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unless he has a familiarity with the properties of these functions. The authors would have done better if one or two chapters had been devoted to motion under periodic and nonlinear dynamical systems, where Mathieu and allied functions come to play an important role in the solution of such problems. In addition, a complete discussion of van der Pol's equation as an important example among nonlinear equations might have been helpful. The same objections could be raised in connection with the section on the Navier-Stokes equation. Here, again, examples from magnetohydrodynamics and fluid mechanics would have given a student an idea of the important role this equation plays in modern developments in many fields of physics. As an application of the perturbation method, the authors could have likewise included a short discussion of motion of satellites and rockets. As a new topic, a chapter devoted to stability of dynamical systems would have been valuable, since it is vigorously studied at the present time. Undoubtedly these additions would have increased the size of the book, but they would also have increased its usefulness to a large circle of students and readers. Perhaps one should not expect such great changes in a new edition.

In spite of these shortcomings, the new edition of this important book should be welcomed by students taking a first course in advanced mechanics and by teachers using it as a text.

Electrons and Phonons: The Theory of Transport Phenomena in Solids. By J. M. Ziman. 554 pp. Oxford U. Press, New York, 1960. \$13.45. *Reviewed by Paul W. Levy, Brookhaven National Laboratory.*

FOR some time there has been an apparent need for a book that would synthesize the numerous recent advances in the field of "collective electron and phonon processes in solids". The need has been competently filled by the present volume. The subject of the book might be more accurately described in the subtitle as "The theory of transport phenomena in solids which involves electrons and phonons".

The organization of the material is straightforward. The first five chapters, entitled: Phonons, Electrons, Phonon-Phonon Interactions, Electron-Electron Interactions, and Electron-Phonon Interactions, form the basis for an understanding of the remainder of the book, which considers the interaction of electrons and phonons with the crystal lattice and lattice imperfections. The author employs a very compact notation which will appeal to individuals who like to see derivations reduced to a minimum of steps. Undoubtedly, some will find the notation excessively abbreviated and even confusing, especially if one attempts to read the later chapters without having read enough of the book to become familiar with the notation, say the first four chapters.

It would appear, both from this book and his other publications, that the author's primary interest is phonon processes, which are here considered first. He

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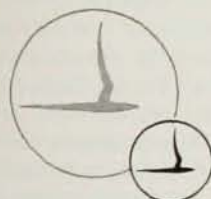
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then takes up electron processes, e.g., band theory, by analogy with the phonon case. Some readers will consider such an approach interesting, particularly the similarity of the mathematical formalism, while others may regard it as merely repetitious. In many instances, a topic is introduced by describing the pertinent theoretical treatment, which is usually begun by stating the assumptions required for each calculation, in most instances quite clearly. However, the author does not, in a strict sense, follow with a derivation of the results. Perhaps it is correct to say that he comments on the derivation, often pointing out the approximations used, mathematical tricks employed, etc. Once a theoretical result is presented, its relation to the whole of solid-state physics is described. It is this description of how each result is related to the rest of the field that makes the book decidedly useful; but again, since so much of it involves interpretation, it is bound to be controversial. While much of the contents may be regarded as theoretical solid-state physics, experimental results are not slighted, particularly when experimental results are available which can be compared directly with the theoretical treatments. It is not a book to be read casually. A thorough knowledge of solid-state physics and of quantum mechanics is required of the reader. Thus, it will be useful mainly to graduate students and experienced researchers.

Boundary and Eigenvalue Problems in Mathematical Physics. By Hans Sagan. 381 pp. John Wiley and Sons, Inc., New York, 1961. \$9.50. Reviewed by T. Teichmann, General Atomic Division of General Dynamics Corporation.

BOUNDARY and eigenvalue problems play such an important role in physics and engineering that almost every general book in these fields contains some discussion of them, quite apart from the number of definitive volumes devoted exclusively to these topics. In discussing a new book of this kind, one must therefore ask what special features, if any, distinguish the content and make it particularly useful or interesting.

The aim of Sagan's book is to provide a self-contained and relatively homogeneous introductory graduate course. The opening chapters deal with variational problems and with the partial differential equations connected with them, particular attention being paid to boundary conditions. Problems of existence and uniqueness are also discussed quite extensively, as is the superposition principle, and to some extent, separability. The next group of chapters treat trigonometric and more general Fourier series, and the boundary value problems out of which they arise. The general theorems about second order differential equations are proved by a method (due to Pruefer) utilizing polar coordinates in the phase plane. A conventional discussion of Legendre and Bessel functions is then followed by a careful description of the external properties of eigenvalues, including numerical procedures due to Rayleigh, Ritz, and Weinstein. The book concludes with