

Dear Readers,

We are pleased to share with you papers covering research on various constituents of concrete and its mechanical characteristics with and without fibers and the structural application of concrete composites.

This edition is guest edited by Prof. (Dr) Shamsheer Bahadur Singh who is a Senior Professor in the Department of Civil Engineering at Birla Institute of Technology and Science (BITS) Pilani, Rajasthan, India. His research interests include composite materials, composite structures, and nonlinear finite element modelling for assessing the structural stability, failure, and strength of fiber reinforced polymers (FRP) reinforced structures.

Prof. Singh has published more than 198 research articles, 14 research reports, 10 books, 2 theses, and 3 patents. Prof. Singh is a fellow of five prominent organizations such as; Fellow of ASCE; Fellow of SEI; Fellow of CDRI (FCDRI); Fellow of Institution of Engineers (FIE, India); and Fellow of Indian Association for Structural Engineers (FIAStructE).

We hope you enjoy reading this edition and look forward to your feedback!

Production Editor
 Indian Concrete Journal



Dear Readers,

I am greatly happy to bring out this May 2023 issue of The Indian Concrete Journal containing the four technical papers of high values in terms of latest innovations for knowledge transfer to the technical community dealing with concrete technology and structural engineering with and without the use of fibers. As we know that there is significant urgency to reduce the carbon footprint by designing the concrete mix using supplementary cementitious materials such as fly ash, blast furnace slag and the combination of fly ash and slag as replacement of ordinary Portland cement which is the main source of generating the green-house gases which in turn has led to the environmental pollution and global warming. The increasing global warming has significant effect on human civilizations and other living beings through natural disasters coming in the form of tsunami, earthquake, floods, and drought conditions etc. If the global warming effect is not controlled this may lead to existential condition for the living beings and the mother earth. In this scenario, researchers, academicians, and practitioners have a great role in designing green construction materials with significant reduction of natural resources with recycling and use of construction and demolition waste, and suitable use of fibers generated from renewable sources such as plants and animals. In addition, the designers, and practitioners especially dealing with concrete technology with, and without the use of fibers must look for innovative design practices so that structures

could be designed keeping in view of sustainability based and durability based design approaches.

It is well known that concrete is most consumed material today in the construction sector and hence by making the concrete with the use of its ingredients from renewable sources as well as industrial wastes, a significant amount of carbon footprint could be reduced for helping this world in controlling the global warming and saving our mother earth. Furthermore, to improve the material characteristics and structural response, the use of the metallic and or polymeric fibers, and most importantly natural fibers could be engineers' choice to use them in making engineered cementitious, ductile, and high performance concrete to support the performance based design of concrete and/ or masonry structures. Some of references are given here to support the editor's perspectives on sustainable use of concrete mix and fibers. For example, Harish *et al.*^[1] have shown the effect of fibers on the compressive strength of concrete and concluded that the concrete compressive strength has increased up to 2 % of fiber additions. However, as per the Patil and Durge^[2] recommendations, enhancement in compressive strength of concrete occurs up to 1% of crimped steel fibers. Similarly, importance of the use of concrete fines obtained from construction and demolition waste as an alternative supplementary cementitious materials has been

demonstrated by Topic *et al.*^[3]. In the biennial report^[4] of the ministry of environment, forest, and climate change, it has been highlighted that construction sector in India utilizes about one-third of the total energy consumption and hence it is essential for the country like India to look for the alternative cementitious composite materials such as CO₂ mineralization process to use the concrete fines from construction and demolition waste. This will in turn may significantly reduce the high energy usage in the construction sector.

Looking at the current scenario of demand and supply, the average annual consumption of construction materials^[5] is 750 MT of sand, 240 MT of limestone, and about 2 billion tons of aggregate. IS 383 codal provisions^[6] allows the use of manufactured sand an alternative to river sand which has been extracted significantly and have detrimental impacts on environments. To further know about the material consumption patterns in India, GIZ report^[7] could be referred by the readers.

From the above points and some specified literature, I want to emphasize that researchers in particular and academician and practitioners in general need to focus on the innovative practices to use the supplementary cementitious materials for design of green concrete mix with or without the use of fibers with primary aim to develop concrete with reduced carbon footprint. Furthermore, it is equally important to develop design guidelines for the sustainable cementitious concrete materials so that performance based structural design could be achieved with reduced carbon footprint and energy consumption.

Now, I would like to highlight that all the four technical publications of this issues have covered the wide range of parameters of concrete technology such as the use of fibers, mix design, circular economy, and its structural applications. Finally, on behalf of the entire team of The Indian Concrete Journal, I extend sincere appreciation for the authors who have spent their valuable time for creating such a good quality papers which are highly beneficial to the concrete research community and meet the need of the time. Furthermore, I also extend my heart-felt thanks to all the valuable reviewers without their support the quality papers could not have been selected for this issue of The Indian Concrete Journal. I also greatly acknowledge the role of entire ICJ team lead by Ms Priti Saldanha for the valuable time they have spent for bringing out this issue of the journal. I

strongly believe that readers in general will be benefited a lot by this issue of The Indian Concrete Journal.

With best regards,

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