FRAGILITY-BASED SEISMIC ASSESSMENT OF IRANIAN RC BUILDINGS

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The recent earthquakes occurred in Iran have caused much tragic life and monetary losses within the last two decades. The high population density near or on the fault zones is an indicator of potential future disasters. Therefore, it is necessary to estimate possible earthquake hazards and develop strategies to reduce losses. A fragility-based assessment that considers local structural properties is required to prepare such disaster mitigation scenarios.

RC structures, often in rural and even in urban areas, have serious design deficiencies such as insufficient lateral resistance, lateral and longitudinal irregularities, weak or soft story, short column and weak column–strong beam joints. Insufficient lateral reinforcement and insufficient or wrong splicing of bars are the most frequent detailing deficiencies. Moreover, low quality concrete and incorrect site applications, due to the lack of supervision and inconsiderate contractors, are among the constructional deficiencies facing Iran.

In this paper, fragility curves for three, five, and eight story RC structures in Iran have been conducted. The structures considered in this article have RC Intermediate Moment Frame systems, which are designed in accordance with Standard No. 2800 (Third Edition, 2005). Numerous full 3-Dimensional Nonlinear time history analysis performed in OpenSEES to capture the components demand.

The uncertainty in ground motion is taken into account in the formation of structural simulations. The demand statistics in terms of maximum inter–story drift ratio are obtained for 20 different far source sets of ground motion records. The structure capacity is determined in terms of four damage states, and the corresponding fragility curves are obtained from the probability of exceeding each limit state for different levels of ground shaking.

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