

# Book Notes

**Rarefied Gas Dynamics**, edited by J. A. Laurmann, *Lockheed Missiles and Space Company, Palo Alto, Calif.* (Academic Press, New York, 1963), Supplement 2, Vol. II, 529 pp. \$16.00.

**Contents:** 27 papers contributed by different authors on such subjects as some aspects of ionospheric aerodynamics, heat transfer from a sphere in a rarefied gas, leading edge slip effects in rarefied hypersonic flow, sphere drag in a low-density supersonic flow, and electron excitation applied to the experimental investigation of rarefied gas flows.

This volume contains the second part of the Proceedings of the Third International Symposium on Rarefied Gas Dynamics, held at the Palais de L'Unesco, Paris, in 1962. The subjects covered should be of interest to both the fundamental researcher and the applied scientist.

**Advances in Materials Research in the NATO Nations**, edited by H. Brooks, N. H. Mason, N. E. Promisel, and G. H. Cooper (Macmillan Company, New York, 1963), 549 pp. \$15.00.

**Contents:** 34 papers contributed by different authors and divided into 3 major parts. Part 1) Fundamental Research; Part 2) The Role of Basic Research in Development; Part 3) Organization of Materials Research.

This volume contains the Proceedings of a NATO Symposium organized by the Structures and Materials Panel of AGARD upon the request of the Science Advisor to NATO. The papers cover basic research on materials, description of the administration of research programs, and study of the complexity of the relationship between basic and applied research as they exist in the NATO nations. The book should be an aid to research workers and those responsible for the planning and administration of effective material research programs.

**Cryogenic Technology**, edited by Robert W. Vance, *Member of the Technical Staff, Technical Development Program Office, Aerospace Corporation, Los Angeles, Calif.* (John Wiley & Sons Inc., New York, 1963), 585 pp. \$19.50.

**Contents:** 16 chapters contributed by different authors. 1) Introduction; 2) Production of Low Temperatures; 3) Properties of Solids and Liquids; 4) Phase Equilibria; 5) Heat Transfer; 6) Measurement of Low Temperatures; 7) Insulation Technology; 8) Fundamentals of Superconductivity; 9) Applications of Superconductivity; 10) Opti-

cal Masers; 11) Cryogenic Pumping and Space Simulation; 12) Nuclear Propulsion; 13) Explosion Hazards in Propellants; 14) Cryogenic Problems in Space; 15) Cryogenic Aspects of Deep-Space Probes; 16) Cryobiology.

This book provides a source of reference for anyone engaged in applications or basic theoretical studies of cryogenic technology. It is a compilation of lectures given as a graduate-level course on a statewide basis by the University of California Departments of Engineering and Physical Sciences.

**Nuclear Physics: An Introduction**, W. E. Burcham, *Oliver Lodge Professor of Physics, University of Birmingham* (McGraw-Hill Book Company Inc., New York, 1963), 739 pp. \$12.00.

**Chapters:** 1) Introduction; 2) Natural Radioactivity and the Discovery of the Nucleus; 3) Spectroscopy of Atoms and Molecules; 4) Nuclear Effects in Spectroscopy; 5) General Properties of Ionizing Radiations; 6) Nuclear Detectors; 7) Measurement of Energy and Intensity of Ionizing Radiations; 8) Acceleration of Charged Particles to High Energies; 9) Nuclear Models (I), the Nuclear Ground State, and the Nuclear Level Spectrum; 10) Mass and Isotopic Abundance of Nuclei; 11) Nuclear Charge, Nuclear Radius, and Nuclear Moments; 12) Nuclear Models (II); 13) Radiative Processes in Nuclear Physics; 14) General Features of Nuclear Reactions; 15) Nuclear Reactions (Detailed Mechanisms); 16) Radioactive Decay; 17) Nuclear Orientation and Angular Correlation Experiments; 18) Nuclear Forces.

This book emphasizes the relations between the different branches of the subject and their connections with atomic and classical physics. The facts and theories of nuclear physics are described from an experimental standpoint. It is designed as an introduction for the senior undergraduate or first-year graduate course.

**Design of Space Powerplants**, Donald B. Mackay, *Space and Information Systems Division, North American Aviation Inc., Downey, Calif.* (Prentice-Hall Inc., Englewood Cliffs, N. J., 1963), 332 pp. \$15.00.

**Chapters:** 1) Temperature Control for Lunar Vehicles; 2) Radiation Heat Transfer from Extended Surfaces Employing Flat Surface Profiles; 3) Radiant Heat Transfer from Extended Surface Shaped to Yield a Constant-Temperature Gradient; 4) Thermal Efficiency of Rankine-Cycle Space Powerplants; 5) Powerplant Heat Cycles for Space Vehicles; 6) Solar Turbo Powerplant Design; 7) Mechanical Refrigeration for Lunar Systems; 8) Design of Condensers for Operation in Space; 9) Design of Radiators for Operation in Space; 10) Expendable-Propellant Power Systems; 11) Energy Storage in Space Vehicles; 12) Expendable Fluids for Temperature Control Systems.

This book links basic theory and practical applications in the fields of power and temperature control. It serves the dual function of text and reference and should be of special value in advanced engineering.

**Quanta and Reality: A Symposium**, David Bohm, N. R. Hanson, Mary B. Hesse, Nicholas Kemmer, A. B. Pippard, and Maurice Pryce (American Research Council, Larchmont, N. Y., 1962), 96 pp. \$3.95.

**Chapters:** 1) Particles and Waves; 2) Waves and Probability; 3) Models and Matter; 4) Discussion; 5) Postscript.

This book, first presented on the BBC Third Programme, is a symposium on the strange and complex concepts dominating modern science. The contributions embrace the broadest and deepest issues of the entire scientific enterprise.

**Aerodynamics: A Space-Age Survey**, John E. Allen (Harper & Row Publishers, New York, 1963), 128 pp. \$2.95.

**Chapters:** 1) Introduction; 2) Aerodynamics through the Ages; 3) The Nature of Air in Motion; 4) Aerodynamic Theory and Experiment; 5) Natural Aerodynamics; 6) Transport and Industrial Aerodynamics; 7) Aeronautics; 8) Aerodynamics in Space; 9) Aerodynamics and Civilization.

This book is written for the nonspecialist, but a few typical mathematical treatments are included in order to illustrate some theoretical methods. It provides a useful starting point for an introduction to the subject.

**Medical and Biological Problems of Space Flight**, edited by Geoffrey H. Bourne, *Department of Anatomy, Emory University, Atlanta, Ga.* (Academic Press, New York, 1963), 289 pp. \$12.00.

**Contents:** 14 chapters contributed by different authors. 1) Development of Manned Space Vehicles; 2) Advanced Manned Space Systems; 3) Marsflight II Space Cabin Simulator; 4) Device for Simulating Weightlessness; 5) Maintenance of Cardiovascular Adaptability during Prolonged Weightlessness; 6) Weightlessness: Its Physical, Biological, and Medical Aspects; 7) Remote Visual Monitoring during Extended Space Missions; 8) Cosmic Ray Shower Production in Manned Space Vehicles; 9) Evaluation of Water Recovery Systems for Space Vehicles; 10) Nutritional Aspects of Space Flight; 11) Growth and Toxicity Studies on Rats Fed *Chlorella* 71105; 12) Experiments Related to the Chemical Origins of Protein; 13) Role of the Chimpanzee in Space Programs; 14) Man in Space—A Medical Bonanza.

This volume contains the Proceedings of a Conference held in Nassau, the Bahamas, in November 1961. The chapters are concerned with outstanding problems of medicine and biology in manned space flight.

The books listed here are those recently received by the AIAA from various publishers who wish to announce their current offerings in the field of astronautics. The order of listings does not necessarily indicate the editor's opinion of their relative importance or competence.

**The Many-Body Problem**, edited by Jerome K. Percus, *Courant Institute of Mathematical Sciences, New York University, New York, N. Y.* (Interscience Division, John Wiley & Sons Inc., New York, 1963), 542 pp. \$30.00.

*Contents:* 31 papers contributed by different authors on such subjects as

multiple scattering methods, the many-body problem with strong forces, collective methods, normal states of matter, coherent states in a degenerate electron gas, and investigation of the many-body problem by electronic computers.

This volume contains the Proceedings of the Symposium on the Many-Body

Problem, held at Stevens Institute of Technology, Hoboken, N. J., January 28-29, 1957. It should be of use to physicists, chemists, and mathematicians who have been exposed to a standard course in quantum mechanics. It may serve both as a principal text and as a reference for research workers.

## Technical Literature Digest

M. H. Smith, Associate Editor

The James Forrestal Research Center, Princeton University

### Propulsion and Power (Combustion Systems)

**Experimental Investigation of Rocket-Engine Ablative-Material Performance After Postrun Cooling at Altitude Pressures**, R. J. Rollbuhler. NASA TN D-1726, June 1963, 29 pp.

**The Ballistic Design, Loading, Inspection and Handling of High Strength Solid Propellant Rocket Motor Assemblies**, A. E. Hornsey. Thiokol Chemical Corp., Wasatch Div., Quart. Progr. Rept. 3 (Air Force Systems Command, AF SC-TR-63-9), Dec. 16, 1962, 22 pp.

**Design Criteria for Large Accurate Solid-Propellant Static-Thrust Stands**, D. P. Aukenev and C. E. Woods. Bur. Naval Weapons NAVWEPS Rept. 8353, Naval Ordnance Test Station NOTS TP 3240, Copy 123, June 1963, 48 pp.

**Heat Transfer to the Throat Region of a Solid Propellant Rocket Nozzle**, E. Lee. Naval Ordnance Lab., NOL TR 62-72 (Aerodynamics Res. Rept. 178), Feb. 26, 1963, 28 pp.

**Development of the Midcourse Trajectory-Correction Propulsion System for the Ranger Spacecraft**, D. H. Lee. Calif. Inst. Tech., Jet Propulsion Lab. TR 32-335, March 15, 1963, 21 pp.

**Development of a Periscope for a Thrust Chamber Combustion Analysis**, J. D. O'Donnell. Aerojet-General Corp., Liquid Rocket Plant Rept. 652/SA 4-2, 2-F-1, May 28, 1963, 48 pp.

**Performance of a Plug Nozzle Having a Concave Central Base with and without Terminal Fairings at Transonic Speeds**, C. E. Mercer and L. B. Salters Jr. NASA TN D-1804, May 1963, 25 pp.

### Propulsion and Power (Noncombustion)

**Mariner Venus Power-Supply System**, E. N. Costoque. Calif. Inst. Tech., Jet Propulsion Lab. TR 32-424, March 30, 1963, 21 pp.

**Probe Measurements of the Discharge in an Operating Electron Bombardment Engine**, W. B. Strickfaden and K. L. Geiler. Calif. Inst. Tech., Jet Propulsion Lab. TR 32-417, April 19, 1963, 22 pp.

**Possible Effects of Nonuniform Flows on Performance of Electrothermal Thrusters**, J. R. Jack and J. W. Schaefer. NASA TN D-1732, June 1963, 16 pp.

**Energy Storage in Superconducting Magnetic Coils**, W. F. Hassel. ARS Preprint 2506-62, Sept. 1962, 8 pp.

**EDITOR'S NOTE:** Contributions from Professors E. R. G. Eckert, E. M. Sparrow, and W. E. Ibele of the Heat Transfer Laboratory, University of Minnesota, are gratefully acknowledged.

**Nuclear Thermionic Space Power Systems**, R. C. Howard and N. S. Rasor. Thermo-Electron Eng. Corp. (AIAA National Propulsion Meeting, Cleveland, Ohio), March 1963, 68 pp.

**Survey of Meteoroid Property and Distribution Data Relevant to SNAP 8 Reactor and Shield Design**, C. R. Harder. North American Aviation Inc. NAA-SR-8127, April 30, 1963, 34 pp., 33 refs.

### Propellants and Combustion

**Performance Calculations for Monopropellant Hydrazine and Monopropellant Hydrazine-Hydrazine Nitrate Mixtures**, D. H. Lee. Calif. Inst. Tech., Jet Propulsion Lab. TR 32-348, Dec. 3, 1962, 87 pp.

**Research in Hybrid Combustion (1 Dec. 1961 through 31 Jan. 1963)**, T. Houser. Final Rept., North American Aviation Inc., Rocketdyne Rept. R5179, May 15, 1963.

**Analytical Approximation for Stationary Conical Detonations and Deflagrations in Supersonic Flow**, H. W. Woolard. Johns Hopkins Univ., Appl. Phys. Lab. TG-446, May 1963, 72 pp.

**Shock-Induced Combustion with Oblique Shocks, Comparison of Experiment and Kinetic Calculations**, P. M. Rubins and R. P. Rhodes Jr. Arnold Eng. Dev. Center AEDC-TDR-63-103, June 1963, 49 pp.

**Heat Transfer and Fluid Mechanics Institute, Pasadena, 1963, Proceedings**, edited by A. Roshko, B. Sturtevant, and D. R. Bartz (Stanford University Press, Stanford, Calif., 1963), 288 pp.

**A Modified Theory for the Effect of a Surface Temperature on the Combustion Rate of Carbon Surfaces in Air**, W. E. Welsh Jr. and P. M. Chung, pp. 146-159.

**Thermal Ignition of Flowing Combustible Cases at Heated Bodies**, G. Adomeit, pp. 160-175.

**Preliminary Experimental Investigation of Frequencies and Forces Resulting from Liquid Sloshing in Toroidal Tanks**, I. E. Sumner. NASA TN D-1709, June 1963, 17 pp.

**Heat Problems of the Boundary Layer with Heterogeneous and Diffusion Burning**, L. Yu. Artyukh, L. A. Vulis, V. P. Kashkarov, and L. P. Yarin. Air Force Systems Command, Foreign Tech. Div. FTD-TT-62-64, Feb. 2, 1962, 16 pp.

**Experimental Evaluation of Liquid-Fluorine System Components**, R. L. DeWitt and H. W. Schmidt. NASA TN D-1727, June 1963, 21 pp.

**Investigation of Catalyst Beds for 98-Percent-Concentration Hydrogen Peroxide**, J. F. Runckel, C. M. Willis, and L. B. Salters Jr. NASA TN D-1808, June 1963, 79 pp.

**Viscoelastic Properties of Solid Propellants and Propellant Binders**, T. L. Smith, J. R. Smith, and L. E. Hiam. Stanford Res. Inst. Quart. Tech. Summary Rept. 7, Jan.-March 1963, April 30, 1963, 27 pp.

**A Research Study to Advance the State of the Art of Solid Propellant Grain Design (Quart. Progr. Rept. 3, Jan. 1, 1963-April 1, 1963)**, Thiokol Chemical Corp., Elkton Div. TR E74-63, April 26, 1963, 70 pp.

**Predicting Thermal Hazards in Propellants Utilizing Cook-Off Techniques**, C. A. Taylor and E. D. Besser. Bur. Naval Weapons NAVWEPS Rept. 7943, Naval Ordnance Test Station NOTS TP 2980, March 1963, 32 pp.

**Review of Fire and Explosion Hazards of Flight Vehicle Combustibles**, R. W. Van Dolah, M. G. Zabetakis, D. S. Burgess, and G. S. Scott. Bur. Mines Info. Circ. 8137, 1963, 80 pp.

### Materials and Structures

**Portable Integrating Sphere for Monitoring Reflectance of Spacecraft Coatings**, W. B. Fussell, J. J. Triolo, and F. A. Jerozal. NASA TN D-1714, April 1963, 12 pp.

**Progress Report of the NASA Special Committee on Materials Research for Supersonic Transports**, R. H. Raring, J. W. Freeman, J. W. Schultz, and H. R. Voorhees. NASA TN D-1798, May 1963, 202 pp.

**A Fundamental Investigation of the Alloying Behavior of the Rare Earth and Related Metals**, J. F. Nachman, C. E. Lundin, and A. S. Yamamoto. Air Force Aeronaut. Res. Labs. ARL 63-15, Jan. 1963, 68 pp.

**Notes on Liquid Metal Studies in France and Great Britain**, L. F. Epstein. NASA Tech. Memo. X-884, June 1963, 17 pp.

**Investigation of Mechanical Properties and Metallurgical Characteristics of a Metallic Chromium and Magnesium Oxide Composite**, C. R. Manning Jr. and D. M. Royster. NASA TN D-1785, June 1963, 44 pp.

**Some Considerations on Plastic Materials for Use as Safety Containers**, M. F. Zimmer and L. K. Asaoka. Bur. Naval Weapons NAVWEPS Rept. 8030, April 15, 1963, 21 pp.

**High Temperature Vaporization Studies Using a Recording Microbalance and Electron Bombardment Heating**, I. Vapor Pressure of Silver, II. Vapor Pressure of Palladium, P. D. Zavitsanos. General Electric Co., Missile & Space Div. R63SDO6, Jan. 1963, 24 pp.

**Empirical Corrections for Variable Absorption of Soft-X-Rays by Mylar (U)**,