

Propagating fragility curve for rc buildings via hazus methodology

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Abstract

In this era where sustainability plays a key role, to design structures for resisting the earthquake in best probable manner is an inspiration for all designers. The recent trend for structural engineers is evolving in the direction of NSA (Nonlinear Static Analysis) in order to generate its ultimate building capacity. Frame structures are evaluated using NSA i.e. push-over analysis to interpret the phenomenon of plastic yielding being experienced within the structure. ATC-40 has well illustrated various performance levels of the buildings. When seismic loads are active due to shaking of ground, it is essential to assess the conditional probability of structural response. This can be done using conditional probability as a function and plotting fragility curves for structural response due to application of seismic activity or loading as a function. These fragility curves are useful not only for calamities before earthquake but also after earthquake to evaluate the seismic losses. The probability of whichever damage state being exceeded can be plotted using fragility curves which can be derived using empirical or analytical methods which rely on both the source of the data along with type of analysis. This paper addresses the analytical method using the guidelines given by the HAZUS MH technical manual. The work represented here is compiled by means of procedure for establishing the fragility curves for three typical Reinforced Concrete (RC) frame structures having variations resembling 3 storey intended for short-period structures, 6 storey used for medium-period structures and 12 storey representing long-period structures. For analyzing structures, FEM based software SAP2000 has been used as a tool. The present study contributes towards quantification of seismic fragility; henceforth fragility curves are co-related and plotted which provides a rational and consistent probabilistic treatment of damage or loss. The fragility curves are figured out to assess and interpret the results.

Keywords : Capacity spectrum, Damage state, HAZUS methodology, Seismic fragility curve, Push over analysis