Seismic protection of frame structures by fluid viscous damped braces

Sorace, S.[a] , **Terenzi, G.**[b]
[a] Dept. of Civil Engineering, Univ. of Udine, Via delle Scienze 208, 33100 Udine, Italy
[b] Dept. of Civil Engineering, Univ. of Florence, Via di S. Marta 3, 50139 Florence, Italy

A research study on a damped bracing system incorporating pressurized silicone fluid viscous devices for seismic protection of frame structures is presented in this paper. This technology features an inverse-chevron brace configuration, where a pair of interfaced devices are placed, parallel with the floor-beam axis, at the tip end of each couple of supporting steel braces. The experimental section of this study consisted of a pseudodynamic testing campaign on a 2:3-scale three-story steel frame and a full-scale three-story reinforced concrete frame seismically retrofitted by the technology considered. Test results were elaborated to evaluate: the improvement of seismic response of both structures after retrofit, also assessed through a formal performance-based evaluation analysis; the capabilities of the assumed analytical and numerical models in reproducing the observed structural response; and the feasibility of a methodology previously formulated to select the damping coefficient of fluid viscous devices, herein implemented with further details for practical use. This methodology was applied to the design of the protection systems of the two test structures, and checked by comparing the target and experimentally obtained values of the governing energy-ratio coefficients.