Structural Control Performance Of Impact Dampers Attached To A Nonlinear Benchmark Structure Under Various Excitations

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The impact damper is a type of vibration attenuation device that is capable of decreasing the dynamic responses of a primary structure with wide frequency band and insensitivity to temperature. In this paper, the vibration control effect of the multi-unit impact damper (MUID) is examined when implemented in a nonlinear benchmark structure subjected to seismic excitations. It is assumed that the plastic hinges only occur at the column-beam and the column-column connections in the nonlinear benchmark structure. Comparisons of control performance of MUID on nonlinear and elastic structures are demonstrated to reveal the influence of structural nonlinearity on the vibration mitigation effects. Furthermore, the reliability of MUID subjected to various seismic excitations is investigated as compared with the single-unit impact damper (SUID). The results show that the structural nonlinearity will lead to a decrease in the vibration control performance of the MUID, and the MUID can achieve better control reliability under various seismic excitations than SUID.