the use of this theory to solve both the structures of the low-index faces of simple metals and the structures of ordered adsorbates upon these faces. This book describes these developments from the point of view of one of the major protagonists of LEED. It is quite clear that the community of scientists working on LEED have surmounted the first barriers towards using the technique to solve surface structures and Dr Pendry shows how the complicated theoretical treatment necessary is built up and then programmed for the computation of LEED intensities.

After a brief introduction dealing mostly with the elements of the experimental method the book contains descriptions of the theory of scattering processes for low energy electrons, diffraction from rigid lattices, schemes of calculation and perturbation schemes which can save computational time, diffraction modified by thermal vibrations and, finally, the solution of the structure of simple ordered adlayers on low-index metal faces. There are substantial appendices containing programs in Fortran IV for the calculation of LEED intensities, the phase shifts for spherically symmetric ion cores and their temperature dependence and of the structure of simple adlayer systems.

The book is offered as a stimulus to the further application of LEED theories to new problems in surface science and it is for this reason that the computer programs have been appended. Although this is extremely useful it might have been wiser to include a clear warning to the potential surface crystallographer pointing out that the theory is not at the point where it can be simply used. These are long, complicated and sophisticated calculations with many approximations 'built-in' and the potential investigator should be aware that he is about to commit himself to many hundreds of hours of effort assessing the validity of the theory/experiment comparisons. He should not be lulled into a false sense of security.

Nevertheless, this in important book which will be useful to anyone working with LEED or planning a start in the field because it makes clear many of the theoretical ideas in use now. It is marred by a moderately high incidence of typographical errors which means that the reader will need to check equations rather carefully.

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Dynamical properties of solids. Vol. 1. Crystalline solids, fundamentals. Edited by G. K. HORTON & A. A. MARADUDIN. Pp. ix + 662, Figs. 103, Tables 19. Amsterdam: North Holland, 1974. Price *f* 225.00, U.S.$86.50.

There have recently been written a number of introductory books on the dynamical properties of solids, but the classic text by Born and Haung has remained the definitive work for all serious workers in the subject. The editors undoubtedly hope that the three books to be published in this series will replace Born and Huang as the standard reference. In this aim the editors are to be praised because there has been considerable progress in the subject during the last twenty years and a new definitive text on the subject would be welcome. Alas, I feel they fail in their aim by choosing the medium of a multiple authorship book. Many of the difficult and subtle aspects of the subject are omitted because none of the authors is prepared to dwell on too much detail, while conversely many of the connexions between different aspects of the subject are lost by having them described by different authors using different notations.

Many of the individual chapters are, however, excellent accounts of particular aspects of the subject. I found the three chapters on the microscopic theory of lattice dynamics of metals (Brovman and Kagan), semiconductors (Sham) and insulators (Bilz, Gliss and Hanke) particularly good. Even in these cases there is of necessity much overlap between the chapters and they would have been even more useful if they had been written in a common framework by a single author when the reader would have been more easily able to see the similarities and differences between the treatment of the different types of solids, and their relationship to the unfashionable phenomenological models described by Hardy.

The three chapters on anharmonic effects I found less appealing. The authors seem to have forgotten that anharmonic effects occur in real crystals on which experimental results can be obtained. There is more to anharmonicity than Green's functions: There is another account of the application of group theory to lattice dynamics, and, surprisingly in such a theoretical book, there is a good description of neutron scattering techniques, mostly as practised at Chalk River, by Dolling.

Unfortunately the price of this book is so high that one must be sure of obtaining value for money before ordering it for the library. Despite the undoubted quality of the individual chapters, I find it disappointing that the editors have not imposed greater discipline on their authors, so that the books could cover the whole of the subject in a more coherent and uniform presentation than is provided at present.

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Ondes élastiques dans les solides. By E. DIEULESAINT and D. ROYER. Pp.xvi+407, Figs. 252. Paris: Masson, 1974. Price 196F.

This book is one of a series entitled *Monographs d'Electronique* under the general editorship of Professor Pierre Grivet. The intention of the authors is to cover the mathematical techniques which are necessary for an understanding of mechanical waves in crystals, and the associated phenomena of piezoelectric and electro-optic interactions. The book is clearly for engineers with rather more than average mathematical ability; it does not set out to explain the fundamental physics underlying the macroscopic behaviour of the materials which are involved.

Even with this restriction, a very wide range of subject matter has to be covered, and the authors have evidently tried to give the reader a sound grounding in fundamental theory and a list of references which will enable him to

extend his understanding in the direction appropriate to his interests. In this they have adopted the sensible policy of not bewildering him with too wide a selection of material, while at the same time covering the main source books and papers in relevant topics. However, there are a few obvious omissions: I was, for instance, surprised not to see a reference to Cady's work on piezoelectricity, nor do I regard the three books given in the bibliography at the end of the section on tensors as really adequate for such a wide subject which, inevitably, has had to be severely compressed within the confines of the present work.

The structure of the book has been well planned. In Chapter 1 some general theorems for the propagation of one-dimensional waves in continuous and discontinuous media are given, and the use of Fourier integrals for the analysis and synthesis of complex signals is introduced. The second chapter is a short course on the elements of crystal physics, setting out the basic Bravais lattices and point-symmetry elements, and this is followed by a chapter on the theory of matrices and Cartesian tensors. Chapters 4 and 5 deal with the theory of static and dynamic elasticity, the latter including an outline of the concept of 'slowness surfaces' and their application to plane-wave propagation in aeolotropic media. The author does not go beyond simple plane bulk and shear waves and two-dimensional surface or Rayleigh waves, referring the reader elsewhere for the development of the theory to systems involving non-Cartesian coordinates. Chapter 6 introduces the modifications to the equations of wave propagation which are needed to take account of the piezoelectric effect, and lists the third-rank reduced symmetric tensors corresponding to the relevant point symmetry groups. The use of the Cristoffel tensor, first introduced in Chapter 5, in analysing the propagation of waves in a piezoelectric medium is also developed. The final three chapters are devoted to the application of the foregoing theory to the design of transducers for the generation and detection of mechanical waves (Chapter 7), to electro-optic effects and the interaction of optical and mechanical waves in solids (Chapter 8) and, finally, to some applications of electro-mechanical and electro-optical devices in signal-processing systems.

As a book for individual study it is probably rather too condensed for the majority of students, although the worked examples at the end of each chapter are designed with considerable ingenuity to illuminate the text and to give the reader an opportunity to assess his comprehension at each stage. It would, however, make an excellent reference work, either as an adjunct to a series of post-graduate lectures or for more mature engineers needing a refresher course in the relevant topics. The general standard of production is good, the typescript is clear and the diagrams well set out, although the binding is somewhat utilitarian and austere by British or American standards. (In particular its colour is a rather sickly orange-brown, not at all attractive.) For French-speaking readers I would judge the book as fulfilling a real need, and I would recommend it to them as an excellent source-book of the fundamental theory of the subject. However, for English readers there are two reasons why it could not be recommended without reservation: one is the obvious one that it is in French, and all the material is quite readily available in English texts (*e.g.* Hearman's *Applied Anisotropic Elasticity* or Musgrave's *Crystal Acoustics*, together with Nye's *Physical Properties of Crystals* cover the bulk of the material) and the second reason is the very high price, equivalent at present exchange rates to nearly £20 sterling. This is likely to restrict its purchase mainly to libraries, which is unfortunate as the book is likely to be more useful for long-term study than as an occasional reference. But for anyone who is not put off by the price or the language this is certainly a book to be recommended as a clear and authoritative exposition of existing knowledge on the subject.

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