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MULTI-OBJECTIVE OPTIMIZATION OF AN EXPERIMENTALLY VERIFIED BASE-ISOLATED BUILDING

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ABSTRACT

During significant seismic events, structures experience considerable seismic energy. A base isolation system (BIS) is among the most effective approaches to mitigating seismic responses. However, the effectiveness of BIS alone may be limited, as the nonlinear behaviour of base isolators can lead to increased displacement demands in earthquake-prone areas. A combination of supplemental viscous dampers and base isolation provides one of the most effective seismic response control techniques. To evaluate the effect of Laminated Rubber Bearing (LRB) stiffness on the building's seismic performance, three distinct bearing stiffnesses were selected for the building model. The findings indicate that compared to the model without dampers, displacements and accelerations at the isolation floor and above are significantly reduced in the isolated system equipped with viscous dampers. Furthermore, the results highlight the importance of optimal damping coefficient selection for multi-objective optimization of the building’s seismic behaviour (i.e., displacement and acceleration).

Keywords: Multi-objective optimization; Additional dampers; Base isolation system; Seismic performance of a real building; Earthquakes