عنوان مقاله:

OPTIMIZED TUNED LIQUID COLUMN DAMPERS FOR EARTHQUAKE OSCILLATIONS OF HIGH-RISE STRUCTURES INCLUDING SOIL EFFECTS

محل انتشار:

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خلاصه مقاله:

This paper investigates the optimized parameters for the tuned liquid column dampers to decrease the earthquake vibrations of high-rise buildings. Considering soil effects, the soilstructure interaction (SSI) is involved in this model. The Tuned Liquid Column Damper (TLCD) is also utilized on the roof of the building. Since the TLCD is a nonlinear device, the time domain analysis based on nonlinear Newmark method is employed to obtain the displacement, velocity and acceleration of different stories and TLCD. To illustrate the results, Kobe earthquake data is applied to the model. In order to obtain the best settings for TLCD, different parameters of TLCD are examined with constant mass quantity. The effective length, head loss coefficient, cross sectional ratio and length ratio of TLCD are assumed as the design variables. The objective is to reduce the maximum absolute and Root Mean Square (RMS) values of displacement and acceleration during earthquake vibration. The results show that the TLCDs are very effective and beneficial devices for decreasing the oscillations of high-rise buildings. It is indicated that the soil type highly affects the suitable parameters of TLCD subjected to the earthquake oscillations. This study helps the researchers to the better understanding of earthquake vibration of the structures including soil effects, and leads the designers to achieve the optimized TLCD for the high-rise buildings.

کلمات کلیدی:

high-rise structures; earthquake oscillations; tuned liquid column dampers; soil-structure interaction