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Editorial

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Engineers are presented with challenges from a fast and continuously changing world, partly due to climate changes and a growing population. Energy and water supply have become the most urgent problems and demand a solution. There are still countries with regular blackouts, which impede the economy and especially industries, thus hampering the development of the country. Solutions require inventive minds taking advantage of what is readily available: industrial and agricultural residues, demolition wastes, renewable materials among other things. Engineers still follow building codes and recommendations, which are used in practice and are still quite conservative. Low-cost, energy-saving construction materials and techniques are recognised but, in practice, the large industries do not show much interest or support. The ideal situation would be industries supporting research programmes, sponsoring young engineers, scientists and actively cooperating in research.

This edition of *Structures and Buildings* presents papers from three continents concentrating on studies of reinforced connections and frames. Each of the six papers present important findings in quite different areas.

The paper 'Efficient lightweight design of FRP bridge deck' (Dey *et al.,* 2015) proposes an efficient surface-based technique for the design of lightweight fibre-reinforced composite bridge deck panels where the total structural volume was optimised under the constraint of deflection limit, stresses, buckling and different failure criteria. The weight of the fibre-reinforced plastic (FRP) bridge deck was minimised by employing a central composite design together with a constrained multivariable non-linear optimisation algorithm. The considered design variables were top/bottom plate thickness, web thickness, overall depth and web numbers. The obtained results of this optimisation technique were compared to the results of conventional optimisation methods.

The second paper 'Role of hoops on seismic performance of reinforced concrete' (Dhake *et al.*, 2015) examines concrete beam–column joint specimens reinforced with varying amounts of joint hoops. Produced specimens were subjected to reverse cyclic loading to evaluate their performance during earthquakes. Parameters such as crack pattern, hysteresis behaviour, failure modes, energy dissipation, displacement ductility, stiffness degradation and maximum shear strength were examined. An assessment was made of the effectiveness of headed bars with short embedded length ending in the exterior beam–column joint. Headed bars were used as longitudinal beam reinforcement as they reduce transverse reinforcement.

In the third paper 'Behaviour of infilled frames with various interface conditions' (Dinh *et al.*, 2015), an experimental study is presented on the behaviour of infilled reinforced-concrete frames using autoclaved concrete blocks with different interface conditions between the infilled masonry and reinforced-concrete frames. Three groups with a total of five models were examined and the structure's behaviour was evaluated in terms of stiffness degradation level, lateral displacement, energy dissipation capacity and displacement ductility ratio. The experimental results were in good agreement with the finite-element method calculation results of a modified equivalent strut model in the elastic stage.

The fourth paper 'Parametric study of RC beams under a wide range of loading' (Adhikary *et al.*, 2015) reports on a numerical parametric study, where the effects of various parameters on the dynamic increase factor (DIF) of maximum resistance and the failure mode of reinforced-concrete beams under a wide range of loading rates were investigated. The results showed that the DIF of maximum resistance for beams with a small amount of longitudinal reinforcements is greater than that for beams with a large amount of longitudinal reinforcement. A failure mode change occurred when the longitudinal reinforcement ratio was increased in an under-reinforced beam. The DIF for beams with a large amount of transverse reinforcement was lower than in a beam with a small amount of transverse reinforcement. The study showed the yield strength of longitudinal reinforcement to be the key parameter affecting the failure mode change from flexure at static loading to shear at high loading rates.

The fifth paper 'Pull-out behaviour of blind bolts from concrete-filled tubes' (Octavianos *et al*., 2015) presents a study on the pull-out behaviour of blind bolts from concrete-filled steel tubes. The recent popularity of concrete-filled hollow steel sections as columns is due to their superior ductility and large energy absorption capacity. Tests were performed to establish the behaviour of individual bolts used in the design of moment-resisting connections. The effect of parameters, such as tube thickness, bolt diameter and embedment depth, were studied experimentally and by means of numerical models. A good agreement was found between the results of the two methods leading to further analysis determining the relative contributions of the concrete and tube walls to the pull-out resistance.

In the final paper 'Brittle failure in timber connections loaded parallel to the grain' (Jensen *et al.*, 2015) a study is presented

using a beam-on-elastic-foundation (BEF) model to determine the perpendicular-to-grain stresses in timber members subjected to loading parallel to the grain by bolted connections. A set of equations to analyse a finite length Timoshenko beam on a Winkler foundation is used and appropriate foundation stiffness values are discussed. In contrast to previous applications, it is suggested to introduce a fracture layer and to associate the foundation stiffness with the perpendicular-to-grain tensile strength and the mode I fracture energy of the wood. This estimation of the foundation stiffness, leading to a so-called quasi-non-linear fracture mechanics model, is applied to other problems where a BEF model is used to analyse mode I fracture. An existing model is also reviewed to analyse pure mode II fracture.

The issue is completed by two book reviews, which are recommended as valuable tools for the present and future generation engineers. Chan (2015) gives a brief introduction of the third edition of *Eurocodes*, while Baniotopoulos (2015) gives a short introduction to *Structural Dynamics for Civil Engineers*.

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