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Modified Framework of Selection of Input Ground Motion for Fragility Analysis of the Structure

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Abstract

In this present study, an updated ground motion selection methodology is proposed for the evaluation of seismic performance of mid-rise reinforced concrete building with multi stripe analysis (MSA) based probabilistic seismic hazard analysis (PSHA). The structures are model in finite element software FEA NX. The nonlinear behavior of beams and columns are represented by Modified Takeda model. The seismic fragility function of a three storied instrumented test building is generated for different performance levels of maximum storey drift under a series of input ground motions (IGM). IGM are obtained from the uniform seismic hazard response spectrum (UHRS) compatible synthetic time histories. In this procedure, the frequency contents of the input motion during the scaling of high intensity earthquakes are conserved. The site specific UHRS are developed from probabilistic seismic hazard analysis (PSHA) and 1st mode spectral acceleration is considered as an intensity measure for the building. The fragility curve generated for the building is also compared for two different methods, such as, the presently proposed method and the existing method of generation of input motion by simple scaling of particular spectrum compatible time history. The proposed method provided a conservative result for all the performance levels.

Keywords: Ground motion selection, Fragility analysis, PSHA, Multiple stripe analysis