

Optimal Design of Friction Dampers for Seismic Retrofit of a Moment Frame

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Abstract : This study investigated the determination of the optimal location and friction force of friction dampers to effectively reduce the seismic response of a reinforced concrete structure designed without considering seismic load. To this end, the genetic algorithm process was applied and the results were compared with those obtained by simplified methods such as distribution of dampers based on the story shear or the inter-story drift ratio. The seismic performance of the model structure with optimally positioned friction dampers was evaluated by nonlinear static and dynamic analyses. The analysis results showed that compared with the system without friction dampers, the maximum roof displacement and the inter-story drift ratio were reduced by about 30% and 40%, respectively. After installation of the dampers about 70% of the earthquake input energy was dissipated by the dampers and the energy dissipated in the structural elements was reduced by about 50%. In comparison with the simplified methods of installation, the genetic algorithm provided more efficient solutions for seismic retrofit of the model structure.

Keywords : friction dampers, genetic algorithm, optimal design, RC buildings

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