



Review

Basalt Fiber Reinforced Concrete: A Compressive Review on Durability Aspects

Buthainah Nawaf Al-Kharabsheh ¹, Mohamed Moafak Arbili ², Ali Majidi ³, Saleh M. Alogla ⁴, Ahmad Hakamy ⁵, Jawad Ahmad ^{6,*} and Ahmed Farouk Deifalla ⁷

- ¹ Civil Engineering Department, Faculty of Engineering, Al-Abbayt University, Maftaq 25113, Jordan
 - ² Department of Technical Civil Engineering, Erbil Technical Engineering College, Erbil Polytechnic University, Erbil 44001, Iraq
 - ³ Department of Building and Construction Techniques, Al-Mustaqbal University College, Hillah 51001, Iraq
 - ⁴ Department of Civil Engineering, College of Engineering, Qassim University, Burraydah 51452, Saudi Arabia
 - ⁵ Department of Physics, Faculty of Applied Science, Umm Al-Qura University, Makkah 21955, Saudi Arabia
 - ⁶ Department of Civil Engineering, Military College of Engineering, Sub Campus of National University of Sciences and Technology, Islamabad 44000, Pakistan
 - ⁷ Structural Engineering Department, Faculty of Engineering and Technology, Future University in Egypt, New Cairo 11845, Egypt
- * Correspondence: jawadcivil13@soetwub.edu.pk

Abstract: The creation of sustainable composites reinforced with natural fibers has recently drawn the interest of both industrial and academics. Basalt fiber (BF) stands out as the most intriguing among the natural fibers that may be utilized as reinforcement due to their characteristics. Numerous academics have conducted many tests on the strength, durability, temperature, and microstructure characteristics of concrete reinforced with BF and have found promising results. However, because the information is dispersed, readers find it problematic to assess the advantages of BF reinforced concrete, which limits its applications. Therefore, a condensed study that provides the reader with an easy route and summarizes all pertinent information is needed. The purpose of this paper (Part II) is to undertake a compressive assessment of basalt fiber reinforced concrete's durability features. The results show that adding BF significantly increased concrete durability. The review also identifies a research deficiency that must be addressed before BF is used in practice.

Keywords: basalt fibers; shrinkage; thermal properties; scan electronic microscopy



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1. Introduction

In recent years, there have been increased demands for strength and durability features due to the construction of large-scale infrastructure in several challenging service settings [1–4]. Contrarily, concrete has several unfavorable characteristics, including brittleness, low impact resistance, and excessive weight. Consequently, there is a need to improve tensile capacity [5–8]. One of the current hot topics for building materials research is the use of fiber-reinforced technology to boost the durability of concrete [9–11]. Traditional concrete is typically strong in compression, but not in tension [12–14]. Reinforcement bars are frequently utilized in concrete to compensate for the tensile stresses. In fiber-reinforced concrete, a specific type of concrete, fibers are added to increase the necessary tensile capacity of concrete [15,16].

Since ancient times, many parts of the world have been using fibers in construction materials. The motivation for this effort was to boost the tensile strain of the concrete's "perceived" delicate properties. In the 20th century, this technique was employed to produce fiber-reinforced concrete, which has grown in popularity and apply in construction sector due to its improved strength. The components of concrete are reinforced with a variety of fibers, including biological and inorganic fibers. The surface of the fibers,

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Mineral-Filled Polymer Composites Hanafi Ismail,S.M. Sapuan,R.A. Ilyas,2022-01-05 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

Mineral-Filled Polymer Composites Handbook, Two-Volume Set Hanafi Ismail,S. M. Sapuan,R.A. Ilyas,2022-07-30 Mineral filled polymer composites exhibit several advantages that make this material class attractive for a variety of applications including their low cost light weight excellent rigidity and high mechanical strength Mineral Filled Polymer Composites Handbook serves as a comprehensive overview of the latest research trends applications and future directions of advanced mineral fiber reinforced polymer composites Comprised of 2 volumes Mineral Filled Polymer Composites Perspective Properties and New Materials Mineral Filled Polymer Composites Selection Processing and Applications Presents details on processing applications and ageing of macro to nanosized mineral reinforced polymer composites Examines fabrication techniques novel synthesis methods and mechanical behavior thermal flammability and functional properties of a wide array of mineral filled polymer composite materials Covers a broad range of different research fields including organic and inorganic filler used in the development of composites for various types of engineering applications Offers the latest developments in nano micromineral based polymer composites 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

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Emerging Trends in Computing and Expert Technology D. Jude Hemanth,V. D. Ambeth Kumar,S. Malathi,Oscar Castillo,Bogdan Patrut,2019-11-07 This book presents high quality research papers that demonstrate how

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Proceedings of SECON'25 Elham Farazdaghi,Rahimi A. Rahman,Katta Venkataramana,Jiji Antony,P. E. Kavitha,S. Sreerath,2026-01-01 This book gathers peer reviewed contributions presented at the 6th International Conference on Structural Engineering and Construction Management SECON 25 held in Angamaly Kerala India on June 4 6 2025 The meeting served as a fertile platform for discussion sharing sound knowledge and introducing novel ideas on issues related to sustainable construction and design for the future The respective contributions address various aspects of numerical modeling and simulation in structural engineering structural dynamics and earthquake engineering advanced analysis and design of foundations BIM building energy management and technical project management Accordingly this book offers a valuable up to date tool and essential overview of the subject for scientists and practitioners alike and inspire further investigations and research

Recent Advances in Durability Improvement and Low-Carbon Strategy of Engineering Materials and Structures Zhongya Zhang,Anbang Li,Zhidong Zhang,2024-08-28 Global warming caused by a significant increase in the concentration of greenhouse gases GHGs such as CO₂ has become a concern all over the world The whole process carbon emissions of the civil engineering industry account for nearly 40% of global energy and process related CO₂ emissions more than half of which come from the process of producing using constructing and dismantling in civil engineering materials and structures resulting in the embodied carbon emissions With the acceleration of global warming warmer and uncertain climates will make engineering materials and structures subject to more severe environmental conditions A series of durability issues will occur more frequently such as the significant variations of humidity in air the chloride induced corrosion caused by the severe chloride ingress concrete cracking caused by the expansion of rusts and more severe carbonation of concrete structures due to the increase in CO₂ concentration The adoption of positive measures to address climate change has become a global consensus as global warming has led to serious threats and challenges to the survival and development of humankind

12th International Conference on FRP Composites in Civil Engineering (CICE 2025) João R. Correia,Susana Cabral-Fonseca,José Gonilha,João Firmo,Mário Garrido,2026-02-09 This book composed of two volumes presents the latest advances innovations and applications in fibre reinforced polymer FRP composites and structures as shared by leading international researchers and engineers at the 12th International Conference on FRP Composites in Civil Engineering CICE held in Lisbon Portugal on July 14 16 2025 The volumes cover a broad spectrum of topics including all FRP structures bond and interfacial behaviour concrete filled FRP tubular members FRP reinforced or

pre stressed concrete structures confinement design methodologies and guidelines durability and long term performance fire impact and blast resistance FRP as internal reinforcement hybrid FRP systems with other materials new materials and products seismic retrofitting structural strengthening of concrete steel masonry and timber and experimental testing All contributions underwent an international peer review process ensuring both quality and relevance Together they provide a rich source of ideas that not only advance current understanding but also inspire new research directions and foster multidisciplinary collaboration across the field

Composites Industry Abstracts ,1996 **Advanced Materials and Manufacturing Processes** Gurugubelli Swami Naidu,K. Sivaprasad,2018-06-22 International conference on Advanced Materials and Manufacturing Processes ICAMMP 18 Selected peer reviewed papers from the International Conference on Advanced Materials and Manufacturing Processes ICAMMP 2018 March 30 31 2018 Vizianagaram India Trends in Building Materials Research Jian Jun Zheng,Xiu Li Du,Wei Ming Yan,Yue Li,Jian Wei Zhang,2012-01-24 Selected peer reviewed papers from the Second International Conference on Structures and Building Materials ICSBM 2012 March 9 11 2012 Hangzhou China Advanced Polymer Processing Lian Xiang Ma,Chuang Sheng Wang,Weimin Yang,2009-12-21 Selected peer reviewed papers from the Advanced Polymer Processing International Forum Qingdao China 19 21 August 2009 APPF 2009 **Innovation in Civil Engineering, Architecture and Sustainable Infrastructure** Shun Bo Zhao,Yi Min Xie,2012-11-29 Selected peer reviewed papers from the International Conference on Civil Engineering Architecture and Sustainable Infrastructure ICCEASI 2012 September 22 24 2012 Zhengzhou China International Aerospace Abstracts ,1999 Process and Chemical Engineering ,2002 Advanced Materials and Manufacturing Engineering II Ramya Muthusamy,Thangaprakash Sengodan,2022-01-04 Selected peer reviewed full text papers from the 3rd International Conference on Materials Science and Manufacturing Technology ICMSMT 2021 Selected peer reviewed full text papers from the 3rd International Conference on Materials Science and Manufacturing Technology ICMSMT 2021 April 08 09 2021 Tamil Nadu India *Sustainable Construction (WSCC 2022)* Ramadhansyah Putra Jaya,2023-03-31 Selected peer reviewed full text papers from the World Sustainable Construction Conference Series 2022 WSCC 2022 Selected peer reviewed full text papers from the World Sustainable Construction Conference Series 2022 WSCC 2022 October 14 15 2022 Kuala Lumpur Malaysia *ACI Structural Journal* ,1994 Government Reports Index ,1975 **Textile Technology Digest** ,1975

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