Editorial

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This opening issue of the *Structures and Buildings* journal for 2019 reminds our readers of the broad spectrum of fascinating initiatives in progress within the domain of structural engineering, both in terms of experimentation and predictive analysis. The *Commentary* (Sebastian, 2019) starts this process by describing a new lab which has just been completed in the UK for testing truly large-scale structural components, up to entire bridges under co-existent fatigue, environmental and other long-term actions. The experimental use of one of the test rigs to evaluate the fatigue life, up to 50 million axle load cycles, of a full-scale bridge incorporating cellular glass fibre composite bridge decking (a revolution in bridge deck technology) is presented.

This is followed by a paper (Zeng *et al.*, 2019) reporting tests to assess the fatigue performance of a 1/4 scale model representing key load paths within a suspension bridge. This cable-anchorage-hanger-girder integrated model was found to show no observable evidence of fatigue degradation at 2 million cycles but then exhibited hanger wire breakage, diaphragm cracks and significant transverse movement of the girder by 2.8 million cycles. The paper highlights some limitations of the reduced scale model where Saint Venant effects are concerned, even with careful attention to boundary conditions in the test setup.

The second paper, by Dong and Cheng (2019), sticks with the theme of bridges but switches focus to estimation of safety factors for aerostatic stability of long-span cable-stayed bridges. The authors explain that their approach departs from the status quo by considering uncertainties in quantifying the structure and wind-load parameters. In the new approach an inverse reliability method for estimating safety factors is combined with finite element computations to determine the critical aerostatic stability velocity. Through application to three existing structures, the benefits of the method are drawn out. The authors contextualise this approach within their observation of a growing trend towards increasing spans (up to 1400 m), greater flexibility and hence the potential for more wind-induced problems of long-span cable-stayed bridges worldwide.

The influence of semi-rigid connections between column lengths in sway-permitted modular steel-frame buildings, which are rapidly built and are a high quality control alternatives to traditional in-situ construction, forms the topic of the next paper by Li *et al.* (2019). They progress by first deriving the governing equations using a sub-assembly model, then solving for the associated K - (column effective length) factors and checking the results against finite element simulations of an example structure. The studies highlight the inadequacies – indeed the unsafe nature – of traditional approaches for application to this specialist type of structure. Attention is drawn to the need to substantiate the connections when the beams and columns are of very different stiffnesses.

The penultimate paper, by Yakhchalian and Amiri (2019), concerns reliable and efficient seismic performance assessment of reinforced concrete buildings, focused on the maximum inter-storey drift ratio (MIDR). A study is presented in which different intensity measures are used to predict the drift demand. The results show that an intensity measure based on the spectral acceleration vector moderated by the peak ground displacement is optimal for reliable prediction of MIDR demand in high-rise structures.

Aslani (2019) authors the closing paper of this issue on the topic of long-term cracking control for normal self-compacting concrete (SCC) and fibre-reinforced SCC (FRSCC) slabs. FRSCCs combine the convenience of casting due to self-compacting concrete with the enhanced concrete properties in tension arising from the fibres. Flexural tests are reported for FRSCC beams comprising of different combinations of steel and/or polypropylene fibres. The reported observations suggest that long-term deflection might be more sensitive than crack width to the actual composition of the concrete mix.

The issue does not end there, though. There are still two treats in store for the readers. The first is a vibrant book review focused on the 2nd edition of a tome describing the background to seismic design of buildings to Eurocode 8. Thurlow (2019), via his inimitable style of writing, builds our confidence in the book's provenance by putting great store on the

Figure 1. Winners of the Frederick Palmer Prize at the awards ceremony in October 2018

impressive line-up of contributors and he highlights the value of the book by presenting a vivid description of each chapter, in the process clearly revealing their relevance to timber, concrete and steel structures, en route drawing attention to the core importance of the ductility classes which separate the materials out. He concludes that the book can be used across a spectrum (no pun intended!) of seismic design cases, from preserving a culturally significant building to preventing collapse of a hospital.

Finally, as a reminder of the outstanding quality of the best papers published in the *Structures and Buildings* journal, we have taken the opportunity to reprint the abstract by Lawson *et al.* (2017) on deflections in steel-concrete composite beams with low degrees of shear connection, which won the Institution of Civil Engineers' *Frederick Palmer* prize for papers published in this journal in 2017. Figure 1 shows the trio of authors receiving their prize certificates from the ICE President, Professor Lord Robert Mair, during the awards ceremony at the Institution's headquarters (London) in October 2018. Many congratulations to the authors Professor Mark Lawson of the Steel Construction Institute and Surrey University, Professor Dennis Lam of Bradford University and Dr Eleftherios Aggelopoulos. Little doubt the paper will strongly influence future work in the field.

We are also pleased to report that the Tso Kung Hsieh award, given for the best paper published by the Institution in the

field of structural and soil vibration caused by mechanical plant, waves or seismic effects, was won by Ke *et al.* Their paper (Ke *et al.*, 2017) focused on energy dissipation as a means of limiting damage in high strength steel frames.

It remains for me to thank the authors of all submitted papers, the editorial panel, the reviewers and the ICE publications team for the crucial roles that you have all played in ensuring the continued success of the *Structures and Buildings* journal throughout 2018. To that end we are pleased to acknowledge the 2018 reviewers via the list presented in this issue. Your work to ensure that the journal retains high standards of publication has been invaluable. We trust that 2019 continues to be another fruitful year in our learned society mission to our authors and readers the world over and we wish you the very best in your own pursuits over the coming months.

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