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Titolo	Numerical Simulation of Mechanical Behavior of Composite Materials // by Sergio Oller
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2014
ISBN	3-319-04933-X
Edizione	[1st ed. 2014.]
Descrizione fisica	1 online resource (XII, 217 p.)
Collana	Lecture Notes on Numerical Methods in Engineering and Sciences, , 1877-735X
Disciplina	620.1183
Soggetti	Mechanics, Applied Mathematics - Data processing Building materials Ceramic materials Engineering Mechanics Computational Science and Engineering Structural Materials Ceramics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Bibliographic Level Mode of Issuance: Monograph
Nota di contenuto	Introduction -- Composite materials uses -- The use of composite materials in the automobile industry -- The use of composite materials in the Aeronautic industry -- Composite materials in the naval industry -- The use of composite materials in Civil Engineering -- Composites properties -- Classification of composite materials -- Classification by the topology -- Classification by their components -- Structural Classification -- Mechanical Anisotropy -- Introduction -- Generalities on the anisotropic formulation -- Yield function and plastic potential for isotropic materials -- General explicit definition of the isotropic yield criterion in the referential configuration -- General explicit definition of the orthotropic yield criterion in the referential configuration -- General implicit definition of the orthotropic criterion in the referential configuration -- Stresses space transformation -- Strain space transformation -- General definition of the stress space

transformation tensor -- Numerical calculation of the adjusting tensor  
matrix form -- Mises-Hill orthotropic criterion verification by the space  
mapping theory -- Anisotropy in the updated configuration --  
Transformation of the stresses space -- Transformation of the strain  
space -- Plastic flow rule. Internal variables evolution law -- Referential  
Configuration -- Updated Configuration -- Definition of the dissipation  
in the isotropic fictitious space. Unicity of the dissipation -- Referential  
configuration -- Updated configuration -- Tangent constitutive  
equation -- Referential Configuration -- Spatial Configuration --  
Mixing Theory -- Introduction -- Classic Mixing Theory -- Free energy  
expression -- Classical theory modification. Serial-Parallel Model --  
The generalized mixing theory -- Large strains classic mixing theory --  
Closure or compatibility equation -- Free energy function -- The  
constitutive equation -- Generalized mixing theory formulated in large  
strains -- Constitutive equation -- Mixing theory modification for short  
length reinforcement -- Fiber axial stress distribution -- Tangent  
stress distribution in the interface -- Short fibers constitutive model --  
Composite constitutive equation -- Free energy for short reinforced  
composite materials -- Fiber mechanical properties in the Mixing  
Theory -- Linear behavior in small strains -- Comparative example.  
“Micromodel” vs. “Mixing Theory” with anisotropy in large strains --  
Behavior simulation of asphalt mixtures -- Introduction -- Problem  
motivation and description -- Materials parameterization. Simplified  
granulometry and properties correction by aspect relation -- Numerical  
Simulation -- Fiber-Matrix Displacement (FMD)-Debonding --  
Introduction -- Stresses distribution along the reinforced fiber --  
Cracks and fibers interaction -- Constitutive models for composite  
materials with "FMD" -- A procedure proposed for “FMD” -- The  
constitutive model modification. Procedure for the fiber–matrix  
displacement phenomenon (FMD) -- Expression of the elastoplastic  
constitutive model of the reinforcement -- Yield condition -- Plastic  
flow rule -- "Total" and "Updated" Lagrangian Formulation --  
Implementation of the mixing and anisotropy theory in the FEM context  
-- "FMD" Phenomenon: Micro model and Mixing Theory with anisotropy  
-- Homogenization Theory -- Introduction and state of the art --  
Average Methods -- The asymptotic expansion theory -- Extension of  
the “Average Method” and the “Asymptotic Expansion Method” to the  
nonlinear problem -- Other homogenization-related subjects --  
Homogenization Theory based on “Local Periodicity” -- Introduction --  
Periodic structure concepts -- Variables Local periodicity -- Strains  
tensor homogenization -- The homogenized stress and the equilibrium  
equation -- Elastic problem basis at micro-macro scales -- Basis of the  
inelastic problem at micro-macro scales -- The elastic constitutive  
tensor determination for composite materials -- Quasi-tangent  
inelastic constitutive tensor determination for the composite materials.  
Analytical determination -- Micro-Macro structural coupling -- Local  
effects influence -- Test examples of the “Homogenization Theory of  
Local Periodicity” -- Transversal behavior of a reinforced long fibers  
matrix -- Simple tensile test -- Thick cylinder subjected to internal  
pressure -- Masonry homogenized, treated as a composite --  
Masonry-Homogenized Composite -- Introduction and background --  
Masonry properties -- Masonry behavior under uniaxial compression  
-- Masonry behavior under uniaxial tension -- Biaxial behavior --  
Post-peak masonry behavior. Softening -- Different methods for  
masonry calculation -- Constitutive model based on a particular case of  
the homogenization concept -- Constitutive model -- Formulation  
checkout -- Non-Linear Buckling of Reinforced Composites --  
Introduction -- Problem description and state-of-the-art -- Euler

critical load -- Rosen model -- Micro-mechanical models -- Mechanical damage models -- Model of stiffness-loss due to buckling in long-fibers composites reinforced -- Introduction -- Fiber model general definition -- Definition of the stiffness-loss variable due to buckling -- Main characteristics of the model -- Energy dissipation -- Test example.

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## Sommario/riassunto

An original mechanical formulation to treat nonlinear orthotropic behavior of composite materials is presented in this book. It also examines different formulations that allow us to evaluate the behavior of composite materials through the composition of its components, obtaining a new composite material. Also two multiple scale homogenization methods are given, one based on the analytical study of the cells (Ad-hoc homogenization), and other one, more general based on the finite element procedure applied on the macro scale (upper-scale) and in the micro scale (sub-scale). A very general formulation to simulate the mechanical behavior for traditional composite structures (plywood, reinforced concrete, masonry, etc.), as well as the new composite materials reinforced with long and short fibers, nanotubes, etc., are also shown in this work. Typical phenomena occurring in composite materials are also described in this work, including fiber-matrix debonding, local buckling of fibers and its coupling with the overall buckling of the structure. Finally, several numerical examples that evaluates the qualities and capabilities of the general model formulated are offered in this book. This book is intended for graduate engineering students who want to expand their knowledge of composite structures behavior.

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2. Record Nr.	UNINA9910132785803321
Titolo	Complex Monge-Ampere equations and geodesics in the space of Kahler metrics // Vincent Guedj, editor
Pubbl/distr/stampa	Berlin ; ; Heidelberg, : Springer Verlag, 2012
ISBN	9783642236693 3642236693
Edizione	[1st ed. 2012.]
Descrizione fisica	1 online resource (VIII, 310 p. 4 illus.)
Collana	Lecture notes in mathematics ; ; 2038
Classificazione	SI 850 MAT 146f MAT 322f MAT 354f MAT 537f 510
Altri autori (Persone)	GuedjVincent
Disciplina	516.362
Soggetti	Monge-Ampere equations Geodesics (Mathematics) Kahlerian structures
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Bibliographic Level Mode of Issuance: Monograph
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	1.Introduction -- I. The Local Homogenous Dirichlet Problem.-2. Dirichlet Problem in Domains of $C^n$ -- 3. Geometric Maximality -- II. Stochastic Analysis for the Monge-Ampère Equation -- 4. Probabilistic Approach to Regularity -- III. Monge-Ampère Equations on Compact Manifolds -- 5.The Calabi-Yau Theorem -- IV Geodesics in the Space of Kähler Metrics -- 6. The Riemannian Space of Kähler Metrics -- 7. MA Equations on Manifolds with Boundary -- 8. Bergman Geodesics.
Sommario/riassunto	The purpose of these lecture notes is to provide an introduction to the theory of complex Monge–Ampère operators (definition, regularity issues, geometric properties of solutions, approximation) on compact Kähler manifolds (with or without boundary). These operators are of central use in several fundamental problems of complex differential geometry (Kähler–Einstein equation, uniqueness of constant scalar curvature metrics), complex analysis and dynamics. The topics covered

include, the Dirichlet problem (after Bedford–Taylor), Monge–Ampère foliations and laminated currents, polynomial hulls and Perron envelopes with no analytic structure, a self-contained presentation of Krylov regularity results, a modernized proof of the Calabi–Yau theorem (after Yau and Kolodziej), an introduction to infinite dimensional riemannian geometry, geometric structures on spaces of Kähler metrics (after Mabuchi, Semmes and Donaldson), generalizations of the regularity theory of Caffarelli–Kohn–Nirenberg–Spruck (after Guan, Chen and Blocki) and Bergman approximation of geodesics (after Phong–Sturm and Berndtsson). Each chapter can be read independently and is based on a series of lectures by R. Berman, Z. Blocki, S. Boucksom, F. Delarue, R. Dujardin, B. Kolev and A. Zeriahi, delivered to non-experts. The book is thus addressed to any mathematician with some interest in one of the following fields, complex differential geometry, complex analysis, complex dynamics, fully non-linear PDE's and stochastic analysis.

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