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Recent Advancements in Geotechnical Engineering CRC Press

Computational Modelling of Concrete Structures Proceedings of the Conference on Computational Modelling of Concrete and Concrete Structures (EURO-C 2018), February 26 - March 1, 2018, Bad Hofgastein, Austria CRC Press

NCRAG'21 Springer Nature

This new book on the fracture mechanics of concrete focuses on the latest developments in computational theories, and how to apply those theories to solve real engineering problems. Zihai Shi uses his extensive research experience to present detailed examination of multiple-crack analysis and mixed-mode fracture. Compared with other mature engineering disciplines, fracture mechanics of concrete is still a developing field with extensive new research and development. In recent years many different models and applications have been proposed for crack analysis; the author assesses these in turn, identifying their limitations and offering a detailed treatment of those which have been proved to be robust by comprehensive use. After introducing stress singularity in numerical modelling and some basic modelling techniques, the Extended Fictitious Crack Model (EFCM) for multiple-crack analysis is explained with numerical application examples. This theoretical model is then applied to study two important issues in fracture mechanics - crack interaction and localization, and fracture modes and maximum loads. The EFCM is then reformulated to include the shear transfer mechanism on crack surfaces and the method is used to study experimental problems. With a carefully balanced mixture of theory, experiment and application, Crack Analysis in Structural Concrete is an important contribution to this fast-developing field of structural analysis in concrete. Latest theoretical models analysed and tested Detailed assessment of multiple crack analysis and multi-mode fractures

Applications designed for solving real-life engineering problems
Computational Modelling of Concrete Structures Springer Science & Business Media

This volume emphasises the most recent advances in fracture mechanics as specifically applied to steel bar reinforced concrete. Fracture mechanics has been applied to plain and fibre reinforced concrete with increasing success over recent years. This workshop extended these concepts to steel bar reinforced and pre-stressed concrete design. Particularly for high strength concrete, which is a very brittle material, and in the case of large structural members, the application of fracture mechanics appears to be very useful for improving the present design rules. The pre-eminent participants at the Turin workshop contributed extensive expert opinions in four selected areas for which a rational approach, using fracture mechanics, could introduce variations into the concrete design codes: size effects; anchorage and bond; minimum reinforcement for elements in flexure; and shear resistance. The 23 chapters logically address these themes and demonstrate the unique ability of fracture mechanics to capture all the experimentally observed characteristics. The book is primarily directed to the researchers in universities and institutions and will be of value to consultants and engineering companies.

Polymers for Resilient and Sustainable Concrete Infrastructure CRC Press

A Powerful Tool for the Analysis and Design of Complex Structural Elements Finite-Element Modelling of Structural Concrete: Short-Term Static and Dynamic Loading Conditions presents a finite-element model of structural concrete under short-term loading, covering the whole range of short-term loading conditions, from static (monotonic and cyclic) to dynamic (seismic and impact) cases. Experimental data on the behavior of concrete at both the material and structural levels reveal the

unavoidable development of triaxial stress conditions prior to failure which dictate the collapse and ductility of structural concrete members. Moreover, and in contrast with generally accepted tenets, it can be shown that the post-peak behavior of concrete as a material is realistically described by a complete and immediate loss of load-carrying capacity. Hence rational analysis and design of concrete components in accordance with the currently prevailing limit-state philosophy requires the use of triaxial material data consistent with the notion of a fully brittle material, and this approach is implemented in the book by outlining a finite-element method for the prediction of the strength, deformation, and cracking patterns of arbitrary structural concrete forms. Presents a Unified Approach to Structural Modeling Numerous examples are given that show both the unifying generality of this proposed approach and the reliability of the ensuing numerical procedure for which the sole input is the specified uniaxial cylinder compressive strength of concrete and the yield stress of the steel. This not only offers a better understanding of the phenomenology of structural concrete behavior but also illustrates, by means of suitable examples, the type of revision required for improving design methods in terms of both safety and economy. This

book: Highlights the significance of valid experimental information on the behavior of concrete under triaxial stress conditions for interpreting structural behavior. Describes the techniques used for obtaining valid test data and modeling concrete behavior. Discusses the modeling of steel properties as well as the interaction between concrete and steel. Presents numerical techniques for incorporating the material models into nonlinear finite-element analysis for the case of short-term static loading. Provides numerical techniques adopted for extending the use of the numerical analysis scheme for the solution of dynamic problems. Predicts the response of a wide range of structural-concrete configurations to seismic and impact excitations. Using relevant case studies throughout, *Finite-Element Modelling of Structural Concrete: Short-Term Static and Dynamic Loading Conditions* focuses on the realistic modeling of structural concrete on the basis of existing and reliable material data and aids in the research and study of structural concrete and concrete materials. [Finite-Element Modelling of Structural Concrete](#) Trans Tech Publications Ltd

FRACTURE MECHANICS OF CONCRETE AND ROCK This book offers engineers a unique opportunity to learn, from internationally recognized leaders in their field, about the latest theoretical advances in fracture mechanics in concrete, reinforced concrete structures, and rock. At the same time, it functions as a superb, graduate-level introduction to fracture mechanics concepts and analytical techniques. Reviews, in depth, the basic theory behind fracture mechanics * Covers the application of fracture mechanics to compression failure, creep, fatigue, torsion, and other advanced topics * Extremely well researched, applies experimental evidence of damage to a wide range of design cases * Supplies all relevant formulas for stress intensity * Covers state-of-the-art linear elastic fracture mechanics (LEFM) techniques for analyzing deformations and cracking * Describes nonlinear fracture mechanics (NLFM) and the

latest RILEM modeling techniques for testing nonlinear quasi-brittle materials * And much more Over the past few years, researchers employing techniques borrowed from fracture mechanics have made many groundbreaking discoveries concerning the causes and effects of cracking, damage, and fractures of plain and reinforced concrete structures and rock. This, in turn, has resulted in the further development and refinement of fracture mechanics concepts and tools. Yet, despite the field's growth and the growing conviction that fracture mechanics is indispensable to an understanding of material and structural failure, there continues to be a surprising shortage of textbooks and professional references on the subject. Written by two of the foremost names in the field, *Fracture Mechanics of Concrete* fills that gap. The most comprehensive book ever written on the subject, it consolidates the latest theoretical research from around the world in a single reference that can be used by students and professionals alike. *Fracture Mechanics of Concrete* is divided into two sections. In the first, the authors lay the necessary groundwork with an in-depth review of fundamental principles. In the second section, the authors vividly demonstrate how fracture mechanics has been successfully applied to failures occurring in a wide array of design cases. Key topics covered in these sections include:

- * State-of-the-art linear elastic fracture mechanics (LEFM) techniques for analyzing deformations and cracking
- * Nonlinear fracture mechanics (NLFM) and the latest RILEM modeling techniques for testing nonlinear quasi-brittle materials
- * The use of R-Curves to describe cracking and fracture in quasi-brittle materials
- * The application of fracture mechanics to compression failure, creep, fatigue, torsion, and other advanced topics

The most timely, comprehensive, and authoritative book on the subject currently available, *Fracture Mechanics of Concrete* is both a complete instructional tool for academics and students in structural and geotechnical engineering courses, and an indispensable working resource for practicing engineers.

Advances in Applied Mechanics CRC Press

This conference proceedings brings together the work of researchers and practising engineers concerned with computational modelling of complex concrete, reinforced concrete and prestressed concrete structures in engineering practice. The subjects considered include computational mechanics of concrete and other cementitious materials, including masonry. **Advanced discretisation methods and microstructural aspects**

within multi-field and multi-scale settings are discussed, as well as modelling formulations and constitutive modelling frameworks and novel experimental programmes. The conference also considered the need for reliable, high-quality analysis and design of concrete structures in regard to safety-critical structures, with a view to adopting these in codes of practice or recommendations. The book is of special interest to researchers in computational mechanics, and industry experts in complex nonlinear simulations of concrete structures.

Advances in Protective Structures Research BoD – Books on Demand

Transit Development in Rock Mechanics Recognition, Thinking and Innovation contains 150 papers presented at the 3rd ISRM International Young Scholars Symposium on Rock Mechanics (8-10 November 2014, Xi an, China). The volume focusses on the transitional development in rock mechanics research from surface to underground mining and from shallow to a **Springer Nature**

We present to our readers the 36th volume of the *International Journal of Engineering Research in Africa*. This volume contains articles describing the results of engineering research and technical solutions in the fields of the applied mechanics, research of materials and processing technologies in the mechanical engineering, construction materials, optimization of reactive power dispatch, technological processes in the chemical and food production, environmental engineering and engineering management. The articles will be useful for the professionals concerned with mechanical engineering, materials science, chemical engineering, power production and engineering management as well as for academic teachers and students majoring in these fields of engineering science.

[Smart Nanoconcretes and Cement-Based Materials](#) Springer Science & Business Media

An important new state-of-the-art report prepared by RILEM Technical Committee 108 ICC. It has been written by a team

of leading international experts from the UK, USA, Canada, Israel, Germany, Denmark, South Africa, Italy and France. Research studies over recent years in the field of cement science have focused on the behaviour of the interfaces between the components of cement-based materials. The techniques used in other areas of materials science are being applied to the complex materials found in cements and concretes, and this book provides a significant survey of the present state of the art.

Field Reference Manual Butterworth-Heinemann
The EURO-C conference series (Split 1984, Zell am See 1990, Innsbruck 1994, Badgastein 1998, St. Johann im Pongau 2003, Mayrhofen 2006, Schladming 2010, St. Anton am Arlberg 2014, and Bad Hofgastein 2018) brings together researchers and practising engineers concerned with theoretical, algorithmic and validation aspects associated with computational simulations of concrete and concrete structures. Computational Modelling of Concrete Structures reviews and discusses research advancements and the applicability and robustness of methods and models for reliable analysis of complex concrete, reinforced concrete and pre-stressed concrete structures in engineering practice. The contributions cover both computational mechanics and computational modelling aspects of the analysis and design of concrete and concrete structures: Multi-scale cement and concrete research: experiments and modelling Aging concrete: from very early ages to decades-long durability Advances in material modelling of plain concrete Analysis of reinforced concrete structures Steel-concrete interaction, fibre-reinforced concrete, and masonry Dynamic behaviour: from seismic retrofit to impact simulation Computational Modelling of Concrete Structures is of special interest to academics and researchers in computational concrete mechanics, as well as industry experts in complex nonlinear simulations of concrete structures.

International Congress on Polymers in Concrete (ICPIC 2018) Academic Press

A complete review of the fast-developing topic of high performance concrete (HPC) by one of the leading researchers in the field. It covers all aspects of HPC from materials, properties and technology, to construction and testing. The book will be valuable for all concrete technologists and construction engineers wishing to take advantage of the re

Numerical Modeling of Concrete Cracking CRC Press
Recycled Ceramics in Sustainable Concrete: Properties and Performance explores the use of novel waste materials in the construction industry as sustainable and environmentally friendly alternatives to traditional cement production technologies. It specifically focuses on using waste ceramics as a binder and aggregate replacement for concrete. Includes a lifecycle assessment Describes recycling of ceramic tile waste as fine and coarse aggregate replacement Discusses microstructure performance of sustainable concrete Evaluates performance of sustainable concrete exposed to elevated temperatures and corrosives Written for materials, chemical, and civil engineers as well as others who develop construction materials, this book provides readers with a thorough understanding of the merits of using waste ceramics to produce sustainable concrete. .

Waste Materials in Advanced Sustainable Concrete CRC Press

The book analyzes a quasi-static fracture process in concrete and reinforced concrete by means of constitutive models formulated within continuum mechanics. A continuous and discontinuous modelling approach was used. Using a continuous approach, numerical analyses were performed using a finite element method and four different enhanced continuum models: isotropic elasto-plastic, isotropic damage and anisotropic smeared crack one. The models were equipped with a characteristic length of micro-structure by means of a non-local and a second-gradient theory. So they could properly describe the formation of localized zones with a certain thickness and spacing and a related deterministic size effect. Using a discontinuous FE approach, numerical results of cracks using a cohesive crack model and XFEM were presented which were also properly regularized. Finite element analyses were performed with concrete elements under monotonic uniaxial compression, uniaxial tension, bending and shear-extension. Concrete beams under cyclic loading were also simulated using a coupled elasto-plastic-damage approach. Numerical simulations were performed at macro- and meso-level of concrete. A stochastic and deterministic size effect was carefully investigated. In the case of reinforced concrete specimens, FE calculations were carried out with bars, slender and short beams, columns, corbels and tanks. Tensile and shear failure mechanisms

were studied. Numerical results were compared with results from corresponding own and known in the scientific literature laboratory and full-scale tests.

Computational Modelling of Concrete Structures Elsevier

Computational intelligence (CI) in concrete technology has not yet been fully explored worldwide because of some limitations in data sets. This book discusses the selection and separation of data sets, performance evaluation parameters for different types of concrete and related materials, and sensitivity analysis related to various CI techniques. Fundamental concepts and essential analysis for CI techniques such as artificial neural network, fuzzy system, support vector machine, and how they work together for resolving real-life problems, are explained. Features: It is the first book on this fast-growing research field. It discusses the use of various computation intelligence techniques in concrete technology applications. It explains the effectiveness of the methods used and the wide range of available techniques. It integrates a wide range of disciplines from civil engineering, construction technology, and concrete technology to computation intelligence, soft computing, data science, computer science, and so on. It brings together the experiences of contributors from around the world who are doing research in this field and explores the different aspects of their research. The technical content included is beneficial for researchers as well as practicing engineers in the concrete and construction industry.

Proceedings of the International Conference on Automation Innovation in Construction (CIAC-2019), Leiria, Portugal Springer

This book gathers outstanding papers presented at the Conference on Automation Innovation in Construction (CIAC-2019). In recent years, there have been significant transformations in the construction sector regarding production and the use of computers and automation to create smart and

autonomous systems. At the same time, innovative construction materials and alternative technologies are crucial to overcoming the challenges currently facing the building materials industry. The book presents numerous examples of smart construction technologies, discusses the applications of new construction materials and technologies, and includes studies on recent trends in automation as applied to the construction sector.

Compressive Strength of Concrete Springer Nature
Following Volumes III and IV that dealt with the fracture mechanics of concrete emphasizing both material testing and structural application in general, it was felt that specimen size and loading rate effects for concrete require further attention. The only criterion that has thus far successfully linearized the highly nonlinear crack growth data of concrete is the strain energy density theory. In particular, the crack growth resistance curves plotting the strain energy density factor versus crack growth known as the SR - curves are straight lines as specimen size and loading steps or rates are altered. This allows the extrapolation of data and provides a useful design methodology. This book is unique in that it is devoted specifically to the application of the strain energy density theory to civil engineering structural members made of concrete. Analyzed in detail is the strain softening behavior of concrete for a variety of different components including the influence of steel reinforcement. Permanent damage of the material is accounted for each increment of loading by invoking the mechanism of elastic unloading. This assumption is justified in concrete structures where the effective stiffness depends primarily on the crack growth rate and load history. Crack growth data are presented in terms of SR-curves with emphases placed on scaling specimen size which alone can change the mode of failure from plastic collapse to brittle fracture. Loading rate effects can also be scaled to control failure by yielding and fracture. Concrete International Woodhead Publishing

Concrete made using mineral cements, the raw materials which on earth are practically endless, is known as one of the oldest building materials and during the last decades of the twentieth century has become a dominant building material for general use. At the same time, the requirements of the quality of concrete and its performance properties, in particular compressive strength, durability, economical efficiency, and low negative impact of its manufacture on the environment have not yet been completely met. Bearing these requirements in mind, researchers and engineers worldwide are working on how to satisfy these requirements.

This book has been written by researchers and experts in the field and provides the state of the art on recent progress achieved on the properties of concrete, including concrete in which industrial by-products are utilized. The book is dedicated to graduate students, researchers, and practicing engineers in related fields.

Properties and Performance Springer

These are the proceedings of the 3rd International Conference on Engineering Sciences and Technologies (ESaT 2018), held from 12th - 14th September 2018 in the High Tatras Mountains, Tatranské Matliare, Slovak Republic. ESaT 2018 was organized under the auspices of the Faculty of Civil Engineering, Technical University of Košice - Slovak Republic in collaboration with Peter the Great St. Petersburg Polytechnic University - Russia after the successful organization with excellent feedback of the previous international conferences ESaT 2015 and ESaT 2016. The proceedings is covering various topics and disciplines in civil engineering sciences, such as Buildings and Architectural Engineering, Bearing Structures, Material and Environmental Engineering, Construction Technology and Management, Building Physics and Facilities, Geodesy, Surveying and Mapping, Geotechnics and Traffic Engineering. The proceedings report on new and original progress and trends in various fields of engineering sciences that will be of interest to a wide range of academics and professionals from university and industry. 116 papers originating from more than 10 countries have been accepted for publication in the conference proceedings. Each accepted paper was reviewed by two reviewers, selected according to the scientific area and orientation of the paper, which guarantees topicality, quality and an advanced level of the presented results.

International Journal for Housing Science and Its Applications Springer

The theme of conference is Emerging Technologies for Sustainability. Sustainability tends to be problem driven and oriented towards guiding decision making. The goal is to raise the global standard of living without increasing the use of resources beyond global sustainable levels. The

conference is intended to act as a platform for researchers to share and gain knowledge, showcase their research findings and propose new solutions in policy formulation, design, processing and application of green materials, material selection, analysis, green manufacturing, testing and synthesis, thereby contributing to the creation of a more sustainable world.

Concrete International Whittles Publishing

Since 1984 the EURO-C conference series (Split 1984, Zell am See 1990, Innsbruck 1994, Badgastein 1998, St Johann im Pongau 2003, Mayrhofen 2006, Schladming 2010) has provided a forum for academic discussion of the latest theoretical, algorithmic and modelling developments associated with computational simulations of concrete and concrete structure