

INVESTIGATION OF THE EFFECT OF SEISMOLOGICAL PARAMETERS ON THE RISK ESTIMATION OF CONVENTIONAL REINFORCED CONCRETE FRAME-WALL EARTHQUAKE RESISTANT BUILDING

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Abstract

In this paper the seismic risk of conventional seven-story reinforced-concrete frame-wall building to near-field strong ground motions records is presented. The purpose of this investigation is to establish the effect of magnitude, directivity and distance to the fault on the seismic risk of a sample of buildings, designed according to the up to date seismic codes available in their region. As a first step, the fragility curves, associated with the different limit states regarding the response of the examined buildings, are estimated, following the methodology incorporated in the HAZUS procedure for individual structures.

A large sample of ground motion time histories, effectively representing the seismic events for which near field records are available, is used as input motion for the selected buildings. The records examined adequately represent the diversification regarding the referred seismological characteristics that affect the strong ground motion. Subsequently, the response of the examined buildings to the selected ground motions is estimated and compared to the fragility curves already established according to the HAZUS procedures.

The referred seismological characteristics of the ground motion are associated to the probability of attaining particular limit states for each building under examination. As a result, a correlation is established between the magnitude, directivity and attenuation characteristics of the ground motion and the limit states attained by the building. The magnitude effect has already been appreciated as a crucial factor affecting structural response. This investigation indicates that the directivity and distance to the fault effects are of equal significance. Characteristically, the range of structural response values for different directivity or attenuation effects may present a difference of an order of magnitude. The sensitivity of the estimation of seismic risk to the referred parameters indicates that their incorporation in procedures such as HAZUS must be as detailed and accurate as possible.