1. Record Nr. UNINA9910784570603321

Autore	Sadd Martin H (Martin Howard)
Titolo	Elasticity [[electronic resource]] : theory, applications, and numerics / / Martin H. Sadd
Pubbl/distr/stampa	Amsterdam ; ; Oxford, : Elsevier Butterworth Heinemann, c2005
ISBN	1-281-00834-6 9786611008345 0-08-047747-X
Edizione	[1st edition]
Descrizione fisica	1 online resource (474 p.)
Disciplina	531.382
Soggetti	Elasticity Mathematical physics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover; Front matter; Half Title Page; Title Page; Copyright; Preface; Contents; About the Author; Part I: Foundations and Elementary Applications; 1. Mathematical Preliminaries; 1.1 Scalar, Vector, Matrix, and Tensor Definitions; 1.2 Index Notation; 1.3 Kronecker Delta and Alternating Symbol; 1.4 Coordinate Transformations; 1.5 Cartesian Tensors; 1.6 Principal Values and Directions for Symmetric Second-Order Tensors; 1.7 Vector, Matrix, and Tensor Algebra; 1.8 Calculus of Cartesian Tensors; 1.9 Orthogonal Curvilinear Coordinates; References; Exercises; 2. Deformation: Displacements and Strains 2.1 General Deformations 2.2 Geometric Construction of Small Deformation Theory; 2.3 Strain Transformation; 2.4 Principal Strains; 2.5 Spherical and Deviatoric Strains; 2.6 Strain Compatibility; 2.7 Curvilinear Cylindrical and Spherical Coordinates; References; Exercises; 3. Stress and Equilibrium; 3.1 Body and Surface Forces; 3.2 Traction Vector and Stress Tensor; 3.3 Stress Transformation; 3.4 Principal Stresses; 3.5 Spherical and Deviatoric Stresses; 3.6 Equilibrium Equations; 3.7 Relations in Curvilinear Cylindrical and Spherical Coordinates; References; Exercises 4. Material Behavior-Linear Elastic Solids 4.1 Material Characterization; 4.2 Linear Elastic Materials-Hooke's Law; 4.3 Physical Meaning of Elastic Moduli; 4.4 Thermoelastic Constitutive Relations; References;

Exercises; 5. Formulation and Solution Strategies; 5.1 Review of Field Equations; 5.2 Boundary Conditions and Fundamental Problem Classifications; 5.3 Stress Formulation; 5.4 Displacement Formulation; 5.5 Principle of Superposition; 5.6 Saint-Venant's Principle; 5.7 General Solution Strategies; References; Exercises; 6. Strain Energy and Related Principles; 6.1 Strain Energy
6.2 Uniqueness of the Elasticity Boundary-Value Problem 6.3 Bounds on the Elastic Constants; 6.4 Related Integral Theorems; 6.5 Principle of Virtual Work; 6.6 Principles of Minimum Potential and Complementary Energy; 6.7 Rayleigh-Ritz Method; References; Exercises; 7. Two-Dimensional Formulation; 7.1 Plane Strain; 7.2 Plane Stress; 7.3 Generalized Plane Stress; 7.4 Antiplane Strain; 7.5 Airy Stress Function; 7.6 Polar Coordinate Formulation; References; Exercises; 8. Two-Dimensional Problem Solution; 8.1 Cartesian Coordinate Solutions Using Polynomials
8.2 Cartesian Coordinate Solutions Using Fourier Methods 8.3 General Solutions in Polar Coordinates; 8.4 Polar Coordinate Solutions; References; Exercises; 9. Extension, Torsion, and Flexure of Elastic Cylinders; 9.1 General Formulation; 9.2 Extension Formulation; 9.3 Torsion Formulation; 9.4 Torsion Solutions Derived from Boundary Equation; 9.5 Torsion Solutions Using Fourier Methods; 9.6 Torsion of Cylinders With Hollow Sections; 9.7 Torsion of Circular Shafts of Variable Diameter; 9.8 Flexure Formulation; 9.9 Flexure Problems Without Twist; References; Exercises
Part II: Advanced Applications

Sommario/riassunto

Although there are several books in print dealing with elasticity, many focus on specialized topics such as mathematical foundations, anisotropic materials, two-dimensional problems, thermoelasticity, non-linear theory, etc. As such they are not appropriate candidates for a general textbook. This book provides a concise and organized presentation and development of general theory of elasticity. Complemented by an online Solutions Manual and companion website, and including MatLab codes and coding, this text is an excellent book teaching guide.- Contains exercises for student engagement