



Dear Readers,

The Indian Concrete Journal (ICJ) is pleased to issue this current edition to all readers. With the growing demands of improving sustainability in concrete construction, the development of new innovative materials and design procedures are essential. Concrete being the widely used material, innovations in concrete technology for sustainable development in the 21<sup>st</sup> century should focus on today's challenges, emphasising environmental consciousness. In the current issue of the ICJ, six papers have been published covering both the material and structural aspects. This issue has interesting articles of high standards. They deal with novel developments in concrete technology and improved analysis approaches for developing sustainable and resilient infrastructure.

The first article in this issue explores the feasibility of using locally available sesame seeds (SS) as an alternative to synthetic foaming agents for foamed concrete production. The authors note that using such eco-friendly and abundantly available sesame seeds as a foaming agent can facilitate the wider use of foamed concrete. Also, the foam generated at the chosen surfactant production parameters can result in foam concrete with acceptable properties per ASTM standards.

The second article explores the use of fly ash in Roller Compacted Concrete (RCC) for pavement applications. The authors have explored the possibility of achieving higher strength in the Indian scenario. However, they noted that fly ash does uniformly not affect flexural strength. RCC pavement made with fly ash is economical than conventional concrete pavement. Furthermore, they noted that the RCC pavement could reduce CO<sub>2</sub> emissions significantly than conventional concrete pavement.

The third article focuses on an experimental study of the mechanical properties of fly ash (FA) and ground granular blast furnace slag (GGBFS) based on geo-polymer concrete (GPC) using glass fibres. They have observed fascinating results. The authors have explored mechanical properties like compressive strength, split tensile strength and flexural strength for different FA and GGBFS. They noted that though the increase of GGBFS content improves the strength, its workability decreased despite the addition of superplasticizer.

The fourth article shows a novel approach that micro-organisms like bacteria can be used to self-healing cracks in concrete. Bacteria they have explored generally of *Bacillus* species. The effectiveness of healer bacteria depends on the crack location. The effectiveness of healing depends on crack is located on the horizontal concrete surfaces like in slabs and floors or vertical as in columns and walls.

The fifth article focuses on developing specific design parameters for high-strength concretes between M65 and M110. The authors have developed expressions necessary for evaluating the P-M interaction curves using concrete stress block parameters given in IRC: 112 (2019) for high strength concretes. With the prevalent use of high strength concrete in building construction, the results of this study help compare the limitations of our code provisions. A comparative study of sectional capacities of rectangular RC sections using the different stress-block properties recommended in the design standards considered reveals that use of existing recommendations of IS: 456 (2000) for concrete of grades between M65 to M90 leads to an over-estimation of capacities with mean deviations ranging from 5 to 28%.

In the sixth and last article of this issue, the authors have proposed a new analytical bimodular elastic damage model for concrete. Salient aspects of the predicted mechanical behavior of concrete are discussed. They have restricted the scope of the new model in identifying the nonlinearity of damaged concrete. They have shown that Isotropically-damaged bimodular concrete belongs to the class of homogeneous mechanical systems.

We thank all the authors and reviewers for contributing to this issue. The ICJ is well-read by practicing engineers and decision-makers in the concrete industry, especially in India. Such a knowledgeable and wide readership (outside the academia and research community) can play a huge role in implementing the latest technologies in construction. We are glad to issue this edition of the ICJ dealing with innovative technologies that could help realise our infrastructure resilience objective. The topics covered in this edition are of great significance and will be helpful for concrete material and structural engineers to make a more sustainable society.

Thank you.

**Prof. S. Suriya Prakash,**  
Editorial Board Member