عنوان مقاله:

Equivalent Viscous Damping in Steel Structures Equipped with Dampers.

نویسندگان:

Seyed Behdad Alehojjat – Department of Civil Engineering, Qazvin Branch, Islamic Azad University, Qazvin, Iran

Omid Bahar – Structural Engineering Research Center, International Institute of Earthquake Engineering & Seismology (IIEES), Tehran, Iran

Masood Yakhchalian – Department of Civil Engineering, Qazvin Branch, Islamic Azad University, Qazvin, Iran

خلاصه مقاله:

Determination of equivalent viscous damping (EVD) is an important step in the direct displacement-based design (DDBD) method. This study aims to investigate whether the proposed method used in the equivalent lateral force (ELF) procedure, according to ASCE/SEI ۷, for the calculation of effective damping in steel structures equipped with fluid viscous dampers (FVDs) can be used in the DDBD method. In order to evaluate the accuracy of this method, modified Jacobsen's method and the approach used in Pennucci et al.'s study are applied to determine the EVD. At first, a set of steel structures with different heights and bays are designed for ۰.۷۵, ۰.۸۵ and ۱.۰ of the design base shears based on the primary calculation of the ELF procedure and then nonlinear time history analyses are carried out to determine the dampers constants and the EVD at two seismic hazard levels, i.e., design earthquake (DE) and maximum considered earthquake (MCE). According to the obtained results for the EVD, it is found that the obtained results in the ELF procedure has acceptably matched with Pennucci et al.'s approach. On the other hand, there are some differences between the obtained results and those obtained from modified Jacobsen's method. Therefore, the ELF proposed equation for calculating EVD can be used in the DDBD method in mid-rise steel structures equipped with FVDs to accurately determine the EVD.

کلمات کلیدی:

equivalent lateral force procedure, equivalent viscous damping, fluid viscous damper, direct displacement-based design