Editorial

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This issue of *Structures and Buildings* includes four technical papers, dealing with three diverse and interesting topics, namely earthquake engineering, reinforced concrete beam columns and timber bridges.

The first paper, by Macabuag *et al.* (2012) discusses practical approaches to prevent or prolong the collapse of mud-brick dwellings in Nepal under strong earthquakes. A retrofitting technique using polypropylene (PP) meshing is developed and tested. The meshing was first tested under static load with the retrofitted PP parallel to the masonry, perpendicular to the masonry and as a mesh. It was noted that masonry stiffness was far greater than that of the mesh, so initial failure stress is unaffected by the retrofitting. However, all three the specimens maintained the load past failure of the masonry. The mesh was most suitable for preventing loss of material and maintaining wall integrity for large deformations. Full-scale dynamic tests were carried out on a shake table for the retrofitted and non-retrofitted models, with sinusoidal input motions between 2 and 35 Hz and amplitudes of 0.05 g to 1.4 g. A significant enhancement of seismic resistance was observed. Finally, a pilot scheme was conducted in Kathmandu valley, Nepal, including a training course for local masons and demonstration, followed by the retrofitting of an abode home.

The second paper, by Dhileep and Nair (2012) discusses the effects of rigid content on modal response combination. Rigid response coefficients were calculated for 40 earthquakes and four damping ratios. A range of frequencies from damped periodic to rigid were used to evaluate the modal response. In all previous studies, the higher key frequency was considered to be a function of the rigid frequency, based on the convergence of spectral curves with different damping ratios. The contribution of rigid modes with a frequency higher than the rigid frequency were accounted for with 'missing mass' corrections. The authors showed that the modal responses become rigid above a frequency that is a function of the damping ratio. An alternative criterion to evaluate this damped rigid frequency from the spectrum of a particular earthquake ground motion was proposed. A simplified expression for the rigid response coefficient was also proposed, based on a logarithmic fit between the key lower frequency and the new key damped rigid frequency. This method gives a better fit for the rigid response coefficient than existing methods.

The third paper, by Afefy (2012) presents an expression for the ultimate flexural rigidity to be used in the stability analysis

of braced reinforced concrete beam–column members with concrete cylinder strengths up to 50 MPa. The expression is a result of well documented experimental results, together with numerical simulation on axially loaded columns with different slenderness ratios and concrete strengths, where the effect of end eccentricity and column length (slenderness) were considered. The ultimate flexural rigidity was compared with US and Canadian standards. The proposed expression is simple to use and gives conservative results, showing the effectiveness of including end eccentricity and slenderness ratios in the expression.

The fourth and final paper by Forsling *et al.* (2012) presents investigations on eight full-size timber bridge stringers that were intentionally damaged by partial and complete saw cuts through the member widths in the middle and lower quarter positions, to simulate old timber bridge members that required rehabilitation past their projected lifetime. The timber members are typical of those in the majority of open-deck timber trestle bridges used in the USA, with short span lengths of 4.0 to 4.6 m. The intentionally damaged stringers were then repaired by an inexpensive repair technique termed shear spiking, before experimental tests were performed. Owing to the low aspect ratio of the span timbers, the contribution of horizontal shear resistance to flexural stiffness is high. The damage was controlled as discussed above, to replicate the stiffness loss related to the loss of horizontal shear capacity observed in degraded or damaged railway bridge span timbers. The spiking was done with pultruded fibre-glass composite rods inserted vertically through damaged areas. An epoxy resin adhesive was used to bond the fibre-glass shear spikes to the timber as well as to partially fill adjacent cracks and decay voids. The tests showed that the intentionally damaged stringers experienced a dramatic recovery of flexural stiffness, from 61% to 106%.

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