Editorial

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Dear Readers,

Every year, severe earthquake-related losses of human lives and built infrastructure are reported across the world. Therefore, developing technologies for building earthquake-resistant structures to attain a hazards resilient community is the priority for most authorities in different countries. Investments are therefore made in researching such devices that improve structural performance under strong shaking due to earthquake ground motion. In this special edition of the journal on, ‘Base Isolation and Energy Dissipating Devices’ we have included eight papers on innovations reported on earthquake response modification or vibration control devices. In most cases, experimental and analytical or numerical studies have been carried out to investigate the effectiveness of the innovative devices.

Base isolation is a well-established technology adopted worldwide to attain a higher level of protection of structures from some of the damaging effects of earthquakes. Seismic base isolation of buildings has a significant influence on the dynamic response of superstructure. The effects of base isolation of such a primary building on the non-structural components have been studied by Wang and Yang (2021). It is reported that the acceleration response of the base-isolated building reduced to about 25% of the conventional fixed-base (non-base-isolated) building. Such benefits of the base isolation are not only important for museum buildings but also for other lifeline structures – for example hospitals. Multi-directional vibration response control is important in critical infrastructure to safeguard buildings and the contents within. A new seismic isolation system, called the vertical seismic isolated rocking-core system (VSI-RCS) has been introduced by Nekooei *et al.*, (2021). They conducted non-classical eigen-analyses, and thereby the frequencies and non-classical damping ratios of the VSI-RCS are quantified. Sequentially, seismic performance of high-rise base-isolated buildings has been evaluated by Xu *et al.*, (2021) and three limit states for uplift, rocking, and overturning are proposed. The shaking table test results are used to verify the outcomes from a theoretical model of the high-rise

base-isolated building. It is important to note here that base isolation can also be effectively used for high-rise buildings to improve their seismic performance. Apart from the buildings, base isolation is popularly used in bridges as well. The laminated-rubber seismic bearings conventionally used in bridges are upgraded by using multi-directional space-flange energy-dissipation (SF-ED) devices, thereby facilitating earthquake response reduction under multi-directional seismic actions in the subsequently reported investigation (Misini *et al.*, 2021). The performance of the SF-ED was studied theoretically and tested experimentally, which revealed its superiority under the strong earthquake excitation.

Passive control devices are gaining popularity in earthquake response control of buildings and structures. Large number of ingenious devices has been proposed and tested for their efficacy. A simple in-plane elliptical damper (i-PED) has been reported by Lee *et al.*, (2021) to dissipate energy under cyclic loading. Based on the experimental investigations, empirical formulae have been developed by them, which are able to predict the behaviour of the small-scale i-PED with acceptable accuracy. Yet another novel hybrid damper consisting of structural steel and nickel-titanium (Nitinol) shape memory alloy (SMA) bars has been reported by Jalaeefer and Asgarian (2021). The experimental investigation carried out by them for testing the effectiveness of the Nitinol-SMA under cyclic loading has adequately exhibited high energy dissipation capacity and strain recovery capability of the hybrid device.

Conventionally, in buckling-restrained braces (BRBs) a steel element is encased within concrete fill. Interestingly, polyamide casing was used as the filler material surrounding the core of the BRB instead of concrete by Gholhaki *et al.*, (2021). They have reported experimental and numerical studies conducted on the BRBs. Subsequently, modal strain energy method and the logarithmic decrement method have been used for the preliminary sizing of energy-dissipating devices such as the BRBs and fluid viscous dampers, by conducting a case study on a 40-storey reinforced concrete core wall building (Ahmed, 2021).

In summary, these new devices being reported have some attractive features and characteristics extremely useful in specific applications for dynamic response abatement. It is hoped that the readers would find the papers included in this special edition on base isolation and energy dissipating devices informative, improving the state-of-the-art in earthquake-resistant design of structures. We will be glad to receive feedback from you on these papers and suggestions on how we can further contribute towards achieving the goal of hazard resilient communities.

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