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Structures and Buildings

Editorial

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This issue of *Structures and Buildings* contains six papers covering different interesting topics including corrosion depths in recycled aggregate concrete structures, bond stress of steel-carbon fibre reinforced concrete, effect of loss of bond on flat-slab building collapses, axially and eccentrically loaded carbon fiber – coral concrete columns, torsional strength limitation of reinforced concrete beams, neural network algorithm for optimisation of structures.

In recent years, the recycling of construction and demolition waste has become an important issue worldwide. Recycled aggregate concrete (RAC) is a type of concrete that utilises recycled aggregates to replace natural aggregates partly or completely, so helping to reduce pollution and increasing sustainability of the construction world. To push forward the application of RAC it is necessary to deeply investigate the corrosion resistance of this concrete type as it is widely considered lower than the one of the normal aggregate concretes. Following this need, in the first paper by Wang *et al.* (2024a), an experimental champaign considering three types of RCA replacement ratios and four kinds of static load levels is presented. The obtained experimental results demonstrate that the corrosion depth of tensile reinforcement showed an increasing trend with the increase of static load level.

Recently, the demand for high strength, non-corrosive and more durable reinforcement led to an increased interest on fibre-reinforced polymers (FRP) bars. The second and the third papers regard the investigation of steel and fibre-reinforced polymer composite reinforcement and coral concrete short columns reinforced with carbon-fibre-reinforced polymer (CFRP) bars. Wang *et al.* (2024b) conduct pull-out tests on concrete reinforced with steel and carbon-fibre-reinforced polymer composite bars, carbon fibre reinforced polymer bars and steel bars. The reinforcement strain and bonding stress distribution are studied by using fibre Bragg grating sensing technology. A bonding stress model and bond stress distribution model are established based on the experimental tests results. In the next paper, Chen *et al*. (2024) investigate the resistance of axially and eccentrically loaded coral concrete (i.e., concrete obtained using dead coral debris as the coarse and fine aggregate and seawater for mixing) short columns reinforced with carbon-fibre-reinforced polymer (CFRP) bars. The concrete and CFRP bars stresses are experimentally studied and a calculation method for the bearing capacity of the proposed technology is developed.

Understanding the causes and risk factors of structural failures is fundamental for advancing the knowledge in the field and reducing the risks. Analysing the partial or total collapses under service loading suffered by flat-slab car park buildings, it has been observed that the collapse is preceded by the loss of bond between the concrete and flexural reinforcement. Kotsovos *et al.* (2024) extend the range of application of already established failure criteria to the case of loose of bonding due to steel corrosion.

The estimation of torsional strength of reinforced concrete members is an important topic that has been widely investigated. Even if the design approaches followed in most of the current design codes are similar, the detailing rules (e.g., the maximum torsional strength, minimum torsional reinforcement and maximum reinforcement spacing) are different. Lee *et al.* (2024) analyse the maximum strength limits of 406 shear critical and 153 torsion-dominated RC beam specimens. Moreover, experimental tests are performed on 22 RC beams subjected to torsional moments. Finally, the Authors propose a lower limit for the maximum torsional strength to avoid over-reinforced torsional failure.

Structural optimization is an important methodology to improve the sustainability in the Construction Industry. In the last paper of this issue, Khodadadi *et al*. (2024) propose a neural network algorithm to be applied for the optimal design of truss structures. An enhanced initialization mechanism founded on opposite-based learning and the use of few tunable parameters to provide proper exploration and exploitation abilities for the algorithm are developed. The performance of the proposed algorithm is demonstrated by using five benchmarks to assess its efficiency in relation to the latest optimisation techniques.

We thank all the Authors, Reviewers and Readers and we welcome discussion on any of these papers.

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