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Structures and Buildings

Editorial

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I am delighted to present the editorial for the August 2024 edition of *Structures and Buildings*. This journal is likely one of the oldest journals in the structures and buildings discipline worldwide. Since its inception, it has strived to enhance the civil engineering profession and practice. It stands out as one of the few journals that publish both academic and practical technical papers on a global scale.

This issue encompasses a broad spectrum of topics, materials, and structures across six papers. Contributions come from four continents, reflecting the global impact of the journal, and gathering researchers and designers from the UK, Canada, United States, India, China, Iran and Egypt. They tackle the behaviour of steel beams, bridge piers, concrete-filled tubular columns reinforced with carbon fibres, seismic design of buildings, investigation of the behaviour of old timber and masonry buildings, and concrete beams with by-products of coal mining.

The inaugural paper in this edition originates from Egypt, authored by Matloub *et al.* (2024). It focuses on the study of flexural strength of steel girders with perforated web and tubular compression flange. Taking advantage of the higher lateral stiffness and resistance to lateral buckling of tubes, the paper reports the results of a study where the conventional plate flange in compression was replaced with a rectangular tube. Furthermore, the scope of the study was expanded to include the introduction of web openings and the examination of different configurations using finite element simulations. The performance of various codes applied to the studied geometries was compared, and a sustainability assessment was also conducted.

The second contribution in this issue (Kocakaplan *et al.*, 2024) comes from research conducted in the UK and Turkey, focusing on modelling the non-linear dynamic behaviour of rocking bridge piers incorporating shape memory alloys, as an alternative to the conventional precast post-tensioned segmental bridge piers. This aims to enhance the energy-dissipation capacity essential in high-seismicity regions. A series of shape memory alloy–concrete composite piers were studied trough non-linear static and dynamic analyses on experimentally validated finite-element models and the results were compared with those of piers without these alloys. Some encouraging results are reported, namely on the enhancement of energy-dissipation capacity and reduction in drift-response.

The third paper, originating from India (Tiwari *et al.*, 2024), is titled 'Non-linear Analysis of CFRP-Wrapped Steel Box Sections Under Biaxial Load.' It explores the use of low-modulus carbon-fibre-reinforced polymer (CFRP) to enhance the performance of hollow steel box columns (HSBC) and concrete-filled steel box columns (CFSBC). This numerical study, employing the finite element method, focused on resistance and buckling load capacities. It culminated in the proposal of an empirical relationship, based on trend analysis, to determine the load-carrying capacity of any section.

The fourth contribution stems from a collaborative study involving a company based in the USA and graduate students from Iran and Canada (Grigorian *et al.*, 2024). It concentrates on the limit state design of resilient earthquake-resisting systems. Recognizing that the future of earthquake engineering is geared towards creating systems that not only endure earthquakes but also ensure survivability and facilitate post-earthquake repairs, the paper addresses critical aspects of sustainable seismic design (SSD). It emphasizes the need to transition from traditional damageability and performance-based seismic design to an approach focused on performance control and reparability. This involves developing new analytical tools and design details tailored to specific purposes. The paper offers graphical solutions and theoretical principles to advance practical SSD for mixed multiple seismic systems, with the goal of improving reliability, cost-effectiveness, and environmental sustainability.

The fifth paper, authored by Sharma *et al.* (2024) is a very interesting study on the Kath-Kuni architecture encompassing field investigations and material characterisation. It represents a collaborative effort between researchers from India and the UK and was conducted to better understand the seismic-resilient characteristics of Kath-Kuni structures, which are predominantly timber-laced dry masonry constructions found in Himachal Pradesh, India. The study involved field reconnaissance surveys to assess the structural configuration of these buildings, and laboratory tests to evaluate the mechanical properties, joint characteristics, and interfacial resistance of the

timber and stone components. This research provides the first insights into the mechanical behaviour of joints in Kath-Kuni structures, contributing valuable knowledge to the field of their seismic resilience.

Finally, the sixth paper is titled 'Theoretical analysis of the moment–curvature relationship of coal gangue concrete beams' and is a contribution from China (Cai *et al*., 2024). It addresses the gap of the limited number of studies on the use of coal gangue concrete in structural components by proposing a simplified calculation method to analyse the moment-curvature relationship of steel-fibre-reinforced coal gangue concrete beams. The results from these calculations were compared with experimental data, revealing that the cracking moment and ultimate moment of coal gangue concrete beams were slightly lower than those of natural concrete beams, but this disadvantage can be override by incorporating steel fibres, increasing not only the cracking moment, but also the flexural stiffness and ductility.

I extend my best wishes for an enriching reading experience, and I hope you make the most of the excellence and variety offered by these papers. As always, we eagerly welcome and highly value comments and discussions from our readers.

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