

Shaking Table and Numerical Seismic Performance Evaluation of a Fluid Viscous-Dissipative Bracing System

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A shaking table campaign was carried out on a 2:3-scale two-story steel frame structure retrofitted by a dissipative bracing system incorporating pressurized fluid viscous spring-dampers. Up to 1.16 g peak ground accelerations were imposed in the most severe of the 33 tests developed. The response was always elastic, with maximum interstory drift ratios limited below 0.62%, thanks to the high dissipative capacities of the protection technology, which produced equivalent linear viscous damping coefficients up to 37.5%. The experimental data were integrated with a numerical enquiry on the test structure in its original unbraced configuration, which showed interstory drift reductions ranging from about 80% to about 90%, when passing to dissipative braced conditions. A final performance-based analysis developed in terms of interstory drifts and beam and column rotations, by referring to the criteria formulated in ASCE/SEI 41-06 Standard, emphasized 3 through 5 enhancements of building performance in retrofitted conditions, for the four earthquake levels examined.

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