
MR2222438 (2007e:74001) 74-01 74B05 74E10 74F05 74K20 74K25 74M15

Ding, Haojiang (PRC-ZHJ); **Chen, Weiqiu** (PRC-ZHJ); **Zhang, L.** (5-SYD)

★**Elasticity of transversely isotropic materials.**

Solid Mechanics and its Applications, 126.

Springer, *Dordrecht*, 2006. *xii*+435 *pp.* $199.00.

ISBN 1-4020-4033-4; 978-1-4020-4033-7

This book provides a detailed study of transversely isotropic media. It focuses on formulation of the constitutive equations and the analysis of many boundary value problems that admit solutions with methods of classical analysis (as opposed to numerical approximations). The scope is limited to homogeneous but anisotropic linearly elastic and thermoelastic materials.

The bulk of Chapter 1 deals with the derivation of the elasticity tensors for elastic materials with various symmetries. Stress-strain relationships are given in Cartesian, cylindrical and spherical coordinates. Thermal and elastic effects are assumed to be loosely coupled in the sense that temperature affects the stress but not conversely.

Chapter 2 introduces several methods of analysis of boundary value problems which will be applied in the rest of the book. The methods are reminiscent of solutions via potential functions, e.g., those of Airy and Papkovich-Neuber, but they are specifically designed to handle transverse anisotropies and cylindrical and spherical symmetries.

Chapter 3 analyzes the elastic response to a point force applied to elastic bodies of various isotropies, each filling the entire 3-dimensional space. These constitute the fundamental solutions to the partial differential equations of equilibrium and are used in the rest of the book to solve a variety of boundary value problems.

Chapter 4 studies elastic half-spaces subjected to surface forces. Chapter 5 deals with bodies of revolution such as annuli, cones and conical shells. Chapter 6 focuses on thermal stresses. Chapter 7 studies elastic contact, such as a sphere, or the vertex of a cone, pressing against a half-space. Chapters 8 through 10 deal with the statics and dynamics of plates and cylindrical and spherical shells.

Analytical methods for solving equations of elasticity are limited by their nature to problems with simple geometries. If a problem at hand falls within the scope of methods of this book, the solutions and solution methods presented here could be of use. In problems with complicated geometries, forces and boundary conditions, numerical methods, such as finite elements, are the usual recourse.

Rouben Rostamian (1-BALT)