

Nonlinear Solid Mechanics

Bifurcation Theory and Material Instability

DAVIDE BIGONI

Università degli Studi di Trento, Italy

About the Book

This book covers solid mechanics for nonlinear elastic and elastoplastic materials, describing the behavior of ductile material subject to extreme mechanical loading and its eventual failure. The book highlights constitutive features to describe the behavior of frictional materials such as geological media. On the basis of this theory, including large strain and inelastic behaviors, bifurcation and instability are developed with a special focus on the modeling of the emergence of local instabilities such as shear band formation and flutter of a continuum. The former is regarded as a precursor of fracture, while the latter is typical of granular materials. The treatment is complemented with qualitative experiments, illustrations from everyday life, and simple examples taken from structural mechanics.

Available from July 2012

235 b/w illus. | 18 color illus. | 10 tables

Hardback | 978-1-107-02541-7

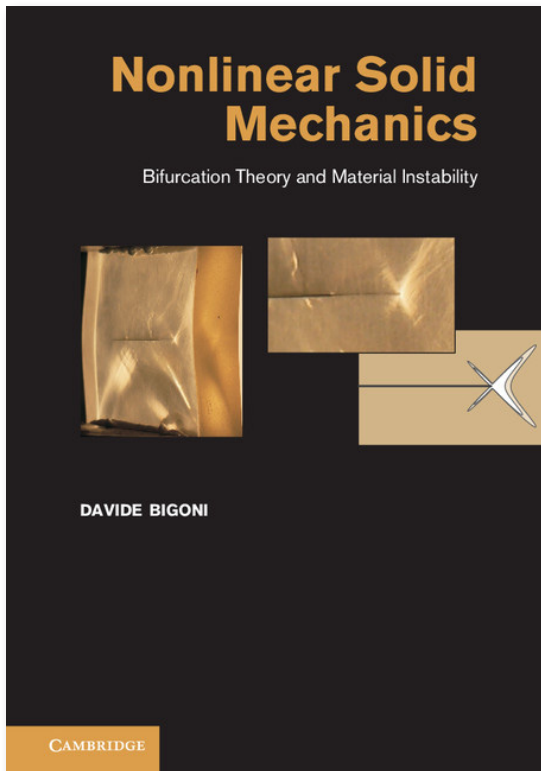
List Price: USD 135.00

Discounted Price: USD 108.00

How To Order

Visit www.cambridge.org/9781107025417
or Call 1.800.872.7423

Enter Discount Code E12BIGONI at
checkout to receive the discount.
Offer expires 6/20/2013



Key Features

- Addresses complex modelling of the behaviour of materials under extreme mechanical conditions
- Deals with failure in terms of nonlinear continuum mechanics and instability theory
- Subject matter is explained with qualitative experiments, illustrations from everyday life and simple examples taken from structural mechanics

Contents

1. Introduction
2. Elements of tensor algebra and analysis
3. Solid mechanics at finite strains
4. Isotropic nonlinear hyperelasticity
5. Solutions of simple problems in finitely deformed nonlinear elastic solids
6. Constitutive equations and anisotropic elasticity
7. Yield functions with emphasis on pressure-sensitivity
8. Elastoplastic constitutive equations
9. Moving discontinuities and boundary value problems
10. Global conditions of uniqueness and stability
11. Local conditions for uniqueness and stability
12. Bifurcation of elastic solids deformed incrementally
13. Applications of local and global uniqueness and stability criteria to non-associative elastoplasticity
14. Wave propagation, stability and bifurcation
15. Post-critical behaviour and multiple shear band formation
16. A perturbative approach to material instability.

How To Order

Visit www.cambridge.org/9781107025417
or Call 1.800.872.7423

Enter Discount Code E12BIGONI at
checkout to receive the discount.
Offer expires 6/20/2013