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2.5 Nonlocal Formulations 2.5.1 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 Model 2.6.3.2 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 Structures 3.4 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.
