

wind". With a temperature of two million degrees, it generates radiations which the photosphere is unable to produce; yet its extreme tenuity prevents these radiations from reaching destructive levels.

A plasma of filamentary structure, betraying the rule of magnetic fields, it appears to be heated from below by shock waves into which sub-photospheric turbulence degenerates upon reaching the tenuous upper strata. The source of its heating is one of the many mysteries of coronal physics and structure discussed in this volume by 47 expert authors from eleven different countries. The contributions range from brief abstracts to extensive memoirs; a Russian article alone contains 22 pages of a table of predicted short-wave spectral emission lines of atoms and ions. Theoretical treatises prevail, setting up more problems than solutions. As examples of observational highlights, the use of American rockets with pinhole cameras for x-ray pictures of the sun, and the French method of polarimetric registration of the corona in daylight could be mentioned.

The volume covers current problems of coronal theory and observation. With ample lists of literature, it is an important landmark, facilitating further study of the corona.

Electromagnetic Waves in Stratified Media. By James R. Wait. Vol. 3 of *Internat'l. Series of Monographs on Electromagnetic Waves*, edited by A. L. Cullen, V. A. Fock, J. R. Wait. 372 pp. Pergamon, London, 1962. Distr. in US by Macmillan, New York. \$15.00.

Reviewed by H. J. Hagger, Albiswerk Zürich, Switzerland.

For studies in electromagnetic wave propagation in our terrestrial atmosphere, a model assuming a layer structure of the medium is very useful, especially for radio waves in the very low-frequency range (3 to 30 kc/s). J. R. Wait is a well-known research worker in this field, and the book reviewed is the outgrowth of courses in wave propagation given at the University of Colorado and the Technical University of Denmark.

Starting with some basic ideas and notation on Maxwell's theory, the author first considers the reflection of waves from horizontally stratified

media, where solutions for the plane waves, and later on for cylindrical (line-source) and spherical waves (dipole), are developed. Some experimental data are also given. In Chapter 3 the variation of conductivity or dielectric constant is assumed to follow certain profiles, where solutions following an exponential or a power law can be found. In the next chapter, continuously stratified media are considered and various approximation procedures either for slowly varying profiles (WKB method) or for rapid variation (iteration process) are given. Propagation along a spherical surface (of both large and small curvatures) is treated, using Watson's method for large, and Bremmer's approach for small, radii (or very low frequency waves around the earth). In Chapter 6 the author gives the fundamentals of the mode theory of wave propagation over a flat earth with a sharply bounded ionospheric layer. Later in the chapter he discusses the influence of the curvature of the layers guiding the waves. At the end of this chapter a stratification of the ionospheric boundary layer is also considered. In Chapter 7 the mode theory is derived for the very low-frequency case with the aim of obtaining numerical results for attenuation, phase velocity, and dominant mode excitation. In the next chapter Wait deals with the very important case of stratified magnetoplasma media. He starts with the dielectric properties of a plasma, the reflection coefficient for a plane boundary between free space and plasma and then develops the theory for a stratified plasma and for an anisotropic ionosphere and makes some remarks on strongly ionized media and the energy dependence of the collision frequency. In Chapters 9 and 10, theoretical and experimental results on very low frequencies (3-30 kc/s) and extremely low frequencies (1-3000 c/s), respectively, are compared. In the next chapter the relationship between mode theory and ray theory is discussed. In the twelfth (and last) chapter Wait considers propagation in a stratified medium having a parabolic refractive index profile, a problem which is of great importance at ultrahigh frequencies.

The book is an excellent monograph on this subject, and a large number of references to each chapter and very helpful indices are given. It is a very theoretical treatise, but clearly written. It can be highly recommended as a reference book for all research workers in the field.

Physics and Chemistry of the Organic Solid State, Volume 1. David Fox, Mortimer M. Labes, Arnold Weissberger, eds. 823 pp. Interscience, New York, 1963. \$25.00.

Reviewed by Stuart A. Rice, University of Chicago.

Following recent developments in molecular biology and solid-state physics, there has been a significant growth of interest in the study of the properties of organic crystals. The text under review consists of a series of articles by experienced investigators dealing with many aspects of the study of such crystals. No attempt has been made to collate in one volume articles which overlap and, for this, the editors are to be commended, since the volume has been published more rapidly than is typical of collections.

The articles vary considerably in quality. That by Craig and Walmsley on the visible and ultraviolet absorption spectra of molecular crystals is excellent and very readable. On the other hand, the article by Lions is disappointing.

The first article in the book, by Westrum and McCullough, deals with the thermodynamics of crystals. It gives a very good coverage of the field and cites approximately 800 pertinent references. There is some description of experimental techniques. In contrast to the thoroughness of this article, that by Sloan on the definition and attainment of purity in organic compounds is adequate but not detailed enough. Many different methods are discussed by Sloan, but too few examples are given to make the article truly useful. For example, tabular material on what substance A can be separated from what substance B and how much of substance A can be detected in substance B would have been very helpful.

Other articles deal with crystal growth, the structure of surfaces, plastic crystals, photochemistry, crystalli-



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PHYSICAL ACOUSTICS

Edited by WARREN P. MASON

Volume 1, Part A—*Methods and Devices*
March 1964, 515 pp., approx. \$17.50
Volume 1, Part B—*Methods and Devices*
Spring 1964, about 375 pp.
Other volumes in preparation

Physical Acoustics describes high frequency sound waves in gases, liquids, and solids, in their uses as tools for analyzing the molecular, defect, domain wall, and other types of motions that can occur in these media. Low and high amplitude waves in these media are also described in their device applications, including such uses as delay lines for storing information, mechanical and electromechanical filters for separating communicating channels, ultrasonic cleaning, testing, inspection, measuring, machining, and therapy.

ELECTRONIC METHODS

Edited by ERNST BLEULER and ROBERT O. HAXBY

Volume 2 of *Methods of Experimental Physics*
Edited by L. Marton

March 1964, 839 pp., \$24.00

Electronic Methods presents the most important methods and general principles of electronic measurements. It will aid the experimental physicist in the choice of the most appropriate system, the construction of apparatus, and the understanding of commercial equipment. Emphasis throughout is on description in terms of physical processes in the circuit components.

TENSORS IN MECHANICS AND ELASTICITY

By LEON BRILLOUIN

Translated by Robert O. Brennan
Volume 2 of *Engineering Physics: An International Series of Monographs*
Edited by Ali Bulent Cambel and Ascher H. Shapiro
March 1964, 478 pp., \$12.50

In this book, Professor Brillouin leads the reader from elementary concepts of vectors to tensor algebra and calculus in affine space. After the introduction of metric geometry and a study of differential operators in Riemann space, analytical mechanics is studied in tensor notation. The equations of elastic media are developed exactly, not in the usual first-order approximation, and radiation pressures associated with elastic waves are discussed in detail.

THEORY OF SUPERCONDUCTIVITY

By J. M. BLATT

Volume 17 of *Pure and Applied Physics*
Edited by H. S. W. Massey

1964, 486 pp., \$12.50

Emphasis is on the fundamental properties of superconductors (the nearly complete expulsion of magnetic fields from superconducting materials, and the persistent currents in superconducting rings). Thermodynamic properties, especially the nature of the thermodynamic transition between the normal and superconducting states and the exponentially decreasing specific heat at low temperatures, are given special attention. Detailed information available upon request.

COMPUTER PROGRAMMING

A Mixed Language Approach

By MARVIN L. STEIN and WILLIAM D. MUNRO

April 1964, about 450 pp., \$11.50

Computer Programming is a textbook designed to give a complete course in the three languages of computers—basic machine, symbolic machine, and problem-oriented. A unique feature is that it not only treats these three languages, but shows how they are interrelated and may be mixed in writing programs for a computer. It uses a real computer instead of a hypothetical example thereby giving a more comprehensive coverage that enables the student at the earliest opportunity to use a computer, yet have an understanding of both what he and it are doing.

ELECTRON PARAMAGNETIC RESONANCE

By S. A. AL'TSHULER and B. M. KOZYREV

Translated by Scripta Technica
Edited by Charles P. Pool, Jr.

March 1964, 372 pp., \$13.50

This book is a comprehensive treatise on the field of electron paramagnetic resonance, covering both the theoretical background and the results of experiment. The text includes discussions of much Russian work that has never been available in English.

DISCRETE AND CONTINUOUS BOUNDARY PROBLEMS

By F. V. ATKINSON

Volume 8 of *Mathematics in Science and Engineering*
A Series of Monographs and Textbooks
Edited by Richard Bellman

February 1964, 570 pp., \$16.50

Discrete and Continuous Boundary Problems is devoted to the theory of boundary problems in one dimension . . . to "ordinary" differential equations, their analogs, and extensions. The work first discusses recurrence relation theories pertaining to boundary problems and differential equations. Secondly, it explores theories of boundary problems for ordinary differential equations.

MARKOV PROCESSES

By E. B. DYNKIN

Authorized translation from the Russian by Jaap Fabius, Vida L. Greenberg, Ashok Maitra, and Gian Domenico Majone at the Statistical Laboratory, University of California, Berkeley
A Springer-Verlag title published in the U.S.A. and Canada by Academic Press, at identical list price.

Volume 1, 1964, about 350 pp., \$12.00

Volume 2, 1964, about 350 pp., \$12.00

This systematic exposition of the modern theory of Markov processes accents new relationships with potential theory as well as new concepts demonstrating the increased importance and value of Markov theory. The Appendix, containing information for understanding the text material, includes results of measure theory, probability theory, and the theory of differential equations.

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zation of long chain polymers, and the thermal reactions of solids. In general, the articles collected give an overall though spotty view of the current status of our knowledge of the properties of molecular crystals. I am confident that the second volume of this series will fill in the gaps, thereby making the set an indispensable aid to all those investigators interested in the properties of these substances.

Methods of Quantum Field Theory in Statistical Physics. By A. A. Abrikosov, L. P. Gorkov, and I. E. Dzyaloshinski. Revised English edition translated and edited by Richard A. Silverman. 352 pp. Prentice-Hall, Englewood Cliffs, N.J., 1963. \$16.00.

Reviewed by George H. Weiss, Rockefeller Institute.

The technique of representing terms of a series by diagrams was first developed for the solution of problems in statistical mechanics. Although the most spectacular advances in the mathematical techniques were made by field theorists, events have come full circle and it is statistical mechanics that reaps the greatest benefit from those advances. The present book gives an account of the considerable contributions made by Russian workers in the systematic application of field theoretic techniques to problems in statistical mechanics.

To this reviewer the outstanding virtue of the book is its emphasis on the role of physical insight as an aid to the usual heavy mathematics. The first chapter, for example, introduces the reader to the concept of elementary excitations in liquids without any formalism. After some of the physical ideas are presented, the authors give an account of the mathematical techniques necessary to treat in detail, the problems suggested by the first chapter. Not surprisingly the authors emphasize the Green's-function approach of Migdal and Galitskii rather than methods more popular in Western research. Further, the book is concerned only with equilibrium problems rather than with any of the more vexing transport questions.

Aside from their presentation of the bare bones of the theory, the authors discuss several interesting applications which are not usually found in texts of this sort. Among these are the