

# Book Notes

**Advanced Propulsion Concepts**, M. M. Slawsky, J. F. Masi, and S. N. Suci, General Chairmen (Gordon and Breach Science Publishers, New York, 1963), Vol. 1, 432 pp. \$29.50.

*Contents:* 17 papers contributed by different authors. 1) Electron-Bombardment Ion Rocket; 2) Quest for Heavy-Particle Electric Propulsion; 3) STL Heavy-Particle Propulsion Program; 4) Condensation Colloid Propellants for Electrostatic Propulsion; 5) NASA Research on Resistance-Heated Hydrogen Jets; 6) Impulsive MHD Devices as Space Engines; 7) Plasma Flow in a Magnetic Annular Arc Nozzle; 8) Plasma Acceleration by Traveling Magnetic Field; 9) Momentum Transfer through Magnetic Fields; 10) Momentum Transfer through the Electric Field; 11) Large Turbo-Nuclear Space Power Systems; 12) MHD Power Generation: Promises and Problems; 13) Thermionic-Nuclear Space Power Systems; 14) Gaseous Core Reactors; 15) Controlled Fusion Propulsion; 16) Fusion Plasma Propulsion System; 17) Feasibility of Interstellar Travel.

This volume contains the Proceedings of the Third Symposium on Advanced Propulsion Concepts, held in Cincinnati, Ohio, October 2-4, 1962. The Symposium was sponsored jointly by the Air Force Office of Scientific Research and the Flight Propulsion Division of General Electric Company. The second volume of the Proceedings is classified as confidential.

**Cryogenic Engineering**, J. H. Bell Jr., *Aerojet General Corporation, Sacramento, Calif.* (Prentice-Hall Inc., Englewood Cliffs, N. J., 1963), 411 pp. \$16.00.

*Chapters:* 1) Introduction; 2) Thermodynamics of a Cryogenic System; 3) Air, the Cryogenic Fluid; 4) Separation of Gases; 5) Insulation; 6) Materials of Construction; 7) Vessel Construction; 8) Transport and Transfer of Cryogenic Liquids; 9) Instrumentation; 10) Special Cryogenic Problems; 11) Cryogenics in Industry; 12) The Future of Cryogenics. *Appendices:* 1) Graphs; 2) Tables; 3) General Information.

This book assimilates in one volume pertinent information needed to understand the characteristics of fluids and engineering materials, as well as their combined use. It is directed to students who are taking courses in cryogenic engineering, and it may also be used as a working source book for practicing cryogenic engineers.

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.

**Fatigue of Aircraft Structures**, edited by W. Barrois, *Service Technique de l'Aéronautique, Paris, France*, and E. L. Ripley, *Royal Aircraft Establishment, Farnborough, England* (Macmillan Company, New York, 1963), 362 pp. \$15.00.

*Contents:* 16 papers contributed by different authors. 1) Importance of Environment in Fatigue Failure of Metals; 2) Effect of Testing Speed upon the Propagation of Fatigue Cracks; 3) Size Effects on Fatigue Crack Initiation and Propagation in Aluminum Sheet Specimens; 4) Study of the Scatter of Fatigue Test Results by Statistical and Physical Methods; 5) Influence of Fretting Corrosion on the Fatigue Life of Notched Specimens of an Al-Cu-Mg<sub>2</sub> Alloy; 6) Experimental Research on the Effects of a Static Preloading on the Fatigue Life of Structural Components; 7) Analysis of Random Load-Time Histories with Relation to Fatigue Tests and Life Calculations; 8) Fatigue Behavior of Notched Aluminum Alloy Specimens under Simulated Random Gust Loading with and without Ground-to-Air Cycles of Loading; 9) Some Statistical Aspects of Fatigue Life Variation; 10) Fatigue Research of Specific Design Problems; 11) Crack Propagation and Residual Strength Characteristics of Some Aircraft Structural Materials; 12) Comparison of Predicted and Achieved Fatigue Lives of Aircraft Structures; 13) Fatigue lessons Learnt from the Argosy; 14) Fail-Safe Investigation of the Fokker Friendship; 15) Acoustic Fatigue on the Caravelle Laboratory Investigations and Ground and Flight Tests; 16) Inspection Periods Determined from Data of Crack Development and Strength Reduction of an Aircraft Structure Using Statistic Analysis.

This volume contains the Proceedings of a Symposium held in Paris, May 16-18, 1961. The Symposium was organized by the French Direction Technique at Industrielle de l'Aéronautique and the French Centre of the International Committee on Aeronautical Fatigue.

**Law and Specifications for Engineers and Scientists**, W. Edgar Jessup Jr. and Walter E. Jessup (Prentice-Hall Inc., Englewood Cliffs, N. J., 1963), 585 pp. \$13.35.

*Chapters:* 1) The Engineering Profession; 2) The United States Legal System; 3) Contracts; 4) Torts; 5) Agency; 6) Contract Documents; 7) Specifications: Technical Requirements; 8) Government Contracts; 9) Real Property; 10) Patents, Inventions, Trademarks, and Copyrights; 11) Forms of Doing Business; 12) Sales; 13) Negotiable Instruments; 14) Professional Problems.

This book contains an interpretation of the major fields of law which apply to scientific and engineering projects. Detailed instructions for drafting contracts and documents, including techniques for specification writing, are included.

**System Reliability Engineering**, Gerald H. Sandler, *Grumman Aircraft Engineering Corporation* (Prentice-Hall Inc., Englewood Cliffs, N. J., 1963), 221 pp. \$10.00.

*Chapters:* 1) Introduction; 2) System Reliability Planning; 3) Essentials of Probability Theory; 4) Reliability Models of Nonmaintained Systems; 5) Reliability Models of Maintained Systems; 6) Reliability Models with Rewards; 7) Allocation of Redundancy; 8) System Maintenance Policies; 9) Allocating Failure and Repair Rates; 10) Conclusions.

This book is designed to fill the practicing engineer's need for a unified treatment of the various reliability aspects of large-scale system design. It should also be useful for students at the graduate level who have some background in mathematical probability. Emphasis is placed on model-building to predict the outcome of design alternatives, and much attention is given to cost considerations.

**The Theory of Turbulent Jets**, G. N. Abramovich, *Moscow Aviation Institute*, edited by Leon H. Schindel, *Massachusetts Institute of Technology* (M.I.T. Press, Cambridge, Mass., 1963), 671 pp. \$20.00.

*Chapters:* 1) General Properties of Turbulent Jets; 2) Theory of Free Turbulence for the Case of a Submerged Jet; 3) Theory of Turbulent Wake behind a Body; 4) Turbulent Mixing at the Boundary of Two Fluid Streams Moving in the Same and Opposite Directions; 5) Jet of an Incompressible Fluid in a Coflowing External Stream; 6) Theory of Free Turbulence in a Compressible Gas; 7) Turbulent Gas Streams; 8) Turbulent Jets in the Presence of a Flame Front (the Plume); 9) Fluid Flow in a Channel behind a Bluff Body; 10) Turbulent Jet Discharged into a Dead-End Channel; 11) Flow Produced by a Semi-Contained Turbulent Jet; 12) Jets in Unbounded Space; 13) Jets in Finite Space.

This monograph contains the results of research by the author, some of which have been reported in journals, as well as the results of a critical reappraisal of the more important theoretical and experimental data published by a number of other authors.

**Ultrahigh Vacuum and Its Applications**, Richard W. Roberts, *General Electric Research Laboratory*, and Thomas A. Vanderslice, *General Electric Vacuum Products* (Prentice-Hall Inc., Englewood Cliffs, N. J., 1963), 199 pp. \$12.00.

*Chapters:* 1) Ultrahigh Vacuum Technology; 2) Ultrahigh Vacuum Components; 3) Material of Construction; 4) Ultrahigh Vacuum Systems; 5) Generation of Clean Surfaces; 6) Physical Properties of Surfaces; 7) Miscellaneous Applications.

This book is written for the experimental scientist, engineer, or technician who has

only an average understanding of ordinary vacuum techniques. The components, their theories of operation, their assembly and use, and the nature of the materials of construction necessary for work in this field are considered.

**Guidance and Control of Aerospace Vehicles**, edited by Cornelius T. Leondes, *University of California, Los Angeles* (McGraw-Hill Book Company Inc., New York, 1963), 610 pp. \$19.50.

*Contents:* 14 papers contributed by different authors. 1) Introduction to the Guidance and Control of Aerospace Vehicles; 2) Trajectory Aspects of Guidance; 3) Inertial and Optical Sensors; 4) Inertial Guidance for Cruise Vehicles; 5) Guidance and Control of Rocket Vehicles; 6) Guidance and Control of Mobile-Launched Ballistic Missiles; 7) Passive Attitude Control of Satellite Vehicles; 8) Active Satellite Attitude Control; 9) Orbital Guidance; 10) Boost Glide and Re-Entry Guidance and Control; 11) Theory of Midcourse Guidance in Interplanetary Missions; 12) Lunar and Interplanetary Trajectories; 13) Terminal Guidance for Soft Lunar Landing; 14) Advanced Lunar Operations.

This book, the result of a summer course at UCLA, provides a detailed treatment of terrestrial, satellite, and extraterrestrial systems. It is designed for the student, as well as for the practicing engineer or scientist.

**Cryogenics: Research and Applications**, Marshall Sittig, *Assistant Director, Office of Research Administration, Princeton University* (D. Van Nostrand Company Inc., Princeton, N. J., 1963), 221 pp.

*Chapters:* 1) The Really New Frontier; 2) How Cold is Produced; 3) The Great Names in Cold; 4) Where Cold is Studied; 5) How Cold is Measured; 6) How Cold Affects the Properties of Materials; 7) How Cold is Contained; 8) How Cold Is Transported; 9) How Cold Is Used in Gas Separation; 10) How Cold Is Used as a Source of Gases; 11) How Cold Is Used in Space Research; 12) How Cold Is Used in Biology; 13) How Cold Is Used in Food Handling; 14) How Cold Is Used in Electronics; 15) How Cold Is Used in Superconductive Devices; 16) How Cold Is Used in Nuclear and High-Energy Physics; 17) How Cold Is Used in Chemistry; 18) How Cold Is Used in

Metals Fabrication; 19) How Cold Is Used in Miscellaneous Applications.

This book details the properties of cryogenic materials which adapt them to their wide range of uses in science and industry. It outlines the methods by which they are produced and gives concise explanations of the principles of these methods.

**Limit Analysis of Rotationally Symmetric Plates and Shells**, Philip G. Hodge Jr., *Professor of Mechanics, Illinois Institute of Technology* (Prentice-Hall Inc., Englewood Cliffs, N. J., 1963), 147 pp. \$5.95.

*Chapters:* 1) General Theory; 2) Theory of Limit Analysis; 3) Yield Conditions for Shells; 4) Circular Plates; 5) Cylindrical Shells; 6) Conical Shells; 7) Spherical Shells; 8) Shallow Shells; 9) Extensions and Limitations of Limit Analysis. *Appendix:* Foundations of Shell Theory.

This monograph requires no previous knowledge of either shell theory or plasticity. The book is intended for students of mechanics or structural engineering, research workers, plasticians, and shell analysts.

## 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.

**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 TP 3240, June 1963, 48 pp.

**Fluid Amplification Symposium, Diamond Ordnance Fuze Laboratories, October 1962, Proceedings, Vol. 1.** Diamond Ordnance Fuze Labs., Oct. 1962, 496 pp. (ASTIA AD 297,935).

**Rocket Thrust Vectoring**, A. B. Holmes, pp. 73-80.

**Mechanical Impedance Study of the X-259 Rocket Motor**, R. G. Hartenstein and W. G. Elsen. NASA TN D-1681, June 1963, 21 pp.

**One-Dimensional Heterogeneous Two-Phase Flow in Rocket Nozzles**, H. H. Chiu. Princeton Univ., Aeronaut. Eng. Dept. Rept. 643, June 1963, 55 pp.

**Evaluation of Solid Rocket Motor Ballistic Properties**. Thiokol Chemical Corp., Elkton Div. Rept. E93-63, June 1963, 83 pp. (Rocket Res. Labs., Edwards, Calif., RTD-TDR-63-1054).

**Product Engineering Final Report: Ablative Thrust Chamber Feasibility**,

T. A. Hughes. Aerojet-General Corp., Liquid Rocket Plant Rept. 652/SA4-2.2-F-1, Vol. 1, June 28, 1963, 99 pp. (Ballistic Systems Div. BSD-TDR-63-118).

**Description of a Control System for Rocket Motor Mass Measurement**, R. A. Elston. Bur. Naval Weapons NAVWEPS Rept. 8354, Naval Ordnance Test Station TP 3241, June 1963, 70 pp.

**U. S. National Congress of Applied Mechanics, Berkeley, 1962, Proceedings** (Am. Soc. Mech. Engrs., New York, 1962), Vol. 2, pp. 733-1467.

**Preliminary Analysis of a New Type of Thrust Augmenter**, K. H. Hohenemser, pp. 1291-1300.

**Advances in Aeronautical Sciences, Proceedings, International Congress in the Aeronautical Sciences, 2nd, Zurich, Sept. 1960** (Macmillan Co., New York, 1962), Vol. 3, pp. 1-592.

**Jet Thrust**, L. A. Simonov, pp. 409-413.

**Elucidation of Combustion Instability in Solid Propellant Rockets**, S. Kumagai, pp. 513-526.

**Ninth Symposium (International) on Combustion, at Cornell University, Ithaca, New York, August 27 to September 1, 1962** (Academic Press, New York, 1963), 1088 pp.

**Turbulent Boundary Layer Combustion in the Hybrid Rocket**, G. A. Marxman and M. Gilbert, pp. 371-383.

**Gas Particle Nozzle Flows**, J. R. Kliegel, pp. 811-826.

**Similarity and Scale Effects in Ramjet Combustors**, D. G. Stewart and G. C. Quigg, pp. 907-922.

**Flow Patterns in a Phase Change Rocket Combustion Model**, R. B. Hern, R. G. Siddall, and M. W. Thring, pp. 965-972.

**Modeling Techniques for Liquid-Propel-**

**lant Rocket Combustion Processes**, R. B. Lawhead and L. P. Combs, pp. 973-981.

**Theoretical and Experimental Models for Unstable Rocket Combustor**, R. J. Priem, pp. 982-992.

**Scaling Problem Associated with Unstable Burning in Solid Propellant Rockets**, R. W. Hart and J. F. Bird, pp. 993-1003.

**Advances in Aeronautical Sciences, Proceedings of the Second International Congress in the Aeronautical Sciences, 2nd, Zurich, 12-16 Sept. 1960** (Macmillan Co., New York, 1962), Vol. 4, pp. 593-1213.

**Mach Number and Altitude Limitations of Air-Breathing Engines**, pp. 797-818. In French.

**On Performance Characteristics of Combustion Chambers with Gradual Admission of Oxidizer Along the Chamber**, V. E. Doroshenko, pp. 819-830.

**Hypersonic Ramjets**, D. L. Mordell and J. W. Swithenbank, pp. 831-848.

**Supersonic Engineering, A Symposium Held at the Royal College of Advanced Technology, Salford, edited by J. T. Henshaw** (Heinemann, London, 1963), 260 pp.

**Power Plants**, J. G. Keenan, pp. 60-83. **Aerodynamics of Power Plant Installations**, J. E. Talbot, pp. 143-160.

**XIIth International Astronautical Congress, Washington, D. C., 1961, Proceedings**, edited by M. L. Baker Jr. and M. W. Makemson (Academic Press, New York, 1963), 2 Vols., 998 pp.

**Note on an Indirect Hyper-heating Process**, J. J. Barre, pp. 41-50. In French.

**Propulsion of the Final Stage of a Satellite Launcher Using Liquid Hydro-**

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