Fourier transforms and their physical applications. By D. C. CHAMPENEY. Pp.x+256, Figs. 26, Tables 16. Techniques of Physics Series No. 1. London: Academic Press, 1973. Price £5·20.

My reactions to this first volume of the 'Techniques of Physics' series are somewhat mixed. Perhaps this should not be too surprising as the author has set himself the almost impossible task of writing a single book of moderate size which will serve 'both as an introduction and as a reference book for those whose work brings them into contact with the subjects, be they advanced undergraduates, postgraduates or others'.

The plan is straightforward; about a third of the book is devoted to introductory theory and the remaining two thirds to applications in electrical systems, to information retrieval, and to optical, X-ray, neutron and electron diffraction. The choice of topics is good and I certainly applaud the notion of using the wide range of applications to enable students to bring the equations to life and to see how the various concepts have such wide validity. As a reference work it is of great value and I particularly liked the beautifully drawn table of one-dimensional Fourier transforms which I would place among the most useful 20 pages in any text on this subject that I have seen for a long time. What a pity that the table of two-dimensional transforms confines itself to equations: a corresponding series of drawings – or photographs of optically-derived transforms – would have widened the usefulness and appeal of the book enormously. Indeed the very small number of drawings and the complete absence of any photographs in a book dealing with experimental applications in optics, holography, X-ray diffraction *etc.* seems to me to be an unfortunate feature.

The chapters on optical and X-ray diffraction – which I freely admit are those to which I turned first – seem disappointing and contain ideas which I find obscure. As an example, the reference on pages 148–149 to the idea that diffraction at one-dimensional objects occurs in two-dimensional space and the conclusion that the results cannot be extended to X-ray diffraction by three-dimensional objects since this would involve four-dimensional space leaves me thoroughly confused and leads the author to miss some splendid opportunities for extending the ideas of unification. I was also disappointed to find a brief – and somewhat odd – reference to Fourier synthesis using a 'large array of loudspeakers each emitting a harmonic wave' on page one and then no further reference to applications in acoustics though this would seem to be an admirable field for illustrating many of the one-dimensional ideas. My final criticism is that there are no references to original papers and the bibliography is short and very limited.

Perhaps most of my comments reflect my own biased view. The whole subject of Fourier transformation is of such elegance and the range of applications so wide that personal preferences are bound to colour one's view. This is a most valuable addition to the literature of the subject and I shall certainly keep my copy close at hand for reference.

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Laser theory. Edited by FRANK S. BARNES. Pp.ix+469, Figs. 242. New York: IEEE Press Selected Reprint Series, 1972. Price £7·50 (cloth), £3·75 (paper).

When Dieter Röss's book on lasers, light amplifiers and oscillators by was translated into English in 1968, he took the opportunity of up-dating the references. There are 4310 of them in the English edition. It is unusual for a lecturer to quote all of these in a course on lasers. Out of any such comprehensive collection however, there emerge a number of papers which form true landmarks of the development of the subject, papers of which the free supply of reprints from the author have long since dried up, and which provide work for the Xerox machine annually in departments where lasers are studied. *Laser Theory* is a collection of just such papers, tracing the development of the major ideas in laser theory since the early fifties. In six sections – Historical, Resonators, Oscillators, Amplifiers, Modulation and Mode-Locking, and Noise, it gives a remarkable perspective of the whole field of laser theory. The selection of only 37 papers from the deluge of the period up to 1971 (the latest date appearing) can have been no easy task. No two editors would probably agree *precisely* on such a selection, but there would be few indeed who would not have included the majority of the papers in this volume. Useful.

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Internal friction of structural defects in crystalline solids. By R. DE BATIST. Pp.xii+490, Figs. 180, Tables 28. Amsterdam: North Holland, 1972. Price *f*120.00 (*ca.* $37.50).

This book is the fifth in the series *Defects in crystalline solids*, edited by S. Amelinckx, R. Gevers and J. Nihoul. Elastic waves in a real crystal interact with point defects, dislocations and internal surfaces, leading to internal friction: a dissipation of energy which accompanies the strain response of a solid to a stress. The effect provides a powerful tool for the study of defects in solids, and one which has been extensively developed and applied in the past two decades. Not a few of these contributions have been made by the author of the present volume. Broad coverages of the interactions of phonons with both intrinsic 'lattice' properties and defects are available – the series *Physical acoustics*, edited by W. P. Mason, for example. The present volume is unique in providing thorough and balanced coverage of the principles, experimental procedures, and review of the experimental results of internal friction studies.

The book is well planned and organized. It opens with a brief (34 pp.) review of the nature of crystalline solids, point defects, tensor representation of elastic properties, and planar defects. This summary is superficial. Crystallographers, in particular, will be disappointed to find mention of only a few simple structures, and at encountering, the all-too-familiar reference to interpenetrating cubic lattices'. The coverage of point defects is correspondingly thin. The discussion of tensors and elasticity is too terse to

be digested by anyone not already familiar with such areas. One feels that these sections are included only for the sake of completeness.

These, however, are but opening preliminaries; the stage is set, and even the modestly informed will approvingly note that the requisite cast of characters is in place. Chapter 2 (95 pp.) moves quickly into internal friction: a formal discussion of anelasticity and relaxation effects, and the experimental means for the observation of these phenomena. Following are three Chapters which form the heart of the book: 'Relaxation of point defects' (99 pp.) 'Dislocation damping effects', with especial emphasis upon the 'vibrating string' model (208 pp.) and 'Two-dimensional defects' (28 pp.). Each of these three chapters contains an extensive review of experimental results.

The typography of the book is clean and appealing. The subject matter is well organized and more than 600 references are included in the bibliography. These appear to be complete through 1969. Well prepared subject and author indices are included which enhance the usefulness of the book. The decision to limit the scope of the book, combined with the balance maintained between theory, technique and a review of available data, have provided both a timely review for the expert and a concise and valuable introduction for those who might wish to become familiar with this area.

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Symmetry and its applications in science. By A. D. BOARDMAN, D. E. O'CONNOR and P. A. YOUNG. Pp. xiii + 305. Figs. 49, Tables 38. New York: McGraw-Hill, 1973. Price £4.75.

The first two chapters of this book are devoted to basic group theory and to group representation both in abstract notation and in matrix form. The assumed background is minimal and for readers requiring such assistance there is a lengthy appendix dealing with matrix theory. The material is supplemented in these chapters and throughout the remainder of the book with many helpful figures although the pictures illustrating the point groups C_2, C_{2h} and S_2 in Fig. 1·4 require a vivid imagination on the part of the reader.

Chapters three and four are devoted to the application of group theory to quantum mechanics and crystal symmetry respectively. The treatment is rather abstract and general but perhaps this is inevitable in a book which covers so much ground and attempts to put over a general principle rather than to teach explicit areas of science. The reader really needs a fairly sound prior knowledge of these subjects in order fully to appreciate the elegance of the group-theoretical approach. If the first introduction to these topics was *via* this book then no great feel for them should be expected.

Chapter five deals with symmetry as applied to tensor quantities with particular reference to conductivity, electrical and thermal, and to the piezoelectric effect.

The final chapters are devoted to energy bands in solids, molecular vibrations and normal modes, molecular orbitals and, finally, the symmetry of atoms. In the final three chapters there is a greater sense of being in contact with real applications to physical problems of interest.

Taken all-in-all this is quite a good book. However, it is the opinion of the reviewer that the authors' stated intention, that it might act as an undergraduate text for those reading physics, chemistry and electrical engineering, is unlikely to be realized. The material is at too advanced a level for any but a few of the very best theoretically-biased undergraduates. On the other hand it provides the basis for an excellent course as part of the postgraduate training of a theoretical physicist or chemist. Many crystallographers should find something of interest in this book. Its value as a textbook is enhanced by the provision of excellent problems at the end of each chapter and a section at the end of the book, some 45 pages, is devoted to detailed solutions of the problems.

It is a sad indication of present day trends to note that a book of this size, with a soft cover and no obviously expensive production features should be the price it is. At this rate books will be luxury items within a few years.

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Surface and defect properties of solids. Vol. 2. By J. M. THOMAS and M. W. ROBERTS - Senior Reporters. Pp. xi + 277, Figs. 36, Tables 33. London: The Chemical Society, 1973. Price £7.50.

This review covers another member of the proliferating series of publications which purport to serve the expert by reporting progress in a specialized area of scientific activity. The range of topics is broad in scope and the coverage is rich in detail. The senior reporters and individual authors have produced an excellent set of 9 specialist reports encompassing Recent Trends in Low Energy Electron Diffraction, Some Developments in Field Ion Microscopy, Electron Spin Resonance Studies of Adsorbed Species, Reactions of Saturated Hydrocarbons with Hydrogen on Metals, Infrared Studies of Species Adsorbed on Oxide Surfaces, Orientational Order and Disorder in Solid Isotopic Methanes, Point Defects in Ionic Crystals, The Role of Structural Defects in the Luminescence of Organic Molecular Crystals and Diffusion in Molecular Solids. The table of contents for each article is detailed and informative.

The authors of each of the articles are acknowledged experts who have provided in several cases not only a summary of recent progress but, in addition, a critical review of the current state of their subjects and a preview of impending developments and possible new directions in their fields. In every case the reports include references to literature published in 1972. The Chemical Society deserves praise for the policy of rapid publication which makes these reports timely as well as authoritative. It is not possible in limited space to mention for each of these reports all of the attractive features which merit comment. However, the coverage of Point Defects in Ionic Crystals by Corish and Jacobs is especially noteworthy for its com-