Editorial

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With an increasing reliance on analysis software and an expanding range of prescriptive engineering codes and standards, it is always reassuring to observe the behaviour of structures in the real world. The first paper in the December 2017 issue of the journal provides a detailed look at the behaviour of reinforced concrete lattice-girder-slabs during manufacture, construction and in operation. Newell and Goggins (2017) demonstrate that the prediction of actual behaviour can be complex and is always subject to a degree of uncertainty therefore the application of Structural Health Monitoring (SHM) techniques can aid our understanding of structures and improve our prediction of behaviour both during construction and in operation. With the popularity of alternative methods of construction in the market increasing, and both an environmental and commercial drive to produce designs that are more efficient, obtaining data on the long-term performance of structures will be increasingly important to ensure that designs are safe, that codes and standards remain appropriate and that long-term serviceability performance can be maintained. It will be interesting to see if the rise of the so-called 'Internet Of Things' will provide a renaissance for SHM in the form of widespread data collection from in-situ buildings.

Continuing with the theme of predicting structural behaviour, Bozer (2017) provides an in-depth study into the relative performance of different modelling parameters on the prediction of the non-linear seismic response of concrete structures. The paper discusses methods typically available in commercially available software to represent the non-linear response of reinforced concrete to cyclic loading, including energy dissipation and stiffness degradation, and compares the predicted performance against physical tests. The paper then examines the impact of the different modelling approaches on the performance of a sample building and demonstrates the benefits of 'fibre-models' over simplified 'plastic hinge models' to estimate behaviour, albeit at additional computational expense. Non-linear methods that were once the reserve of sophisticated solvers are now increasingly common in standard structural engineering software and therefore an understanding of how the features and limitations of material models and modelling

approaches can affect predicted structural behaviour is increasingly important. Papers exploring the sensitivity and accuracy of different numerical methods on structural design are always welcome.

The strengthening of existing structures to increase capacity or improve performance can be a difficult and complex task especially when they are in use. There are many constraints that limit the application of traditional construction techniques and it is therefore an area where carbon-fibre-reinforced polymers (CFRP) are often employed. Shankar *et al.* (2017) provide a study into the behaviour of concrete-filled steel tubular (CFST) columns strengthened using strips of CFRP and explore the impact of both the number of CFRP layers and the spacing of the strips on the structural performance and failure mode. The paper concludes that CFRP strips can significantly enhance the load-carrying capacity of CFST columns and proposes a model for the prediction of enhanced confining pressure. The application of innovative, non-invasive methods of improving the performance, or prolonging the service life, of existing structures will become increasingly necessary as the demands on society's aging infrastructure increase, and therefore our understanding of how to apply such methods needs to keep pace. Further papers on this subject are therefore also invited.

Where the service life of structures requires resilience against seismic events, and traditional methods of seismic resistance are either ineffective or unachievable, innovative methods of modifying dynamic response are often required to limit structural damage, reduce subsequent repair costs and mitigate disruption for local communities. In Amini *et al.* (2017) an external energy dissipation device (EEDD), designed to improve the seismic performance of segmental precast post-tensioned bridge piers, is investigated through physical testing and computational analysis. The paper describes a simple system of steel and lead circumferential plates installed between the precast segments of bridge pier which is demonstrated to provide a significant increase in energy dissipation, and a corresponding reduction in structural damage, when compared to the unmodified reference design.

Commonly used connection details such as anchorages often receive little attention in both research and design, so in the final paper of this issue it is encouraging to see Park *et al.* (2017) describe an experimental programme to investigate the breakout shear strength of cast-in-place anchors under dynamic loads. The testing, carried out using a shaking table, was designed to establish the benefit of stirrup-reinforced anchors in uncracked and cracked concrete. The study confirms an enhancement of shear strength under dynamic loading and establishes that concrete cracking has a minimal influence on the dynamic shear strength of stirrup-reinforced anchors. The paper concludes by showing that the current design standards are conservative and proposes an alternative method accounting for the resistance of both concrete and stirrup reinforcement.

I trust you find the papers in the December 2017 issue of interest and hope that they may be of practical benefit. Looking ahead to 2018, the journal will be publishing two themed issues on composites; one on structures and buildings of fibre-reinforced polymers and one on new developments and trends in steel and concrete composites.

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