Structures and Buildings
Volume 170 Issue SB3
Editorial
Davison

ice | proceedings

Proceedings of the Institution of Civil Engineers
Structures and Buildings 170 March 2017 Issue SB3
Pages 157–158 http://dx.doi.org/10.1680/jstbu.2017.170.3.157

Editorial

Buick Davison BEng, PhD, MICE, CEng
Professor of Structural Engineering, Department of Civil & Structural Engineering, University of Sheffield, Sheffield, UK

Welcome to this issue of *Structures and Buildings*. The papers this month cover a wide range of topics, from detailed consideration of joints in both steel and precast concrete, to the seismic response of braced buildings and the dynamic response of reinforced-concrete beams under impact, to steel plate girders with tubular compression flanges and the shear behaviour of fibre-reinforced-concrete beams. All the papers relate to practical problems faced by practitioners and offer new methods of analysis, design or implementation.

A neural network model has been developed by Doran *et al.* (2017) to study the seismic response of braced steel-framed buildings. The use of steel concentrically braced frames is restricted to low-to-moderate seismic regions and low-rise buildings. Recent studies of the response of such frames under moderate earthquakes has shown them to perform better than expected and this paper sets out to investigate further using two example buildings, one of three stories and a second much taller one of nine stories. As step-by-step time-history analyses are time consuming to conduct, the paper explores how the use of a neural network model might capture the behaviour of the frames under seismic action. The development of the neural network is described in detail before conducting sensitivity analyses. Valuable insights into the dynamic response of concentrically braced frames to seismic loads are provided alongside evidence to suggest that neural network models could form the basis of practical design tools.

When using precast concrete it is clearly important to tie together the individual components to achieve a robust structure. For precast wall elements, this is commonly done using U bars, through which a lock bar is inserted and grouted in place. As installation of the wall panels is impeded by the protruding U bars, alternative solutions using high-strength wire ropes have been developed. Joergensen *et al.* (2017) have conducted a series of tests on precast concrete shear joints incorporating high-strength wire ropes and developed a design model to predict the failure load. An accurate design model is important because wire ropes, although very strong, do not yield and therefore may result in undesirable brittle failure of the joint. It is therefore essential that the wire rope is the strongest part of the joint and ensure that failure occurs in a ductile manner by yielding of the lock bar and crushing of the joint mortar. The development of the design model is described in detail and compared with eleven tests recently conducted by the authors and twenty-nine reported in the literature.

Conventional steel plate girders are, as the name implies, fabricated from flat plate. Replacing the compression flange with a tubular section may improve material efficiency by improving local capacity and resistance to lateral torsional buckling. Kharoob (2017) presents the results of a detailed finite-element investigation of the effect of tubular section shape (i.e. radius of gyration and section modulus) on the resistance of simply supported girders subjected to uniform bending. American Institute of Steel Construction design rules, developed for I-section plate girders, are shown to be very conservative for girders with a tubular compression flange and a modified design method is proposed.

The shear behaviour of steel fibre-reinforced-concrete has been extensively researched and the use of steel fibres as minimum shear reinforcement is now permitted. Arslan *et al.* (2017) have investigated the shear behaviour of polypropylene fibre-reinforced-concrete (PFRC) beams and report the results of a series of 11 PFRC beams with span-to-effective depth ratios ranging from 2·5 to 4·5 and fibre contents from 0–3%. The authors compare the results with a modified design equation based on earlier work by the lead author for steel fibre-reinforced-concrete and find good agreement with the test results. The use of polypropylene fibres increases both the shear strength and the ductility of the beams in shear but increasing the fibre content did not change the failure mode from shear to flexure for the low span-to-effective depth ratio beams.

Flush endplate connections are widely used in steel construction and their behaviour has been extensively studied. The paper by Goudarzi *et al.* (2017) considers the less well-researched area of how the moment resistance and rotational ductility of these connections are affected when subjected to coexistent axial load. In many design situations, the axial load in beams will be small and can be safely ignored but in situations where this is not the case, an understanding of how the presence of axial load influences the moment-rotation characteristic is important. This issue is addressed by a detailed study using finite-element models of two flush endplates; one with a relatively thin endplate and one much thicker. The influence of axial load (both tensile and compressive) on moment resistance, stiffness and ductility under monotonic and cyclic loading is investigated.

The final paper in this issue concerns the response of reinforced-concrete beams to impacts. Guo *et al.* (2017)

develop a mass-spring model to predict the response of reinforced-concrete beams to low velocity impacts as might arise from, for example, a vehicle impact. The model includes the local effect of the impacting body on the surface of the concrete beam; how this is accounted for is explained in detail. Using the proposed model the authors have conduced parametric studies to investigate the effect of initial impact velocity and the mass of the projectile relative to the beam.

I would like to take this opportunity to thank all the authors for their excellent contributions and also remind readers that they are very welcome to discuss any of the articles presented in this issue – details of how to do so are included at the end of each paper – or indeed submit a paper. I trust you will enjoy this issue.

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