Dear Readers,

We are pleased to share a sequel themed edition with the selected few publications presented in the International Conference on Recent Advances in Structural Engineering (RAISE-2024) held at SVNIT Surat, Gujarat in December 2024 and a paper with simplified doubly reinforced beam design. These editions have been enhanced extensively and included in this edition that has been guest-edited by Dr B. Kondraivendhan and Dr C. D. Modhera.

Dr B. Kondraivendhan is an Associate Professor in the Department of Civil Engineering at the Sardar Vallabhbhai National Institute of Technology (SVNIT), Surat, Gujarat, India. With over 20 years of experience in teaching and research in the area of Cement and Concrete Technology, he has published more than 80 research papers and plays an active role as a review member of various reputed International Journals and conferences. He was a visiting student of University of Dundee, Scotland, UK. He also has a Post-Doctoral Experience from Nanyang Technological University (NTU), Singapore.

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We hope you enjoy this themed edition and we look forward to your feedback.

Production Editor
Indian Concrete Journal

Dear Readers,

As guest editors of this edition, we are pleased to present a collection of interesting papers focused on building materials and construction. This issue showcases selected and extended version of best research papers originally presented at the International Conference on Recent Advances in Structural Engineering (RAISE-2024) held at SVNIT Surat, Gujarat on 16-18 December 2024. The conference is one of the well-recognized conference on cement and construction materials in India which witnessed more than 300 participations this time by cement industry, construction industry, academia, researchers and experts from diverse fields to discuss and disseminate the latest advancements in the area of cement, concrete and allied structural Engineering of construction industry. The research papers presented in this edition reflects a diverse topic in the area of plastering technique, Geo-polymer concrete, ultra-high performance concrete, lime stone calcined clay cement and rebar corrosion as well.

In the first paper, Archana and co-authors [1] highlight Plastering in buildings is still ineffective due to inconsistent mix designs and reliance on manual knowledge. The goal of this project is to maximize mortar mix compositions by creating a machine learning-powered user interface for an automatic plastering machine. Four regression models: Random Forest, SVR, Bayesian Ridge, and Naïve Bayes were evaluated using 189 mortar samples. Random Forest exposed the best accuracy with $R^2 = 0.816$. Material estimate driven by artificial intelligence guarantees consistency and helps to lower waste by means of real-time monitoring and automated mix optimization guarantees. This study advances automated, sustainable plastering for India's expanding infrastructure, which in turn raising building efficiency and quality.

In the second paper by Kalyani *et al.*[2], explores corrosion resistance of concrete cylinders strengthened with Glass Fiber Reinforced Polymer (GFRP) - Stainless Steel Wire Mesh (SSWM) hybrid wraps under accelerated corrosion conditions. A total of 21 concrete cylinders (100 mm in diameter and 200 mm in height) are cast, each reinforced with an 8 mm steel bar at the centre. Six different wrapping configurations, including single and double layers of GFRP and SSWM including hybrid wraps, are considered. The specimens immersed in a 3.5 % sodium chloride solution and 60V anodic voltage is supplied for 28 days to simulate accelerated corrosion environment. Corrosion performance is assessed using a digital half-cell potential meter and through visual inspection. From the results of experimental investigation, it is observed that that GFRP-SSWM hybrid wraps effectively enhances corrosion resistance of concrete cylinders by reducing rate of corrosion progression.

The third paper by Sachin *et al.* [3] investigates Limestone calcined clay cement (LC^3) is a ternary blend cement that decreases greenhouse gas emissions and uses less energy throughout the manufacturing process. Polypropylene (PP) and hooked end steel (HES) fibers were incorporated into both LC^3-based and conventional concrete materials in the current research. Concrete grades of M25 is created using LC^3 and normal concrete. The volume of HES taken as 0.5, 1, 1.5, 2, and 2.5 % for PP fiber was used as 0.1, 0.2, and 0.3 %. The fresh and hardened properties of the LC^3 cement system were equated with normal concrete. The maximum strength of LC^3 and normal concrete combined with steel fiber was observed at 2 %. Similarly, for PP, the highest gain in strength was observed at 0.3 %. The enhancement in impact resistance of LC^3 concrete was greater than that of standard concrete. It was also observed that fiber content decreased the workability.

The fourth paper [4] investigates incredibly innovative blending ferrocement technology, geopolymer matrix, and natural fibers like Ambari fiber creates a promising sustainable and efficient construction solutions. By replacing chicken mesh with Ambari fiber mesh, it also opens up opportunities to explore

the integration of locally available, eco-friendly materials in construction. Geopolymer mortar was prepared using fly ash, maintaining an alkaline solution-to-fly ash ratio of 0.40. Two water tank was cast using ferrocement technology in which Ambari fibre was used to support the geopolymer matrix instead of chicken mesh. This study explores mechanical properties, and environmental impacts, of geopolymer matrix compared to conventional cement matrix.

The fiftth paper [5] investigates the feasibility of incorporating fine and coarse aggregates recycled from Construction and Demolition (C & D) wastes in Conventional Concrete (CC) and Geopolymer Concrete (GPC) mixtures with a special attention on the impact resistance. Four mixes were adopted, the first mix is with Conventional Fine Aggregate (CFA) and Conventional Coarse Aggregates (CCA), second mix is with Recycled Coarse Aggregate (RCA) and Recycled Fine aggregate (RFA), the third mix consists of CCA and RFA and the fourth mix comprises of RCA and CFA. Drop weight hammer tests were conducted for both the concretes with and without steel fibers. In fibrous concrete mixtures, hooked end steel fibers were added at 0.5 % of volume fraction of concrete. Effect of steel fibers in improving the resistance to impact were investigated using drop hammer test as per ACI 544 procedure. Addition of steel fibers enhances the impact resistance of conventional and geopolymer concrete. The findings of the present investigation will be useful for practical applications of recycled aggregate concrete in the construction industry for promoting the circular economy and the steel fibre reinforced concrete will find its way in the real time applications where the impact strength is the major criterion.

The sixth paper by Vineet Kothari and Co-authors [6] investigates the casting and testing of UHPC made with a blend of Class F Fly ash, Blast Furnace Slag, micro silica, and cement as binders. Five optimized UHPC mixes, featuring a binder content of 1400 kg/m³ and a water-to-cement ratio (w/c) of 0.16, were evaluated according to ASTM C1856. Key durability tests, including rapid chloride permeability and water impermeability, were performed. The findings revealed a direct correlation between compressive strength and embodied CO_2 (eCO_2). Additionally, the durability results highlighted the importance of mix optimization, underscoring the need for a balanced selection of materials to enhance both sustainability and durability in UHPC.

The seventh Paper authors Nath, D., and Bhanja, S. [7] explored to simplify the design calculations of the doubly reinforced beams by ignoring the compression reinforcements and tension reinforcements are only considered in the load design. If reinforcements on both sides are to be taken into consideration, capacity-based design approach is to be adopted. The two limiting or terminal flexural design conditions as per IS: 456 (2000), are balanced and maximum under-reinforced conditions. The basic objective of design is to interpret the behavior of structural elements under loads. Structural elements are inert in nature and will behave as per their own natural characteristics. They cannot understand that some of their resources have not been considered in design, rather reinforcements on both the faces will be effective in resisting loads. In real life situations, compression reinforcements are provided in under-reinforced sections making the sections under-reinforced doubly reinforced ones. Though the calculations of moment of resistance of such sections are a bit complicated and needs to be performed by following capacity-based approach instead of load design, this methodology not only results in economical sections but can effectively predict the structural behavior of the sections.

We thank the ICJ for their invaluable support across both themed editions. In the themed editions, as guest editors we attempted to create awareness and encourage sustainable and durable construction practices in India. The research presented offers promising insights into the future of sustainable construction materials. The use of alternative materials not only presents a novel solution but also contributes in reducing environmental impacts and promotes circular economy. Together, we can continue to disseminate cutting-edge knowledge in the concrete industry. The topics covered here deepen understanding of innovations in civil engineering materials.

We encourage you to keep sharing new findings and applications to drive meaningful change in the construction sector.

It has been a privilege to present this concise summary of recent advances and showcase impactful research outcomes.

With Best Regards,

Dr B. Kondraivendhan and Dr C. D. Modhera

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REFERENCES

[1] Tanawade, A. G., Kothavade, A. S., Khandagale G. S., Waybhase G. B., and Joshi, P. M. (2025). "Development of a machine learning-driven interface for indigenous plastering machine: A mix design optimization approach", *The Indian Concrete Journal*, Vol. 99, No. 10, pp. 7-13.

[2] Kalyani, V. J., Makawana, R. V., Joshi, D. D., and Patel, P. V. (2025). "Effect of accelerated corrosion on GFRP-SSWM hybrid-strengthened concrete cylinders: An experimental investigation", *The Indian Concrete Journal*, Vol. 99, No. 10, pp. 14-25.

[3] Gunjal, S. M., Gayake, S. B., Sairam, V., and Kondraivendhan, B. (2025). "Performance of limestone calcined clay cement (LC^3) concrete using polypropylene and steel fiber", *The Indian Concrete Journal*, Vol. 99, No. 10, pp. 26-34.

[4] Patankar, A. S., Patankar, S. V., and Sayyad, A. S. (2025). "Suitability of geopolymer matrix used in the construction of ferrocement water tank with natural fibres", *The Indian Concrete Journal*, Vol. 99, No. 10, pp. 35-42.

[5] Kumutha, R., Kannan, L. D., Shariff, K. N. M. S., and Kumar, D. P. (2025). "Resistance of steel fibre reinforced geopolymer concrete under impact using demolition waste aggregates", *The Indian Concrete Journal*, Vol. 99, No. 10, pp. 43-49.

[6] Kothari, V., and Dave, U. (2025). "Sustainability and durability studies of ternary blended ultra-high performance concrete", *The Indian Concrete Journal*, Vol. 99, No. 10, pp. 50-58.

[7] Nath, D., and Bhanja, S. (2025). "Real life flexural members – all are under-reinforced doubly reinforced sections", *The Indian Concrete Journal*, Vol. 99, No. 10, pp. 59-71.