1. Record Nr. UNISA996203495503316

Autore	Haussler-Combe Ulrich
Titolo	Computational methods for reinforced concrete structures / / Ulrich Haussler-Combe
Pubbl/distr/stampa	Berlin, Germany : , : Ernst & Sohn, , 2015 ©2015
ISBN	3-433-60363-4 3-433-60361-8 3-433-60362-6
Edizione	[2nd ed.]
Descrizione fisica	1 online resource (356 p.)
Disciplina	624.18340285
Soggetti	Buildings, Reinforced concrete Finite element method Reinforced concrete construction
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; Title Page; Preface; Contents; Notations; 1 Finite Elements Overview; 1.1 Modeling Basics; 1.2 Discretization Outline; 1.3 Elements; 1.4 Material Behavior; 1.5 Weak Equilibrium and Spatial Discretization; 1.6 Numerical Integration and Solution Methods for Algebraic Systems; 1.7 Convergence; 2 Uniaxial Structural Concrete Behavior; 2.1 Scales and Short-Term Stress-Strain Behavior of Homogenized Concrete; 2.2 Long-Term Behavior - Creep and Imposed Strains; 2.3 Reinforcing Steel Stress-Strain Behavior; 2.4 Bond between Concrete and Reinforcing Steel; 2.5 The Smeared Crack Model 2.6 The Reinforced Tension Bar2.7 Tension Stiffening of Reinforced Tension Bar; 3 Structural Beams and Frames; 3.1 Cross-Sectional Behavior; 3.1.1 Kinematics; 3.1.2 Linear Elastic Behavior; 3.1.3 Cracked Reinforced Concrete Behavior; 3.1.3.1 Compressive Zone and Internal Forces; 3.1.3.2 Linear Concrete Compressive Behavior with Reinforcement; 3.1.3.3 Nonlinear Behavior of Concrete and Reinforcement; 3.2 Equilibrium of Beams; 3.3 Finite Element Types for Plane Beams; 3.3.1 Basics; 3.3.2 Finite Elements for the Bernoulli Beam; 3.3.3 Finite Elements for the Timoshenko Beam

3.4 System Building and Solution Methods3.4.1 Elementwise Integration; 3.4.2 Transformation and Assemblage; 3.4.3 Kinematic Boundary Conditions and Solution; 3.5 Further Aspects of Reinforced Concrete; 3.5.1 Creep; 3.5.2 Temperature and Shrinkage; 3.5.3 Tension Stiffening; 3.5.4 Shear Stiffness for Reinforced Cracked Concrete Sections; 3.6 Prestressing; 3.7 Large Deformations and Second-Order Analysis; 3.8 Dynamics of Beams; 4 Strut-and-Tie Models; 4.1 Elastic Plate Solutions; 4.2 Modeling; 4.3 Solution Methods for Trusses; 4.4 Rigid-Plastic Truss Models; 4.5 More Application Aspects
5 Multiaxial Concrete Material Behavior5.1 Basics; 5.1.1 Continua and Scales; 5.1.2 Characteristics of Concrete Behavior; 5.2 Continuum Mechanics; 5.2.1 Displacements and Strains; 5.2.2 Stresses and Material Laws; 5.2.3 Coordinate Transformations and Principal States; 5.3 Isotropy, Linearity, and Orthotropy; 5.3.1 Isotropy and Linear Elasticity; 5.3.2 Orthotropy; 5.3.3 Plane Stress and Strain; 5.4 Nonlinear Material Behavior; 5.4.1 Tangential Stiffness; 5.4.2 Principal Stress Space and Isotropic Strength; 5.4.3 Strength of Concrete
5.4.4 Phenomenological Approach for the Biaxial Anisotropic Stress-Strain Behavior5.5 Isotropic Plasticity; 5.5.1 A Framework for Multiaxial Elastoplasticity; 5.5.2 Pressure-Dependent Yield Functions; 5.6 Isotropic Damage; 5.7 Multiaxial Crack Modeling; 5.7.1 Basic Concepts of Crack Modeling; 5.7.2 Multiaxial Smeared Crack Model; 5.8 The Microplane Model; 5.9 Localization and Regularization; 5.9.1 Mesh Dependency; 5.9.2 Regularization; 5.9.3 Gradient Damage; 5.10 General Requirements for Material Laws; 6 Plates; 6.1 Lower Bound Limit Analysis; 6.1.1 The General Approach
6.1.2 Reinforced Concrete Contributions

Sommario/riassunto

The book covers the application of numerical methods to reinforced concrete structures. To analyze reinforced concrete structures linear elastic theories are inadequate because of cracking, bond and the nonlinear and time dependent behavior of both concrete and reinforcement. These effects have to be considered for a realistic assessment of the behavior of reinforced concrete structures with respect to ultimate limit states and serviceability limit states.The book gives a compact review of finite element and other numerical methods. The key to these methods is through a proper description of m