

Dear Readers,

We are proud to present to you the sequel edition that encompasses papers of researchers passionately working towards climate-resilient and sustainable construction. This edition has been curated by Prof. Kodur V. K. R. and Prof. Dr B. B. Das.

Kodur V. K. R. is a University Distinguished Professor of the Department of Civil and Environmental Engineering at Michigan State University (MSU), USA. He also serves as Director of the Centre on Structural Fire Engineering and Diagnostics at Michigan State University. His research interests include: evaluation of fire resistance of structural systems through large scale fire experiments and numerical modeling and characterization of materials under high temperature. His research contributions have led to the development of fundamental understanding on the fire behavior of material and structural systems, and also resulted in numerous design approaches and innovative and cost-effective solutions for enhancing fire-resistance of structural systems. The methodologies, techniques and design guidelines, resulting from his research, have been incorporated into various codes and standards, as well practical applications, in the US and around the world and are instrumental in minimizing the destructive impact of fire in the built infrastructure. We thank him for his exemplary contribution that supports the community.

Dr B. B. Das is a Professor of Civil Engineering at NITK Surathkal. After completing his PhD from IIT Bombay in 2007, he worked for two years as a Post-Doctoral Research Associate at the Centre for Innovative Materials Research (CIMR), Lawrence Technological University, Southfield, Michigan, USA. Before joining NITK, he was the centre head for NICMAR at Goa and Indore. In an era when environmental concerns were at the forefront of global discussions, Prof. Das recognized the urgent need to revolutionize the construction sector and developed Sustainable Construction and Building Materials Laboratory (SCBM Lab) in 2018 at NITK Surathkal. He has co-authored around 100 scientific and technical publications (SCI/ SCOPUS) in the areas of concrete technology.

We hope our readers enjoy reading this edition. We are excited to hear your valuable feedback, please write to us at : [icj@adani.com](mailto:icj@adani.com)

Best Regards,

Production Editor



Dear Readers,

We hope you enjoyed reading the ICJ November 2023 edition that included papers on climate-resilient and sustainable construction. We are pleased to bring to you a sequel edition that has been curated by Prof. Kodur V. K. R. and myself.

In this edition, we bring to you some unique and interesting research papers that range from strengthening structures to microstructural analysis of recycled aggregate concrete.

In the first paper, Sharath B. P. and co-authors<sup>[1]</sup> examines the implementation of multi-criteria decision-making approaches (MCDM) in creating fly ash (FA) based pelletized geopolymer

coarse aggregates integrated with iron ore tailings (IOT). The authors evaluated three MCDM approaches- GRA, TOPSIS, and DFA- on sixteen different mixes of FA-based aggregates integrated with IOT, using Taguchi's experimental methodology. The results showed that GRA was the most effective approach. This study highlights the usefulness of MCDM approaches for decision-making in the production of FA-based aggregates integrated with IOT.

The next paper is about the strengthening of existing structures. The construction industry has been focusing on strengthening existing structures due to various factors like poor construction quality, changes in loading conditions, and corrosion of reinforcement. In this article<sup>[2]</sup>, an

experimental study was conducted on reinforced concrete specimens wrapped with ferro-cement and ferro-geopolymer composites. Results showed that short columns with thicker wrap had higher load-carrying capacity compared to slender columns. Ferro-geopolymer significantly increased strength compared to conventional ferrocement composites. The first crack appeared at the top corner and later caused failure of the concrete specimen.

This paper<sup>[3]</sup> presents a study on the effectiveness of using fly ash and  $\text{CaCO}_3$  in self-compacting concrete (SCC). In this study, 30 % of the cement content in SCC was replaced with fly ash and 15 % with micro-sized  $\text{CaCO}_3$  by weight. The rheology, compressive strength, and water penetration were assessed according to relevant codes of practice. With the increase in cementitious content, mixes with  $\text{CaCO}_3$  demonstrated better rheological properties, exhibiting an increase of around 17 % in strength and nearly 70 % in permeability of mixes in comparison to the control mix. The presence of finer  $\text{CaCO}_3$  particles in SCC mixes led to an enhanced packing density and reduced porosity, resulting in improved strength and durability. This also helps in reducing the earth's carbon footprint.

The final paper<sup>[4]</sup> of this special issue is on microstructural analysis of recycled aggregate concrete. This study investigated the mechanical properties and microstructural changes of recycled aggregate concrete (RAC) subjected to high temperatures of 200°C and 400°C, along with RAC

mixed with hybrid fibers. The performance of RAC at normal and elevated temperatures was assessed, and microstructural analysis was conducted using EDX and SEM. Results showed that a mix containing 50 % RAC had better compressive strength and improved microstructure at both normal and elevated temperatures. RAC with a low water-cement ratio exhibited better fire resistance than natural aggregate concrete.

Through these themed editions we aim to build awareness and promote sustainable construction with our community. We encourage each of you to share your feedback and also circulate these among your network. Together we can accelerate the spread of knowledge and make a positive impact in the construction sector.

As we come to end of this year, we believe this year has been fruitful for each of you and wish you all a very happy and a prosperous 2024 !!

Best regards,

**Prof. Bibhuti Bhusan Das**

Guest Editor

The Indian Concrete Journal

**Prof. Kodur V. K. R.**

Guest Editor

The Indian Concrete Journal

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## REFERENCES

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