

1. Record Nr.	UNINA9910138855303321
Titolo	Damage mechanics of cementitious materials and structures [[electronic resource]] / edited by Gilles Pijaudier-Cabot, Frederic Dufour
Pubbl/distr/stampa	London, : ISTE Hoboken, N.J., : Wiley, 2012
ISBN	1-118-56208-9 1-118-56622-X 1-118-56629-7 1-299-18896-6
Descrizione fisica	1 online resource (271 p.)
Collana	ISTE
Altri autori (Persone)	Pijaudier-CabotGilles DufourFrederic
Disciplina	620.1/36
Soggetti	Concrete - Deterioration Fracture mechanics
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; Damage Mechanics of Cementitious Materials and Structures; Title Page; Copyright Page; Table of Contents; Preface; Chapter 1. Bottom-Up: From Atoms to Concrete Structures; 1.1. Introduction; 1.2. A realistic molecular model for calcium-silicate hydrates; 1.2.1. Background; 1.2.2. Molecular properties of C-S-H; 1.2.3. From molecular properties to C-S-H microtexture; 1.3. Probing C-S-H microtexture by nanoindentation; 1.3.1. Does particle shape matter?; 1.3.2. Implementation for back analysis of packing density distributions 1.3.3. Functionalized properties: nanogranular origin of concrete creep1.4. Conclusions; 1.5. Bibliography; Chapter 2. Poromechanics of Saturated Isotropic Nanoporous Materials; 2.1. Introduction; 2.2. Results from molecular simulations; 2.3. Poromechanical model; 2.3.1. Nomenclature and definitions; 2.3.2. Effective pore pressure; 2.3.3. Thermodynamical equilibrium condition; 2.3.4. Constitutive equation of the effective pore pressure; 2.3.5. Effect on the volumetric strain; 2.3.6. Effect on the permeability; 2.4. Adsorption-induced swelling and permeability change in nanoporous materials

2.4.1. Comparison with data by Day et al. 2.4.2. Comparison with data by Ottiger et al.; 2.4.3. Variation of effective permeability; 2.5. Discussion - interaction energy and entropy; 2.6. Conclusions; 2.7. Acknowledgments; 2.8. Bibliography; Chapter 3. Stress-based Non-local Damage Model; 3.1. Introduction; 3.2. Non-local damage models; 3.2.1. Continuum damage theory; 3.2.2. Original integral non-local approach; 3.2.3. Non-local integral method based on stress state; 3.2.4. Numerical implementation; 3.3. Initiation of failure; 3.4. Bar under traction; 3.4.1. Global behavior 3.4.2. Mechanical quantities in the FPZ 3.4.3. Crack opening estimation; 3.5. Description of the cracking evolution in a 3PBT of a concrete notched beam; 3.5.1. Global behavior; 3.5.2. Cracking analysis; 3.6. Conclusions; 3.7. Acknowledgments; 3.8. Bibliography; Chapter 4. Discretization of Higher Order Gradient Damage Models Using Isogeometric Finite Elements; 4.1. Introduction; 4.2. Isotropic damage formulation; 4.2.1. Constitutive modeling; 4.2.2. Implicit gradient damage formulation; 4.3. Isogeometric finite elements; 4.3.1. Univariate B-splines and NURBS 4.3.2. Multivariate B-splines and NURBS 4.3.3. Isogeometric finite-element discretization; 4.4. Numerical simulations; 4.4.1. One-dimensional rod loaded in tension; 4.4.2. Three-point bending beam; 4.5. Conclusions; 4.6. Acknowledgments; 4.7. Bibliography; Chapter 5. Macro and Mesoscale Models to Predict Concrete Failure and Size Effects; 5.1. Introduction; 5.2. Experimental procedure; 5.2.1. Material, specimens and test rig descriptions; 5.2.2. Experimental results; 5.2.3. Size effect analysis; 5.3. Numerical simulations; 5.3.1. Macroscale modeling; 5.3.2. Mesoscale modeling approach 5.3.3. Analysis of three-point bending tests

Sommario/riassunto

The book, prepared in honor of the retirement of Professor J. Mazars, provides a wide overview of continuum damage modeling applied to cementitious materials. It starts from micro-nanoscale analyses, then follows on to continuum approaches and computational issues. The final part of the book presents industry-based case studies. The contents emphasize multiscale and coupled approaches toward the serviceability and the safety of concrete structures.
