

عنوان مقاله:

MULTI-OBJECTIVE OPTIMIZATION OF TUNED MASS DAMPERS CONSIDERING SOIL-STRUCTURE INTERACTION

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خلاصه مقاله:

Tuned mass dampers (TMDs) are as a efficient control tool in order to reduce undesired vibrations of tall buildings and large-span bridges against lateral loads such as wind and earthquake. Although many researchers has been widely investigated TMD systems due to its simplicity and application, the optimization of parameters and placement of TMD are challenging tasks. Furthermore, ignoring the effects of soil-structure interaction (SSI) may lead to unrealistic design of structure and its dampers. Hence, the effects of SSI should be considered in the design of TMD. Therefore, the main aim of this study is to optimize parameters of TMD subjected to earthquake and considering the effects of SSI. In this regard, the parameters of TMD including mass, stiffness and damping optimization are considered as the variables of optimization. The maximum absolute displacement and acceleration of structure are also simultaneously selected as objective functions. The multi-objective particle swarm optimization (MOPSO) algorithm is adopted to find the optimal parameters of TMD. In this study, the Lagrangian method is utilized for obtaining the equations of motion for SSI system, and the time domain analysis is implemented based on Newmark method. In order to investigate the effects of SSI in the optimal design of TMD, a ۴۰ storey shear building with a TMD subjected to the El-Centro earthquake is considered. The numerical results show that the SSI effects have the significant influence on the optimum parameters of TMD.

کلمات کلیدی:

tuned mass dampers, soil-structure interaction, displacement, acceleration, multi-objective particle swarm optimization algorithm

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