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## book reviews

### Elastodynamic Diffraction Problems

**Diffraction of Elastic Waves and Dynamic Stress Concentrations.** By Y.-H. Pao and C.-C. Mow. Crane, Russak & Co. Inc., New York, 1973. 693 Pages.

REVIEWED BY J. D. ACHENBACH<sup>1</sup>

Elastodynamic stress concentrations near cavities and inclusions can be quite different in magnitude from the corresponding elastostatic stress concentrations. This interesting and typically dynamic effect, which is often due to the diffraction of elastic waves, has generated a good many analytical and experimental studies, including several important ones by Pao and Mow. These authors have now written a monograph in which they have collected the most useful methods of analysis for elastodynamic diffraction problems, together with extensive numerical information on the accompanying stress concentrations.

The book opens with an informative history of studies of elastic wave diffraction. The first chapter also contains sections summarizing the theory of elasticity and a brief discussion of pertinent aspects of wave propagation in elastic solids. In Chapter 2, an analysis of scattering of plane harmonic SH-waves by a cylindrical obstacle serves to introduce methods of analysis. The four remaining chapters present analytical and numerical results for both steady-state and transient diffraction by cylindrical and spherical obstacles. Chapter 3 focuses on a thorough presentation of circular cylinder problems, such as diffraction of longitudinal and transverse waves by cavities and rigid and elastic inclusions. The scattering of flexural waves by a circular inclusion in a plate is also discussed, as is the transient interaction of a circular shell with a surrounding elastic medium. Elliptic cylinder problems and parabolic cylinder problems are

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discussed in Chapters 4 and 5, respectively. Chapter 5 includes an analysis of the important problem of stress singularities generated by elastodynamic diffraction at the edge of a semi-infinite crack. The last chapter is concerned with the spherical inclusion problem.

This book packs a lot of information which until now was only partially available, and then dispersed in the technical literature. It will be valuable to anyone who is, or should be, interested in elastodynamic effects.

### Introduction to Materials Science

**Materials Science.** By A. L. Ruoff. Prentice-Hall, Englewood Cliffs, N. J., 1973. vii-928. \$18.95 Cloth.

REVIEWED BY A. PHILLIPS<sup>2</sup>

This is an excellent introductory book on material science. It covers a large number of topics making it suitable for any engineer who wishes to be introduced to those aspects of the science of materials which are important for his work. Suitable references at the end of each chapter provide guidance for further study. The book covers material properties and behavior, electrons and atoms, micro and macrostructure, chemical equilibria, kinetics, mechanical properties, electrical properties, optical, and magnetic properties.

It is very well written and it includes a large number of examples and problems. It is a good text for teaching at the undergraduate level.

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Materials science, the study of the properties of solid materials and how those properties are determined by a material's composition and structure. It grew out of an amalgam of solid-state physics, metallurgy, and chemistry, since the rich variety of materials properties cannot be understood. <https://www.britannica.com/technology/materials-science>, "title": "Materials science", "documentGroup": "TOPIC PAGINATED LARGE", "gaExtraDimensions": {"3": "false"} }