Book Notes

Atmospheric Processes, Paul J. Nawrocki and Robert Papa, *formerly Members of the Technical Staff, Geophysics Corporation of America* (Prentice-Hall Inc., Englewood Cliffs, N. J., 1963), 701 pp. $20.00.

Chapters: 1) The Upper Atmosphere; 2) The Solar Spectrum and Cross Sections for Photoionization and Absorption; 3) Reaction Rates; 4) Atomic Transition Probabilities; 5) Molecular Diffusion; 6) Atmospheric Turbulence; 7) Solutions of the Continuity Equation; 8) Energy Loss Processes of Solar Corpuscles; 9) Generation of Electromagnetic Waves; 10) Transmission of Electromagnetic Waves; 11) Cosmic Rays; 12) Geomagnetism; 13) Plasma Dynamics.

This volume provides an up-to-date tabulation of atmospheric parameters. It is designed to enable the physicist to formulate more sophisticated treatments not only for the ambient atmosphere, but also for the atmosphere as perturbed by hydrodynamic and hydromagnetic shock, strong fluxes of electromagnetic and/or corpuscular energy, nuclear detonations, etc.

Fundamentals of Celestial Mechanics, J. M. A. Danby, *Yale University* (Macmillan Company, New York, 1962), 348 pp.

Chapters: 1) Astronomical Background; 2) Introduction to Vectors; 3) Introduction to Vectorial Mechanics; 4) Central Orbits; 5) Some Properties of Solid Bodies; 6) The Two-Body Problem; 7) Determination of Orbits; 8) The Three-Body Problem; 9) The *n*-Body Problem; 10) Numerical Procedures; 11) Perturbations; 12) Motion of the Moon; 13) The Earth and Its Rotation; 14) The Moon and Its Rotation. *Appendixes:* 1) Properties of Conics; 2) The Rotation of Axes; 3) Numerical Tables; 4) Miscellaneous Expansions in Series; 5) The Greek Alphabet; 6) Bibliography.

This book is written at a level accessible to readers with a background of three-dimensional analytic geometry, calculus, differential equations, and mechanics. It is adaptable for use as a textbook to either a one-term or a two-term course.

Thermodynamic Properties of Helium to 50,000°K, Wilbert J. Lick and Howard W. Emmons (Harvard University Press, Cambridge, Mass., 1962), 122 pp. + charts. $2.95.

Chapters: 1) Introduction; 2) Calculation of Thermodynamic Properties; 3) Thermodynamic Properties of the Components; 4) Equilibrium Composition; 5) Thermodynamic Properties of the Mixture; 6) Discussion and Comparisons; 7) Tables; 8) Notation; 9) References.

This volume tabulates some of the properties of helium as computed by what appears to be the best currently available theory. It may be of use for looking up rough values, for noting trends of properties, or for making detailed calculations over a limited temperature-pressure range.

Inertial Navigation, Richard H. Parvin, *Senior Systems Engineer, Program Management Department, St. Petersburg, Fla.* (D. Van Nostrand Company Inc., Princeton, N. J., 1962), 370 pp. $12.00.

Chapters: 1) Characteristics of Inertial Systems; 2) The Laplace Transformation; 3) Transfer Functions; 4) Closed Loop Systems; 5) Vectors, Matrices, and Coordinate Transformation; 6) Inertial Sensors: The Gyro; 7) Inertial Sensors: The Accelerometer; 8) The Inertial Measuring Unit; 9) The Earth in Inertial Space; 10) Basic System Mechanization; 11) Prelaunch Trim and Alignment; 12) Classes of Errors; 13) Sources of Errors; 14) Space Stabilized and Base Point Systems; 15) The Computer; 16) Space Ballistics: Inertial Frames in Motion; 17) Guidance Equations.

This volume of a series on principles of guided missile design presupposes a knowledge of the system requirements of a guided missile, aircraft, or space vehicle such as that offered in the main series. It brings concise information to the engineer new in the field and contains useful equations, charts, and tables.

Microminiaturization, edited by G. W. A. Dummer, *Royal Radar Establishment, Great Malvern, England* (Pergamon Press, Oxford, 1962), 355 pp. $15.00.

Contents: 27 papers contributed by different authors and divided into 4 major sections. Section 1) Survey Papers; Section 2) Micromodules; Section 3) Microcircuits; Section 4) Solid Circuits.

This is a record of the Proceedings of the AGARD Conference on Microminiaturization held in Oslo in July 1961 under the Chairmanship of Th. von Kármán. Full discussions on each paper are given. The information is designed to be especially useful to industrial organizations and companies engaged in the development of miniature electronic components and equipment.

Nuclear Instruments and Their Uses, edited by Arthur H. Snell, *Assistant Director and Director of Thermonuclear Divison, Oak Ridge National Laboratory* (John Wiley & Sons Inc., New York, 1962), Vol. 1, 494 pp. $7.50.

Contents: 7 chapters contributed by different authors. 1) Pulse Ionization Chambers and Proportional Counters; 2) Scintillation Counters; 3) A Survey of Cerenkov Counter Technique; 4) Elec-

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.

trometers and Amplifiers; 5) Counting Methods for the Assay of Radioactive Samples; 6) Applications to Radiation Dosimetry; 7) Techniques of Personnel Monitoring and Radiation Surveying.

The first volume of this book covers the nuclear detectors most commonly used in counting experiments, radiochemical work, and health physics. Designed to be useful to the nuclear physicist, radiochemist, radiobiologist, health physicist, and instrumentalist, the collection was assembled by the Subcommittee on Instruments and Techniques of the Committee on Nuclear Science, National Academy of Sciences/National Research Council.

Creep in Structures, edited by Nicholas J. Hoff (Academic Press Inc., New York, 1962), 375 pp. $15.00.

Contents: 20 papers contributed by different authors on such subjects as the creep analysis of some structures, mechanics of creep and combined stresses, oil canning problems in creep, effect of creep on stresses in cylindrical shells, the mechanics of column creep, and damping of the vibrations of a coiled spring due to creep.

This volume constitutes the Proceedings of the International Union of Theoretical and Applied Mechanics Colloquium, held at Stanford University, July 11–15, 1960. In order to insure a broad exchange of ideas, the number of persons invited to participate was kept to a minimum.

Explosive Shocks in Air, Gilbert Ford Kinney, *U. S. Naval Postgraduate School, Monterey, Calif.* (Macmillan Company, New York, 1962), 198 pp. $7.50.

Chapters: 1) Explosions; 2) Characteristics of Air; 3) The Shock Front; 4) Reflected Shock; 5) Blast Waves; 6) The Scaling Law; 7) Explosion Overpressures; 8) Dynamic Blast Loads; 9) Structure Response.

The purpose of this work is to present a simple, brief outline of phenomena associated with explosions in air. The material analyzing and characterizing the dynamic load imposed on a structure should be of particular interest to architects and engineers.

Progress in the Astronautical Sciences, edited by S. F. Singer, *University of Maryland* (North-Holland Publishing Company, Amsterdam, and Interscience Publishers Inc., New York, 1962), Vol. 1, 416 pp. $14.50.

Contents: 7 chapters contributed by different authors. 1) Properties of the Atmosphere Revealed by Satellite Orbits; 2) Physical Properties of the Earth's Ionosphere; 3) Radio Doppler Method of Using Satellites for Geodesy, Navigation, and Geophysics; 4) Optimization of Rocket Trajectories—A Survey; 5) Surface Properties of the Moon; 6) Atmosphere and Surface Properties of Mars and Venus; 7) Biodynamics of Space Flight.

This series of books is designed to fill the need for a publication that reports advances in the various astronautical disciplines in a manner easily intelligible to the scientist or engineer, regardless of his field of specialization. The individual progress articles are more extensive than normal research papers in order to allow for broader treatment of the subject.

Elements of Mathematical Astronomy with a Brief Exposition of Relativity, Martin Davidson, revised by Cameron Dinwoodie (Macmillan Company, New York, 1962), 3rd ed., 276 pp.

Chapters: 1) The Earth; 2) The Celestial Sphere; 3) Mathematical Tables and Astronomical Computing; 4) Elementary Formulae in Spherical Astronomy; 5) Problems Arising from the Sun's Motion amongst the Stars; 6) Atmospheric Refraction; 7) Parallax; 8) Aberration, Precession, and Nutation; 9) The Law of Gravitation and the Motions of the Heavenly Bodies; 10) Artificial Earth Satellites and Space Probes; 11) The Moon; 12) The Stars; 13) Introductory Remarks to a Brief Exposition of Relativity; 14) How Einstein's Theory Arose; 15) Relation between Time and Distance Intervals; 16) The World of the Flatlander; 17) Velocity and Mass in Different Worlds; 18) Summary of the Results of Special Relativity; 19) General Relativity.

This book is intended for all who wish to obtain a foundation of the principles of mathematical astronomy, with a view to undertaking the calculations necessary in every branch of the subject. It will be an advantage if readers have some knowledge of plane and spherical trigonometry, and it is assumed that they have a working acquaintance with at least the former.

Elements of Dynamic Meteorology, A. H. Gordon, *Principal Scientific Officer, Meteorological Office, Air Ministry* (D. Van Nostrand Company Inc., Princeton, N. J., 1962), 217 pp. $6.75.

Chapters: 1) The Behavior of Dry Air; 2) The Behavior of Moist Air; 3) Hydrostatic Equilibrium; 4) Equations of Motion; 5) Trajectories and Streamlines; 6) Balanced and Unbalanced Flow; 7) Circulation and Vorticity; 8) The Long Wave Equations; 9) Thicknesses and Contours; 10) Balanced Frictional Flow; 11) Sutcliffe Development Technique; 12) Numerical Prediction.

This book is written as a basic course for meteorologists, mathematicians, and physicists in theoretical meteorology at both undergraduate and postgraduate levels. It is designed to meet the need of all those who are taking up meteorology or any of the allied geophysical subjects as a career, but it should be useful also to students of other branches of science or engineering.

Transistors, Dennis Le Croissette, *Jet Propulsion Laboratory, California Institute of Technology* (Prentice-Hall Inc., Englewood Cliffs, N. J., 1963), 280 pp. $9.00.

Chapters: 1) Electrical Conduction in Semiconductors; 2) Electrons and Holes in Semiconductors; 3) Junctions between Materials; 4) The Continuity Equation 5) The Junction Transistor; 6) The Transistor as a Two-Port Network; 7) Low Frequency h Parameter Representation; 8) Single and Multistage a.c. Amplifiers; 9) Physical Characteristics of the Transistor; 10) High Frequency and Pulse Operation of the Transistor; 11) The Tunnel Diode.

This book provides an introduction to both the physical theory and the amplifying properties of transistors. It is suitable for use as an undergraduate text in electrical engineering and should be helpful also to engineers in industry who require a knowledge of transistors.

Engineering and Scientific High-Speed Photography, William G. Hyzer, *Consultant Research Engineer* (Macmillan Company, New York, 1962), 536 pp. $15.00.

Chapters: 1) Introduction to Photoinstrumentation; 2) Data-Recording Cameras: Low Speed; 3) Data-Recording Cameras: High Speed; 4) Photographic Optics; 5) Photosensitive Materials; 6) Lighting and Exposure; 7) Techniques in High-Speed Photography; 8) Oscillography; 9) Specialized Applications; 10) Film Analytical Techniques.

This handbook brings together in understandable terms information about the techniques, the potentialities, and the advantages of high-speed photography for scientific uses. It is designed for research engineers and scientists who need photographic records of their findings and for photographers who specialize in quantitative work.

Inertial Guidance Engineering, Manuel Fernandez and George R. Macomber, *both at Aeronautical Division, Minneapolis-Honeywell* (Prentice-Hall Inc., Englewood Cliffs, N. J., 1962), 530 pp. $14.75.

Chapters: 1) Introduction; 2) Basic Concepts for Inertial Navigation; 3) Gyros and Gyro Stabilized Platforms; 4) Accelerometers; 5) Inertial Systems; 6) Inertial Navigating System Configurations; 7) Steering; 8) Errors in Inertial Systems; 9) Error Analysis of Inertial Navigation Systems; 10) Aids for Reducing Errors; 11) Space Missions. *Appendixes:* 1) Proof of Vector Identity; 2) Solution of Simultaneous Differential Equations; 3) Lin's Method of Determining Roots of Polynomial; 4) Residue Theorem and Laplace Transformations; 5) The Earth; 6) The Solar System; 7) Vibration Effects on Gyros and Accelerometers; 8) Vibropendulous Torque Caused by Random Vibration; 9) Anisoelastic Torque Caused by Random Vibration.

This book provides a comprehensive course for personnel just entering the field and gives experienced personnel a complete reference source. Basic concepts involved in the various facets of inertial guidance are stressed from the analytical viewpoint as well as from the device or hardware viewpoint.

Introduction to Thermodynamics of Irreversible Processes, I. Prigogine, *University of Brussels, Brussels, Belgium* (Interscience Publishers, New York, 1962), 2nd ed., 119 pp. $5.00.

Chapters: 1) Conservation of Mass in Closed and Open Systems; 2) Conserva-

tion of Energy in Closed and Open Systems—The First Principle of Thermodynamics; 3) Entropy Production—The Second Principle of Thermodynamics; 4) General Statements Concerning Entropy Production and Rates of Irreversible Processes; 5) The Phenomenological Laws—Interference of Irreversible Processes; 6) Stationary Nonequilibrium States; 7) Nonlinear Problems.

This book presents a short and simple account of recent developments in the thermodynamics of irreversible processes. It is not necessary for the reader to be fully acquainted with classical thermodynamics, although a certain familiarity with its methods will facilitate understanding of the text.

Principles of Mechanics and Dynamics (formerly titled *Treatise on Natural Philosophy*), William Thomson and Peter Guthrie Tait (Dover Publications Inc., New York, 1962, orig. publ. 1879), paperback reprint in two volumes. Vol. 1, 508 pp., $2.35. Vol. 2, 527 pp., $2.35.

Technical Literature Digest

M. H. Smith, *Associate Editor*

The James Forrestal Research Center, Princeton University

Propulsion and Power (Combustion Systems)

Noise Measurements during Captive and Launch Firings of a Large Rocket-Powered Vehicle, W. H. Mayes and P. M. Edge Jr. NASA TN D-1502, Nov. 1962, 33 pp.

A Digital Propellant Utilization System, R. L. Rod and J. A. Massa. Aerospace Eng. **21,** 27–32 (Nov. 1962).

Charge Buildup on Solid Rockets as a Flame Burst Mechanism, R. M. Fristrom, F. A. Oyhus, and G. H. Albrecht. ARS J. **32,** 1729–1730 (1962).

Influence of Hetereogeneous Reaction Processes on Atomic Recombination Rates in Rocket Nozzles, S. S. Penner and J. W. Porter. Astronaut. Acta **8,** 240–242 (1962).

Propulsion and Power (Noncombustion)

Nonsimilar Numerical Methods of Solution for Electrode Boundary Layers in a Crossed Field Accelerator, G. L. Grohs. Boeing Sci. Research Labs., Flight Sci. Lab. Rept. D1-82-0192, Rept. 63, Aug. 1962, 56 pp.

A Composite Energy Gas Photovoltaic Cell, J. D. Nixon and N. E. Heydahl. Air Force Aeronaut. Research Labs. ARL 62-395, Aug. 1962, 39 pp.

Experimental Investigation of a 90° Flat-Plate Magnetic Triode for Direct Energy Conversion, R. R. Cullom. NASA TN D-1532, Nov. 1962, 13 pp.

Analytical Investigation of a Bipropellant Arc Jet, H. O. Noeske and R. R. Kassner. ARS J. **32,** 1701–1708 (1962).

Neutralization of Ion Beams from Engines of Annular Geometry, J. W. Ward and R. A. Hubach. ARS J. **32,** 1730–1731 (1962).

Propellants and Combustion

Theoretical Vibrational Energy Levels of H_2 Associated with Various Combinations of Molecular-Orbital Configurations, G. M. Leies. J. Chem. Phys. **37,** 1418–1424 (Oct. 1, 1962).

Reactions of Hydrogen Atoms with Hydrazine, Ammonia, and Nitrous Oxide, M. Schiavello and G. G. Volpi. J. Chem. Phys. **37,** 1510–1513 (Oct. 1, 1962).

Effects of Water on the Burning Velocity of Hydrogen-Air Flames, D. K. Kuehl. ARS J. **32,** 1724–1726 (1962).

Deflagration of Pressed Ammonium Perchlorate, M. D. Horton and E. W. Price. ARS J. **32,** 1745 (1962).

The Problem of an Explosion on the Surface of a Liquid, A. A. Deribas and S. I. Pokhozhaev. Soviet Phys.—Doklady **7,** 383–385 (1962).

Effect of Oxidizer Particle Size on Additive Agglomeration, L. A. Povinelli. NASA TN D-1438, Nov. 1962, 32 pp.

Bibliography on the High Temperature Chemistry and Physics of Gases and Gas-Condensed Phase Reactions, No. 5, L. Brewer. Internatl. Union of Pure and Appl. Chem., Commission on High Temperatures and Refractories, Sub-Commission on Gases, Sept. 30, 1962, 24 pp.

Materials and Structures

Investigation of High-Speed Impact: A Technique, W. B. Stephenson. Aerospace Eng. **21,** 10–16 (Nov. 1962).

A Method for Reducing the Number of Degrees of Freedom in Mathematical Models of Damped Linear Dynamic Systems, S. E. Staffeld. J. Eng. Ind. **84,** 418–422 (1962).

A Note on the Shielding of Energetic Particles in Space, S. P. Shun. Astronaut. Acta **8,** 228–231 (1962).

Measurement of the Density of Solid Bodies with a Gradient Tube, M. Ya. Kats. Instr. Exptl. Tech., no. 1, 180–183 (Sept. 1962).

Determination of the Heat and Electric Conductivity of Metals at Temperatures in Excess of 1000°C, V. S. Gumenyuk, V. E. Ivanov, and V. V. Lebedev. Instr. Exptl. Tech., no. 1, 188–192 (Sept. 1962).

Design Parameters for Elliptical Toroidal Pressure Vessels, H. M. Turner. Aerospace Eng. **21,** 33–38 (Nov. 1962).

National Electronics Conference, Proceedings (National Electronics Confer-

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