

1. Record Nr.	UNINA9910786614803321
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Titolo	Modelling of engineering materials / / C. Lakshmana Rao & Abhijit P. Deshpande
Pubbl/distr/stampa	New Delhi, India ; ; Chichester, England : , : Ane Books Pvt. Ltd. : , : John Wiley & Sons Ltd, , 2014 ©2010
ISBN	1-118-91958-0 1-118-91959-9
Descrizione fisica	1 online resource (266 p.)
Collana	Ane/Athena Books
Disciplina	658.404
Soggetti	Engineering - Management Industrial engineering
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; Title Page; Copyright; Preface; Notations; Contents ; Chapter 1 : Introduction; 1.1 Introduction to material modelling; 1.2 Complexity of material response in engineering; 1.3 Classification of modelling of material response; 1.3.1 Empirical models; 1.3.2 Micromechanical models; 1.3.3 Phenomenological models; 1.4 Limitations of the continuum hypothesis; 1.5 Focus of this book; Chapter 2 : Preliminary Concepts; 2.1 Introduction; 2.2 Coordinate frame and system; 2.3 Tensors; 2.3.1 Tensors of different orders; 2.3.2 Notations for tensors; 2.4 Derivative operators; Summary; Exercise Chapter 3 : Continuum Mechanics Concepts3.1 Introduction; 3.2 Kinematics; 3.2.1 Transformations; 3.2.1.1 Transformation of line elements; 3.2.1.2 Transformation of volume elements; 3.2.1.3 Transformation of area elements; 3.2.2 Important types of motions; 3.2.2.1 Isochoric deformations; 3.2.2.2 Rigid body motion; 3.2.2.3 Homogeneous deformations; 3.2.3 Decomposition of deformation gradient; 3.2.3.1 Polar decomposition theorem; 3.2.3.2 Stretches; 3.2.4 Strain measures; 3.2.4.1 Displacements; 3.2.4.2 Infinitesimal strains; 3.2.5 Motions; 3.2.5.1 Velocity gradient 3.2.6 Relative deformation gradient3.2.7 Time derivatives viewed from different coordinates; 3.2.7.1 Co-rotational derivatives; 3.2.7.2

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 configurations3.3.7.2 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 materials3.4.4.3 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

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#### 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

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