

Book Notes

The Moon, Meteorites, and Comets, edited by Barbara M. Middlehurst, *Research Associate, Steward Observatory, University of Arizona*, and Gerard P. Kuiper, *Director, Lunar and Planetary Laboratory, University of Arizona* (University of Chicago Press, Chicago, Ill., 1963), Vol. IV of *The Solar System*, 810 pp. \$15.00.

Contents: 22 chapters contributed by different authors. 1) The Lunar Surface: Introduction; 2) Selenography; 3) Investigation of the Far Side of the Moon with the Aid of Rockets; 4) Evaluation of the Soviet Photographs of the Moon's Far Side; 5) Scattering Properties of the Lunar Surface at Radio Wave Lengths; 6) Meteorite Distribution on the Earth; 7) Meteorite Craters on the Earth's Surface; 8) The Tunguska and Sikhote-Alin Meteorites; 9) Fossil Meteorite Craters; 10) Astroblemes: Ancient Meteorite-Impact Structures on the Earth; 11) Impact Mechanics at Meteor Crater, Arizona; 12) Physics and Chemistry of Meteorites; 13) Meteorite Ages; 14) Chemical Evolution of the Carbonaceous Chondrites; 15) Comets: Discovery, Orbits, Astrometric Observations; 16) Statistics of Comet Orbits; 17) Physics of Comets; 18) Comets: Structure and Dynamics of Tails; 19) Structure of the Cometary Nucleus; 20) Empirical Data on the Origin of Comets; 21) Meteors; 22) Meteors, Meteorites, and Comets: Interrelations.

This series is an attempt to collect and systematize information available on the solar system. The fourth volume is designed to be a reference book for the specialist and also a source of information for nonastronomical scientists working in allied fields of study.

Proceedings of the 1963 Heat Transfer and Fluid Mechanics Institute, edited by Anatol Roshko, Bradford Sturtevant, and D. R. Bartz (Stanford University Press, Stanford, Calif., 1963), 288 pp. \$8.75.

Contents: 18 papers contributed by different authors. 1) Differential Approximation for Radiative Transfer with Application to Normal Shock Structure; 2) Energy Transfer by Radiation and Conduction; 3) Recent Studies on the Use of Reference States in Predicting Transport Rates for High-Speed Flows with Mass Transfers; 4) Interactions of Heat Transfer and Hypersonic Boundary Layers under Highly Favorable Pressure Gradients; 5) Heat Transfer from High-Temperature Argon; 6) Detailed Flow-Field Observations in the Transition Process in a Thick Boundary Layer; 7)

Visualization of Natural Convection on a Plane Wall and in a Vertical Gap by Differential Interferometry; Transitional and Turbulent Regimes; 8) Two-Parameter Method for Shock Wave-Laminar Boundary Layer Interaction and Flow Separation; 9) Closed-Form Solutions for the Hypersonic Viscous Shock Layer with Finite-Rate Chemistry; 10) Modified Theory for the Effect of Surface Temperature on the Combustion Rate of Carbon Surfaces in Air; 11) Thermal Ignition of Flowing Combustible Gases at Heated Bodies; 12) Displacement of a Viscous Fluid from a Porous Medium; 13) Compressible Flow of an Air-Water Mixture through a Vertical, Two-Dimensional, Converging-Diverging Nozzle; 14) Condensation of Vapor on a Horizontal Rotating Cylinder; 15) Growth and Collapse of Vapor Bubbles on a Boiling Surface; 16) Simultaneous Conduction, Convection, and Radiation in a Porous Bed; 17) Local Heat Transfer Measurements for Forced Convection of Hydrogen and Helium at Surface Temperatures up to 5600°R; 18) Forced Convection Heat Transfer in Eccentric Annular Passages.

The sixteenth annual meeting of the Institute was held at the California Institute of Technology, Pasadena, Calif., June 12-14, 1963. The included papers present recent technical and scientific advances in heat transfer, fluid mechanics, and related fields.

Switching Theory in Space Technology, edited by Howard Aiken, *Professor of Mathematics, Emeritus, Harvard University, and Distinguished Service Professor of Information Technology, Miami University*, and William F. Main, *Director, Electronic Sciences Laboratory, Lockheed Missiles and Space Company* (Stanford University Press, Stanford, Calif., 1963), 357 pp. \$11.50.

Contents: 25 papers contributed by different authors. 1) Intuitive Outline of the Solution of a Basic Combinatorial Problem; 2) Mathematical Theory of Linear Sequential Networks; 3) Totally Sequential Switching Circuits; 4) Threshold, Majority, and Bilateral Switching Devices; 5) Tryon's Delay Operator and the Design of Synchronous Switching Circuits; 6) Minimum Weights for Threshold Switches; 7) Switching and Information; 8) Realizability of Graphs with Prescribed Circuit Matrices; 9) Theory of Algorithms; 10) Analysis and Design Confirmation of Controlled-Flow Nets; 11) General E -Algebras; 12) New Techniques for the Machining and Shaping of Ferrites; 13) Magnetic Comparators and Code Converters; 14) Computer Memories: Remarks on Possible Future Developments; 15) Nonlinear Resonance Switching Devices; 16) Superconductive Switches and Storage Devices; 17) Hydraulic Switching Devices; 18) Magnetic Films: New Possibilities, New Problems; 19) Electron Spin-Echo Storage; 20) Switching and Programming; 21) Application of System Theory to

Space Missions; 22) Asynchronous Logics and Application to Information Processing; 23) Information Storage and Retrieval as a Switching System; 24) Space-Borne Digital System for Data Bandwidth Compression; 25) Recent Advances in Modular Arithmetic.

This volume contains papers presented at the Symposium on the Application of Switching Theory in Space Technology, held at Sunnyvale, Calif., February 27-March 1, 1962. The symposium was sponsored by the Air Force Office of Scientific Research and Lockheed Missiles and Space Company. The intention of the symposium was to describe the present state of the art in a way that would be of maximum use to theoreticians and applied scientists.

Molecular Vib-Rotors: The Theory and Interpretation of High-Resolution Infrared Spectra, Harry C. Allen Jr., *National Bureau of Standards*, and Paul C. Cross, *Mellon Institute* (John Wiley and Sons Inc., New York, 1963), 324 pp. \$13.50.

Chapters: 1) Hamiltonians for the Molecular Models; 2) The Rigid Rotor; 3) Higher Approximations to the Energies of an Asymmetric Rotor; 4) Perturbations to the Rigid Rotor Energy Levels; 5) Line Strengths and Selection Rules; 6) Analysis of Vibrational-Rotational Bands of Linear Molecules; 7) Analysis of Symmetric Rotor Spectra; 8) Structure and Analysis of Asymmetric Rotor Bands. **Appendixes:** 1) Proof of Integral Values of K ; 2) Values of $f(J,n)$; 3) Symmetry of the Wang Functions; 4) Table of Rigid Rotor Energy Level Patterns $E(\kappa)$; 5) Sum Rules Relating Energy Levels and Inertial Constants of a Rigid Asymmetric Rotor; 6) Approximate Methods for Calculation of Rigid Rotor Energies; 7) Theory of Centrifugal Distortion Constants; 8) Vibrational-Rotational Interaction Constants; 9) Table of Line Strengths.

This book presents the theory of the vibrating-rotating molecule and describes band analysis in detail. The reader is expected to have an acquaintance with the methods of quantum mechanics and the principles of group theory.

Ninth Symposium (International) on Combustion, edited by W. G. Berl, *Applied Physics Laboratory, Johns Hopkins University* (Academic Press, New York, 1963), 1091 pp. \$42.00.

Contents: 109 papers contributed by different authors and divided into 15 major parts. Part 1) Turbulent Gas Flames; Part 2) Laminar Gas Flames; Part 3) High-Temperature Spectroscopy; Parts 4 and 5) Reaction Kinetics; Part 6) Hydrogen-Oxygen Reaction; Part 7) Detonation and Transition to Detonation; Part 8) Combustion Instability; Part 9) Combustion Involving Solids; Part 10) Miscellaneous Studies; Part 11) Discussion on Detonations; Part 12) Discussion

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 editors' opinion of their relative importance or competence.

on Fundamental Flame Processes; Part 13) Colloquium on Chemical Reactions and Phase Changes in Supersonic Flow; Part 14) Colloquium on Modeling Principles; Part 15) Colloquium on Reciprocating Engine Combustion Research.

This symposium, organized by the Combustion Institute, was held at Cornell University, Ithaca, N. Y., August 27–September 1, 1962. The volume represents a collection of the most recent research results obtained during the past two years in the United States, Europe, and the Far East.

Random Vibration, edited by Stephen H. Crandall, *Professor of Mechanical Engineering, Massachusetts Institute of Technology* (MIT Press, Cambridge, Mass., 1963), Vol. 2, 319 pp. \$7.50.

Contents: 10 chapters contributed by different authors. 1) Basic Theory of Random Vibration; 2) Measurement of Stationary Random Processes; 3) Nonstationary Random Inputs and Responses; 4) Random Excitation of Nonlinear Systems; 5) Failure Resulting from Vibration; 6) Noise of High-Speed Missiles; 7) Response of Space Vehicle Structures to Rocket Engine Noise; 8) Field Measurements, Specifications, and Testing; 9) Vibration Generation; 10) Applications to the Development of Structure and Equipment for Space Missions.

The contents of this book reflect the significant theoretical advances and accumulated practical experience in vibration technology gained in the past five years. The principle applications of the theory are to vehicles, with particular emphasis on missiles, satellites, and space vehicles.

Introduction to the Utilization of Solar Energy, edited by A. M. Zarem, *President, Electro-Optical Systems Inc.*, and Duane D. Erdway, *Electro-Optical Systems Inc.* (McGraw-Hill Book Company Inc., New York, 1963), 398 pp. \$13.50.

Contents: 14 chapters contributed by

different authors. 1) Introduction to the Utilization of Solar Energy; 2) Energy Sources of the Future; 3) Availability of Solar Energy; 4) Diathermanous Materials and Properties of Surfaces; 5) Collection of Solar Energy; 6) Concentration of Solar Energy; 7) Conversion of Solar to Mechanical Energy; 8) Direct Conversion of Solar Energy to Electrical Energy; 9) Photochemical Processes for Utilization of Solar Energy; 10) Economics of Solar Energy; 11) Heating and Cooling of Buildings with Solar Energy; 12) Distillation of Sea Water and Other Low-Temperature Applications of Solar Energy; 13) High-Temperature Applications of Solar Energy; 14) Space Applications of Solar Energy.

This text and reference book is based on a course in solar energy utilization given at the University of California, Los Angeles, and has been designed to supply a thorough treatment of the fundamentals of the subject. It is intended to be used as a text, a supplement, and a reference for the graduate student or the practicing engineer.

Proceedings of the First International Symposium on Rocket and Satellite Meteorology, edited by H. Wexler and J. E. Caskey Jr. (Interscience Division, John Wiley and Sons Inc., New York, 1963), 440 pp. \$15.50.

Contents: 38 papers contributed by different authors and divided into 4 major parts. Part 1) Meteorological Rockets; Part 2) Meteorological Satellites—Radiation Studies; Part 3) Meteorological Satellites—Cloud Studies; Part 4) Meteorological Satellites—Special Studies.

This symposium was held in Washington, D. C., April 23–25, 1962. It was sponsored by the Committee on Space Research, the World Meteorological Organization, and the International Union of Geodesy and Geophysics. These papers are designed to contribute to better understanding of atmospheric phenomena and to wider employment of the powerful new tools made possible by the new age of space.

Error Propagation for Difference Methods, Peter Henrici, *Lehrstuhl für höhere Mathematik, Eidgenössische Technische Hochschule, Zürich* (John Wiley and Sons Inc., New York, 1963), 73 pp. \$4.95.

Chapters: 1) Introduction; 2) Basic Concepts; 3) Stability, Consistency, and Convergence; 4) Asymptotic Behavior of Discretization Error; 5) Asymptotic Behavior of Round-Off Error. **Appendix:** Application to Two Problems of Circular Motion.

This volume, a sequel to the author's *Discrete Variable Methods in Ordinary Differential Equations*, concentrates on the analogous results for the integration of systems by multistep methods. The results contained here were presented, in part, at the Annual Meeting of the Association for Computing Machinery in 1961 and, by invitation, at the Annual Meeting of the Mathematical Association of America in 1961 and at the International Congress of Mathematicians in Stockholm in 1962.

Mechanical Vibrations, Austin H. Church, *Professor of Mechanical Engineering, New York University* (John Wiley and Sons Inc., New York, 1963), 2nd ed., 432 pp. \$12.00.

Chapters: 1) Introduction; 2) Undamped Free and Transient Vibrations—Single Degree of Freedom; 3) Damped Free and Transient Vibrations—Single Degree of Freedom; 4) Steady-State Forced Vibrations—Single Degree of Freedom; 5) Introduction to Laplace Transformations; 6) Electrical Analogies and Mobility; 7) Two Degrees of Freedom; 8) Multimass Lumped Systems; 9) Distributed Systems. **Appendices:** 1) Mathematical Relationships; 2) Characteristic Functions of Beams.

This revised text covers the basic principles needed to analyze the response of dynamic systems to transient or steady-state excitation. Because the book is intended for use in a senior undergraduate or introductory graduate course, topics are developed with a minimum mathematical background (differential equations).

Technical Literature Digest

M. H. Smith, Associate Editor

The James Forrestal Research Center, Princeton University

Propulsion and Power (Noncombustion)

Recent Research on Photovoltaic Solar Energy Converters, J. J. Loferski. *Proc. IEEE* 51, 667–673 (1963).

Drift Fields in Photovoltaic Solar

Energy Converter Cells, M. Wolf. *Proc. IEEE* 51, 674–693 (1963).

Thermo-Photo-Voltaic Energy Conversion, B. D. Wedlock. *Proc. IEEE* 51, 694–698 (1963).

Theory of Materials for Thermoelectric and Thermomagnetic Devices, R. W. Ure Jr. *Proc. IEEE* 51, 699–712 (1963).

The Development of Thermoelectric Power Generators, R. W. Fritts. *Proc. IEEE* 51, 713–720 (1963).

Transport Effects in Cesium Thermionic Converters, G. N. Hatsopoulos. *Proc. IEEE* 51, 725–732 (1963).

Emission Physics of the Thermionic

Energy Converter, N. S. Rasor. *Proc. IEEE* 51, 733–747 (1963).

Analysis of the Arc Mode Operation of the Cesium Vapor Thermionic Energy Converter, K. G. Hernquist. *Proc. IEEE* 51, 748–752 (1963).

Radio-Frequency Oscillations in Thermionic Diodes, R. J. Zollweg and M. Gottlieb. *Proc. IEEE* 51, 754–759 (1963).

Effect of Anode Emission of Electrons on Space-Charge Theory of the Plasma Thermionic Converter, R. G. McIntyre. *Proc. IEEE* 51, 760–768 (1963).

Some Characteristics of a Cesium Plasma Cell, M. Kihara, S. Ono, Y.

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