

AIAA

Progress in Astronautics and Aeronautics Series

Volumes 58-62, published in 1978, are indexed in this issue of the Combined Index

Prices and descriptions of Volumes 40-63 are given below. For information on Volumes 1-39 and on forthcoming volumes, write to AIAA Special Publications Department, 1290 Avenue of the Americas, New York, New York 10019

EXPERIMENTAL DIAGNOSTICS IN COMBUSTION OF SOLIDS

v. 63

Edited by Thomas L. Boggs, Naval Weapons Center, and Ben T. Zinn, Georgia Institute of Technology

The objective of this volume is to assemble in one place a set of advanced expository treatments of the newest diagnostic methods that have emerged in recent years in experimental combustion research in heterogeneous systems and to analyze both the potentials and the shortcomings in ways that would suggest directions for future development.

This volume was planned as a means to disseminate the techniques hitherto known only to specialists to the much broader community of research scientists and development engineers in the combustion field. We believe that the articles and the selected references to the current literature contained in the articles will prove useful and stimulating.

339 pp., 6 × 9, illus., \$20.00 Mem., \$35.00 List

ALTERNATIVE HYDROCARBON FUELS: COMBUSTION AND CHEMICAL KINETICS

v. 62

Edited by Craig T. Bowman, Stanford University, and Jørgen Birkeland, Department of Energy

This volume is based on a set of original papers delivered at a special workshop called by the Department of Energy and the Department of Defense for the purpose of discussing the problems of switching to fuels producible from nonpetroleum sources for use in automotive engines, aircraft gas turbines, and stationary power plants. The authors were asked also to indicate how research in the areas of combustion, fuel chemistry, and chemical kinetics can be directed toward achieving a timely transition to such fuels, should it become necessary. Research scientists in those fields, as well as development engineers concerned with engines and power plants, will find this volume a useful up-to-date analysis of the changing fuels picture.

463 pp., 6 × 9, illus., \$20.00 Mem., \$35.00 List

RADIATION ENERGY CONVERSION IN SPACE

v. 61

Edited by Kenneth W. Billman, NASA Ames Research Center

The principal theme of this volume is the analysis of potential methods for the effective utilization of solar energy for the generation and transmission of large amounts of power from satellite power stations down to Earth for terrestrial purposes.

Physicists interested in the basic processes of the interaction of space radiation and matter in various forms, engineers concerned with solutions to the terrestrial energy supply dilemma, spacecraft specialists involved in satellite power systems, and economists and environmentalists concerned with energy will find in this volume many stimulating concepts deserving of careful study.

670 pp., 6 × 9, illus., \$24.00 Mem., \$45.00 List

AERODYNAMIC HEATING AND THERMAL PROTECTION SYSTEMS

v. 59

HEAT TRANSFER AND THERMAL CONTROL SYSTEMS

v. 60

Edited by Leroy S. Fletcher, University of Virginia

Volume 59 and Volume 60 offer a coordinated set of original papers representing some of the latest developments in the field of heat transfer. In Volume 59, the topics covered are: 1) The Aerothermal Environment, particularly aerodynamic heating combined with radiation exchange and chemical reaction; 2) Plume Radiation, with special reference to the emissions characteristic of the jet components; and 3) Thermal Protection Systems, especially for intense heating conditions. Volume 60 is concerned with: 1) Heat Pipes, a widely used but rather intricate means for internal temperature control; 2) Heat Transfer, especially in complex situations; and 3) Thermal Control Systems, a description of sophisticated systems designed to control the flow of heat within a vehicle so as to maintain a specified temperature environment.

Vol. 59—424 pp., 6 × 9, illus., \$20.00 Mem., \$35.00 List

Vol. 60—382 pp., 6 × 9, illus., \$20.00 Mem., \$35.00 List

TURBULENT COMBUSTION

v. 58

Edited by Lawrence A. Kennedy, State University of New York at Buffalo

In the last few years, two strong forces have emerged that now compel research scientists to attack the subject of turbulent combustion anew. One is the development of novel instrumental techniques that permit rather precise nonintrusive measurement of reactant concentrations, turbulent velocity fluctuations, temperatures, etc., generally by optical means using laser beams. The other is the compelling demand to solve hitherto bypassed problems such as identifying the mechanisms responsible for the production of the minor compounds labeled pollutants and discovering ways to reduce such emissions.

This new climate of research in turbulent combustion and the availability of new results led to the Symposium from which this book is derived. Anyone interested in the modern science of combustion will find this book a rewarding source of information.

485 pp., 6 × 9, illus., \$20.00 Mem., \$30.00 List

SPACE-BASED MANUFACTURING FROM NONTERRESTRIAL MATERIALS

v. 57

Editor: Gerard K. O'Neill, Assistant Editor: Brian O'Leary

Some of the most important engineering problems are dealt with in this book in a series of papers derived from a NASA-sponsored study organized by Prof. Gerard K. O'Neill: how to gather material resources from the nearby moon or nearby asteroids, how to convert the materials chemically and physically to useful forms, how to construct such gigantic space structures, and necessarily, how to plan and finance so vast a program.

192 pp., 6x9, illus., \$15.00 Member \$23.00 List

THERMOPHYSICS OF SPACECRAFT AND OUTER PLANET ENTRY PROBES

v. 56

Edited by Allie M. Smith, ARO, Inc., Arnold Air Force Station, Tennessee

Stimulated by the ever-advancing challenge of space technology in the past 20 years, the science of thermophysics has grown dramatically in content and technical sophistication. The practical goals are to solve problems of heat transfer and temperature control, but the reach of the field is well beyond the conventional subject of heat transfer. As the name implies, the advances in the subject have demanded detailed studies of the underlying physics, including such topics as the processes of radiation, reflection and absorption, the radiation transfer with material, contact phenomena affecting thermal resistance, energy exchange, deep cryogenic temperature, and so forth. This volume is intended to bring the most recent progress in these fields to the attention of the

physical scientist as well as to the heat-transfer engineer.

467 pp., 6x9, illus., \$20.00 Member \$40.00 List

SATELLITE COMMUNICATIONS: FUTURE SYSTEMS

v. 54

SATELLITE COMMUNICATIONS: ADVANCED TECHNOLOGIES

v. 55

Edited by David Jarett, TRW, Inc.

Volume 54 and its companion, Volume 55, provide a comprehensive treatment of the satellite communication systems that are expected to be operational in the 1980's and of the technologies that will make these new systems possible. Cost effectiveness is emphasized in each volume, along with the technical content.

Volume 54 on future systems contains authoritative papers on future communication satellite systems in each of the following four classes: North American Domestic Systems, Intelsat Systems, National and Regional Systems, and Defense Systems. A significant part of the material has never been published before.

Volume 55 on advanced technologies presents a series of new and relevant papers on advanced spacecraft engineering mechanics, representing advances in the state of the art. It includes new and improved spacecraft attitude control subsystems, spacecraft electric power, propulsion subsystems, spacecraft antennas, spacecraft RF subsystems, and new earth station technologies.

Volume 54—541 pp., 6x9, illus., \$19.00 Member \$35.00 List

Volume 55—489 pp., 6x9, illus., \$19.00 Member \$35.00 List

Two-Volume Set (Vol. 54 & 55) \$55.00 Mem. & List

EXPERIMENTAL DIAGNOSTICS IN GAS PHASE COMBUSTION SYSTEMS

v. 53

Editor: Ben T. Zinn; Associate Editors: Craig T. Bowman, Daniel L. Hartley, Edward Price, and James F. Skifstad

Our scientific understanding of combustion systems has progressed in the past only as rapidly as penetrating experimental techniques were discovered to clarify the details of the elemental processes of such systems. Modern problems in combustion are not simple ones, and they involve much more than chemistry. The important problems of today often involve nonsteady phenomena, diffusional processes among initially unmixed reactants, and heterogeneous solid-liquid-gas reactions. To clarify the innermost details of such complex systems required the development of new experimental tools. The diagnostic methods described in this volume were largely undeveloped a decade ago. These powerful methods make possible a far deeper understanding of the complex processes of combustion than we had thought possible only a short time ago.

This book has been planned as a means of disseminating to a wide audience of research and development engineers the techniques that had heretofore been known mainly to specialists.

671 pp., 6x9, illus., \$20.00 Member \$37.00 List

MATERIALS SCIENCES IN SPACE WITH APPLICATIONS TO SPACE PROCESSING

v. 52

Edited by Leo Steg

The newly acquired ability of man to project scientific instruments into space and to place himself on orbital and lunar spacecraft to spend long periods in extraterrestrial space has brought a vastly enlarged scope to many fields of science and technology. Revolutionary advances have been made as a direct result of our new space technology in astrophysics, ecology, meteorology, communications, resource planning, etc. Another field that may well acquire new dimensions as a result of space technology is that of materials science and materials processing. The environment of space is very much different from that on Earth, a fact that raises the possibility of creating materials with novel properties and perhaps exceptionally valuable uses. This book is a pioneer collection of papers describing the first efforts in this new and exciting field.

564 pp., 6x9, illus., \$20.00 Member \$35.00 List

RAREFIED GAS DYNAMICS: PART I AND PART II

v. 51

Edited by J. Leith Potter

Research on phenomena in rarefied gases supports many diverse fields of science and technology, with new applications continually emerging in hitherto unexpected areas.

Recently, aerodynamics concerned with forces on high-altitude aircraft, and on spacecraft flying in the fringes of the atmosphere, became deeply involved in the application of fundamental kinetic theory to aerodynamics as an engineering discipline. Then, as this particular branch of rarefied gas dynamics reached its maturity, new fields again opened up.

This two-volume set offers important papers in a wide variety of fields of rarefied gas dynamics, each providing insight into a significant phase of research.

Volume 51 sold only as a two-volume set

Part I—658 pp., 6x9, illus.

Part II—679 pp., 6x9, illus.

\$37.50 Mem. \$70.00 List

EXPLORATION OF THE OUTER SOLAR SYSTEM

v. 50

Edited by Eugene W. Greenstadt, Murray Dryer and Devrie S. Intriligator

This volume of the AIAA Progress in Astronautics and Aeronautics series offers a collection of original articles on the first results of outer solar system exploration. It encompasses three distinct fields of

inquiry: the major planets and satellites beyond Mars, comets entering the solar system, and the interplanetary medium containing mainly the particle emanations from the Sun.

251 pp., 6x9 illus., \$15.00 Mem. \$24.00 List

RADIATIVE TRANSFER AND THERMAL CONTROL

v. 49

Edited by Allie M. Smith, ARO, Inc., Arnold Air Force Station, Tennessee

This volume is concerned with the mechanisms of heat transfer, a subject that is regarded as classical in the field of engineering. Problems of radiative transfer in empty space, conductance and contact resistances among conductors within a spacecraft, gaseous radiation in complex environments, interactions with solar radiation, the physical properties of materials under space conditions, and the novel characteristics of that rather special device, the heat pipe—all of these are the subject of this volume.

569 pp., 6x9, illus., \$19.00 Mem. \$40.00 List

SCIENTIFIC INVESTIGATIONS ON THE SKYLAB SATELLITE

v. 48

Edited by Marion I. Kent and Ernst Stuhlinger, NASA George C. Marshall Space Flight Center; Shi-Tsan Wu, the University of Alabama

The papers published in this volume represent much of what was accomplished on Skylab. They will provide the stimulus for many future programs to be conducted by means of the Space Shuttle, which will be able eventually to ferry experimenters and laboratory apparatus into near and far orbits on a routine basis.

The papers in this volume also describe work done in solar physics; in observations of comets, stars, and Earth's airglow; and in direct observations of planet Earth. They also describe some initial attempts to develop novel processes and novel materials, a field of work that is being called space processing or space manufacturing.

552 pp., 6x9, illus., plus 8 pages of color plates, \$19.00 Mem. \$45.00 List

SPACECRAFT CHARGING BY MAGNETOSPHERIC PLASMAS

v. 47

Edited by Alan Rosen, TRW, Inc.

Spacecraft charging by magnetospheric plasma is a recently identified space hazard that can virtually destroy a spacecraft in Earth orbit or a space probe in extra terrestrial flight by leading to sudden high-current electrical discharges during flight.

The problem of eliminating this type of hazard has prompted the development of a specialized field of research into the possible interactions between a spacecraft and the charged planetary and in-

terplanetary mediums through which its path takes it.

The results of this research have a bearing on diverse fields of physics and astrophysics, as well as on the engineering design of spacecraft.

304 pp., 6x9, illus., \$16.00 Mem. \$28.00 List

**AEROACOUSTICS: JET NOISE,
COMBUSTION AND CORE ENGINE NOISE**
v.43

**AEROACOUSTICS: FAN NOISE AND
CONTROL; DUCT ACOUSTICS; ROTOR NOISE**
v.44

**AEROACOUSTICS: STOL NOISE;
AIRFRAME AND AIRFOIL NOISE**
v.45

**AEROACOUSTICS: ACOUSTIC WAVE
PROPAGATION; AIRCRAFT NOISE
PREDICTION; AEROACOUSTIC
INSTRUMENTATION**
v.46

*Edited by Ira R. Schwartz, NASA Ames Research Center,
Henry T. Nagamatsu, General Electric Research and
Development Center,
and Warren C. Strahle, Georgia Institute of Technology*

The demands placed upon today's air transportation systems, in the United States and around the world, have dictated the construction and use of larger and faster aircraft. At the same time, the population density around airports has been steadily increasing causing a rising protest against the noise levels generated by the high-frequency traffic at the major centers. The modern field of aeroacoustics research is the direct result of public concern about airport noise.

Today there is need for organized information at the research and development level to make it possible for today's scientists and engineers to cope with today's environmental demands. It is to fulfill both these functions that the present set of books on aeroacoustics has been published.

The technical papers in this four-book set are an outgrowth of the Second International Symposium on Aeroacoustics held in 1975 and later updated and revised and organized into the four volumes listed above. Each volume was planned as a unit, so that potential users would be able to find within a single volume the papers pertaining to their special interest.

*Volume 43—613 pp. 6x9 illus.
\$19.00 Member \$40.00 List*

*Volume 44—635 pp. 6x9 illus.
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*Volume 45—445 pp. 6x9 illus.
\$18.00 Member \$33.00 List*

*Volume 46—307 pp. 6x9 illus.
\$16.00 Member \$28.00 List
Four—Volume Set (Vols. 43-46)
\$65.00 Member \$125.00 List*

**COMMUNICATION SATELLITE
DEVELOPMENTS: TECHNOLOGY**
v. 41

This volume has been published simultaneously with its companion,

**COMMUNICATION SATELLITE
DEVELOPMENTS: SYSTEMS**
v. 42

*Edited by William G. Schmidt, CML Satellite Corp., and
Gilbert E. LaVean, Defense Communications Agency*

The AIAA 5th Communications Satellite Systems Conference was organized with a greater emphasis on the overall system aspects of communication satellites. This emphasis resulted in introducing sessions on U.S. national and foreign telecommunication policy, spectrum utilization, and geopolitical/economic/national requirements, in addition to the usual sessions on technology and system applications. This was considered essential because, as the communications satellite industry continues to mature during the next decade, especially with its new role in U.S. domestic communications, it must assume an even more productive and responsible role in the world community. Therefore, the professional systems engineer must develop an ever-increasing awareness of the world environment, the most likely needs to be satisfied by communication satellites, and the geopolitical constraints that will determine the acceptance of this capability and the ultimate success of the technology. The papers from the Conference are organized into two volumes of the AIAA Progress in Astronautics and Aeronautics series; the first book (Volume 41) emphasizes the system aspects, and the second book (Volume 42) highlights recent technological innovations.

The systematic coverage provided by this two-volume set will serve on the one hand to expose the reader new to the field to a comprehensive coverage of communications satellite systems and technology, and on the other hand to provide also a valuable reference source for the professional satellite communication systems engineer.

v.41 - Communication Satellite Developments: Systems \$19.00 Mem. \$35.00 List

v.42 - Communication Satellite Developments: Technology \$19.00 Mem. \$35.00 List

For volumes 41 & 42 purchased as a two-volume set: \$35.00 Mem. \$55.00 List

v. 41, 334 pp., 6 x 9, illus.

v.42, 419 pp., 6 x 9, illus.

AERODYNAMICS OF BASE COMBUSTION

v.40

*Edited by S.N.B. Murthy, J.R. Osborn, Purdue University,
A.W. Barrows and J.R. Ward, Ballistics Research Laboratories*

The various aspects of base flow control through injection and combustion in the base region are presented in this volume. The first paper in this volume is an extensive review of the fluid-mechanical literature on wakes and base flows, which may serve as a guide to the reader in his study of this aspect of the base pressure control problem. This book deals with both base and external combustion under small and large injection conditions.

Other papers include Base Flow Phenomena with and without Injection: Experimental Results, Theories, and Bibliography; Component Analysis and Synthesis for Fully Separated Flows with Special Consideration of Base Drag Reduction Combustion; A Discussion of Transonic Base Flows in the Presence of a Propulsive Jet; Development of Fumers for Small Caliber Ammunition; etc.

For the study of metal combustion, the reader is referred especially to the two previous volumes in the series: Volume 1, Solid Propellant Rocket Research, and Volume 15, Heterogeneous Combustion.

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