

Life Cycle Cost Evaluation of Structures Retrofitted with Damped Cable System

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Abstract : In this study, the seismic performance and life cycle cost (LCC) are evaluated of the structure retrofitted with the damped cable system (DCS). The DCS is a seismic retrofit system composed of a high-strength steel cable and pressurized viscous dampers. The analysis model of the system is first derived using various link elements in SAP2000, and fragility curves of the structure retrofitted with the DCS and viscous dampers are obtained using incremental dynamic analyses. The analysis results show that the residual displacements of the structure equipped with the DCS are smaller than those of the structure with retrofitted with only conventional viscous dampers, due to the enhanced stiffness/strength and self-centering capability of the damped cable system. The fragility analysis shows that the structure retrofitted with the DCS has the least probability of reaching the specific limit states compared to the bare structure and the structure with viscous damper. It is also observed that the initial cost of the DCS method required for the seismic retrofit is smaller than that of the structure with viscous dampers and that the LCC of the structure equipped with the DCS is smaller than that of the structure with viscous dampers.

Keywords : damped cable system, fragility curve, life cycle cost, seismic retrofit, self-centering

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