Experimental Investigation Of A Four-Story Structure Incorporating The Sliding Bistable Nonlinear Energy Sink

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Nonlinear energy sink (NES), a rapid and passive vibration absorber attached to building structures, has been proposed to mitigate the undesired response of the structure under different types of excitation. The essential nonlinearity of the NES enables it to resonate with all modes of the structure which is achieved through targeted energy transfer. Over the last few decades, the bistable nonlinear energy sink (BNES) system has been proposed and proved to be a more efficient vibration absorber compared to cubic NES and attracted great interest in many areas. Previous study shows that the proposed sliding bistable energy sink (SBNES) attached to a single degree of freedom (DOF) system is robust and capable to protect the primary structure under earthquake excitations. In this paper, the experimental performance of the SBNES device applied in a moderate 4-story primary structure is discussed. By utilizing a large shake table test, earthquake ground motions were implemented as base excitations input into the test structure. The results of this study show that the SBNES system greatly improves the structural seismic performance of the multi-story building structure by reducing its both acceleration and displacement.