Experimental Behaviour Of Reinforced Concrete Elements | d16b18ed444aab2684cd25c379b3ab82

The Ultimate Load Design of Continuous Concrete Beams
Echinoderms: Munchen
Continuous and Discontinuous Modelling of Fracture in Concrete Using FEM
Fibrous and Composite Materials for Civil Engineering Applications
ECCM-8 Analysis of Concrete Structures by Fracture Mechanics
The Behaviour of Reinforced Concrete Members Subjected to Bending and In-plane Tension
An Experimental Investigation Into the Effects of Shear and Tension on the Flexural Behaviour of Reinforced Concrete Beams
Sustainable Practices and Innovations in Civil Engineering
Principles of Reinforced Concrete
Mechanics of Structures and Materials XXIV
Fire Safety Engineering Design of Structures
Life-Cycle Civil Engineering
CONCRETE Innovations in Materials, Design and Structures
Fibre-Reinforced Polymer Reinforcement for Concrete Structures
Integrity of Offshore Structures
Applications of Fracture Mechanics to Reinforced Concrete
Compressive Force-Path Method
Seismic Behaviour of Reinforced Concrete Frames with Different Configurations of Masonry Infill
Design, Assessment, Monitoring and Maintenance of Bridges and Infrastructure Networks
Brick and Block Masonry
An Experimental Investigation Into Some Aspects of the Ultimate Load Behaviour of Reinforced Concrete Columns
Shear and Punching Shear in RC and FRC Elements
An Experimental Investigation Into the Effects of Shear and Tension on the Flexural Behaviour of Reinforced Concrete Beams
Advances in Concrete Slab Technology
Experimental Study on the Behaviour of Reinforced Concrete Deep Beams with Large Circular Openings
Strengthened Using CFRP
Fire Safety Engineering Design of Structures, Second Edition
Behavior and analysis of reinforced concrete structures under alternate actions
This experimental research was conducted to study the behaviour of unstrengthen RC deep beams with openings and strengthened using Carbon Fiber Reinforced Polymer (CFRP). Strengthening configuration of CFRP-wrap used in this study were U-wrap and surface-wrap which applied with one layer of CFRP and in vertical alignment (90°). Four RC deep beams which included a solid control beam, a beam with two large circular openings, beams with two large circular openings strengthened using U-wrap and surface-wrap were tested to failure under four-point loading. All the beam specimens were in a dimension of 120 x 600 mm and 2400 mm in length. The support and loading point were located at 300 mm and 800 mm from the edge of the RC deep beams, respectively. Circular openings was designed with a standard of 0.45h which considered as large circular openings in a diameter of 270 mm that located 435 mm from the edge of the RC deep beams. Shear span-to-depth ratio (a/h) in this study was 0.83 in which the distance between the loading point and the support was 500 mm in order for the beam
specimens to fail in shear region. RC deep beam with large circular openings, NS-BCO greatly reduced the beam strength, approximately 51.20 % as compared to the control beam. On the other hand, RC deep beam with circular openings strengthened using U-wrap, UW-BCO increases the beam strength up to almost 85.0 % as compared to NS-BCO. Hence, the most effective strengthening method was U-wrap, UW-BCO which re-gained the beam strength up to 90.28 % as compared to control beam.

This book presents a method which simplifies and unifies the design of reinforced concrete (RC) structures and is applicable to any structural element under both normal and seismic loading conditions. The proposed method has a sound theoretical basis and is expressed in a unified form applicable to all structural members, as well as their connections. It is applied in practice through the use of simple failure criteria derived from first principles without the need for calibration through the use of experimental data. The method is capable of predicting not only load-carrying capacity but also the locations and modes of failure, as well as safeguarding the structural performance code requirements. In this book, the concepts underlying the method are first presented for the case of simply supported RC beams. The application of the method is progressively extended so as to cover all common structural elements. For each structural element considered, evidence of the validity of the proposed method is presented together with design examples and comparisons with current code specifications. The method has been found to produce design solutions which satisfy the seismic performance requirements of current codes in all cases investigated to date, including structural members such as beams, columns, and walls, beam-to-beam or column-to-column connections, and beam-to-column joints.

Life-Cycle Civil Engineering contains the papers presented at the First International
Symposium on Life-Cycle Civil Engineering (IALCCE 08), held in Villa Monastero, Varenna, Lake Como, Italy, 10-14 June, 2008. It consists of a book and a CD-ROM containing 150 papers, including eight keynote papers and 142 technical contributions from 28 countries.

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.
The use of fibrous materials in civil engineering, both as structural reinforcement and in non-structural applications such as geotextiles, is an important and interesting development. Fibrous and composite materials for civil engineering applications analyses the types and properties of fibrous textile and structures and their applications in reinforcement and civil engineering. Part one introduces different types of fibrous textiles and structures. Chapters cover the properties of natural and man-made fibres and of yarns, as well as an overview of textile structures. Part two focuses on fibrous material use in concrete reinforcement, with chapters on the properties and applications of steel fibre reinforced concrete, natural fibre reinforced concrete and the role of fibre reinforcement in mitigating shrinkage cracks. In part three, the applications of fibrous material-based composites in civil engineering are covered. Chapters concentrate on production techniques and applications such as reinforcement of internal structures, structural health monitoring and textile materials in architectural membranes. With its distinguished editor and international team of contributors, Fibrous and composite materials for civil engineering applications is a standard reference for fabric and composite manufacturers, civil engineers and professionals, as well as academics with a research interest in this field. Explores the development of fibrous materials in civil engineering, both as structural reinforcement and in non-structural applications such as geotextiles Key topics include short fibre reinforced concrete, natural fibre reinforced concrete and high performance fibre reinforced cementitious composites A standard reference for fabric and composite manufacturers, civil engineers and professionals, as well as academics with a research interest in this field

Designing structures to withstand the effects of fire is challenging, and requires a series of complex design decisions. This third edition of Fire Safety Engineering Design of
Structures provides practising fire safety engineers with the tools to design structures to withstand fires. This text details standard industry design decisions, and offers

Fibre-reinforced polymer (FRP) reinforcement has been used in construction as either internal or external reinforcement for concrete structures in the past decade. This book provides the latest research findings related to the development, design and application of FRP reinforcement in new construction and rehabilitation works. The topics include FRP properties and bond behaviour, externally bonded reinforcement for flexure, shear and confinement, FRP structural shapes, durability, member behaviour under sustained loads, fatigue loads and blast loads, prestressed FRP tendons, structural strengthening applications, case studies, and codes and standards.

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 Alberg 2014) brings together researchers and practising engineers concerned with theoretical, algorithmic and validation aspects associated with computational simulations of concrete and concrete structures. The conference 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. Conference topics and invited papers cover both computational mechanics and computational modelling aspects of the analysis and design of concrete and concrete structures: * Constitutive and Multiscale Modelling of Concrete * Advances in Computational Modelling * Time Dependent and Multiphysics Problems * Performance of Concrete Structures The book is of special interest to researchers in computational concrete mechanics, as well as industry experts in complex
nonlinear simulations of concrete structures.

Papers presented at the Fourth International Symposium on Integrity of Offshore Structures, 2-3 July 1990, Kelvin Conference Centre, University of Glasgow, Scotland organized by the Department of Naval Architecture and Ocean Engineering and Mechanical Engineering.

Advances in Concrete Slab Technology documents the proceedings of the International Conference on Concrete Slabs held at Dundee University on April 3-6, 1979. This book discusses the influence of steel fiber-reinforcement on the shear strength of slab-column connections; sulfur-treated concrete slabs; yield line analysis of orthotropicaly reinforced exterior panels of flat slab floors; and behavior of flat slab/edge column joints. The design of multiple panel flat slab structures; structural behavior of floor slabs in shear wall buildings; shrinkage and cracking of concrete at early ages; and slab construction for HAB system modules are also elaborated. This text likewise covers the direct finishing of concrete slabs using the early age power grinding technique; application of vacuum dewatering to in-situ slab production; retexturing of concrete slabs; and fatigue resistance of composite precast and in situ concrete floors. This publication is a good reference for students and individuals concerned with the practices and research relating to slab technology.

Relevant advances have been accomplished by the scientific community and engineering profession in the design, assessment, monitoring, maintenance, and management of sustainable and resilient bridge structures and infrastructures. These advances have been presented and discussed at The Sixth International Conference on Bridge Maintenance, Safety And Management (IABMAS 2012), held in Stresa, Italy, from 8 to 11
July 2012 (http://www.iabmas2012.org). IABMAS 2012 has been organised on behalf of the International Association for Bridge Maintenance And Safety (IABMAS) under the auspices of Politecnico di Milano. This book collects the extended versions of selected papers presented at IABMAS 2012 and invited papers originally published in a Special Issue of Structure and Infrastructure Engineering. These papers provide significant contributions to the process of making more rational decisions in bridge design, assessment, monitoring and maintenance. The editors would like to thank the authors for their contributions and hope that this collection of papers will represent a valuable reference for scientific research and engineering applications in the fields of design, assessment, monitoring, and maintenance of bridges and infrastructure networks.

This Proceedings contains the papers of the fib Symposium “CONCRETE Innovations in Materials, Design and Structures”, which was held in May 2019 in Kraków, Poland. This annual symposium was co-organised by the Cracow University of Technology. The topics covered include Analysis and Design, Sustainability, Durability, Structures, Materials, and Prefabrication. The fib, Fédération internationale du béton, is a not-for-profit association formed by 45 national member groups and approximately 1000 corporate and individual members. The fib’s mission is to develop at an international level the study of scientific and practical matters capable of advancing the technical, economic, aesthetic and environmental performance of concrete construction. The fib, was formed in 1998 by the merger of the Euro-International Committee for Concrete (the CEB) and the International Federation for Prestressing (the FIP). These predecessor organizations existed independently since 1953 and 1952, respectively.

This volume contains the peer-reviewed papers accepted for presentation at the 18th
Australasian Conference on the Mechanics of Structures and Materials held in Perth, 2004. Papers contained describe significant advances in a large number of diverse areas, indicating the range of applications of the basic principles and techniques of mechanics from traditional areas such as steel and concrete structures, through to modern areas such as structural health monitoring and structural rehabilitation using carbon fibre composites. With topics ranging from foundation piles to shaken baby syndrome, this volume reports the results of countless thousands of hours of research and millions of dollars of research funding.

This book presents the latest research findings of the fast developing applications of fracture mechanics to concrete structures. Key papers from leading experts in the field describe existing and new modelling techniques in the analysis of materials and structures. The book explains the practical application of fracture mechanics to structural modelling, bending, shear, bond and anchorage. The proceedings of this RILEM Workshop will be an important reference for those engaged in design, development, research and teaching in the field of concrete structures.

Brick and Block Masonry - Trends, Innovations and Challenges contains the lectures and regular papers presented at the 16th International Brick and Block Masonry Conference (Padova, Italy, 26-30 June 2016). In an ever-changing world, in which innovations are rapidly implemented but soon surpassed, the challenge for masonry, the oldest and most traditional building material, is that it can address the increasingly pressing requirements of quality of living, safety, and sustainability. This abstracts volume and full paper USB device, focusing on challenges, innovations, trends and ideas related to
masonry, in both research and building practice, will prove to be a valuable source of information for researchers and practitioners, masonry industries and building management authorities, construction professionals and educators.

Mechanics of Structures and Materials: Advancements and Challenges is a collection of peer-reviewed papers presented at the 24th Australasian Conference on the Mechanics of Structures and Materials (ACMSM24, Curtin University, Perth, Western Australia, 6-9 December 2016). The contributions from academics, researchers and practising engineers from Australasian, Asia-pacific region and around the world, cover a wide range of topics, including: • Structural mechanics • Computational mechanics • Reinforced and prestressed concrete structures • Steel structures • Composite structures • Civil engineering materials • Fire engineering • Coastal and offshore structures • Dynamic analysis of structures • Structural health monitoring and damage identification • Structural reliability analysis and design • Structural optimization • Fracture and damage mechanics • Soil mechanics and foundation engineering • Pavement materials and technology • Shock and impact loading • Earthquake loading • Traffic and other man-made loadings • Wave and wind loading • Thermal effects • Design codes Mechanics of Structures and Materials: Advancements and Challenges will be of interest to academics and professionals involved in Structural Engineering and Materials Science.

The ECCM conferences attract world-wide participation and are now recognised as the premier European forum for discussion in all aspects of composites research and development. The eighth conference is to be held in Naples in June 1998. The book is
structured on 8 different symposia dealing with all major scientific and industrial aspects of the science, technologies and application of composite materials.

Principle of Reinforced Concrete introduces the main properties of structural concrete and its mechanical behavior under various conditions as well as all aspects of the combined function of reinforcement and concrete. Based on the experimental investigation, the variation regularity of mechanical behavior, working mechanism, and calculation method are presented for the structural member under various internal forces. After examining the basic principle and analysis method of reinforced concrete, the book covers some extreme circumstances, including fatigue load, earthquake, explosion, high temperature (fire accident), and durability damage, and the special responses and analysis methods of its member under these conditions. This work is valuable as a textbook for post-graduates, and can be used as a reference for university teachers and under-graduates in the structural engineering field. It is also useful for structural engineers engaged in scientific research, design, or construction. Focuses on the principles of reinforced concrete, providing professional and academic readers with a single volume reference Experimental data enables readers to make full use of the theory presented The mechanical behavior of both concrete and reinforcement materials, plus the combined function of both are covered, enabling readers to understand the behaviors of reinforced concrete structures and their members Covers behavior of the materials and members under normal and extreme conditions

This book sheds light on the shear behavior of Fiber Reinforced Concrete (FRC) elements, presenting a thorough analysis of the most important studies in the field and highlighting their shortcomings and issues that have been neglected to date. Instead of
proposing a new formula, which would add to an already long list, it instead focuses on existing design codes. Based on a comparison of experimental tests, it provides a thorough analysis of these codes, describing both their reliability and weaknesses. Among other issues, the book addresses the influence of flange size on shear, and the possible inclusion of the flange factor in design formulas. Moreover, it reports in detail on tests performed on beams made of concrete of different compressive strengths, and on fiber reinforcements to study the influence on shear, including size effects. Lastly, the book presents a thorough analysis of FRC hollow core slabs. In fact, although this is an area of great interest in the current research landscape, it remains largely unexplored due to the difficulties encountered in attempting to fit transverse reinforcement in these elements.

Brick and Block Masonry - From Historical to Sustainable Masonry contains the keynote and semi-keynote lectures and all accepted regular papers presented online during the 17th International Brick and Block Masonry Conference IB2MaC (Kraków, Poland, July 5-8, 2020). Masonry is one of the oldest structures, with more than 6,000 years of history. However, it is still one of the most popular and traditional building materials, showing new and more attractive features and uses. Modern masonry, based on new and modified traditional materials and solutions, offers a higher quality of life, energy savings and more sustainable development. Hence, masonry became a more environmentally friendly building structure. Brick and Block Masonry - From Historical to Sustainable Masonry focuses on historical, current and new ideas related to masonry development, and will provide a very good platform for sharing knowledge and experiences, and for learning about new materials and technologies related to masonry structures. The book will be a valuable compendium of knowledge for researchers, representatives of industry and building management, for curators and conservators of
monuments, and for students.

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.

fib Bulletin 57 is a collection of contributions from a workshop on "Recent developments on shear and punching shear in RC and FRC elements", held in Salò, Italy, in October 2010. Shear is one of a few areas of research into fundamentals of the behaviour of concrete structures where contention remains amongst researchers. There is a continuing debate between researchers from a structures perspective and those from a materials or fracture mechanics perspective about the mechanisms that enable the force flow through a concrete member and across cracks. In 2009, a Working Group was formed within fib Task Group 4.2 "Ultimate Limit State Models" to harmonise different ideas about design procedures for shear and punching. An important outcome of this work was the ensuing discussions between experts and practitioners regarding the shear and punching provisions of the draft fib Model Code, which led to the organization of the
Salò workshop. Invited experts in the field of shear and FRC gave 18 lectures at the workshop that was attended by 72 participants from 12 countries in 3 different continents. The contributions from this conference as compiled in this bulletin are believed to represent the best of the current state of knowledge. They certainly are of general interest to fib members and especially helpful in the finalization of the 2010 fibModel Code. It is hoped that this publication will stimulate further research in the field, to refine and harmonize the available analytical models and tools for shear and punching design.

An essential resource on the design and performance of common structural materials when they are exposed to fire.

This volume emphasizes 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...
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Since 1972, scientists from all over the world working on fundamental questions of echinoderm biology and palaeontology have conferred every three years to exchange current views and results. The 11th International Echinoderm Conference held at the University of Munich, Germany, from 6-10 October 2003, continued this tradition. This volume comprises 95 submitted papers and 96 abstracts covering a wide spectrum from innovative student contributions to the lessons learnt from experienced specialists. The content of the contributions ranges from original research results to the latest synopses concerning a variety of topics, including visual sensing, larval cloning, mutable collagenous tissues, sea urchin aqua-culture, deuterostome phylogeny, palaeobiology and
taphonomy.

Describes a study, based on a comprehensive experimental programme of slab test to failure, which covered the design reinforced concrete flat slabs with regard to flexure, punching shear and deflection.

Fibre-reinforced polymer (FRP) reinforcement has been used in construction as either internal or external reinforcement for concrete structures in the past decade. This book provides the latest research findings related to the development, design and application of FRP reinforcement in new construction and rehabilitation works. The topics include FRP properties and bond behaviour, externally bonded reinforcement for flexure, shear and confinement, FRP structural shapes, durability, member behaviour under sustained loads, fatigue loads and blast loads, prestressed FRP tendons, structural strengthening applications, case studies, and codes and standards.

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