Books

Magnetism, edited by G. T. Rado and H. Suhl

Published (1963) by Academic Press, Inc., 111 Fifth Ave., New York 3, N. Y. 597 pages+25 index pages+xv pages+references by chapter. Illus. 6×9. $18.00.

Although described as Volume III, this is, in fact, the first to be published of a set of three volumes designed to cover the modern theory of magnetism and magnetic materials. The total project is an ambitious one, involving almost 2000 pages and costing over fifty dollars for the three volumes. It therefore represents a major investment to the prospective buyer, but one which is almost mandatory for anyone connected with magnetism, since there are at present no comparable alternatives in scope and coverage. Nor is any similar compendium likely for a long time to come.

The form of these volumes is a series of somewhat related, but essentially independent, review articles, written by over forty leading research workers in their respective fields. Some of the articles refer to previously published reviews and concentrate on selected areas in which there has been recent progress, and while this is very welcome to the specialist, it is hard on the newcomer to the field. All the articles contain copious numbers of references to original papers (over two hundred in one case). For both specialists and newcomers to the field, it might be a welcome concession if individual articles could be made available separately.

The present volume contains twelve articles, and a good impression of the scope and contents may be gathered from the list of authors and titles. To this list we shall add a few brief explanatory comments, thought it is clear that it is impossible to give any detailed description of the full scope:

1) J. B. Goodenough: Magnetism and Crystal Structure in Nonmetals. Description of structures, elements of ligand field theory and their relation.
2) J. S. Smart: Evaluation of Exchange Interactions from Experimental Data (Non-metallic compounds). Analysis in terms of "isotropic exchange" model; good discussion of data on isolated clusters.
3) P. G. Gennes: Theory of Neutron Scattering by Magnetic Crystals. An excellent formulation of the basic theory in general terms but very condensed. Marred by inadequate editing (*e.g.* failure to translate 95 p. 100 into the english equivalent 95 per cent).
4) E. F. Bertant: Spin Configuration of Ionic Structures: Theory and Practice. Detailed theoretical treatment includes much of the author's own formulation, well illustrated by examples. Experimental data discussed in terms of relation to theory rather than practical methods of analysis.
5) R. Nathans and S. J. Pickart: Spin Arrangements in Metals. General discussion of background and experimental methods. Results related to actual observations. Excellent discussion of form factors.
6) I. S. Jacobs and C. P. Bean: Fine Particles Thin Films and Exchange Anisotropy. Clear and comprehensive review of the effects of finite dimensions and interfaces: super paramagnetism, surface and exchange anisotropies.
7) E. P. Wohlfarth: Permanent Magnet Materials. Review of recent advances in general theory, and discussion of actual materials.
8) S. Shtrikman and D. Treves: Micromagnetics. Survey of the problem of finding magnetization distribution in ferromagnets without invoking semiempirical domain concepts.
9) J. F. Dillon, Jr.: Domains and Domain Walls. Methods of observation and recent results on relatively simple systems, such as single crystals and whiskers. Very well illustrated. Sections on domain wall motion experiments and antiferromagnetic domains.
10) D. O. Smith: Structure and Switching of Permalloy Films. Review of maggetization reversal processes in technically important films. A good introduction to a rapidly developing field.
11) E. M. Gyorgy: Magnetization Reversal in Non-Metallic Ferromagnets. Complementary to the article on thin films. Discussion of current models of switching in ferrite cores.
12) C. J. Kriessman and N. Goldberg: Preparation and Crystal Synthesis of Magnetic Oxides. A useful introduction to the art of material preparation—necessarily somewhat condensed, but contains a good collection of references.

Altogether this is a very welcome and highly informative addition to the literature on magnetism. An expensive book, primarily for specialists, which surveys a significant fraction of our present day understanding of the wide range of magnetic phenomena.

W. P. Wolf
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Wave Interaction and Dynamic Nonlinear Phenomena in Plasmas

Published (1963) by The Pennsylvania State University, College of Engineering, University Park, Pa. 234 pages+vi pages+references by chapter. Illus. 8½×11. $5.00.

This volume is a mimeographed collection of the papers presented at a conference held at the Pennsylvania State University in February 1963 and sponsored by the Ionosphere Research Laboratory of that University and the National Aeronautics and Space Administration. The conference was an outcome of the increasing concern, of investigators in fields ranging from radio-astronomy to high power microwave devices, with the nonlinear behaviour of waves in plasmas. The topics covered by the papers are electromagnetic nonlinear interaction and reflection from a plane ionized medium; nonlinear generation of harmonics in magnetoionic media; interaction of charged particle streams with whistlers; radio bursts from the sun; nonlinear theory of multistream electronic devices; nonplanar phenomena in electron beams, and beam-plasma amplifiers. It is a pity that some of the invited papers on plasma physics that formed the basic structure of the conference appear only in abstract form. This omission considerably detracts from the usefulness of the volume, as they would have provided a continuity of theme for the remaining papers which cover particular fields.

The papers are theoretical in content except for one or two concerned with the experimental end of beam-plasma interaction—they are addressed to the specialists in their respective fields. A person grounded in the general principles of plasma physics may succeed in following the gist of the argument after overcoming a nomenclature that differs from field to field. Numerical techniques for attacking nonlinear problems are discussed, *e.g.*, the model that regards an electron beam of finite diameter as a set of discs. These techniques yield interesting results. Analytical treatment of nonlinearities center mostly around the method of asymptotic expansions developed in its general form by Kryloff and Bogoliuboff. It is evident that nonlinear work in plasma physics will receive even greater attention in the future. The Pennsylvania State University is to be commended for bringing out the proceedings of this conference.

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Modern Mathematics for the Engineer, edited by Edwin F. Beckenbach

Published (1963) by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. 497 pages+16 pages+xxii pages+references by chapter. Illus. 5½×8. Paperback. $3.45.

This is a paperback edition of a book originally published by McGraw-Hill in 1956. It consists of lectures given in an extension course at the University of California, Los Angeles, and at the University of California, Berkeley. There are so many authors and such a catholicity of subjects that a simple listing of chapters and authors seems the quickest effective way to indicate the scope of the book:

Part one: Linear and Non-linear Oscillations, by S. Lefschetz; Equilibrium Analysis, by R. Bellman; Exterior Ballistics, by J. W. Green; Elements of the Calculus of Variations, by M. W. Hestenes; Hyperbolic Partial Differential Equations, by R. Cou-