

Abstract:

To determine a set of ground motions that is employed for response history analysis (RHA), it is necessary to modify and select the seismic records that represent the hazard of the site. In current practice, either the uniform hazard spectrum (UHS) or the conditional mean spectrum (CMS) are target spectra used to select ground motion records. For structures whose response is influenced significantly by multiple vibration modes, multiple CMSs (mCMS) are implemented to determine the maximum of mean demands; however, this method increases the number of GMs that must be implemented in RHA. Two target spectra were proposed to reduce the computational effort of mCMS, these spectra are the simplified generalized conditional mean spectrum (sGCMS) and the CMS-UHS composite spectrum. The results of the implementation of these target spectra performing nonlinear RHAs of three symmetric-plan buildings with 5, 10, 15 stories and ten idealized structures, suggest that the sGCMS and the composite spectrum lead to conservative estimates of seismic demands in comparison to the mCMS method. However, in most cases, their estimates are smaller than the UHS procedure.