

### Ferromagnetisme et antiferromagnétisme, Grenoble, 3 juillet-6 juillet 1950

(Colloques Internationaux du Centre National de la Recherche scientifique, 27.) Pp. iv+360. (Paris: Centre National de la Recherche scientifique; London: H. K. Lewis and Co., Ltd., 1951.) 3500 francs; 77s.

THIS volume, comprising part of the March 1951 number of the *Journal de Physique*, contains the papers presented at an international conference in Grenoble in 1950 and the discussions arising from them; the majority of the papers were mentioned briefly in an article on the conference published in *Nature* (166, 777; 1950). Although much of the work reported in the various papers has by now been published elsewhere, many of the reviews of particular subjects or of the work of particular laboratories bring together scattered information and provide a stimulating presentation of it.

The contributions from France itself, covering a wide range of detailed experiments on various anti-ferromagnetic compounds and important advances in the theory of these materials, as well as of the coercive force and magnetic viscosity of ferromagnetics, show how worthily the French tradition of magnetic research is being upheld.

Among the papers contributed by foreign visitors there are useful reviews of recent work on ferromagnetic resonance and on the thermal changes associated with magnetization, summaries of the properties of ferrites and of modern permanent magnet materials, and a very lucid account of the principles of the collective electron theory of ferromagnetism. The recent very beautiful American and British work on domain structures as revealed by the powder pattern technique is also reported, but its vivid presentation by motion pictures, which was so striking a feature of the conference, cannot, of course, be repeated in this book.

K. H. STEWART

### The Algebra of Vectors and Matrices

By Thomas L. Wade. (Addison-Wesley Mathematics Series.) Pp. ix+189. (Cambridge, Mass.: Addison-Wesley Press, Inc., 1951.) 4.50 dollars.

THE scope of this book is wider than would be expected from its title. In addition to an account of vectors and matrices, there is also a chapter on abstract algebra, and these subjects are correlated. This is a great advantage to students of pure mathematics, who are helped to understand the difficult concepts of abstract algebra by concrete examples of entities to which they relate, and at the same time to gain a deeper understanding of vectors and matrices by seeing how their properties exemplify general theorems. The book can also be used by students of physics or engineering, by the omission of the sections on abstract algebra indicated in the preface. The mathematical knowledge assumed is a first course in analytical geometry and determinants.

The abstract algebra comes in Chapter 1, which gives a lucid introductory account of groups, integral domains, fields and rings. Chapter 2 deals with vectors in two and three dimensions, Chapter 3 with vector methods in geometry, and Chapter 4 with vectors in  $n$  dimensions. Matrices are introduced in Chapter 5, and further considered in Chapter 6. Chapter 7 deals with groups of matrices, matrix representation of groups, and transformations. The characteristic equation is considered in Chapter 8,

and the concept of rank in Chapter 9. Chapter 10 gives a brief account of linear, bilinear and quadratic algebraic forms, referring to other books for proofs of the more difficult theorems. Chapter 11 gives some applications of matrices, including those to statistics and the 'multiple factor' analysis of psychology. The book concludes with two short appendixes, a bibliography, an index and answers to the exercises.

H. T. H. PIAGGIO

### The Theory of Group Characters and Matrix Representations of Groups

By Prof. Dudley E. Littlewood. Second edition. Pp. viii+310. (Oxford: Clarendon Press; London: Oxford University Press, 1950.) 25s. net.

THIS new edition of Prof. D. E. Littlewood's well-known book is reprinted lithographically from corrected sheets of the first edition, a method of which the possibilities for extensive alteration are obviously strictly limited. The author has added an appendix summarizing recent applications of the theory of  $S$ -functions to invariant theory, and in one or two places in the body of the book he has given references to recent work which has caused him to modify his opinions. Otherwise, the only alterations are the correction of a number of misprints, so that the virtues and faults of the book are substantially unchanged. Unfortunately, some mistakes remain, the most important being the quite inaccurate table of characters given on p. 279 for the simple group of order 504; and some of the corrections have been wrongly made, as on p. 123 where in the two penultimate formulæ the exponent of  $q$  should read  $(r-1)\lambda_r$ . This is a pity, because the book both requires and deserves a more thorough overhaul.

GRAHAM HIGMAN

### Fluorine and its Compounds

By Dr. R. N. Haszeldine and Dr. A. G. Sharpe. (Methuen's Monographs on Chemical Subjects.) Pp. vii+154. (London: Methuen and Co., Ltd.; New York: John Wiley and Sons, Inc., 1951.) 8s. 6d. net.

DURING the past decade advances in fluorine chemistry have been so rapid that most chemists find it difficult to keep abreast with new knowledge in this field. In reviewing fluorine and its compounds, Drs. R. N. Haszeldine and A. G. Sharpe have written a timely and commendable little book in which a store of knowledge has been condensed into a small space.

The first chapter deals briefly with the preparation, properties and analysis of fluorine, and the second chapter deals in the same manner with the two fluorine compounds, hydrogen fluoride and boron trifluoride, which have a high commercial significance as catalysts. The third chapter deals with the inorganic fluorides in a clear and precise manner and provides a useful summary. Finally, the last chapter, about half the book, deals with the rapidly expanding subject of the organic compounds of fluorine. A summary is given of the methods of synthesis and of the chemical and physical properties of many important compounds such as the 'Freons', the fluoroacids and polytetrafluoroethylene. Apart from the incorrect statement on p. 94 that DL-trifluoromethyl lactic acid gives a methacrylate derivative on treatment with sulphuric acid, one finds very few errors.

The book will be particularly useful for students. It is essentially a digest and, like all good digests, whets the appetite for more.

M. STACEY