SEISMIC RESPONSE OF MASS ISOLATION STRUCTUES CONNECTED WITH VISCOUS AND FRICTION DAMPERS

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Adding to the flexibility and energy dissipation potential of the system is the main feature of some new approaches in seismic design of structures. Extra flexibility helps to reduce earthquake-induced forces and accelerations in the building and provides higher energy dissipation potential for the system (by creating large relative deformations in the structure. (Ziyaeifar et al., 2012).

In seismic design of structures based on flexibility and energy dissipation approach the structural system is usually consisted of two subsystems (a mass and a stiffness subsystem) and energy dissipation takes place in between these subsystems (Figure 1). Whereas the flexibility of mass subsystem helps to reduce the earthquake effects in this part of the building, the role of stiffness subsystem is to control the deformation of the mass subsystem by providing support for reaction forces of energy-dissipating devices located between the two subsystems (Nekooei and Ziyaeifar, 2008).

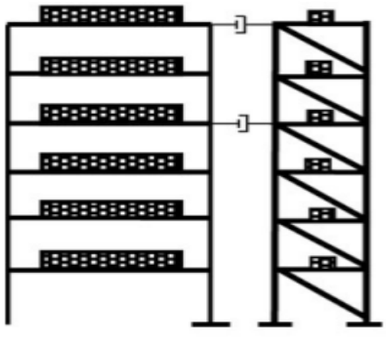

Figure 1. Mass Isolation techniques

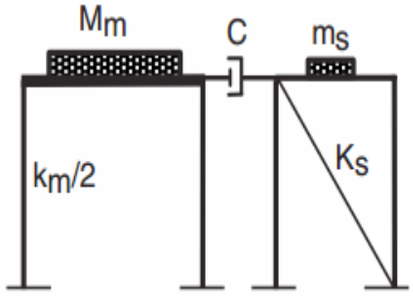

Figure 2. Mass Isolation models (Vertical Isolation)

In this paper, the structural response of Mass isolation building that designed and connected with various types of dampers under different earthquake excitations is studied. The effectiveness of various types of Linear and Nonlinear viscous dampers and friction dampers in terms of the reduction of structural responses (i.e., displacements, accelerations and shear forces) is investigated.

Results show that connecting the two subsystems with dampers by different fundamental frequencies can effectively reduce the earthquake induced responses of two subsystems (a mass and a stiffness subsystem). Also connected two subsystems with friction damper is more effective in reducing the response of Mass subsystem in low ranges of provided force in damper than linear viscous damper. Meanwhile the reduction of the response of two subsystems with nonlinear viscous damper in all ranges of provided force in damper is more than linear viscous and friction dampers.

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