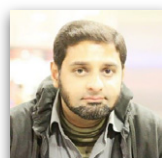


Editorial

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This issue of *Structures and Buildings* contains flexural distortional strength of steel beams determined by finite-element modelling, FEM analysis of out-of-plane behaviour of masonry infill walls, strength and buckling of cold-formed steel laterally unbraced stiffened sections. It also contains interaction of masonry walls and shear walls in masonry buildings, fibre-reinforced polymer efficiency in square columns with different corner radii etc. This issue also presents effect of admixtures on the behaviour of lightweight concretes and testing specimen effect on shrinkage of lightweight concrete. The presented papers continue the tradition of this journal to provide results useful for the professional development of its readers. This issue contains papers that have passed the rigorous peer review procedure adopted by the journal and contribute to the areas of knowledge discussed in this editorial.

This first paper presents flexural distortional strength of steel beams determined by finite-element modelling (Tohidi and Sharifi, 2018). This paper reports on the development of a three-dimensional finite-element model for inelastic non-linear flexural buckling analysis of steel I-beams. The model was used to investigate the effects of unbraced length and yield strength on member moment capacity. Unlike existing design codes, the model considers the effect of web distortions in a lateral-distortional buckling mode. Beam slenderness ranges can be divided into three main regions depending on the failure type – low slenderness (plastic), intermediate slenderness (inelastic buckling) and high slenderness (elastic buckling). Structural design codes give criteria that specify some form of transition from the end of the elastic region to the plastic moment. In the work reported in this paper, the effect of yield strength and web distortion on the limiting laterally unbraced length for the limit state of inelastic lateral-torsional buckling (LTB) was investigated.

The second paper presents the finite-element analysis of out-of-plane behaviour of masonry infill walls (Zhai *et al.*, 2018). In this paper Masonry infill walls should have sufficient out-of-plane stability to ensure the safety of people and the performance of safety-relevant components. The behaviour of masonry infill walls under out-of-plane loading, which is caused by earthquakes due to the mass and inertia of the wall, is crucial to the overall safety of buildings. A simplified micro non-linear three-dimensional finite-element method for simulating the behaviour of masonry infills under out of-plane loading is presented in this paper. Appropriate experimental data from the literature are utilised to examine the capability of the model. A parametric study is presented using the connection

conditions of the wall and frame, the slenderness ratio, the compressive strength of the masonry and the aspect ratio as parameters. It is shown that the model can simulate the various crack patterns observed in experimental studies reported in the literature. Based on the results of the parametric study, a simplified formula is developed to compute the out-of-plane load resistance of a masonry infill wall. A comparison of the results from the simplified formula and experimental data indicates that the formula can be employed to predict the out-of-plane strength of masonry infill walls in reinforced concrete frames with acceptable accuracy, except for those with extremely small slenderness ratios.

The third paper is about the strength and buckling of cold-formed steel laterally unbraced stiffened C and Z sections (Yerudkar and Vesmawala, 2018). In this paper the ultimate strength and buckling behaviour of cold-formed steel (CFS) laterally unbraced stiffened C and Z section members in bending and torsion were investigated. Bending tests were conducted on CFS beams with five different stiffener combinations (web, flange or a combination of web and flange intermediate stiffeners). The experimental and numerical results showed a reduction in displacement and an increase in bending strength after the provision of intermediate stiffeners along the web and flange of the channel members while there was an increase in both buckling loads and displacement in the Z sections. Flexural and lateral torsional buckling was predominant in simple end stiffened and single web stiffened sections, while sections with combined web and flange stiffeners failed due to combined distortional, flexural and lateral torsional buckling. The experimental results were simulated using finite element software and they showed good agreement with the experimental results in terms of displacement, bending strength and buckling modes. CFS members can be plain in simple applications, but if provided with flange or web intermediate stiffeners, their performance and resistance to buckling improves. The idea behind this study was to use CFS members with a modified shape rather than thickness to carry extra load. Due to the relatively easy manufacturing method, a large number of different configurations can be produced to fit the demands of optimised designs for both structural and economic purposes.

The fourth paper presents interaction of masonry walls and shear walls in masonry buildings (Sartaji *et al.*, 2018). In most seismic regions of the world, many unreinforced masonry buildings have been constructed for different uses, including schools. Statistical analyses showed that 90% of schools on the retrofitting list in Iran are

unreinforced masonry buildings. The addition of shear walls is a frequently used retrofitting method in these buildings. However, in most seismic rehabilitation projects, the lateral resistance of the masonry walls is neglected when determining the lateral resistance of the building and therefore the whole lateral resistance of the structure is provided by the newly added shear walls. In this study, the effects of including the lateral resistance of masonry walls in resisting seismic loads was investigated in order to reduce the cost of retrofitting. To achieve this, it was necessary to properly assess the non-linear behaviour of masonry buildings. This paper presents a modelling technique for non-linear static and dynamic analyses of masonry buildings in order to investigate the interaction between masonry walls and squat shear walls. By including masonry walls in the lateral resistance of a building, a considerable reduction in maximum drift was observed. For the representative building considered in this study, the lateral drift of the building decreased by 30% in the north–south direction and by 10% in the east–west direction.

The fifth paper is about the fibre-reinforced polymer efficiency in square columns with different corner radii (Mostofinejad *et al.*, 2018). Confinement of concrete columns by means of externally bonded fibre-reinforced polymer composites is a well established technique for strengthening purposes. The corner effect is one of the most important parameters affecting the polymer composite efficiency in confined square and rectangular columns. In this work, non-linear finite element analysis was used to investigate the behaviour of polymer-composite-confined square columns considering the effect of the corner radius. To compare the efficiency of polymer confinement for different corner radii, column specimens with corner radius-to-side dimension ratios between 0 and 0.5 were modelled and analysed. The Tsai–Wu failure criterion was used to examine the behaviour of the polymer composite under biaxial stresses. The results showed that increasing the corner radius provided more uniformly distributed confining stresses and also increased the polymer composite rupture strain, which improved its efficiency in confinement. Based on the results, in specimens with sharper corners, the interaction of biaxial stresses, hoop tension and axial compression, according to the Tsai–Wu failure criterion, causes maximum stress at the section corners. This leads to premature rupture of the polymer composite at these parts, thus reducing the efficiency of the composite.

The sixth paper is regarding the effect of admixtures on the behaviour of lightweight concretes (Al-Sibahy and Edwards, 2018). This paper presents an experimental investigation of the combined effect of a superplasticiser admixture and metakaolin material on the mechanical behaviour of expanded clay lightweight concrete containing recycled glass aggregate. The optimum dosage of the superplasticiser admixture (type SNF) was adjusted and used by weight of cement. The short- and long-term mechanical properties of concrete mixes were measured in accordance with the relevant British/EN standards. The results obtained were compared with the results of control concrete mixes (without superplasticiser). They showed that the superplasticiser admixture exhibited a 20% reduction in mixing water content. All measured values of unit weight, compressive and splitting tensile strengths increased when the superplasticiser

admixture and metakaolin material were used. The concrete mix containing 30% recycled glass revealed an increase in the mechanical strength compared with the mix of 15% recycled glass. However, the workability of the superplasticiser concrete mixes was degraded, reaching 44% reduction in slump value.

The last paper deals with the testing specimen effect on shrinkage of lightweight concrete (Behnam Vakhshouriet 2018). In this paper the shape and size of the testing specimen influence on the measured shrinkage strain of concrete at different ages is discussed. This study compares the shrinkage strain of lightweight concrete containing treated expanded polystyrene beads measured by prism (2857575 mm) and cylindrical (150300 mm) specimens for 225 d after 7 and 14 d of moist curing, respectively. The shape of the specimen had a distinct effect on the shrinkage, especially immediately before and after 60 d. The increasing trend of the shrinkage strain in the prism and cylinder specimens was different. Considering the specimen shape, a relationship is proposed and verified by the existing models and experimental data to predict the shrinkage strain of lightweight concrete.

I hope that you will find these articles informative and useful to your work and I invite you to contribute to the discussion by sending your comments to the journal. Furthermore, beyond the classical printed and electronic version, *Structures and Buildings* publishes the most recent articles online Ahead of Print on the Virtual Library homepage of the journal: <https://www.icevirtuallibrary.com/toc/jstbu/0/0>.

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