Design And Experimental Verification Of Geometrically Nonlinear Viscous Damper In Seismic Isolation For Protection Of Essential Equipment In Buildings

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Seismic isolation with supplement damping devices is one of the popular solutions to mitigate earthquake-induced vibrations for high-precision machining. Isolation performance in this system may not be effective in all levels of earthquakes. In this study, a geometrically nonlinear damping strategy, i.e., a viscous damper being perpendicular or oblique to the isolation motion direction at the equilibrium, is proposed to generate adaptive damping forces. First, the dynamic characteristics of the proposed systems are briefly introduced. A stochastic design method is developed to fulfill multi-objective isolation performance such as better reductions in isolation accelerations and displacements against under and beyond design-level earthquakes, respectively. In addition, the isolation system is experimentally verified for the displacement- and velocity-force relationships. As a result, the proposed design method yields this isolation system to be adaptive at multiple earthquake levels.