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Convected derivatives; 3.3 Balance laws; 3.3.1 Transport theorem; 3.3.2 Balance of mass; 3.3.3 Balance of linear momentum; 3.3.4 Balance of angular momentum; 3.3.5 Work energy identity; 3.3.6 Thermodynamic principles; 3.3.6.1 First law of thermodynamics; 3.3.6.2 Second law of thermodynamics; 3.3.6.3 Alternate energy measures in thermodynamics; 3.3.7 Referential description of balance laws
 3.3.7.1 Relations between variables in deformed and undeformed configurations
 3.3.7.2 Statement of the balance laws in reference configuration; 3.3.8 Indeterminate nature of the balance laws; 3.3.9 A note on multiphase and multi-component materials; 3.3.9.1 Chemical potential; 3.4 Constitutive relations; 3.4.1 Transformations; 3.4.1.1 Euclidean transformations; 3.4.1.2 Galilean transformations; 3.4.2 Objectivity of mathematical quantities; 3.4.3 Invariance of motions and balance equations; 3.4.4 Invariance of constitutive relations; 3.4.4.1 Frame invariance in a thermoelastic material
 3.4.4.2 Constitutive relations for thermoelastic materials
 3.4.4.3 Frame invariance and constitutive relations for a thermoviscous fluid; 3.4.5 Frame invariance of derivatives; Summary; Exercise; Chapter 4 : Linear Mechanical Models of Material Deformation; 4.1 Introduction; 4.2 Linear elastic solid models; 4.2.1 Small strain assumption of linear elasticity; 4.2.2 Classes of elastic constants; 4.2.2.1 General anisotropic linear elastic solid; 4.2.2.2 Materials with single plane of elastic symmetry; 4.2.2.3 Materials with two planes of elastic symmetry
 4.2.2.4 Materials with symmetry about an axis of rotation

Sommario/riassunto

Modelling of Engineering Materials presents the background that is necessary to understand the mathematical models that govern the mechanical response of engineering materials. The book provides the basics of continuum mechanics and helps the reader to use them to understand the development of nonlinear material response of solids and fluids used in engineering applications. A brief review of simplistic and linear models used to characterize the mechanical response of materials
