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Soggetti	Materials - Fatigue Mechanics, Applied Continuum mechanics Physics Statics Materials Materials Fatigue Engineering Mechanics Continuum Mechanics Classical and Continuum Physics Mechanical Statics and Structures Materials Engineering
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Getting ready (mostly review) -- Deformations -- Forces -- Force-energy relationships -- Isotropic materials -- Minimizing energy -- Simulations -- Quasi-static simulation examples -- The invariants -- Experiments -- Time dependent simulations -- Anisotropic Materials -- Plot deformation, displacements, and forces -- Euler-Lagrange elasticity -- Linear elasticity -- Classical finite elasticity -- Appendix A Deformation in jig coordinates -- Appendix B Origins of Anisotropic Invariants -- Appendix C Euler-Lagrange equations -- Appendix D

Project Ideas.

Sommario/riassunto

This textbook aimed at upper-level undergraduate and graduate engineering students who need to describe the large deformation of elastic materials like soft plastics, rubber, and biological materials. The classical approaches to finite deformations of elastic materials describe a dozen or more measures of stress and strain. These classical approaches require an in-depth knowledge of tensor analysis and provide little instruction as to how to relate the derived equations to the materials to be described. This text, by contrast, introduces only one strain measure and one stress measure. No tensor analysis is required. The theory is applied by showing how to measure material properties and to perform computer simulations for both isotropic and anisotropic materials. The theory can be covered in one chapter for students familiar with Euler-Lagrange techniques, but is also introduced more slowly in several chapters for students not familiar with these techniques. The connection to linear elasticity is provided along with a comparison of this approach to classical elasticity. Explains ably simulation of materials undergoing large deformations Illustrates a simpler mathematical base to build thermodynamic and viscoelastic theories Describes how experimenters can make better numerical descriptions of deformable bodies.