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2.6 Generalized Formulation of the Equilibrium Problem for a String2.7 Virtual Work Principle for a String; 2.8 Riesz Representation Theorem; 2.9 Generalized Setup of the Dirichlet Problem for a String; 2.10 First Theorems of Imbedding; 2.11 Generalized Setup of the Dirichlet Problem for a String, Continued; 2.12 Neumann Problem for the String; 2.13 The Generalized Solution of Linear Mechanical Problems and the Principle of Minimum Total Energy; 2.14 Nonlinear Model of a Membrane; 2.15 Linear Membrane Theory: Poisson's Equation
2.16 Generalized Setup of the Dirichlet Problem for a Linear Membrane2.17 Other Membrane Equilibrium Problems; 2.18 Banach's Contraction Mapping Principle; 3. Theory of Elasticity: Statics and Dynamics; 3.1 Introduction; 3.2 An Elastic Bar Under Stretching; 3.3 Bending of a beam; 3.4 Generalized Solutions to the Equilibrium Problem for a Beam; 3.5 Generalized Setup: Rough Qualitative Discussion; 3.6 Pressure and Stresses; 3.7 Vectors and Tensors; 3.8 The Cauchy Stress Tensor, Continued; 3.9 Basic Tensor Calculus in Curvilinear Coordinates; 3.10 Euler and Lagrange Descriptions of Continua
3.11 Strain Tensors3.12 The Virtual Work Principle; 3.13 Hooke's Law in Three Dimensions; 3.14 The Equilibrium Equations of Linear Elasticity in Displacements; 3.15 Virtual Work Principle in Linear Elasticity; 3.16 Generalized Setup of Elasticity Problems; 3.17 Existence Theorem for an Elastic Body; 3.18 Equilibrium of a Free Elastic Body; 3.19 Variational Methods for Equilibrium Problems; 3.20 A Brief but Important Remark; 3.21 Countable Sets and Separable Spaces; 3.22 Fourier Series; 3.23 Problem of Vibration for Elastic Structures; 3.24 Self-Adjointness of A and Its Consequences
3.25 Compactness of A

Sommario/riassunto

This book provides the general reader with an introduction to mathematical elasticity, by means of general concepts in classic mechanics, and models for elastic springs, strings, rods, beams and membranes. Functional analysis is also used to explore more general boundary value problems for three-dimensional elastic bodies, where the reader is provided, for each problem considered, a description of the deformation; the equilibrium in terms of stresses; the constitutive equation; the equilibrium equation in terms of displacements; formulation of boundary value problems; and variational principl

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