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Editorial

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Welcome to the September 2019 edition of *Structures and Buildings*. In this month's edition we have six papers covering a range of materials (steel, concrete and timber), a range of structural forms (buildings and bridges) and a range of perspectives, from the relatively specific focus of material properties and local capacities, through to the broader focus of global behaviour and response. It is also once again encouraging to see the global reach of the journal, with contributing authors from Brazil, Portugal, China and Egypt.

As a UK practitioner, what has also struck me in reading these papers is the increasingly global influence and adoption of the Eurocodes. As these are reviewed and updated into the next generation of Eurocodes the challenge of knowing when and where to 'draw the line' in terms of content, in the face of continuing outputs from research, cannot be underestimated. Yet a number of papers in this edition remind us that the content of codes of practice are not the 'be all and end all', and we as engineers must keep ourselves abreast of ongoing developments in research if we are to provide our communities with both safe and efficient designs.

Our first paper, from de Oliveira *et al*., (2019) presents results from a series of pull-out tests of headed reinforcement studs. There is no doubt that headed reinforcement presents many cost and buildability benefits, but in some countries experience with this solution for reinforcement, as opposed to anchorages, appears to be limited. For example, the current BS EN 1992-1-1 (BSI, 2004) doesn't recognise the use of headed bars as a method of anchoring reinforcement (although it is understood by this author to be included in the current draft of the next generation of Eurocode 2 Part 1) and BS EN 1992-4 (BSI, 2018) has only just brought the theory of headed anchors into the Eurocode 2 suite of documents. The results of this paper are of particular interest with respect to shallow embedment depths, noting the potentially significant over-conservatism within existing models for estimating concrete capacity in such cases.

Buckling of longitudinal reinforcement in columns during earthquakes, due to inadequate transverse reinforcement, is a well known phenomenon. Buckling of this reinforcement is a complex problem, due to both material and geometrical non-linearities. In our second paper, Qiu *et al*., (2019) develop a new numerical model for buckling analysis of reinforcement bars in compression and then use this model to conduct a parametric study on the influence of factors such as bar length-to-diameter on the average response of buckling bars. Finally, they present a pseudo-material constitutive model for reinforcement bars incorporating the effects of buckling. Whilst the method and model proposed are limited in scope to monotonic compressive loading, the authors are confident that it can be used to define the compressive envelope of the existing hysteretic model.

Wang *et al*., (2019) have identified an apparent shortfall in studies relating to shear buckling behaviour of curved girders with corrugated steel webs (CGCSW), as opposed to straight girders (SGCSW). As a result, the authors have provided interactive buckling formulas for different panel aspect ratios for CGCSW and compared outcomes to those derived for SGCSW, noting as a result that the radius of curvature cannot be neglected. The authors then go on to propose a buckling design formula for curved corrugated steel webs, and finally apply these formulas to existing experimental data on SGCSW in order to effectively separate buckling modes, noting that local buckling (as opposed to interactive or global buckling) was found to be the dominant buckling mode in the majority of cases.

I have personally not had much experience in the design or construction of timber structures. I therefore found the paper by Martins *et al*., (2019) particularly interesting regarding the challenges faced by the timber industry in reliably determining the mechanical properties of structural glued laminated timber (GLT) given the non-homogeneity of the timber used and the range of sources. In the authors' paper non-destructive methods are used to asses the mechanical properties of GLT made from Portugese poplar with subsequent comparison to full-scale test results. The authors conclude on a strength class of GL24c and show that the transformed section method shows stronger correlations with modulus of elasticity and shear strength than the longitudinal vibration method.

Pre-cast concrete is well established now given the benefits if can offer for constructability, quality, cost, programme and construction health and safety, especially so when combined with in-situ concrete to create composite structures. In their paper, Xue *et al*., (2019) consider modifications to the most widely used form of composite concrete t-beams — pre-cast beam with pre-cast slabs forming the flange, made composite

through an in-situ stitch and topping — and subject these to both cyclic and monotonic loading under full-scale testing. Although not unexpected, particularly worth noting is the significantly reduced ultimate flexural capacity under cyclic loading compared to monotonic. The authors conclude that the proposed modifications result in flexural behaviour similar to that of the fully in-situ control sample, although it would have been helpful to have compared results with a composite control sample without the proposed modifications. Nonetheless, the proposed modification of using an inverted t-section for the pre-cast beam component of the composite section remain noteworthy for its potential to reduce the need for temporary works given its increased stiffness compared to a more conventional rectangular profile, whilst still providing strength comparable to that of a fully in-situ solution.

Finally, Pilz *et al*., (2019) present an analytical study into the influence of transfer beams in the basement of a tall building on overall stiffness and the need to consider second order effects in analysis and design. The authors consider various arrangements and configurations of transfer beams at ground level, as well as introducing asymmetries into the sample building considered. Of note is the observation, through the parametric studies conducted, that appropriately-designed transfer beams that limit deflections within the span to L/700 have a beneficial effect on building stiffness in the direction of beam alignment, but sometimes result in a decrease in stiffness in the orthogonal direction.

I hope you find these papers as stimulating and informative as I have. Finally, please also remember that the journal publishes its most recent articles Ahead of Print on its Virtual Library homepage (https://www.icevirtuallibrary.com/toc/jstbu/0/0).

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