1. Record Nr. UNINA9910133643703321

Titolo	Advanced computational materials modeling [[electronic resource]] : from classical to multi-scale techniques / / edited by Miguel Vaz Junior, Eduardo A. de Souza Neto, and Pablo A. Munoz-Rojas
Pubbl/distr/stampa	Weinheim, Germany, : Wiley-VCH, c2011
ISBN	1-283-30241-1 9786613302410 3-527-63232-8 3-527-63231-X
Edizione	[4th ed.]
Descrizione fisica	1 online resource (452 p.)
Altri autori (Persone)	Vaz JuniorMiguel NetoE. A. de Souza (Eduardo) Munoz-RojasPablo A
Disciplina	620.11015118
Soggetti	Materials - Mathematical models Finite element method Electronic books.
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	Advanced Computational Materials Modeling: From Classical to Multi-Scale Techniques; Contents; Preface; List of Contributors; 1 Materials Modeling - Challenges and Perspectives; 1.1 Introduction; 1.2 Modeling Challenges and Perspectives; 1.2.1 Mechanical Degradation and Failure of Ductile Materials; 1.2.1.1 Remarks; 1.2.2 Modeling of Cellular Structures; 1.2.2.1 Remarks; 1.2.3 Multiscale Constitutive Modeling; 1.3 Concluding Remarks; Acknowledgments; References; 2 Local and Nonlocal Modeling of Ductile Damage; 2.1 Introduction; 2.2 Continuum Damage Mechanics; 2.2.1 Basic Concepts of CDM 2.2.2 Ductile Plastic Damage2.3 Lemaitre's Ductile Damage Model; 2.3.1 Original Model; 2.3.1.1 The Elastic State Potential; 2.3.1.2 The Plastic State Potential; 2.3.1.3 The Dissipation Potential; 2.3.1.4 Evolution of Internal Variables; 2.3.2 Principle of Maximum Inelastic Dissipation; 2.3.3 Assumptions Behind Lemaitre's Model; 2.4 Modified Local Damage Models; 2.4.1 Lemaitre's Simplified Damage Model;

2.4.1.1 Constitutive Model; 2.4.1.2 Numerical Implementation; 2.4.2 Damage Model with Crack Closure Effect; 2.4.2.1 Constitutive Model; 2.4.2.2 Numerical Implementation
2.5 Nonlocal Formulations2.5.1 Aspects of Nonlocal Averaging; 2.5.1.1 The Averaging Operator; 2.5.1.2 Weight Functions; 2.5.2 Classical Nonlocal Models of Integral Type; 2.5.2.1 Nonlocal Formulations for Lemaitre's Simplified Model; 2.5.3 Numerical Implementation of Nonlocal Integral Models; 2.5.3.1 Numerical Evaluation of the Averaging Integral; 2.5.3.2 Global Version of the Elastic Predictor/Return Mapping Algorithm; 2.6 Numerical Analysis; 2.6.1 Axisymmetric Analysis of a Notched Specimen; 2.6.2 Flat Grooved Plate in Plane Strain; 2.6.3 Upsetting of a Tapered Specimen
2.6.3.1 Damage Prediction Using the Lemaitre's Simplified Model2.6.3.2 Damage Prediction Using the Lemaitre's Model with Crack Closure Effect; 2.7 Concluding Remarks; Acknowledgments; References; 3 Recent Advances in the Prediction of the Thermal Properties of Metallic Hollow Sphere Structures; 3.1 Introduction; 3.2 Methodology; 3.2.1 Lattice Monte Carlo Method; 3.2.2 Finite Element Method; 3.2.2.1 Basics of Heat Transfer; 3.2.2.2 Weighted Residual Method; 3.2.2.3 Discretization and Principal Finite Element Equation; 3.2.3 Numerical Calculation Models
3.3 Finite Element Analysis on Regular Structures3.4 Finite Element Analysis on Cubic-Symmetric Models; 3.5 LMC Analysis of Models of Cross Sections; 3.5.1 Modeling; 3.5.2 Results; 3.6 Computed Tomography Reconstructions; 3.6.1 Computed Tomography; 3.6.2 Numerical Analysis; 3.6.2.1 Microstructure; 3.6.2.2 Mesostructure; 3.6.3 Results; 3.7 Conclusions; References; 4 Computational Homogenization for Localization and Damage; 4.1 Introduction; 4.1.1 Mechanics Across the Scales; 4.1.2 Some Historical Notes on Homogenization; 4.1.3 Separation of Scales
4.1.4 Computational Homogenization and Its Application to Damage and Fracture

Sommario/riassunto

With its discussion of strategies for modeling complex materials using new numerical techniques, mainly those based on the finite element method, this monograph covers a range of topics including computational plasticity, multi-scale formulations, optimization and parameter identification, damage mechanics and nonlinear finite elements.