Compressive Behavior Of Basalt Fiber Reinforced Composite

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Selected articles from ICMMPE 2019 CRC Press
Creep and Fatigue in Polymer Matrix Composites, Second Edition, updates the latest research in modeling and predicting creep and fatigue in polymer matrix composites. The first part of the book reviews the modeling of viscoelastic and viscoplastic behavior as a way of predicting performance and service life. Final sections discuss techniques for modeling creep rupture and failure and how to test and predict long-term creep and fatigue in polymer matrix composites. Reviews the latest research in modeling and predicting creep and fatigue in polymer matrix composites Puts a specific focus on viscoelastic and viscoplastic modeling Features the time-temperature-age superposition principle for predicting long-term response Examines the creep rupture and damage interaction, with a particular focus on time-dependent failure criteria for the lifetime prediction of polymer matrix composite structures that are illustrated using experimental cases
Bio-Fiber Reinforced Composite Materials Springer Nature
This book contains selected papers in the area of structural engineering from the proceedings of the conference, Futuristic Approaches in Civil Engineering (FACE) 2019. In the area of construction materials, the book covers high quality research papers on raw materials and manufacture of cement, mixing, rheology and hydration, admixtures, characterization techniques and modeling, fiber-reinforced concrete, repair and retrofitting of concrete structures, novel testing techniques such as digital image correlation (DIC). Research on sustainable building materials like Geopolymer concrete and recycled aggregates are covered. In the area of earthquake engineering, papers related to the seismic response of load-bearing unreinforced masonry walls, reinforced concrete frame and buildings with dampers are covered. Additionally, there are chapters on structures subjected to vehicular impact and fire. The contents of this book will be useful for graduate students, researchers and practitioners working in the areas of concrete, earthquake and structural engineering.
Mechanics And Architectural Design - Proceedings Of 2016 International Conference Springer
This book presents high-quality research papers that demonstrate how emerging technologies in the field of intelligent systems can be used to effectively meet global needs. The respective papers highlight a wealth of innovations and experimental results, while also addressing proven IT governance, standards and practices, and new designs and tools that facilitate rapid information flows to the user. The book is divided into five major sections, namely: “Advances in High Performance Computing”, “Advances in Machine and Deep Learning”, “Advances in Networking and Communication”, “Advances in Circuits and Systems in Computing” and “Advances in Control and Soft Computing”.
Perspectives, Properties, and New Materials Trans Tech Publications Ltd
Mineral-filled polymer composites are widely used in industries across the globe, and applications are continuously increasing in sectors such as shipping, manufacturing and renewable energy. One of two volumes comprising the Mineral-Filled Polymer Composites Handbook, this volume provides an overview of the latest research and future directions of advanced mineral fiber-reinforced polymer composites, focused specifically on materials properties. It covers fundamentals, recent progress and new materials involved in mineral-filled polymer composites and includes a wide-ranging list of chapters authored by an international team of experts. This book: Examines the properties of a wide range of materials, from macro- to nano-sized Highlights resources for bio-based minerals production and compares bio-based minerals with commercial mineral fillers Covers novel synthesis methods Discusses effects of aging on properties Describes using halloysite and montmorillonite to improve composite properties and the potential of using mineral fillers to enhance the properties of biopolymer and synthetic polymers This book serves as an excellent reference guide for researchers, advanced students, academics and industry professionals interested in the synthesis of mineral-filled polymer and biopolymer composites, as well as those pursuing research in the broad fields of composite materials, polymers, organic/inorganic hybrid materials and nano-assembly.
Advances in Manufacturing Engineering Elsevier
This volume highlights the latest advances, innovations, and applications in the field of fibre reinforced concrete (FRC) and discusses a diverse range of topics concerning FRC: rheology and early-age properties, mechanical properties, codes and standards, long-term properties, durability, analytical and numerical models, quality control, structural and Industrial applications, smart FRC’s, nanotechnologies related to FRC, textile reinforced concrete, structural design and UHPFRC. The contributions present improved traditional and new ideas that will open novel research directions and foster multidisciplinary collaboration between different specialists. Although the symposium was postponed, the book gathers peer-reviewed papers selected in 2020 for the RILEM-fib International Symposium on Fibre Reinforced Concrete (BEFIB).
Handbook of Graphene CRC Press
Volume is indexed by Thomson Reuters CPCI-S (WoS). This book aims to collect the latest development and applications of advanced and sustainable materials, the innovation in civil and hydraulic engineering, the innovation in architecture and building construction, and the innovation in bridge and underground engineering.
Mineral-Filled Polymer Composites CRC Press
ICTAEM_1 treated all aspects of theoretical, applied and experimental mechanics including biomechanics, composite materials, computational mechanics, constitutive modeling of materials, dynamics, elasticity, experimental mechanics, fracture, mechanical properties of materials, micromechanics, nanomechanics, plasticity, stress analysis, structures, wave propagation. During the conference special symposia covering major areas of research activity organized by members of the Scientific Advisory Board took place. ICTAEM_1 brought together the most outstanding world leaders and gave attendees the opportunity to get acquainted with the latest developments in the area of mechanics. ICTAEM_1 is a forum of university, industry and government interaction and serves in the exchange of ideas in an area of utmost scientific and technological importance.
Durability and Life Prediction MDPI
This book sheds light on recent advances in sustainable construction and building materials with special emphasis on the characterization of natural and composite hydraulic mortars, advanced concrete technology, green building materials, and application of nanotechnology to the improvement of the design of building materials. The book covers in detail the characterization of natural hydraulic lime mortars, a decade of research on self-healing concrete, biocomposite cement binding process and performance, development of sustainable building materials from agro-industrial wastes, applications of sugarcane biomass ash for developing sustainable construction materials, oil-contaminated sand: sources, properties, remediation, and engineering applications, oil shale ash addition effect in concrete to freezing/thawing, connection node design and performance optimization of girders, functionally graded concrete structures, cumulative tensile damage and consolidation effects on fracture properties of sandstone, key performance criteria influencing the selection of construction methods used for the fabrication of building components in the Middle East, fly ash as a resource material for the construction industry, degradation monitoring systems for a building information modeling maintenance approach, durability of composite-modified asphalt mixtures based on inherent and improved performance, and bitumen and its modifiers.
X RILEM-fib International Symposium on Fibre Reinforced Concrete (BEFIB) 2021 World Scientific
Selected chapters from the German concrete yearbook are now being published in the new English "Beton-Kalender Series" for the benefit of an international audience. Since it was founded in 1906, the Ernst & Sohn "Beton-Kalender" has been supporting developments in reinforced and prestressed concrete. The aim was to publish a yearbook to reflect progress in "ferro-concrete" structures until - as the book's first editor, Fritz von Emperger (1862-1942), expressed it - the "tempestuous development" in this form of construction came to an end. However, the "Beton-Kalender" quickly became the chosen work of reference for civil and structural engineers, and apart from the years 1945-1950 has been published annually ever since. Ultra high performance concrete (UHPC) is a milestone in concrete technology and application. It permits the construction of both more slender and more durable concrete structures with a prolonged service life and thus improved sustainability. This book is a comprehensive overview of UHPC - from the principles behind its production and its mechanical properties to design and detailing aspects. The focus is on the material behaviour of steel fibre-reinforced UHPC. Numerical modelling and detailing of the connections with reinforced concrete elements are featured as well. Numerous examples worldwide - bridges, columns, facades and roofs - are the basis for additional explanations about the benefits of UHPC and how it helps to realise several architectural requirements. The authors are extensively involved in the testing, design, construction and monitoring of UHPC structures. What they provide here is therefore a unique synopsis of the state of the art with a view to practical applications.
New Trends in Recycled Aggregate Concrete CRC Press
The special focus of this proceeding is to cover the areas of infrastructure engineering and sustainability management. The state-of-the art information in infrastructure and sustainable issues in engineering covers earthquake, bioremediation, synergistic management, timber engineering, flood management and intelligent transport systems. It provides precise information with regards to innovative research development in construction materials and structures in addition to a compilation of interdisciplinary finding combining nano-materials and engineering.
Encyclopedia of Renewable and Sustainable Materials Elsevier
Value-Added Biocomposites: Technology, Innovation, and Opportunity explores advances in research, processing, manufacturing, and novel applications of biocomposites. It describes the current market situation, commercial competition, and societal and economic impacts and advantages of substituting biocomposites for conventional composites, including natural fibers and bioplastics. FEATURES Discusses manufacturing and processing procedures that focus on improving physical, mechanical, thermal, electrical, chemical, and biological properties and achieving required specifications of downstream industries and customers Analyzes the wide range of available base materials and fillers of biocomposites and bioplastics in terms of the strength and weaknesses of materials and economic potential in the market Displays special and unique properties of biocomposites in different market sectors Showcases the insight of expert scientists and engineers with first-hand experience working with biocomposites across various industries Covers environmental factors, life cycle assessment, and waste recovery Combining technical, economic, and environmental topics, this work provides researchers, advanced students, and industry professionals a holistic overview of the value that biocomposites add across a variety of engineering applications and how to balance research and development with practical results.
Effect of Basalt Fibers on the Flexural Behavior of Beams Reinforced With BFRP Bars Woodhead Publishing
Polymers make up one of the three main raw material groups used in the modern world, together with metals and inorganic non-metallics. They are widely used in all fields of economic development and scientific & technological innovation, and continue to play an increasingly important role. As China□s modern manufacturing forges ahead, going from a large producing country to a powerful manufacturing state, the extent of the knowledge, the tendency to innovation and the technical skill brought to bear on advanced polymer processing increase daily. There is a trend towards rapid development involving high performance and environmental-friendliness, backed up by lots of new research performed by the scientific and engineering communities.
Fiber Technology for Fiber-Reinforced Composites MDPI
Encyclopedia of Renewable and Sustainable Materials provides a comprehensive overview, covering research and development on all aspects of renewable, recyclable and sustainable materials. The use of renewable and sustainable materials in building construction, the automotive sector, energy, textiles and others can create markets for agricultural products and additional revenue streams for farmers, as well as significantly reduce carbon dioxide (CO2) emissions, manufacturing energy requirements, manufacturing costs and waste. This book provides researchers, students and professionals in materials science and engineering with tactics and information as they face increasingly complex challenges around the development, selection and use of construction and manufacturing materials. Covers a broad range of topics not available elsewhere in one resource Arranged thematically for ease of navigation Discusses key features on processing, use, application and the environmental benefits of renewable and sustainable materials Contains a special focus on sustainability that will lead to the reduction of carbon emissions and enhance protection of the natural environment with regard to sustainable materials
InCIEC 2013 Woodhead Publishing
Tribology of Polymer Composites: Characterization, Properties,

and Applications provides an exhaustive overview of the latest research, trends, applications and future directions of the tribology of polymer composites. Covering novel methods for the synthesis of polymer composites and their properties, the book starts by reviewing the fabrication techniques, wear and frictional properties of polymer composite materials. From there, it features chapters looking at the tribological behavior and properties of specific polymer composite materials such as synthetic fiber-reinforced, cellulose fiber-reinforced, wood fiber, synthetic fiber, mineral fiber-reinforced, and thermosetting composites. Final chapters cover the tribology of polymer nanocomposites and particulate polymer composites and their metal coatings. Applied examples spanning a wide range of industries are emphasized in each chapter. Demonstrates the potential of polymer composites and their applications Covers novel methods for the synthesis of polymer composites and their properties Reviews the fabrication techniques, wear and frictional properties of polymer composite materials

Flexural Behavior of Basalt FRP Bar Reinforced Concrete Members with and Without Polypropylene Fiber Springer Nature

The third edition of Introduction to Composite Materials Design is a practical, design-oriented textbook aimed at students and practicing engineers learning analysis and design of composite materials and structures. Readers will find the third edition to be both highly streamlined for teaching, with new comprehensive examples and exercises emphasizing design, as well as complete with practical content relevant to current industry needs. Furthermore, the third edition is updated with the latest analysis techniques for the preliminary design of composite materials, including universal carpet plots, temperature dependent properties, and more. Significant additions provide the essential tools for mastering Design for Reliability as well as an expanded material property database.

Mechanical and Dynamic Properties of Biocomposites Springer

This volume highlights the latest advances, innovations, and applications in the field of FRP composites and structures, as presented by leading international researchers and engineers at the 10th International Conference on Fibre-Reinforced Polymer (FRP) Composites in Civil Engineering (CICE), held in Istanbul, Turkey on December 8-10, 2021. It covers a diverse range of topics such as All FRP structures; Bond and interfacial stresses; Concrete-filled FRP tubular members; Concrete structures reinforced or pre-stressed with FRP; Confinement; Design issues/guidelines; Durability and long-term performance; Fire, impact and blast loading; FRP as internal reinforcement; Hybrid structures of FRP and other materials; Materials and products; Seismic retrofit of structures; Strengthening of concrete, steel, masonry and timber structures; and Testing. The contributions, which were selected by means of a rigorous international peer-review process, present a wealth of exciting ideas that will open novel research directions and foster multidisciplinary collaboration among different specialists.

Advances in Structural Engineering John Wiley & Sons

Presenting a wealth of completely revised examples and new information, Introduction to Composite Materials Design, Second Edition greatly improves on the bestselling first edition. It incorporates state-of-the-art advances in knowledge and design methods that have taken place over the last 10 years, yet maintains the distinguishing features and vital content of the original. New material in this second edition: Introduces new background topics, including design for reliability and fracture mechanics Revises and updates information on polymer matrices, modern fibers (e.g., carbon nanotubes, Basalt, Vectran) and fiber forms such as textiles/fabrics Includes new information on Vacuum Assisted Resin Transfer Molding (VARTM) Incorporates major advances in prediction of unidirectional-lamina properties Reworks sections on material failure, including the most advanced prediction and design methodologies, such as in situ strength and Mohr-Coulomb criterion, etc. Covers all aspects of preliminary design, relegating finite element analysis to a separate textbook Discusses methodology used to perform damage mechanics analysis of laminated composites accounting for the main damage modes: longitudinal tension, longitudinal compression, transverse tension, in-plane shear, and transverse compression Presents in-depth analysis of composites reinforced with plain, twill, and satin weaves, as well as with random fiber reinforcements Expands the analysis of thin walled beams with newly developed examples and MATLAB® code Addresses external strengthening of reinforced-concrete beams, columns, and structural members subjected to both axial and bending loads The author distributes 78 fully developed examples throughout the book to illustrate the application of presented analysis techniques and design methodology, making this textbook ideally suited for self-study. Requiring no more than senior undergraduate-level understanding of math and mechanics, it remains an invaluable tool for students in the engineering disciplines, as well as for self-studying, practicing engineers.

Introduction to Composite Materials Design Springer Nature

This book is the result of a Special Issue published in Applied Sciences, entitled “New Trends in Recycled Aggregate Concrete". It identifies emerging research areas within the field of recycled aggregate concrete and contributes to the increased use of this eco-efficient material. Its contents are organised in the following sections: Upscaling the use of recycled aggregate concrete in structural design; Large scale applications of recycled aggregate concrete; Long-term behaviour of recycled aggregate concrete; Performance of recycled aggregate concrete in very aggressive environments; Reliability of recycled aggregate concrete structures; Life cycle assessment of recycled aggregate concrete; New applications of recycled aggregate concrete.

Tribology of Polymer Composites Springer Nature

Mechanical and Dynamic Properties of Biocomposites A comprehensive review of the properties of biocomposites and their applications Mechanical and Dynamic Properties of Biocomposites offers a comprehensive overview of the mechanical and dynamic properties of biocomposites and natural fiber-reinforced polymer composites. This essential resource helps with materials selection in the development of products in the fields of automotive and aerospace engineering as well as the construction of structures in civil engineering. With contributions from a panel of experts in the field, the book reviews the mechanical and damping properties of lingo-cellulosic fibers and their composites. The authors highlight the factors that contribute to the improved properties and their advancements in modern industrialization. Besides, the book is designed to (a) introduce the mechanical and damping properties of lingo-cellulosic fibers and their composites, (b) factors that contribute to improvement in properties such as hybridization, chemical treatment of natural fibers, additive or fillers, etc. and (c) the real-time applications with case studies and future prospects. Key features: Presents viable alternatives to conventional composites Examines the environmentally friendly and favorable mechanical properties of biocomposites Reviews the potential applications of biocomposites in the fields of automotive, mechanical and civil engineering Brings together in one comprehensive resource information found scattered across the professional literature Written for materials scientists, polymer chemists, chemists in industry, civil engineers, construction engineers, and engineering scientists in industry, Mechanical and Dynamic Properties of BIocomposites offers a compreshensive review of the properties and applications of biocomposites.

Impact Damages of Braided Composites Flexural Behavior of Basalt FRP Bar Reinforced Concrete Members with and Without Polypropylene FiberThe thesis presents the results of an experimental investigation of the performance characteristics of concrete members reinforced with basalt fiber reinforced polymer (BFRP) bars along with polypropylene fibers. The primary objective of the research is the identification of the stress-strain relationship which ensues the determination of the load-strain behavior and maximum load capacity of the basalt FRP reinforced slabs reinforced with or without polypropylene fiber. The slab tests were designed to determine the influence of concrete strength and percentage volume of fiber on the maximum load capacity, shear strength, deflections and ductility. One of the objectives of the slab tests is also the study of the load-deflection behavior of the basalt FRP reinforced beams with and without polypropylene fiber. Another objective of the research is to check the validity of the code defined design methods for the calculation of shear strength for FRP reinforced beams made from fiber reinforced concrete. The secondary objective of this research was to study the effect of polypropylene fiber on the post-cracking strengths of beams and round determinate panels and to find the correlation between the beam and panel specimens. To achieve the objectives of this study, large number of plain and fiber reinforced concrete slab elements, and cylinders were cast with two different fiber dosages (1.0% and 0.5% volume fraction). The type of fiber used was Ferro (2.25"). All the slabs were tested under four-point bending to determine the maximum load capacity of slabs. Six fiber reinforced concrete beams and two round panels with 0.5% volume fraction of fiber were cast to determine the average residual strength (ARS) and toughness properties respectively. The standard test methods ASTM C1399 was used for testing the beams and ASTM C1550 was used for testing the round panels. The cylinder compression tests revealed that compressive strength decreased marginally with the increase in fiber dosage. The load carrying capacity of the slabs particularly in shear strength mode is found to increase with the addition of polypropylene fiber to the concrete in spite of the lower concrete strength. The concrete compressive strains and the tensile bar strains were found to increase with the addition of fiber. The deflections were decreased with the addition of fiber to the concrete. For the polypropylene fiber reinforced concrete slabs, an average of 8% difference was observed in the predicted values of maximum load obtained using the proposed model, an average of 9% difference using the Desayi and Krishnan curve for plain concrete, an average of 8% difference using the Hognestad's Model and an average of 20% difference using the ACI 440.1R method with failure loads being greater than the predicted strengths. For the slabs without polypropylene fiber, an average of 16% difference was observed in the predicted values of maximum load obtained using Desayi and Krishnan curve and an average of 18% difference was observed using Hognestad's Model and 12% difference using the ACI method with predicted strengths being much greater than the corresponding failure loads obtained from tests. The theoretical deflections determined using the ACI 400.1R method was reasonably close to the experimental deflections obtained from tests. A need for the improvement of shear strength equations given by ACI 440.1R is determined based on the comparison of experimental shear strength to the shear strength equation given by ACI 440.1R. The amount of energy stored in concrete with respect to that stored in BFRP bars is determined using the Proposed method and Hognestad's model. The evaluations show that in spite of the lower concrete strengths of the polypropylene fiber-reinforced concrete slabs compared to the plain slabs, the percentage of energy stored in concrete for the polypropylene-fiber reinforced concrete slabs is found almost more or less equal to the percentage of energy stored in concrete for the slabs without fiber. For the ductility of the slabs, the ducitility index is found to decrease with increasing reinforcement ratio. With the addition of polypropylene fiber to the slabs, the ductility of the slabs was found to be less than that for the slabs without fiber due to the lower concrete strength of the polypropylene fiber-reinforced concrete slabs. For the study of post-cracking strength, five beams and two round panels were tested. From the beam tests, the average residual strength of the polypropylene fiber reinforced concrete beams were found to be greater than the average residual strength of the beam observed from literature. From the round panel tests, the toughness of the polypropylene fiber reinforced concrete panels was found to be greater than toughness of the panels observed from the published literature. From these tests, the correlation between the flexural toughness of beam and panel specimens was also studied and compared with the published literature. It was found that the linear correlation suggested in literature for other types of fiber is equally valid for polypropylene fiber.Reinforced Concrete Structures

"Over the last few decades, construction materials have gone through many developments aimed at improving their structural and operational properties. The implementation of fiber-reinforced polymer (FRP) bars as a replacement for conventional steel reinforcement in reinforced concrete structures has gained significant acceptance in the construction field. Basalt Fiber-Reinforced Polymer (BFRP) bars area new type of FRP reinforcement material that was recently introduced to the construction industry. The main shortcoming associated with the use of the BFRP bars in concrete beams is related to the brittle behavior of these beams. This research investigates, experimentally and analytically, the effects of using different types of fibers within the concrete mix on the flexural behavior of BFRP-reinforced concrete beams. The experimental program consisted of material evaluation and flexural testing. A total of 12 beams were prepared and cast using plain, basalt fiber, and synthetic fiber-reinforced concrete with a 40MPa target compressive strength. Flexural testing was conducted on each of the BFRP-FRC beams using a four-point loading test. Results showed a noticeable improvement in the flexural capacities of these beams due to the delay in concrete failure strain (beyond 0.003) at the compression zone, which helped the BFRP bars to attain a higher ultimate strength. Results also indicated that introducing fibers to the concrete increased curvature ductility. Furthermore, the flexural capacity of the section increased by 12% for the basalt fibers RC beams compared to 19% for specimen with synthetic fibers. The opening of cracks and their deep propagation was effectively restrained by the bridging effect of the fibers, which keeps the crack widths lower than the allowable limit of 0.7 mm at the service stage. In addition, the applicability of ACI 440-1R-06 recommendations was assessed using the results of plain concrete specimen and extended to cover fiber-reinforced concrete beams. The experimental results showed good agreement with the analytical ones obtained using ACI equations in terms of flexural capacity, crack spacing, crack widths and mid-span deflection."--Abstract.