Book Notes

John von Neumann, Collected Works, edited by A. H. Taub, *Research Professor of Applied Mathematics, Digital Computer Laboratory, University of Illinois* (Pergamon Press, Oxford, 1961), Vols. I–VI.

Contents: Vol. I) Logic, Theory of Sets, and Quantum Mechanics; Vol. II) Operators, Ergodic Theory, and Almost Periodic Functions in a Group; Vol. III) Rings of Operators; Vol. IV) Continuous Geometry and Other Topics; Vol. V) Design of Computers, Theory of Automata, and Numerical Analysis; Vol. VI) Theory of Games, Astrophysics, Hydrodynamics, and Meteorology.

This set of six volumes contains a reprinting of all the articles published by John von Neumann, some of his reports to government agencies and other organizations, and reviews of unpublished manuscripts found in his files. The bibliography given at the end of each volume contains a listing of von Neumann's scientific works, including his books and mimeographed lecture notes.

Visual Problems in Aviation Medicine, edited by Armand Mercier, *Chairman, Vision Committee, Aero Space Medical Panel, AGARD* (Macmillan Company, New York, 1962), 120 pp. $6.00.

Contents: 14 papers contributed by different authors on such subjects as protective glasses against atomic flash, visual problems of high altitude flight, the origin of blackout, eye protection in aviation, and problems of empty visual fields.

The papers in this volume, five of which are in French, were presented at the latest meetings of the Aero Space Medical Panel of the Advisory Group for Aeronautical Research and Development. They are intended to stimulate further research that will be beneficial to aviation and space medicine.

Plasma Hydromagnetics, edited by Daniel Bershader, *Associate Professor of Aeronautics and Astronautics, Stanford University, and Consulting Scientist, Physical Sciences Laboratory, Lockheed Missiles and Space Company* (Stanford University Press, Stanford, Calif., 1962), 146 pp. $4.50.

Contents: 8 papers contributed by different authors. 1) Some Observations on Plasma Instabilities in the Mirror Machine; 2) Application of Plasma Physics to Problems in Solar Physics; 3) Energy and Momentum in the Theory of Waves in Plasmas; 4) Hydromagnetic Ionizing Waves; 5) Absorption of Magnetohydrodynamic Waves in the Lower Ionosphere; 6) Shock Waves and Colli-

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.

sion-Free Plasmas; 7) Theory of Viscous Magnetogasdynamic Flow in Slowly Diverging Two-Dimensional Channels; 8) Particle Interactions in a Plasma.

These eight papers were presented at the Sixth Lockheed Symposium on Magnetohydrodynamics, held in December 1961. They cover both experimental and theoretical results in molecular and macroscopic aspects of the dynamics of plasma behavior.

The Exploration of Space, edited by Robert Jastrow, *Chief, Theoretical Division, NASA Goddard Space Flight Center* (Macmillan Company, New York, 1960), 160 pp.

Contents: 14 papers contributed by different authors on such subjects as solid particles in the solar system, plasma and magnetic fields in the solar system, the moon, primary and secondary objects, rocket astronomy, and experimental research program in the space sciences.

This volume contains the Proceedings of a Symposium on Space Physics, held April 29–30, 1959, and sponsored by the National Academy of Sciences, NASA, and the American Physical Society. The authors survey the present frontiers of space research and delineate the major problems of the future.

Radiative Transfer from Solid Materials, edited by Henry Blau, *Head, Molecular Physics Group, Advanced Research Division, Arthur D. Little Inc.,* and Heinz Fischer, *Section Chief and Technical Advisor, Electronics Research Directorate, Air Force Cambridge Research Laboratories* (Macmillan Company, New York, 1962), 257 pp. $7.50.

Contents: 14 papers contributed by different authors and divided into five sections. Section 1) Metals and Dielectrics; Section 2) High-Temperature Emittance; Section 3) Radiation and Material Reference Standards; Section 4) Room Temperature Emittance and Reflectance; Section 5) Radiation and the Space Environment.

This volume contains the Proceedings of a Conference on Radiative Transfer from Solid Materials, held in Boston, Mass., December 12–13, 1960, and sponsored by the Air Force Cambridge Research Laboratories and Arthur D. Little Inc. The purpose of the conference was to review the state of the art, to discuss theoretical and experimental problems, and to give an account of immediate and long-range objectives.

Applied Cryogenic Engineering, edited by R. W. Vance, *Member of the Technical Staff, Aerospace Corporation, Los Angeles, Calif.,* and W. M. Duke, *President, ITT Federal Laboratories Inc., Nutley, N. J.* (John Wiley & Sons Inc., New York, 1962), 510 pp. $17.50.

Contents: 15 chapters contributed by different authors. 1) Introduction; 2)

Cryogenic Fluids—Their Properties and Technology; 3) Mechanical Properties of Materials; 4) Low-Temperature Thermometry; 5) Fluid Flow and Heat Transfer; 6) Low-Temperature Insulation; 7) Liquefaction of Oxygen, Nitrogen, and Hydrogen; 8) Helium Liquefaction—Cryogenic Equipment Applications; 9) Storage and Transfer of Cryogenic Fluids; 10) Safety Aspects of Cryogenic Systems; 11) Explosion Hazards in Liquid Bipropellants; 12) Helium; 13) Storage of Cryogenic Fluids in Space; 14) Application of Cryogenic Rocket Propellants to Space Vehicles; 15) The Future of Cryogenic Fuels for Space Systems. *Appendixes:* 1) Properties of Cryogenic Fluids; 2) Processing Helium from Natural Gas; 3) Contamination Control in Cryogenic Fluids and Systems.

This book is designed to serve as a repository of information and technical data for those engaged in cryogenic research and development. It is directed toward engineers and scientists working on missile and space vehicle systems.

Hypersonic Flow Research, edited by Frederick R. Riddell, *Avco Corporation, Wilmington, Mass.* (Academic Press, New York, 1962), 758 pp. $10.50.

Contents: 28 papers contributed by different authors and divided into 5 major parts. Part 1) Hypersonic Flow at Low Reynolds Number; Part 2) Chemical Kinetic Effects in Hypersonic Flow; Part 3) Inviscid Hypersonic Flow; Part 4) Experimental Techniques I; Part 5) Experimental Techniques II.

The technical papers in this volume are based mainly on a Symposium of the American Rocket Society held in Cambridge, Mass., August 16–18, 1961. The emphasis of the book is on research problems; however, the motivation is to further an understanding of the problems of flight in the atmosphere at hypersonic speeds. The volume thus is intended to be of use to engineers involved in advanced design problems as well as to the pure researcher.

Semiconductor and Conventional Strain Gages, edited by Mills Dean III, *Department of the Navy, David Taylor Model Basin, Washington, D. C.,* and Richard D. Douglas, *Newport News Shipbuilding and Dry Dock Company, Newport News, Va.* (Academic Press, New York, 1962), 381 pp. $15.00.

Contents: 16 papers contributed by different authors on such subjects as some temperature effects on resistance strain gages, recent developments in semiconductor strain transducers, characteristics of resistance strain gages, pressure transducer evaluation report, and recent developments in flexible silicon strain gages.

This volume contains the proceedings of a symposium held under the auspices of the Physical and Mechanical Measurements Instrumentation Division of the

Instrument Society of America in January 1961. It is designed to provide up-to-date information on the characteristics, limitations, applications, and peculiarities of modern strain gages, with emphasis on semiconductor types.

Space Age Astronomy, edited by Armin J. Deutsch, *Mount Wilson and Palomar Observatories, Carnegie Institute of Washington, and California Institute of Technology,* and Wolfgang B. Klemperer, *Douglas Aircraft Company Inc.* (Academic Press, New York, 1962), 531 pp.

Contents: 56 papers contributed by different authors and divided into 3 major sections. Section 1) Accomplishments, Current Projects, and Proven Techniques; Section 2) Desiderata for Future Astronomical Observations from Stations in Space (Solar, Interplanetary, Galactic, and Extragalactic Phenomena); Section 3) Celestial Mechanics Problems in the Solar System, Planetary Exploration, and Related Engineering Problems.

This volume contains the Proceedings of an International Symposium sponsored by Douglas Aircraft Company Inc. and held August 7–9, 1961, at the California Institute of Technology. Included in the Proceedings are invited papers, some of them in the form of panel presentations, invited comments, and spontaneous discussions.

Space Logistics Engineering, edited by Kenneth Brown, *Member of the Instructional Staff, Engineering Extension, University of California, Los Angeles,* and Lawrence D. Ely, *Assistant Director, Office of Technical Relations, Aerospace Corporation, Los Angeles* (John Wiley & Sons Inc., New York, 1962), 623 pp. $16.95.

Contents: 18 chapters contributed by different authors. 1) Introduction to Space Logistics; 2) Relationship between Performance and Logistics; 3) Space Environment; 4) Physiological Aspects of the Spaceman; 5) Personnel Requirements; 6) Space Guidance and Control; 7) Astrodynamics of Space Vehicles; 8) Propulsion for Space Vehicles; 9) Space Communications; 10) Reliability and Developmental Testing; 11) Space Vehicle Design; 12) Earth-Lunar Logistics Employing Orbital Assembly and Launch; 13) Supply Support; 14) Maintenance Requirements; 15) Facilities for Space Logistics; 16) Transportation; 17) Civilian and Military Uses of Space; 18) Economics of Space Travel.

This text discusses the numerous factors affecting space logistics, with the purpose of enabling the space vehicle designer to consider these factors during the initial design rather than having to incorporate them as an after-thought. Each of the chapters is contributed by a specialist in that field.

High Magnetic Fields, edited by Henry Kolm, Benjamin Lax, Francis Bitter, and Robert Mills (MIT Press, Cambridge, Mass., and John Wiley & Sons Inc., New York, 1962), 751 pp. $15.00.

Contents: 88 papers contributed by different authors and divided into 4 major parts. Part 1) Generation of High Magnetic Fields; Part 2) High-Magnetic-Field Research Programs; Part 3) Solid-State and Low-Temperature Physics in High Magnetic Fields; Part 4) Plasma and Fusion Physics in High Magnetic Fields.

This volume contains the Proceedings of the International Conference on High Magnetic Fields, held at the Massachusetts Institute of Technology, Cambridge, Mass., November 1–4, 1961, and sponsored by the Solid State Sciences Division of the Air Force Office of Scientific Research. The papers presented here cover significant work on the generation and use of very high or very special magnetic fields.

Space Systems Engineering, Francis E. Riley, *Space Systems Division, Lockheed Missiles and Space Company,* and J. Douglas Sailor, *Space Programs Division, Lockheed Missiles and Space Company* (McGraw-Hill Book Company Inc., New York, 1962), 323 pp. $12.50.

Chapters: 1) System Concepts in Astronautics; 2) Ascent Trajectories and Satellite Orbits; 3) Lunar and Interplanetary Trajectories; 4) Vehicle System Requirements; 5) Space Propulsion Systems; 6) Guidance, Navigation, and Attitude Control; 7) Electric Power Systems; 8) Communication Systems; 9) Payload Environment and Instrumentation; 10) Requirements for Manned Space Flight; 11) Unmanned Space Vehicle Missions; 12) Manned Space Systems.

This book provides a survey of the field of astronautics from the viewpoint of the practicing engineer. It is designed to be of value to engineers and scientists in all fields who are interested in entering space work and to students in technical institutes and college extension courses studying any phase of the space program.

Viscous Hypersonic Flow—Theory of Reacting and Hypersonic Boundary Layers, William H. Dorrance, *Head, Gas Dynamics Department, Aerospace Corporation* (McGraw-Hill Book Company Inc., New York, 1962), 334 pp. $12.50.

Chapters: 1) Introduction to Hypersonic Heat Transfer Problems; 2) Boundary Layer Equations; 3) Surface Material-Boundary Layer Interactions; 4) Dissociated Laminar Boundary Layer; 5) Mass Transfer and Chemical Reactions in the Laminar Boundary Layer; 6) Leading-Edge Bluntness, Shock-Wave Interaction, and Vorticity Effects; 7) Dissociated Turbulent Boundary Layer; 8) Mass Transfer and Chemical Reactions in the Turbulent Boundary Layer; 9) Thermodynamic Properties of Dilute Gas Mixtures; 10) Transport Coefficients of Dilute Gas Mixtures.

The theories presented in this book are developed from fundamentals; all related chemical, thermodynamic, and physical concepts are illustrated. The material should be useful to those performing research or engineering analyses of hypersonic atmospheric re-entry bodies, ablation heat protection systems, and rocket nozzle

analyses, and to students associated with aeronautics, aerospace, or mechanical engineering departments.

The Theory of Plasma Waves, Thomas Howard Stix, *Professor of Astrophysical Sciences, Princeton University* (McGraw-Hill Book Company Inc., New York, 1962), 283 pp. $9.75.

Chapters: 1) Topology of Wave-Normal Surfaces; 2) Waves in a Cold Uniform Plasma; 3) Energy Flow and Accessibility; 4) Kruskal-Schwarzschild Solutions for a Bounded Plasma; 5) Free and Forced Oscillations of a Cold Cylindrical Plasma; 6) Plasma Models with Discrete Structure; 7) Longitudinal Oscillations in a Plasma of Continuous Structure; 8) Derivation of the Theory for a Hot Plasma in a Magnetic Field; 9) Some Applications of the Equivalent Dielectric Tensor; 10) Reflection and Absorption of Waves in a Hot Inhomogeneous Plasma.

This book contains a unified presentation of information in plasma physics which is contained in the solutions to the linearized collision-free Boltzmann equations. It is designed to serve as a text for graduate students in plasma physics which will give the background necessary to understand current work in the field of plasma waves and instabilities.

Materials for Rockets and Missiles, Robert G. Frank, *Engineer, Alloy Development Division, Flight Propulsion Laboratory, General Electric Company,* and William F. Zimmerman, *Engineer, Metallurgical Processes Development Division, Flight Propulsion Laboratory, General Electric Company* (Macmillan Company, New York, 1959), 124 pp.

Chapters: 1) Introduction; 2) Sheet Alloys: Iron, Nickel, and Cobalt Base; 3) Wrought Alloys: Iron, Nickel, and Cobalt Base; 4) Cast Alloys: Iron, Nickel, and Cobalt Base; 5) Wrought and Cast Alloys of Aluminum and Magnesium; 6) Titanium Alloys; 7) Cermets; 8) Molybdenum Alloys; 9) Ceramics; 10) Materials Fabrication Development; 11) Interpreting the Data.

This book is designed to provide the engineer who is not familiar with materials with an understanding of ceramics and of high-temperature metallurgy. It aims to give a cross section of all materials available, with a recommendation of the best material for each use.

Electrical Engineering Fundamentals, Robert Brownell Angus Jr., *Registered Professional Engineer, Lincoln Institute of Northeastern University and Sylvania Electric Products Inc.* (Addison-Wesley Publishing Company Inc., Reading, Mass., 1961), 516 pp. $8.00.

Chapters: 1) Basic Principles Concerning Electricity; 2) Basic Elements and Their Mathematical Models; 3) Electrical Energy User; 4) Equivalent Circuits; 5) Direct-Current Network Theory; 6) Nature of Magnetism; 7) Electromagnetism; 8) Meters; 9) Inductance and Capacitance; 10) Inductance, Capacitance, and the Transient State; 11) Mathematical Tools and Electrical De-

vices for Alternating-Current Theory; 12) Basic Alternating-Current Parameter Relations; 13) Phasor Algebra; 14) Alternating-Current Circuit Analysis; 15) Selected Alternating-Current Topics; 16) Polyphase Circuits.

This text offers an introduction to a.c. and d.c. circuit theory, for students of colleges and technical institutes, suitable for use in a two- or three-term course. Algebra and trigonometry are applied extensively throughout, and calculus is introduced principally in selected examples.

Applications of Ion Flow Dynamics, Demetrios G. Samaras, *Fellow of the Royal Aeronautical Society, and Consultant, U. S. Air Force* (Prentice-Hall Inc., Englewood Cliffs, N. J., 1962), 595 pp. $16.00.

Chapters: 1) Periosis; 2) Production of Plasmas—Discharges; 3) Isoenergetic Applications; 4) Applications with Energy Release; 5) Space Propulsion Applications; 6) Experimental Installations, Instrumentation, and Measurements.

This book may be considered the sequel to *Theory of Ion Flow Dynamics*, in which the fundamentals of ion flow dynamics were developed. At the end of each chapter, a collection of problems is given to enable the student to assimilate and digest the pertinent theory.

Printed Circuits in Space Technology: Design and Application, Albert E. Linden, *Manager, Aerospace Support Systems Development, General Electric Company* (Prentice-Hall Inc., Englewood Cliffs, N. J., 1962), 197 pp. $9.00.

Chapters: 1) Concepts; 2) Design; 3) Reproduction; 4) Testing; 5) Fabrication; 6) Applications; 7) New Techniques.

This book probes the problems encountered in the production of electronic equipment possessing a degree of reliability commensurate with the costs and risks involved in space exploration. It should be of value to the graduate engineer as well as to the novice in the manufacturing, design, chemical, test, quality control, electrical, electronic processing, and packaging fields.

The Calculus of Variations, Naum I. Akhiezer, *Professor, Kharkov University,* translated by Aline H. Frink, *Associate Professor of Mathematics, Pennsylvania State University* (Blaisdell Publishing Company, New York, 1962), 247 pp.

Chapters: 1) Equations of the Calculus of Variations; 2) Theory of Fields; 3) Generalizations of the Fundamental Problem; 4) Direct Methods of the Calculus of Variations. *Appendix:* Supplementary Topics and Exercises.

This translation from the Russian is presented so that it can be covered in a one-semester course for both graduate and advanced undergraduate students. It also should be useful for scientists, engineers, and mathematicians.

Solar Activity and the Ionosphere for Radio Communications Specialists, N. Ya. Bugoslavskaya, translated by G. O. Harding (Pergamon Press, Oxford, 1962), 39 pp. $2.50.

Chapters: 1) Regular Solar Radiation, Laws of Irradiation of the Earth; 2) Radiation of Disturbed (Active) Regions of the Sun, and Ionospheric Disturbances. *Appendix:* The Sun Service.

This lecture, translated from the Russian, is designed to acquaint the reader with the influence of solar activity on the state of the ionosphere. The author assumes that the reader is acquainted with the general structure of the ionosphere and the fundamentals of short-wave radio propagation and has a basic knowledge of astronomy.

Theoretical Elasticity and Plasticity for Engineers, D. E. R. Godfrey, *Head, Mathematics Department, Woolwich Polytechnic* (Thames and Hudson, London, 1959), 311 pp.

Chapters: 1) Analysis of Stress; 2) Analysis of Strain; 3) Pure Bending of a Beam; 4) Torsion of a Beam; 5) Bending of a Beam with Shear; 6) Two-Dimensional Elasticity; 7) Problems in Curvilinear Coordinates; 8) Concentrated and Discontinuous Loads; 9) Theory of Thin Flat Plates; 10) Theory of Plasticity; 11) Plastic Bending and Torsion of a Beam; 12) Plane Problems of Plasticity. *Appendixes:* 1) Mathematical Methods; 2) Functions of a Complex Variable; 3) Solutions to Problems.

This text provides an introductory account of the theory of elasticity and plasticity. It is intended to be suitable for inclusion in a course in mathematics and also to be useful to research workers.

Theoretical Physics, A. S. Kompaneyets (Dover Publications Inc., New York, 1962, orig. publ. 1961), 592 pp. Paperback reprint, $2.45.

Superfluids—Macroscopic Theory of Superconductivity, Fritz London (Dover Publications Inc., New York, 1961, orig. publ. 1950), 2nd ed., Vol. 1, 173 pp. Paperback reprint, $1.45.

Technical Literature Digest

M. H. Smith, *Associate Editor*

The James Forrestal Research Center, Princeton University

Propulsion and Power (Combustion Systems)

Solid-Propellant Rockets, T. E. Myers. Astronautics **7,** 81–89 (Nov. 1962).

Ramjets, G. L. Dugger. Astronautics **7,** 138–145 (Nov. 1962).

Combustion Instability Limits Determined by a Nonlinear Theory and a One-Dimensional Model, R. J. Priem and D. C. Guentert. NASA TN D-1409, Oct. 1962, 43 pp.

Applicability of Solid Propellants to High-Performance Rocket Vehicles, M.

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

Summerfield, J. I. Shafer, H. L. Thackwell Jr., and C. E. Bartley. Astronautics **7,** 50–59 (Oct. 1962).

Modified Wagon Wheel Grain Design $W_1 > W_2 = W_3 \; W_1 = W_2 > W_3 \; W_1 = W_3 > W_2$, M. W. Stone. Rohm & Haas Co., Redstone Arsenal Research Div. Rept. S-36, Oct. 1, 1962, 1 vol.

Propulsion and Power (Noncombustion)

Electric Propulsion, E. Stuhlinger, Astronautics **7,** 60–71 (Nov. 1962).

Nuclear Propulsion, F. E. Rom and H. B. Finger. Astronautics **7,** 90–91 (Nov. 1962).

Power Systems, N. W. Snyder. Astronautics **7,** 110–114 (Nov. 1962).

Underwater Propulsion, L. Greiner. Astronautics **7,** 126–131 (Nov. 1962).

Nuclear Rockets for Unmanned Missions, F. E. Rom, A. F. Lietzke, and P. G. Johnson. Nucleonics **20,** 53–57 (Nov. 1962).

Current Oscillations in the System of a Thermionic Energy Converter with Cesium Vapor, N. D. Morguils, C. M. Levitskiy, and I. N. Groshev. Radio Eng. Electron. Phys., no. 2, 330–332 (1962).

Numerical Solution of Two-Dimensional Poisson Equation: Theory and Application to Electrostatic-Ion-Engine Analysis, B. Hamza and E. A. Richley. NASA TN D-1323, Oct. 1962, 80 pp.

Cold-Air Investigation of Prototype Snap-8 Turbine, W. J. Nusbaum and D. E. Holeski. NASA TN D-1529, Oct. 1962, 16 pp.

International Conference on Ionization Phenomena in Gases, 5th, Munich, Aug. 28–Sept. 1, 1961, Proceedings, edited by H. Maecker (North-Holland