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Editorial

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This issue of *Structures and Buildings* contains papers discussing the seismic retrofit of beam column joints using prestressing wires, the study of a hybrid structural damper for multi-seismic levels, strength reduction factors for wind and earthquake effects, column under-pinning joints with inclined steel bars and observer application in decentralized control of civil structures. 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.

The first paper presents the seismic retrofit of beam–column joints using pre-stressing wires (Huang *et al*., 2017). This paper highlights the improvements of the seismic performance and enhancements of the shear strength of beam–column joints with non-seismic design, as well as the shortcomings of traditional seismic retrofitting techniques for the joints. Six large-scale interior beam–column joints were tested under reversed cyclic loading, where five were strengthened by the proposed technique and one was un-retrofitted as a control specimen. Particular emphasis was placed on the effects of the ratio of prestressed high-strength steel wires, prestressing level of wires and polymer grout layer. Test results showed that the joint shear capacity was increased significantly and cracks in beam–column joints were controlled effectively after retrofitting. All retrofitted joint specimens failed in a ductile mode of beam flexural failure, whereas the control specimen failed in a brittle mode of joint shear failure. In addition, the energy dissipation capacity as well as ductility of the retrofitted joint specimens was enhanced significantly.

The second paper presents the hybrid structural damper for multi-seismic levels (Hosseini Hashemi and Moaddab, 2017). In this paper two dual-performance designs are introduced as alternatives to the standard steel-plate yielding and friction damper. The new devices are detailed and designed to absorb and dissipate seismic input energy at different levels of ground motion. Both systems are composed of a main fuse to dissipate energy at high-level drift demands encountered in severe earthquakes but also have an auxiliary fuse to control the responses at lower drift demands that normally occur in moderate earthquakes. Six specimens with different specifications were designed and tested. The experimental results prove the efficiency of the dampers at different levels of ground motion. In moderate-level ground motion intensities, the dual-performance characteristics of the dampers permit energy dissipation in the auxiliary fuse without disturbing the main fuse. In high-intensity ground motions, the main fuses are engaged with significant energy-dissipating capability. Moreover, significant enhancements were observed in the plastic rotation capacity of the dampers and the ductility provided.

The third paper is about the strength reduction factors for wind and earthquake effects (Martinez-Vazquez, 2017). In this paper it is shown that the combined action of strong winds and earthquakes, however low its probability of occurrence, would considerably increase the ductility demand of buildings and cause a decrease in SRFs calculated by ignoring wind. The paper examines the non-linear performance of single-degree-of-freedom systems subject to various levels of winds and earthquake load and deals with the estimation of SRFs associated with those multi-hazard scenarios.

Fourth paper presents an experimental investigation on column underpinning joints with inclined steel bars (Wu *et al*., 2017). A new column underpinning method with inclined rectangular ribbed steel bars is developed in this paper. Six specimens were tested experimentally under vertical static load. The inclination angle and the number of inclined steel bars were considered as the main parameters. Tests were carried out to study the mechanical performance of the column underpinning joints, especially bearing capacity. The results indicate that, compared with a specimen without inclined bars, the addition of inclined bars in joints improves the bearing capacity by a maximum of 143·7%. Analysis revealed that the bearing capacity of joints with inclined bars is mainly composed of three parts, (*a*) the vertical component of force in inclined bars, (*b*) partial cohesion strength and (*c*) the shear strength resulting from friction at the interface between new and old concrete.

The last paper deals with observer application in decentralised control of civil engineering infrastructure (Aghajanian *et al.*, 2017). In this paper a new decentralised control technique based on the Luenberger observer is proposed to improve the control performance of structural vibrations based on the state estimation approach. The controlled responses of a three-storey shear frame model are investigated. The efficiency of the proposed method is demonstrated through a comparison of the results with the corresponding centralised control method, a fully decentralised method and the recently proposed Kalman-based approach. In addition, precise results of an uncertain structural model clearly illustrate the superiority of the Luenberger method. An intelligent design procedure is assigned to the observer poles, which ensures acceptable accuracy of the proposed method.

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: http://www.icevirtuallibrary.com/toc/jstbu/current.

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