

Hybrid Seismic Energy Dissipation Devices Made of Viscoelastic Pad and Steel Plate

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Abstract : This study develops a hybrid seismic energy dissipation device composed of a viscoelastic damper and a steel slit damper connected in parallel. A cyclic loading test is conducted on a test specimen to validate the seismic performance of the hybrid damper. Then a moment-framed model structure is designed without seismic load so that it is retrofitted with the hybrid dampers. The model structure is transformed into an equivalent simplified system to find out optimum story-wise damper distribution pattern using genetic algorithm. The effectiveness of the hybrid damper is investigated by fragility analysis and the life cycle cost evaluation of the structure with and without the dampers. The analysis results show that the model structure has reduced probability of reaching damage states, especially the complete damage state, after seismic retrofit. The expected damage cost and consequently the life cycle cost of the retrofitted structure turn out to be significantly small compared with those of the original structure. Acknowledgement: This research was supported by the Ministry of Trade, Industry and Energy (MOTIE) and Korea Institute for Advancement of Technology (KIAT) through the International Cooperative R & D program (N043100016).

Keywords : seismic retrofit, slit dampers, friction dampers, hybrid dampers

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