BOOK REVIEW


Acoustics is often understood in its restricted, original meaning, i.e. the science and techniques of sound propagation, in the audible range, by longitudinal waves in a fluid. Obviously, ultrasonics, seismology, signal processing by mechanical or electromagneto-mechanical means, fluid-structure interactions, NDT and, more generally, elastic waves and the propagation of any signal in strain in solid materials with various constitutive behaviors have much enlarged the subject matter of acoustics. This clearly is an enrichment, not only in the physical descriptions and responses, but also in the applicability of many methods inherent in acoustics. Restricting acoustics to musical acoustics, architectural acoustics and underwater acoustics may result in an impoverishment contrary to scientific progress.

There already exist excellent books on elastic-wave propagation, but these are mostly of the treatise type. J. D. Achenbach’s Wave Propagation in Elastic Solids, the two volume work of A. C. Eringen and E. S. Şuhubi on Elastodynamics and F. I. Fedorov’s Theory of Elastic Waves in Crystals are successful examples of these. Books with a marked inclination towards applications to electroacoustics and signal processing are exemplified by those of B. A. Auld, D. F. Nelson, and E. Dieulesaint and D. Royer, all excellent from that point of view. Some encyclopaedic articles (e.g. Thurston’s) in the Handbuch der Physik are also relevant, and one should not forget the precious syntheses published from time to time in Physical Acoustics in the U.S.A. and Soviet Acoustics in the Soviet Union. Professor A. I. Beltzer presents a small book with a very explicit title: Acoustics of Solids. This is neither a lengthy treatise nor a research monograph. Rather, the author has tried to make us feel, through a rather elementary exposition that can be delivered in one semester to undergraduate students in mechanical engineering, applied mathematics or physics, what are some of the trends that may bloom in the next few years. In a way, here research marks its print on teaching in the most efficient manner as, we believe, it should always do. That is why, along with more classical substance presented in a traditional manner (linear isotropic and anisotropic elasticity, plane, cylindrical and spherical elastic waves, Rayleigh and Love surface waves, simple models of structural members and their basic dynamics), the reader will find in the book from time to time hints at new developing trends. Among these we note the notion of causality and the use of Kramers Kronig relations for linear systems in Chapter 1 and in Chapter 5 (for composites, a subject dear to the author), radiation from an embedded obstacle, and the radiation from defects such as dislocations in Chapter 2, a simple introduction to the notion of shock waves in Chapter 2, piezoelectric waves and resonators in Chapter 3, acoustic emission in Chapter 4, dispersion and diffraction in various composite structures in Chapter 5. All these small points, developed more substantially for the last one, together with some nice features (e.g. the nice definitions of various strain measures, the introduction of Debye’s frequency, that of Green’s dynamic tensor), a selection of thought provoking problems, and directions for additional reading in each chapter, give a special charm to this small book. A list of references essentially gives recent references, with a natural emphasis on the author’s and co-workers’ works.

Each teacher has his own way of introducing general concepts and models, and delineating research trends to his students. But it is our feeling that such a book can be used as a basis for a one-semester course, each lecturer having the possibility to stress a particular point or another. In addition, the book is readable directly by students and engineers with an elementary background in elasticity and analysis, who want a direct and easy access to the promising field of acoustics in solids. The book can belong on the shelf of many who are active in the field of engineering science, professionals as well as students and, why not, enlightened amateurs. Springer have produced their usual quality work and the sale price remains reasonable for a scientific book.

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