the Damage Tolerance Enhancement of Carbon/Epoxy Laminated by Utilizing an Outer Lamina of Ultra High Molecular Weight Polyethylene. For presentation at the 23rd International SAMPE Technical Conference, Lake Kiamesha, NY, October 22, 1991.
- NETTLES, A.T. EH33  
HODGE, A.J.  
Compression-After-Impact Testing of Thin Composite Materials. For presentation at the 23rd International, SAMPE Technical Conference, Lake Kiamesha, NY, October 22-24, 1991.
- NETTLES, A.T. EH33  
LANCE, D.G.  
HODGE, A.J.  
A Damage Tolerance Comparison of 7075-T6 Aluminum Alloy and IM7/977-2 Carbon/Epoxy. For presentation at the 36th International SAMPE Symposium, San Diego, CA, April 15-18, 1991.
- NOEVER, D.A. ES76  
Self-Collapse of Protein Crystals: Scaling Relations for Structural Fragility. For presentation at the Fourth International Conference on Crystallization of Biological Macromolecules, Freiburg, Germany, August 18-23, 1991.
- NOEVER, D.A. ES76  
CRONISE, R.J.  
Gravity Coarsening of Bubble Lattices. For presentation at the Fifth Annual Meeting Alabama Materials Research Conference, Birmingham, AL, September 25-26, 1991.
- NOEVER, D.A. ES76  
CRONISE, R.J., IV  
Gravity Coarsening of Bubble Lattices. For presentation at the Gordon Research Conference, Plymouth, NH, June 17-21, 1991.
- NOEVER, D.A. ES76  
Size Effects and Failure Model for Mechanically Stressed Protein Crystals and Aggregates. For presentation at the Fourth International Conference on Crystallization of Biological Macromolecules, Freiburg, Germany, August 18-23, 1991.
- NOEVER, D.A. ES76  
Statistics of Contractive Cracking Patterns. For publication in Canadian Journal of Physics, Quebec, Canada.
- NOEVER, D.A. ES76  
Fractal Dimension of Bioconvection Patterns. For publication in Journal of the Physical Society of Japan, Tokyo, Japan.
- NOEVER, D.A. ES76  
Rotating Bioconvection: A New Twist on Life. For publication in American Journal of Physics, Wooster, MA.
- NOEVER, D.A. ES76  
Diffusive Slip and Surface Transport Properties. For publication in Journal of Colloid and Interfacial Science, New York, NY.
- NOEVER, D.A. ES76  
Evolution of Bioconvective Patterns in Variable Gravity. For publication in The Physical Review A15, Ridge, NY.
- NOEVER, D.A. ES76  
Aggregative Stability in Lecithin Liposomes: A Statistical Crystallographic Approach. For publication in Journal of Colloid and Interfacial Science, New York, NY.
- NOEVER, D.A. ES76  
A  $3/2$  Power Law Spanning Multiple Bioconvective Planforms. For publication in Physical Review Letters, Ridge, NY.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- NOEVER, D.A. ES76  
Statistics of Pre-Mixed Flame Cells. For publication in The Physical Review A15, Ridge, NY.
- NOEVER, D.A. ES76  
Statistics of Low-Density Microcellular Materials. For publication in Journal of Materials Science, New York, NY.
- NOLL, K.S. ES63  
The Strange Gases of Jupiter and Saturn. For publication in The Planetary Report, Pasadena, CA.
- NOLL, K.S. ES63  
Saturn's Great White Spots: Correlation With Heliocentric Distance. For publication in Nature, Washington, DC.
- NUNES, A.C., JR. EH42  
Modeling the VPPA Welding Process. For presentation at the Advanced Aerospace Materials/Processes (Aeromat) Conference and Exposition, Long Beach, CA, May 20-24, 1991.
- NURRE, G.S. ED12  
SHARKEY, J.P.  
WAITES, H.B.  
Initial Performance Improvements Due to Design Modifications for the Pointing Control System on the HST. For presentation at the 14th Annual AAS Guidance and Control Conference, Keystone, CO, February 2-6, 1991.
- NURRE, G.S. ED12  
In-Flight Experience and Lessons Learned on HST. For presentation at Dynamics and Control of Flexible Aerospace Structures: Modeling and Verification, International Federation of Automatic Control, Huntsville, AL, April 2-4, 1991.
- OBENHUBER, D.C. EH32  
SHAFFER, J.  
BRITTAIN, A.  
RODGERS, E.G. EH32  
Closed Ecological Systems as Models for Long-Term Life Support Systems. For presentation at the Seventh Annual American Society of Gravitational and Space Biology, Washington, DC, October 17-20, 1991.
- OLSEN, C.D. EO43  
ECHOLS, R.T.  
WOODS, W.K.  
ONKEN, J.F.  
Orbiter Attitude Design for the Astro-1 Spacelab Mission. For presentation at the AIAA Space Programs and Technologies Conference, Huntsville, AL, March 24-27, 1992.
- OSHEROVICH, V.A. GSFC  
GARCIA, H.A. NOAA  
HAGYARD, M.J. ES52  
Three-Component Electric Current Density in a Unipolar Sunspot With Twisted Field. For presentation at the Meeting of the American Astronomical Society/Solar Physics Division, Huntsville, AL, April 9-12, 1991.
- OWENS, J.K. ES55  
TORR, M.R.  
Emissions From the 4-5 eV O<sub>2</sub> States in the Terrestrial Nightglow. For presentation at the 1991 Spring Meeting of the American Geophysical Union, Baltimore, MD, May 28-June 1, 1991.
- PAIK, H.J. ES01  
MORGAN, S.H.  
Superconducting Gravity Gradiometer Mission. For publication in the Proceedings of The First William Fairbanks Meeting on Relativistic Gravitational Experiments in Space, University of Rome, Rome, Italy, September 10-14, 1990.
- PALEY, M.S. ES74  
FRAZIER, D.O.  
ABELEDEYEM, H.  
McMANUS, S.P.  
ZUTAUT, S.E.  
Synthesis, Vapor Growth, Polymerization, and Characterization of Thin Films of Novel Diacetylene Derivatives of Pyrrole. The Use of Computer Modeling to Predict Chemical and Optical Properties of These Diacetylenes and Polydiacetylenes. For publication in Journal of the American Chemical Society, Austin, TX.

**MSFC PAPERS CLEARED FOR PRESENTATION**  
 (Available only from authors. Dates are presentation dates.)

- |  |      |   |
|--|------|---|
| PANG, Q.<br>PANG, T.<br>NUNES, A.C.<br>McCLURE, J.   | EH42 | Electron Mobility in n-Type $Hg_{1-x}Cd_xTe$ and $Hg_{1-x}Zn_xTe$ Alloys. For publication in Journal of Applied Physics, New York, NY.  |
| Workpiece Cleaning During Variable Polarity Plasma Arc Welding of Aluminum. For publication in ASME Journal of Engineering for Industry, New York, NY.   |      | PERSOON, A.M. University of Iowa<br>ANDERSON, R.R.<br>PETERSON, W.K. Lockheed<br>COLLIN, H.L.<br>ROBINSON, R.M.<br>SINGER, H.J. Phillips<br>KERNS, K.<br>HARDY, D.A.<br>DENIG, B.<br>MAYNARD, N.C.<br>WYGANT, R., JR. University of California<br>SLAVIN, J.A. GSFC<br>POLLOCK, C.J. ES53<br>MOORE, T.E. ES53 |
| PARNELL, T.A.<br>ASAKIMORI, K.<br>DERRICKSON, J.H.<br>FOUNTAIN, W.F.<br>FUKI, M.<br>et al.   | ES62 | Observations of a Quiet Magnetosphere and Polar Cap by CRRES, DE-1, and DMSP. For presentation at the 1991 Fall AGU Meeting, San Francisco, CA, December 9-13, 1991.  |
| SCIN/MAGIC: Spectra, Composition, and Interactions of Nuclei With a Balloon-Borne Superconducting Magnet. For presentation at the 22nd International Cosmic Ray Conference, Dublin, Ireland, August 11-23, 1991. |      | PETERS, P.N. ES63<br>CRISTL, L.<br>GREGORY, J.C.  |
| PARNELL, T.A.<br>WATTS, J.W., JR.<br>BENTON, E.V.<br>DUDKIN, V.E.<br>KOVALEV, E.E.<br>BENTON, E.R.<br>et al.   | ES62 | Measurements of Erosion Characteristics for Metal and Polymer Surfaces Using Profilometry. For publication in Conference Proceedings of the First LDEF Post Retrieval Symposium, Orlando, FL, June 1991.  |
| Cosmic Ray LET Spectra and Doses on Board COSMOS-2044 Biosatellite. For publication in Nuclear Track and Radiation Measurements, Pergamon Press, Oxford, England.  |      | PETERS, P.N. ES63<br>GREGORY, J.C.  |
| PARNELL, T.A.  | ES62 | Pinhole Cameras: Multipurpose Sensors for Atomic Oxygen in Orbit; Application to Attitude Determination of the LDEF. For publication in Conference Proceedings of the First LDEF Post Retrieval Symposium, Orlando, FL, June 1991.  |
| Summary of Ionizing Radiation Analysis on the Long Duration Exposure Facility. For presentation at the First LDEF Post Retrieval Symposium, Orlando, FL, June 2-8, 1991.   |      | PETERS, P.N. ES63<br>GREGORY, J.C.<br>LIGIA, C.C.<br>RAIKAR, G.   |
| PATEL, S.  | PP03 | Effects on LDEF Exposed Copper Film and Bulk. For publication in Conference Proceedings of the First LDEF Post Retrieval Symposium, Orlando, FL, June 1991.   |
| Predicting the Cost of NASA Space Programs Using Historical Cost Trends. For presentation at the Society of Women Engineers National Convention, San Diego, CA, June 25-29, 1991.                                |      |   |
| PATTERSON, J.D.<br>ABDELHAKIEM, W.<br>LEHOCZKY, S.L.   | ES75 |   |

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- POLITES, M.E. ED10  
Reconstructing Tethered Satellite Skiprope Motion by Bandpass Filtering Magnetometer Measurements. For publication in *Journal of Spacecraft and Rockets*, Washington, DC. Institute for Advanced Studies, Dublin, Ireland, August 12–23, 1991.
- POLITES, M.E. ED12  
A New Scheme for Processing Star Tracker Measurements in Spacecraft Attitude Determination Systems. For presentation at the AIAA Guidance, Navigation, and Control Conference, New Orleans, LA, August 12–14, 1991.
- PORTER, J.G. ES52  
HOOVER, R.B.  
WALKER, A.B.C.  
The Quiet Solar Network at 10<sup>6</sup> K. For presentation at the Gordon Research Conference, Plymouth, NH, August 5–9, 1991.
- PORTER, J.G. ES52  
FONTENLA, J.M.  
MOORE, R.L.  
SIMNETT, G.M.  
The X-Ray Counterparts of UV Microflares. For presentation at the AAS-Solar Physics Division and MAX '91 Meeting, Huntsville, AL, April 9–12, 1991.
- PORTER, J.G. ES52  
FONTENLA, J.M.  
MOORE, R.L.  
SIMNETT, G.M.  
Simultaneous UV and X-Ray Observations of Solar Microflares. For presentation at the 178th Meeting of the American Astronomical Society, Seattle, WA, May 26–30, 1991.
- POULIN, E.  
HORAN, C. ED64  
High Conductance Thermal Interface for Space Applications. For presentation at the 21st International Conference on Environmental Systems, San Francisco, CA, July 15–18, 1991.
- PREECE, R.D. ES62  
HARDING, A.K.  
A Strong-Field Synchrotron Self-Compton Gamma-Ray Burst Emission Model. For presentation at the 22nd ICRC Dublin
- PREECE, R.D. ES62  
HARDING, A.  
Resonant Compton Cooling and Annihilation Line Production in Gamma-Ray Bursts. For publication in *The Astrophysical Journal*, Tucson, AZ.
- PRESTWICH, A.H. ES65  
WRIGHT, G.S.  
JOSEPH, R.D.  
Variability of Near Infrared Emission Lines in NGC 4151—Implications for Nuclear Star Formation in Seyfert, Galaxies. For publication in *The Astrophysical Journal*, Chicago, IL.
- PUSEY, M.L. ES76  
Continuing Adventures With Lysozyme Crystal Growth. For presentation at the Fourth International Conference on Crystallization of Biological Macromolecules, Freiburg, Germany, August 18–23, 1991.
- PUSEY, M.L. ES76  
CACIOPPO, E.  
The Effects of Acid Treatment and Calcium Ions on the Solubility of Concanavalin A. For publication in the Conference Proceedings of the Fourth International Symposium on the Crystallization of Biological Macromolecules, Freiburg, Germany, August 18–23, 1991.
- PUSEY, M.L. ES76  
Effects of Convection on Protein Crystal Growth. For presentation at the Pittsburgh Diffraction Conference, Huntsville, AL, October 31–November 2, 1990.
- RAMACHANDRAN, N. ES42  
DOWNEY, J.P.  
Three Dimensional Numerical Investigation of Gravitational and Solutal Effects in a Cylindrical Cell. For presentation at the AIAA 26th Thermophysics Conference, Honolulu, HI, June 24–26, 1991.
- RAMSEY, B.D. ES65  
AUSTIN, R.A.  
BOWER, C.R.  
DIETZ, K.L.  
FULTON, A.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- JOY, M.K.  
WEISSKOPF, M.C.  
The MSFC Fluorescence-Gated Imaging Proportional Counter. For presentation at SPIE's 1991 International Symposium, San Diego, CA, July 21-26, 1991.
- REASONER, D.L. ES53  
The Chemical Release Mission of CRRES. For publication in *Journal of Spacecraft and Rockets*, Washington, DC.
- REASONER, D.L. ES53  
The First CRRES Chemical Release Campaigns—Kwajalein, South Pacific, and High-Altitude Magnetosphere. For presentation at the 1991 Spring Meeting American Geophysical Union, Baltimore, MD, May 28-June 1, 1991.
- RICHARDS, D.R. Sverdrup  
CHARKLWICK, D.M. EP62  
Investigation of Ice Formation in the Space Shuttle Main Engine (SSME) 0209 Main Injector Coolant Cavity. For presentation at the 27th Joint Propulsion Conference, Sacramento, CA, June 24-27, 1991.
- ROBERTSON, F.R. ES42  
Consistency Between SSM/I-Derived Global Moisture Analyses and Estimates of Large-Scale Vertical Motion. For presentation at the Sixth Conference on Satellite Meteorology and Oceanography, Atlanta, GA, January 5-10, 1992.
- ROBERTSON, F.R. ES42  
CHRISTY, J.R.  
Structure, Propagation, and Growth Rates of Transient Anomalies in the Tropospheric Temperature Field as Depicted by MSU2. For presentation at the Sixth Conference on Satellite Meteorology and Oceanography, Atlanta, GA, January 5-10, 1992.
- ROBERTSON, F.R. ES42  
Low Frequency Variability in SSM/I Moisture Retrievals. For presentation at the Ninth Conference on Numerical Weather Prediction, Denver, CO, October 14-18, 1991.
- ROBINSON, M.B. ES75  
HOFMEISTER, W.H.
- BAYUZICK, R.J.  
RATNZ, T.J.  
Measurement of the Solidification Velocity in an Undercooled Free Falling Droplet. For presentation at the Fourth International Symposium on Experimental Methods for Microgravity Materials Science Research, San Diego, CA, March 1-5, 1992.
- ROBSON, R.R. ES53  
WILLIAMSON, W.S.  
OLSEN, R.C.  
MOORE, T.E.  
Plasma Contractor for the ISTP/POLAR Spacecraft. For presentation at the 22nd International Electric Propulsion Conference, Centro Congressi, Viareggio, Italy, October 14-17, 1991.
- RODGERS, E.B. EH32  
OBENHUBER, D.C.  
Closed Ecological Systems as Models for Space Station. For presentation at TABES, Huntsville, AL, May 15, 1991.
- RODGERS, E.B. EH32  
Ecology of Microorganisms in a Closed System. For presentation at the Fifth Annual Skin in Space Seminar, Huntsville, AL, October 17, 1991.
- RODGERS, E.B. EH32  
Microbial Contamination of the Environmental Control and Life Support System Water Recovery Test for Space Station. For presentation at the International Conference on Environmental Systems, San Francisco, CA, July 15-18, 1991.
- RODGERS, E.B. EH32  
Microbial Contamination in NASA-Environmental Control and Life Support System Water Recovery Test for Space Station *Freedom*. For presentation at the American Society for Microbiology, Dallas, TX, May 12-16, 1991.
- RODGERS, E.B. EH32  
Microbial Starvation Survival of Nine Bacterial Cultures for Over 1 Year in Distilled Deionized Water. For presentation at the American Society of Microbiology, Dallas, TX, May 12-16, 1991.

**MSFC PAPERS CLEARED FOR PRESENTATION**  
(Available only from authors. Dates are presentation dates.)

- |   |             |  |
|---|-------------|--|
| <p>RODGERS, E.B.<br/>Bioburden Control for Space Station <i>Freedom's</i> Ultrapure Water System. For presentation at the International Conference on Environmental Systems, San Francisco, CA, July 15-18, 1991.</p>   | <p>EH32</p> | <p>Remote Tropospheric Backscatter Measurements at 9.1 and 10.6 Micrometers With Airborne Focused Doppler Lidars. For presentation at the Coherent Laser Radar Topical Meeting, Snowmass, CO, July 8-12, 1991.</p>   |
| <p>RODRIGUEZ, P.<br/>Optimum Design of a Linearly Tapered Laminated Orthotropic Cantilever Beam. For presentation at OPTI '91, Boston, MA, June 25-27, 1991.</p>  | <p>ED52</p> | <p>RUSSELL, C.<br/>POORMAN, R.<br/>JONES, C.S.<br/>NUNES, A.<br/>HOFFMAN, D.<br/>Considerations of Metal Joining Processes for Space Fabrication, Construction, and Repair. For presentation at the 23rd International SAMPE Technical Conference, Kiamesha Lake, New York, October 22-24, 1991.</p> |
| <p>ROMAN, M.<br/>RODGERS, E.<br/>WILSON, M.E.<br/>OBENHUBER, D.<br/>HUFF, T.<br/>TERRELL, D.<br/>GAUTHIER, J.J.<br/>Microbial Contamination in NASA ECLSS Water Recovery System Test. For presentation at the American Society of Microbiology 91st Annual Meeting, Dallas, TX, May 5-9, 1991.</p>    | <p>ED62</p> | <p>RUSSELL, S.S.<br/>Technical Material on Impacts of Composite Materials Which Were Acquired From Applicants University Research, NDE of Impact Damage to Fibrous Composites. For presentation at the Nondestructive Evaluation for Aerospace Requirements, Huntsville, AL, June 4-6, 1991.</p>     |
| <p>RONAN, R.<br/>WEST, E.A.<br/>HAGYARD, M.J.<br/>BALASUBRAMANIAM, K.S.<br/>et al.<br/>A Comparison of Vector Magnetograms From the Marshall Space Flight Center and Mees Solar Observatory. For publication in Solar Physics, The Netherlands.</p>   | <p>ES52</p> | <p>SAFIE, F.M.<br/>FOX, E.P.<br/>A Probabilistic Design Approach for Launch Systems. For presentation at the 27th AIAA/SAE/ASME Joint Propulsion Conference, Sacramento, CA, June 24-27, 1991.</p>   |
| <p>ROSNER, R.<br/>AN, C.-H.<br/>MUSIELAK, Z.E.<br/>MOORE, R.L.<br/>SUESS, S.T.<br/>Magnetic Confinement, Alfven Wave Reflection, and the Origins of X-Ray and Mass Loss "Dividing Lines" for Late-Type Giants and Supergiants. For publication in The Astrophysical Journal Letters, Chicago, IL.</p> | <p>ES52</p> | <p>SAKURAI, H.<br/>RAMSEY, B.D.<br/>Dependence of Energy Resolution on Anode Diameter in Xenon Proportional Counters. For publication in Nuclear Instruments and Methods in Physics, The Netherlands.</p>  |
| <p>ROTHERMEL, J.<br/>JONES, W.<br/>SRIVASTAVA, V.<br/>JARZEMBSKI, M.<br/>HAMPTON, D.</p>  | <p>ES43</p> | <p>SAKURAI, H.<br/>RAMSEY, B.D.<br/>The Energy Resolution of a High-Pressure Xenon-Filled Proportional Counter. For presentation at the 1991 IEEE Nuclear Science Symposium, Santa Fe, NM, November 5-8, 1991.</p>   |
|   |             | <p>SAKURAI, H.<br/>RAMSEY, B.D.<br/>WEISSKOPF, M.C.</p>  |

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- High Pressure Xenon Proportional Counter up to 10 atm. For publication in *Nuclear Instruments and Methods in Physics Research*, The Netherlands.
- SAKURAI, H. ES65  
RAMSEY, B.D.  
Characteristics of a High Pressure Gas Proportional Counter Filled with Xenon. For presentation at SPIE's 1991 International Symposium on Optical Applied Science and Engineering, San Diego, CA, July 21-26, 1991.
- SCHARFEN, G.R. ES44  
GOODMAN, S.J.  
Global Nighttime Lightning Detection From DMSP Imagery. For presentation at IUGG/IAMAP Symposium, Vienna, Austria, August 11-24, 1991.
- SCHMIEDER, B. ES52  
FONTENLA, J.  
TANDBERG-HANSSSEN, E.  
A Microflare-Related Activation of a Filament Observed in H $\alpha$  and C IV Lines. For publication in *Astronomy and Astrophysics*, The Netherlands.
- SCHUTZENHOFER, L.A. ED32  
McCONNAUGHEY, P.K.  
McCONNAUGHEY, H.V.  
WANG, T.S.  
Management of a CFD Organization in Support of Space Hardware Development. For presentation at the AIAA 22nd Fluid Dynamics, Plasma Dynamics, and Lasers Conference, Honolulu, HI, June 24-26, 1991.
- SHEPHERD, C.C. CQ24  
Marshall Space Flight Center Standard for Electrostatic Discharge (ESD) Control for Propellant and Explosive Devices. For presentation at the JANNAF Propulsion Systems Hazards Subcommittee Meeting, Albuquerque, NM, March 18-22, 1991.
- SIBILLE, L. ES76  
PUSEY, M.L.  
Investigation Into the Early Stages of Lysozyme Nucleation. For publication in *Proceedings of Fourth International Conference on Crystallization Growth of Biological Macromolecules*, Freiburg, Germany.
- SIMS, P.A. EP62  
ZEE, R.  
Stress State in Turbopump Bearing Induced by Shrink Fitting. For presentation at the AIAA/SAE/ASME Joint Propulsion Conference, Sacramento, CA, June 24-27, 1991.
- SMITH, D. EL56  
PEARSON, S.  
A Systems Engineering Approach to Electromagnetic Compatibility (EMC) Analysis for the Space Station *Freedom* Program. For presentation at the Electromagnetic Compatibility Expo, Orlando, FL, June 25-27, 1991.
- SNODDY, W.C. PA01  
Geostationary Earth Observatories—Key Elements to Mission to Planet Earth. For presentation at the International Pacific Air and Space Technology (IPAC) Conference, Gifu, Japan, October 6-11, 1991.
- SNYDER, R.S. ES71  
PUSEY, M.  
CARTER, D.  
et al.  
Protein Crystal Growth in Microgravity. For presentation at the IKI/AIAA Microgravity Science Symposium, Moscow, Russia, May 13-17, 1991.
- SNYDER, R.S. ES75  
TAYLOR, W.  
WILLENBERG, H.J.  
Space Station *Freedom* Capabilities for Users. For publication in *Space Technology International*, London, England, January 1992.
- SNYDER, R.S. ES71  
RHODES, P.H.  
Electrophoresis Experiments in Microgravity. For presentation at the IKI/AIAA Microgravity Science Symposium, Moscow, Russia, May 13-17, 1991.
- SNYDER, R.S. ES76  
FURHMANN, K.  
WALTER, H.U.  
Protein Crystallization Facilities for Microgravity Experiments. For publication in

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- |  |  |         |
|--|--|---------|
| Journal of Crystal Growth, Amsterdam, The Netherlands.   | SUESS, S.T.  | ES52    |
| SPENCER, R.W.  | NERNEY, S.   |         |
| CHRISTY, J.R.  | The Magnetic Field in the Heliosheath. For presentation at Solar Wind Seven, Goslar, Germany, September 16-20, 1991.   |         |
| A Physical Interpretation of Brightness Temperatures Observed by the Microwave Sounding Units Based on Raobs. For presentation at the Fifth Conference on Climate Variations, Denver, CO, October 13-18, 1991. | SUESS, S.T.  | ES52    |
| SPENCER, R.W.  | MHD Flows in the Heliosphere. For publication in Reports on Astronomy (International Astronomical Union), The Netherlands.   |         |
| CHRISTY, J.R.  |  |         |
| Precision and Radiosonde Validation of Satellite Gridpoint Temperature Anomalies, Part II: A Tropospheric Retrieval and Trends During 1979-90. For publication in Journal of Climate, Boston, MA, April 1991.  | SUESS, S.T.  | ES52    |
| SPENCER, R.W.  | Dynamics of the Outer Heliosphere and Temporal Variations in the Termination Shock. For presentation at the 1991 Fall Meeting of the American Geophysical Union, San Francisco, CA, December 9-13, 1991.       |         |
| CHRISTY, J.R.  |  |         |
| Precision and Radiosonde Validation of Satellite Gridpoint Temperature Anomalies, Part I: MSU Channel 2. For publication in Journal of Climate, Boston, MA, April 1991.  | SUESS, S.T.  | ES52    |
| SPENCER, R.W.  | Shape of and Plasma Flow Patterns Around the Heliopause. For presentation at the European Geophysical Society 16th General Assembly, Wiesbaden, Germany, April 22, 1991.                                       |         |
| CHRISTY, J.R.  |  |         |
| SPRINGER, J.   | SUITS, M.W.  | EH13    |
| SILBERMAN, E.  | Air Coupled Ultrasonic Inspection of Large Solid Rocket Motors. For presentation at the Nondestructive Evaluation for Aerospace Requirements, Huntsville, AL, June 4-6, 1991.                                  |         |
| KROES, R.  |  |         |
| REISS, D.  | Mapping Crystal Defects With a Digital Scanning Ultramicroscope. For presentation at SPIE's 36th Annual International Symposium, San Diego, CA, July 21-26, 1991.  |         |
| STORY, G.  | SULLIVAN, K.W.   | EE74    |
| WILLIAMS, W.   | SCHRAMM, F.  | PF24    |
| Space Station <i>Freedom</i> Water Recovery Test Data Base. For presentation at the SAE ICES Convention, San Francisco, CA, July 15, 1991.   | An Evaluation of the Total Quality Management Implementation Strategy for ASRM at NASA/MSFC. For presentation at the University of Tennessee Space Institute Masters Degree Thesis, Tullahoma, TN, March 1991. |         |
| SU, C-H.   | SULYMA, P.R.   | ED33    |
| LEHOCZKY, S.L.   | REARDON, J.E.  | Remtech |
| SZOFRAN, F.R.  | EVERSON, J.  | Remtech |
| GILLIES, D.G.  | SMITH, S.D.  | SECA    |
| PERRY, G.L.E.  | ASRM Radiation and Flowfield Status. For presentation at the JANNAF Plume Technology Conference, Redstone Arsenal, AL, May 14-16, 1991.  |         |
| Directional Solidification and Casting of HgCdTe in a Transverse Magnetic Field. For presentation at the ECCG-3 Third European Conference on Crystal Growth, Budapest, Hungary, May 5-11, 1991.                | SUSKO, M.  | ES44    |
|  | Chemical Analysis Reveals the Difference Between Natural and Manmade Space   |         |

MSFC PAPERS CLEARED FOR PRESENTATION  
 (Available only from authors. Dates are presentation dates.)

- Debris. For publication in Geophysical Research Letters, Washington, DC.
- SUSKO, M. ES44  
 Turbulence Indicators for Space Shuttle Launches. For presentation at the AIAA 30th Aerospace Sciences Meeting and Exhibit, Reno, NV, January 6-9, 1992.
- TAKAHASHI, Y. ES62  
 GREGORY, J.C.  
 HAYASHI, T.  
 CHRISTL, M.J.  
 DERRICKSON, J.H.  
 FOUNTAIN, W.F.  
 PARNELL, T.A.  
 et al.  
 A Study of Isospin Clustering and Intermittency Fluctuations in Heavy Ion Reactions From CERN EMU05. For presentation at the 22nd International Cosmic Ray Conference, Dublin, Ireland, August 11-23, 1991.
- TANDBERG-HANSEN, E. ES01  
 FONTENLA, J.M.  
 X. Prominences. For presentation at the 21st IAU General Assembly, Buenos Aires, Argentina, July 23-August 1, 1991.
- TAYLOR, W. ES71  
 SNYDER, R.  
 WILLENBERG, H.  
 Space Station *Freedom* Capabilities for Users. For presentation at the 42nd Congress of the International Astronautical Federation, Montreal, Canada, October 5-11, 1991.
- TELESCO, C.M. ES63  
 KNACKE, R.F.  
 Detection of Silicates in the  $\beta$  Pictoris Disk. For publication in *Astrophysical Journal Letters*, Cambridge, MA.
- THOMAS, F. ED52  
 Slip Joint Invention. For publication in *Design News Excellence in Design Competition*, Chicago, IL, February 24-27, 1992.
- THOMAS, F.P. ED52  
 FINCKENOR, J.L.
- Mechanical Joint Development Testing for In-Space Assembly and Construction. For presentation at the AIAA Space Programs and Technologies, Huntsville, AL, March 24-27, 1992.
- THRASHER, D. Boeing  
 DAVISON, G.  
 TUCKER, M. PS04  
 Space Station Evolution Logistics. For presentation at the Society of Allied Weight Engineers, Guntersville, AL, October 6, 1990.
- THREET, G.E., JR. PD24  
 PANNELL, W.P.  
 ET Derived Core Stage. For presentation at the 28th Space Congress, Cocoa Beach, FL, April 23-26, 1990.
- TINKER, M.L. ED22  
 CLAYTON, J.P. Remtec  
 Characterization and Modeling of Advanced Ceramic Fabric for Space Applications. For presentation at the AIAA 32nd Structures Structural Dynamics and Materials Conference, Baltimore, MD, April 8-10, 1991.
- TORR, M.R. ES51  
 TORR, D.G.  
 SPANN, J.  
 OWENS, J.  
 SAVAGE, L.  
 FELLOWS, C.  
 et al.  
 Optical Observations of a Lithium Release From the CRRES Spacecraft. For presentation at the Spring 1991 Meeting of the American Geophysical Union, Baltimore, MD, May 28-30, 1991.
- TORR, M. ES51  
 TORR, D.G.  
 ZUKIC, M.  
 SPANN, J.  
 An Ultraviolet Imager for the International Solar-Terrestrial Physics Mission. For publication in *Reviews of Scientific Instruments*, Woodbury, NY.
- TORR, M. ES51  
 TORR, D.G.  
 RICHARDS, P.G.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- The N2+ First Negative System in the Dayglow From Spacelab 1. For publication in Journal of Geophysical Research, Washington, DC.
- TORRES, M.R. EH42  
McCLURE, J.C.  
NUNES, A.C.  
GUREVITICH, A.C.  
Gas Contamination Effects in Variable Polarity Plasma Arc Welding. For publication in Welding Journal, Miami, FL.
- TRAWEEK, M.S. ED62  
Space Station Water Recovery Design and Test. For publication in Processing in Space Waste Management and Research, Moffett Field, CA.
- TRAWEEK, M.S. ED62  
BAGDIGIAN, R.M.  
GRIFFITH, G. Sverdrup  
Phase III Integrated Water Recovery Testing at MSFC: Partially Closed Loop Results and Lessons Learned. For presentation at the 21st Intersociety Conference on Environmental Systems, San Francisco, CA, July 15-18, 1991.
- TUCKER, D.S. EH34  
Long-Life Prediction of Glass in Space. For publication in SAMPE Local Chapter Proceedings, Huntsville, AL, March 22, 1991.
- TUCKER, D.S. EH34  
ETHRIDGE, E.C.  
CURRERI, P.A.  
Production of Continuous Glass Fiber Using Lunar Simulant. For presentation at the 23rd Annual SAMPE Technical Conference, Lake Kiamesha, NY, October 22-24, 1991.
- UPADHYAY, T.N. EL58  
COTTERILL, S.  
DEATON, A.W. EL58  
Autonomous Reconfigurable GPS/INS Navigation and Pointing System for Rendezvous and Docking. For presentation at the Automated Rendezvous and Capture Review, Williamsburg, VA, November 19-21, 1991.
- UPADHYAY, T. MCCI  
COTTERILL, S. MCCI  
DEATON, A.W. EL58  
Autonomous GPS/INS Navigation Experiment for Space Transfer Vehicle (STV). For presentation at the First ESA International Conference on Spacecraft Guidance, Navigation, and Control Systems, Noordwijk, The Netherlands, June 4-7, 1991.
- UPADHYAY, T. MCCI  
RHODEHAMEL, H. MCCI  
DEATON, A.W. EL58  
Navigation With Lunar-Based GPS Pseudolites. For presentation at the 1st ESA International Conference on Spacecraft Guidance, Navigation, and Control Systems, Noordwijk, The Netherlands, June 4-7, 1991.
- UTREJA, L. ED12  
CHRISTIAN, P.M.  
BUKLEY, A.  
Multibody Modeling Verification and Control. For presentation at the AAS/AIAA Space Flight Mechanics Meeting, Colorado Springs, CO, February 24-26, 1991.
- VAUGHAN, O.H. ES43  
Photograph and Caption. For publication in AMS Journal, September 9, 1991, Cover Photograph, Boston, MA.
- VAUGHN, J.A. EH12  
CARRUTH, M.R., JR.  
Current Flow in a Plasma Caused by Dielectric Breakdown. For presentation at the Space Operations, Applications, and Research Symposium 1991, Houston, TX, July 9-11, 1991.
- VENKATESWARLU, P. ES74  
HE, K.  
BRYANT, W.  
HYDE, H.  
PENN, B.  
FRAZIER, D.  
New Organic Materials for Nonlinear Optics: Study of High Efficient Second Harmonic Generation From N-Alkyl and N,N-Dialkyl Derivatives of 4-Methyl-6-Mitro-2-Quinolinamines. For presentation at CLEO 91, Baltimore, MD, May 12-17, 1991.

**MSFC PAPERS CLEARED FOR PRESENTATION**  
(Available only from authors. Dates are presentation dates.)

- |   |  |
|---|--|
| <p>VERDERAIME, V. ED01<br/>Aerostructural Safety Factor Selection Criterion. For presentation at the AIAA Space Programs and Technologies Conference, Huntsville, AL, March 24-27, 1992.</p>  | <p>WALKER, A.B.C., JR. ES52<br/>LINDBLOM, J.L.<br/>TIMOTHY, J.G.<br/>HOOVER, R.B.<br/>The Ultra High Resolution XUV Telescope III: A Modified Configuration for a Free Flying Platform. For presentation at SPIE's Multilayer and Grazing Incidence X-Ray EUV Optics, San Diego, CA, July 21-26, 1991.</p> |
| <p>VIKRAM, C.S. ES74<br/>WITHEROW, W.K.<br/>TROLINGER, J.D.<br/>Refractive Properties of TGS Aqueous Solution for Two-Color Interferometry. For presentation at SPIE's International Symposium, San Diego, CA, July 21-26, 1991.</p>          | <p>WALKER, A.B.C., JR. ES52<br/>KANKELBORG, C.<br/>HOOVER, R.B.<br/>et al.<br/>Narrow Band Solar Images in the Soft X-Ray (~5-50Å) Regime With Multilayer Optics. For presentation at SPIE's Multilayer and Grazing Incidence X-Ray EUV Optics, San Diego, CA, July 21-26, 1991.</p>                       |
| <p>VIKRAM, C.S. UAH<br/>WITHEROW, W.K. ES74<br/>TROLINGER, J.D.<br/>Determination of Refractive Properties of Fluids for Dual Wavelength Interferometry. For publication in Applied Optics, Newton Highlands, MA.</p>                         | <p>WALKER, A.B.C., JR. ES52<br/>MOORE, R.<br/>ROBERTS, W.<br/>HOOVER, R.B.<br/>et al.<br/>The High Resolution Telescope Cluster. For presentation at SPIE's Multilayer and Grazing Incidence X-Ray EUV Optics, San Diego, CA, July 21-26, 1991.</p>  |
| <p>VOLZ, M.P. ES75<br/>SU, C.-H.<br/>LEHOCZKY, S.L.<br/>SZOFRAN, F.R.<br/>Vibronic Spectra of Cu<sup>2+</sup> In ZnTe. For publication in Physical Review B, New York, NY.</p>  | <p>WALKER, A.B.C., JR. ES52<br/>MARTINEZ, D.S.<br/>HOOVER, R.B.<br/>Cosmic X-Ray Spectroscopy With Multilayer Optics. For presentation at SPIE's Multilayer and Grazing Incidence X-Ray EUV Optics, San Diego, CA, July 21-26, 1991.</p>   |
| <p>VON PRAGENAU, G.L. ED14<br/>Damping Bearings for Cryogenic Turbo-pumps. For presentation at the 1990 JANNAF Propulsion Meeting, Anaheim, CA, October 3-5, 1990.</p>  | <p>WALKER, A.B.C., JR. ES52<br/>WILLIS, T.D.<br/>HOOVER, R.B.<br/>The Objective Double Crystal Spectrometer. For presentation at SPIE's Multilayer and Grazing Incidence X-Ray EUV Optics, San Diego, CA, July 21-26, 1991.</p>  |
| <p>WAITES, H.B. ED12<br/>Challenges to Performance. For presentation at Dynamics and Control of Flexible Aerospace Structures: Modeling and Verification, International Federation of Automatic Control, Huntsville, AL, April 2-4, 1991.</p> | <p>WALKER, A.B.C., JR. ES52<br/>ALLEN, M.J.<br/>HOOVER, R.B.<br/>Performance of Reflective Multilayer Coated Coronagraphs. For presentation at SPIE's</p>  |
| <p>WALKER, A.B.C., JR. ES52<br/>HOOVER, R.B.<br/>et al.<br/>High Resolution Imaging With Multilayer Soft X-Ray, EUV, and FUV Telescopes of Modest Aperture and Cost. For publication in Optical Engineering, Bellingham, WA.</p>              | <p>WALKER, A.B.C., JR. ES52<br/>ALLEN, M.J.<br/>HOOVER, R.B.<br/>Performance of Reflective Multilayer Coated Coronagraphs. For presentation at SPIE's</p>  |

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- Multilayer and Grazing Incidence X-Ray EUV Optics, San Diego, CA, July 21-26, 1991.
- WALKER, A.B.C., JR. ES52  
DeFOREST, C.E.  
BARBEE, T.W.  
HOOVER, R.B.  
Design of a Normal Incidence XUV Grating Spectrograph Using Multilayer Techniques. For presentation at SPIE's Multilayer and Grazing Incidence X-Ray EUV Optics, San Diego, CA, July 21-26, 1991.
- WALKER, A.B.C., JR. ES52  
LINDBLOM, J.F.  
TIMOTHY, J.G.  
HOOVER, R.B.  
TANDBERG-HANSSSEN, E.  
BARBEE, T.W., JR.  
The Ultra High Resolution XUV Spectroheliograph. For presentation at the AAS-Solar Physics Division and MAX '91 Meeting, Huntsville, AL, April 9-12, 1991.
- WANG, M. EH13  
WORKMAN, G.L.  
BRYSON, C.  
Eddy Current Analysis of Graphite Fiber Materials. For presentation at the Alabama Materials Research Conference, Tuscaloosa, AL, October 2-3, 1990.
- WANG, T.-S. ED32  
SCHUTZENHOFER, L.  
Numerical Analysis of a Nuclear Element Tester for Thermal Nuclear Propulsion. For presentation at AIAA/NASA/OAI Conference on Advanced SEI Technologies, Cleveland, OH, September 4-6, 1991.
- WANG, T.-S. ED32  
Numerical Study of the Transient Nozzle Flow Separation of Liquid Rocket Engines. For presentation at the Fourth International Symposium on CFD, Davis, CA, September 9-12, 1991.
- WANG, T.-S. ED32  
Computational Analysis of the Three-Dimensional Steady and Transient SSME Fuel Preburner Combustor. For presentation at the International Union of Theoretical and Applied Mechanics (IUTAM) Symposium on Aerothermodynamics in Combustors, Taipei, Taiwan, R.O.C., June 3-5, 1991.
- WATTS, J. ES62  
LDEF Radiation Environment. For presentation to the NATO Advanced Study Institute, Algarve, Portugal, October 12, 1991.
- WATTS, J.W., JR. ES62  
DERRICKSON, J.H.  
PARNELL, T.A.  
FISHMAN, G.J.  
HARMON, A.  
BENTON, E.V.  
et al.  
The Ionizing Radiation Environment of LDEF Prerecovery Predictions. For presentation at the First LDEF Post-Retrieval Symposium, Orlando, FL, June 2-8, 1991.
- WEDDENDORF, B. ED52  
Portable Powered Seat Lift Design. For publication in Design News Magazine, Newton, MA, and Institute for Technology Development, Oxford, MS.
- WEISSKOPF, M.C. ES65  
The Advanced X-Ray Astrophysics Facility. For presentation at the Colloquium on AXAF, Toledo, OH, June 5-7, 1991.
- WEISSKOPF, M.C. ES65  
ELSNER, R.F.  
Off-Axis Effects in Focal Plane Stellar X-Ray Polarimeters. For presentation at SPIE's 1991 International Symposium, San Diego, CA, July 21-26, 1991.
- WEST, E.A. ES52  
Problems Associated With Aligning MSFC Transverse Azimuth Maps and H-Alpha Images. For presentation at the AAS-Solar Physics Division and MAX '91 Meeting, Huntsville, AL, April 9-12, 1991.
- WHITAKER, A. EH11  
Preliminary Assessment of LEO Surface Effects on LDEF A0171 Composite Materials. For publication in Advanced Materials and Processing, April 1991.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- WHITAKER, A.F. EH11  
YOUNG, L.E. Determination of Monomer Concentrations in Crystallizing Lysozyme Solutions. For publication in the Proceedings of the Fourth International Conference on Crystallization of Biological Macromolecules, Freiburg, Germany.
- An Overview of First Results on Solar Array Passive Experiment (SAMPE) No. A0171. For presentation at the LDEF Investigators Working Group Meeting, Orlando, FL, June 2-8, 1991.
- WILSON, R.B. ES62  
HARMON, B.A.  
FINGER, M.H.  
MEEGAN, C.A.  
FISHMAN, G.J.  
PACIESAS, W.S.  
Long-Term Source Monitoring Capabilities of BATSE. For presentation at the Gamma-Ray Observatory Science Workshop, Annapolis, MD, September 23-25, 1991.
- WHORTON, M.S. ED12  
Simulation of the IPS for the Astro-1 Mission. For presentation at the AIAA 29th Aerospace Sciences Meeting and Exhibit, Reno, NV, January 7-10, 1991.
- WILFONG, T.L. ES44  
Improving the Velocity Estimates From the NASA 50 MHz Wind Profiler. For presentation at the Second Symposium on Tropospheric Profiling, Boulder, CO, September 9-13, 1991.
- WILSON, R.M. ES52  
Using the "Even-Odd" Sunspot Cycle Variation to Predict Maximum Amplitude for Cycle 23. For presentation at the AAS-Solar Physics Division and MAX '91 Meeting, Huntsville, AL, April 9-12, 1991.
- WILFONG, T.L. ES44  
SMITH, S.A.  
High Temporal Resolution Velocity Estimates From the NASA 50 MHz Wind Profiler. For presentation at the AIAA 30th Aerospace Sciences Meeting, Reno, NV, January 6-9, 1992.
- WINGARD, C.D. EH33  
PATTERSON, W.J.  
The Use of Photoelectron Emission to Determine the Effects of Contamination on Bond Strength and Integrity of Metal/Polymer Composite Specimens. For presentation at the American Chemical Society (National Meeting), Atlanta, GA, April 14-19, 1991.
- WILKINSON, L.K. ES52  
The Distribution of Longitudinal Currents in Sunspots. For presentation at the AAS-Solar Physics Division and MAX '91 Meeting, Huntsville, AL, April 9-12, 1991.
- WILLIAMS, R.W. ED32  
Computational Study of Duct and Pipe Flows Using the Method of Pseudocompressibility. For presentation at the AIAA 21st Fluid Dynamics, Plasma Dynamics, and Lasers Conference, Honolulu, HI, June 24-26, 1991.
- WINKLER, C. TA71  
DAILEY, C.  
CUMINGS, N.  
Advanced X-Ray Astrophysics Facility (AXAF) Science Instruments. For presentation at SPIE's International Symposium on Optical Engineering and Photonics in Aerospace Sensing, Orlando, FL, April 1-5, 1991.
- WILLIAMS, W. ED62  
STORY, G. Sverdrup  
CHIU, C. ION  
Space Station *Freedom* ECLSS Data Base System (FEDS) for MSFC Testing. For presentation at the 21st Intersociety Conference on Environmental Systems, San Francisco, CA, July 15-18, 1991.
- WINTER, C.A. ES42  
JONES, J.  
A Data Base Describing Low Gravity Fluids and Materials Processing Experiments. For presentation at the AIAA 30th Aerospace Sciences Meeting, Reno, NV, January 6-9, 1992.
- WILSON, L.J. ES76  
PUSEY, M.L.

MSFC PAPERS CLEARED FOR PRESENTATION  
(Available only from authors. Dates are presentation dates.)

- WITHEROW, W.K. ES74  
Visualizing Convection During Crystal Growth. For presentation at the Pittsburgh Diffraction Conference, Huntsville, AL, October 31–November 2, 1990.
- WITHEROW, W.K. ES74  
Measuring Residual Accelerations in the Spacelab Environment. For presentation at SPIE's 36th Annual International Symposium, San Diego, CA, July 21–26, 1991.
- WOODIS, K. EH13  
Overview of NDE Programs at Marshall Space Flight Center. For presentation at the Nondestructive Evaluation of Aerospace Requirements, Huntsville, AL, June 4–6, 1991.
- WORKMAN, G. EB24  
HINMAN, E.  
Physical and Digital Simulations of Robots for Space. For presentation at SimTec 1991, Orlando, FL, October 21–23, 1991.
- WORKMAN, G.L. EH13  
WANG, M.  
ADAMS, B.  
Robotic Eddy Current Inspection for Graphite Fiber Components. For presentation at the Third Conference on NDE for Aerospace Requirements, Huntsville, AL, June 6, 1991.
- WU, S.T. ES01  
SONG, M.T.  
TANDBERG-HANSSSEN, E.  
A Numerical Simulation of Atmospheric Responses Due to Emerging Flux From Subphotospheric Layers. For presentation at the 21st SPD Meeting of the American Astronomical Society and MAX '91 Meeting, Huntsville, AL, April 9–12, 1991.
- YOUNG, A.C. PD32  
EMRICH, W.J.  
MULQUEEN, J.A.  
Nuclear Stage Configuration Studies for Mars Missions. For presentation at the 28th Space Congress, Cocoa Beach, FL, April 23–26, 1991.
- ZUKIC, M. ES51  
TORR, D.  
TORR, M.  
High Throughput Narrowband 83.4 nm Self-Filtering Camera. For publication in Optical Engineering, Bellingham, WA.
- ZWIENER, J.M. EH15  
Unusual Materials Effects Observed on the Thermal Control Surfaces Experiment No. S0069. For presentation at the LDEF Investigators Working Group, Orlando, FL, June 2–8, 1991.

**APPROVAL**

**FY 1991 SCIENTIFIC AND TECHNICAL REPORTS,  
ARTICLES, PAPERS, AND PRESENTATIONS**

Compiled by Joyce E. Turner

The information in this report has been reviewed for technical content. Review of any information concerning Department of Defense or nuclear energy activities or programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.



---

C.D. BEAN  
Director  
Administrative Operations Office

☆ U.S. GOVERNMENT PRINTING OFFICE 1992-631-060/60040