Sensitivity and Reliability Analysis of Masonry Infilled Frames

Authors : Avadhoot Bhosale, Robin Davis P., Pradip Sarkar

Abstract : The seismic performance of buildings with irregular distribution of mass, stiffness and strength along the height may be significantly different from that of regular buildings with masonry infill. Masonry infilled reinforced concrete (RC) frames are very common structural forms used for multi-storey building construction. These structures are found to perform better in past earthquakes owing to additional strength, stiffness and energy dissipation in the infill walls. The seismic performance of a building depends on the variation of material, structural and geometrical properties. The sensitivity of these properties affects the seismic response of the building. The main objective of the sensitivity analysis is to found out the most sensitive parameter that affects the response of the building. This paper presents a sensitivity analysis by considering 5% and 95% probability value of random variable in the infills characteristics, trying to obtain a reasonable range of results representing a wide number of possible situations that can be met in practice by using pushover analysis. The results show that the strength-related variation values of concrete and masonry, with the exception of tensile strength of the concrete, have shown a significant effect on the structural performance and that this effect increases with the progress of damage condition for the concrete. The seismic risk assessments of the selected frames are expressed in terms of reliability index.

Keywords : fragility curve, sensitivity analysis, reliability index, RC frames