

problems are very judiciously chosen and cover a very wide area of applications. I do not know of any other example of extensive choice of problems in electron-microscopy practice.

While the price is somewhat high, I would like to recommend this book without any reservations. Its contents are so excellent and the book is so well presented that close to thirty dollars is not too high a price.

Gas flows

INTRODUCTION TO PHYSICAL GAS DYNAMICS. By Walter G. Vincenti and Charles H. Kruger Jr. 538 pp. Wiley, New York, 1965.

by T. Teichmann

Although the classical equations of gas dynamics are the direct consequence of the underlying atomic and molecular interactions and their statistical combination, it is only in recent years that this relation has come to have more than academic and conceptual interest. The practical importance of high-speed, high-temperature and low-density gas flows has impelled consideration both of the physical significance of the quantities occurring in these classical equations, and in the degree of approximation to reality. Kinetic phenomena and transport processes of all types have thus begun to play an important role in expositions of modern gas dynamical situations.

In this book, the authors, who are members of the Aeronautics and Mechanical Engineering Departments at Stanford University, have set out to describe the foundation of high-temperature and nonstationary gas flows with particular reference to the underlying physical phenomena. Most of the contents are therefore devoted to questions of kinetic theory and statistical mechanics, equilibrium and nonequilibrium reactions, and radiative transfer. Interspersed with these are discussions of gas flows, in which the main emphasis is on the deviations (if any) from the classical picture due to the underlying physical phenomena. There is a particularly extensive treatment of nonequilibrium kinetic theory and its application to flows with translational nonequilibrium.

The work is thus designed not so much to facilitate the analytical solution of a variety of problems, but rather to indicate the important physical phenomena, and the way in which they limit the idealized problem formulation in a variety of situations. These are, of course, illustrated by reference to the most important "standard" examples: plane shocks, nozzle flows, Prandtl-Meyer expansions plane acoustic waves, Couette flow, and the wavy-wall problem. The approach is by no means formal and overly academic, and is always aimed at physical situations. It is nevertheless amusing to note that in a book written by engineers and presumably for engineers (among others) very few of the hallowed nondimensional numbers of fluid mechanics are mentioned, and even the Reynolds number appears only as an aside in an example for the reader! Despite this minor caveat, the book can be well recommended, not only as a complement to more standard fluid-dynamical treatises, but also as a clear exposition of modern kinetic theory.

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The reviewer is a member of the staff of the General Atomic Division of General Dynamics Corporation in San Diego.

For users of photography

THE THEORY OF THE PHOTOGRAPHIC PROCESS. (3rd ed.) T. H. James, ed. 591 pp. (Collier-Macmillan, London) Macmillan, New York, 1966. \$25.00.

by M. F. McCarthy, S.J.

The publication of the revised, enlarged and extended third edition of the classic: *The Theory of the Photographic Process* will be welcomed by all whose work involves serious attention to the problems of photometry and photography. This is the first revision to appear after the death of C. E. Kenneth Mees, who edited the earlier volumes of 1942 and 1954; the present edition is a most worthy successor to these and will, together with them and the recently inaugurated Mees Observatory in Rochester, honor the memory of this pioneer of the photographic process.

The reviewer agrees with the new editor, T. H. James of the Eastman

Kodak Research Laboratories, that the title implies a more comprehensive coverage of the topic than could actually be realized. When the time comes for planning the next edition, the editor will have to decide whether to include a proportionate treatment of those processes which employ materials other than silver halides or simply to change the title to "The Theory of Silver Processes in Photography."

The present edition gives us an excellent treatment of a most difficult subject and synthesizes the latest information from several branches of physics and chemistry in a thorough survey of the principles, practice and problems of the photographic process. One notes especially the extensive contributions from crystal physics. In an effort to keep the book within reasonable limits (22 cm × 30 cm, 591 pages, \$25.00) the editor has condensed certain topics now chiefly of historical importance and quite properly makes frequent references to the earlier editions. This allows him more opportunity to accommodate the many important advances in this field since 1954. However, no one who owns one of the earlier editions will want to part with it; the third edition adds many treasures to the already rich trove of the earlier editions.

The book begins with a description of the properties of the silver halides both as crystals and as grains. There follows a discussion of gelatins and emulsions. It may be noteworthy that not all of the details concerning emulsion making have been revealed. The relations of density and exposure are discussed and the very clear exposition of reciprocity, intermittency and low temperature exposure effects is of special value. The theory of the latent image and its various effects are treated completely. A "textbook" rather than a "handbook" approach to these topics is most commendable. Especially in the chapters devoted to sensitivity, sensitizing dyes and the mechanism of sensitization one notes a certain modest reluctance of the authors to appear to be endorsing the local products. In any case most of those who read this volume will already be well supplied with the Kodak Technical Data Books and do not require

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By R. Jayaram

Geophysical Institute, University of Alaska

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APPROX. 225 PAGES PP OCTOBER 1966 \$12.50

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Edited by Academician D. V. Skobel'tsyn

Lebedev Physics Institute, Academy of Sciences of the USSR, Moscow

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APPROX. 240 PAGES CB SPECIAL RESEARCH REPORT
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REVIEWS OF PLASMA PHYSICS Volume 2

Edited by Academician M. A. Leontovich

Kurchatov Institute of Atomic Energy

Translated from Russian by Herbert Lashinsky

*Institute for Fluid Dynamics and Applied Mathematics
University of Maryland*

Contains four review papers concerned primarily with the problem of plasma confinement: Magnetic Field Geometries, by A. I. Morozov and L. S. Solov'ev; Plasma Equilibrium in Magnetic Fields, by V. D. Shafranov; Hydromagnetic Plasma Stability, by B. B. Kadomtsev; and Motion of Charged Particles in Electromagnetic Fields, by A. I. Morozov.

297 PAGES CB SEPTEMBER 1966 \$12.50

VACUUM MICROBALANCE TECHNIQUES, Volume 5

PROCEEDINGS OF THE PRINCETON CONFERENCE HELD AT PRINCETON, NEW JERSEY, SEPTEMBER 27-28, 1965

Edited by Klaus H. Behrndt

Bell Telephone Laboratories, Murray Hill, New Jersey

Another volume in an important series on advanced research in vacuum microbalance methods including 16 papers dealing with pivot bearings, construction of microbalances employing substitution weighing and a negative feedback system, the application of a balance to the measurement of thrust, and theoretical and experimental investigations of the thermomolecular flow effect, with special emphasis given to thin films and the theory, calibration, and applications of the quartz crystal oscillator.

APPROX. 245 PAGES PP OCTOBER 1966 \$13.50

METHODS IN THE QUANTUM THEORY OF MAGNETISM

By Sergei Vladimirovich Tyablikov

*Chairman, Department of Mechanics, V. A. Steklov Mathematical Institute
Academy of Sciences of the USSR*

Translated from Russian by Albin Tybulewicz

Editor of Physics Abstracts and Current Papers in Physics

With a Foreword by Daniel C. Mattis

Belfer Graduate School, Yeshiva University, New York

APPROX. 340 PAGES PP DECEMBER 1966 \$13.50

CHEMICAL BONDS IN SEMICONDUCTORS AND SOLIDS

Edited by N. N. Sirota

*Institute of Solids and Semiconductors, Academy of Sciences of the
Belorussian SSR*

Translated from Russian by Geoffrey D. Archard

Translation Editor: Charles P. Poole, Jr.

Dept. of Physics, Univ. of South Carolina, Columbia, South Carolina

APPROX. 275 PAGES CB SPECIAL RESEARCH REPORT
JANUARY 1967 IN PREPARATION

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more broadcast publicity. The physics and chemistry of developers is very well described and the chapters on sensitometry are of special excellence.

The final chapter, "The Structure of the Developed Image," was written by F. D. Perrin, one of the five authors who contributed to the first edition of 1942 and to the present volume. (The others are L. G. S. Brooker, B. H. Carroll, R. P. Loveland and A. Weissberger.) This chapter is of special merit and forms a fitting conclusion for the book. The author considers first the fundamental mathematical concepts required for an understanding of image structure and gives proper emphasis to the optical

transfer function; this leads to a description of the imagery of points, lines and edges and to a discussion of the resolving power of emulsions. His treatment of the errors of density and position is excellent. The value of *MT* curves is demonstrated throughout. Recent studies of granularity and of image evaluation are of special interest. The relation of the photographic process to the varied technologies of information recording and storage forms the conclusion to this chapter and to the entire volume.

The design, figures, tables and illustrations are of the highest quality. The references are extensive, accurate and most helpful for the interested

reader. Author and subject indices are, as always in a volume such as the present one, indispensable.

Along with their editor, the authors of the 23 chapters manifest their high competence together with a clarity of exposition and an accuracy of description of the diverse branches of photographic theory. All their colleagues who employ photographic techniques in their own researches are indebted to them for the excellence of this superb treatment of the photographic process.

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An astrophysicist, Father McCarthy is a member of the staff of the Vatican Observatory at Castel Gandolfo.

One-volume encyclopedia

ENCYCLOPEDIA OF PHYSICS. Robert M. Besançon, ed. Reinhold, New York, 1966. 832 pp. \$25.00.

by H. M. Otte

Should the need arise to fill a lull in the conversation during a social evening's gathering of scientists, one could broach the topic of the value of "Encyclopedias of This and That." The editor of this particular volume felt that an *Encyclopedia of Physics* would be of use to physicists who need information outside of their own special areas of interest, to teachers and librarians who must answer inquiries, to students who wish to add to their funds of knowledge, and to engineers and scientists who encounter physical concepts in pursuit of their professions. For this diffuse but large audience Besançon obtained the contributions of 320 "internationally" prominent authorities each of whom wrote about one article (some two and a half pages long) in his field.

No attempt was made to hold all articles at the same technical level; in fact, the level for each entry was supposedly aimed at those readers who would be most likely to look for information on that specific topic. In effect, the contents of each article were left to the discretion of the author, who in most cases provided references to summary articles and books; cross references to other articles in the *Encyclopedia* were added where they were thought to be of help.

Unquestionably the most difficult problem for the editor was deciding which topics to include and which to leave out since space was clearly at a premium. The choice of audience ensured inclusion of introductory articles on physics, on the history of physics, on measurements, and on symbols, units and nomenclature, plus general articles on the major areas of physics, as well as more detailed ones on the divisions and subdivisions of the major areas. Entries were also made on subjects that include both physics and other disciplines, such as astrophysics or mathematical biophysics. It is an easy temptation to judge the book not on what has been included, but rather on what has been omitted, since the omissions have necessarily been many, in some cases in areas that were supposedly to be emphasized. Thus, no mention could be found of the nomenclature for the elastic constants (that is, compliances and stiffnesses).

The contributors and their contributions are listed at the beginning of the book and present an imposing array. A most creditable feature of the book is the very comprehensive and detailed index, although a brief perusal did reveal at least one omission: under "Dislocation," no reference is made to page 145, where there is an important discussion of the topic. Finally, this reviewer feels that it would be of great interest, if not also

actually of considerable value, to be able to determine to what extent such books as this one do indeed fill a genuine need and if so, how well.

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The reviewer is manager of the Materials Research Laboratory of the Martin Company at Orlando, Fla.

BOOKS RECEIVED

ELEMENTARY PARTICLES AND FIELDS

Many-Body Theory. Part I of 1965 Tokyo Summer Lectures in Theoretical Physics. Edited by Ryogo Kubo, 1966. 160 pp. Benjamin, New York, \$6.75

Exchange Reactions. Symp. Proc. (Brookhaven, 1965). 417 pp. IAEA, Vienna, 1965, \$9.00

High Energy Physics. 1965 Les Houches Lectures. C. DeWitt and M. Jacob, eds. 509 pp. Gordon and Breach, New York, 1965. Cloth \$10.50, paper \$8.50

Lectures on High Energy Physics. Conf. Proc. (Hercegovina, 1961). B. Jaksic, ed. 532 pp. Gordon and Breach, New York, 1965. \$29.50

High Energy Physics. Part 2 of 1965 Tokyo Summer Lectures in Theoretical Physics. Edited by Gyo Takeda. 121 pp. Benjamin, New York, 1966. \$5.75

Accélérateurs circulaires de Particules. Introduction à la Théorie. By H. Bruck, 358 pp. Presses Universitaires de France, Paris, 1966

Internal Conversion Processes. Conf. Proc. (Nashville, May 1965). Joseph H. Hamilton, ed. 669 pp. Academic Press, New York, 1966. \$22.50

Methods in Computational Physics. Advances in Research and Applications. Nuclear Particle Kinematics. Berni Alder,