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Effect of URM Infills on Seismic Behaviour of RC Frame Building: Part-1

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Abstract

The reliability of multi-storey buildings against natural calamities like earthquakes becomes more critical because of high occupancy. Unreinforced masonry walls (URM) in reinforced concrete (RC) frames are most commonly practised and usually considered as non-structural element and their effect on the behaviour of building against the seismic loading is generally ignored. The different modelling techniques of URM infill walls have been explored by researchers. In the present study, the seismic performance of a six-storey (G+5) RC frame building with and without consideration of URM infill has been estimated and compared using non-linear pushover analysis. The building has been modelled as bare frame (BF) as well as frame with infills, which has been modelled as equivalent compression only strut. Different configurations of equivalent strut have been considered for numerical modelling of URM infill walls, i.e., Eccentrically Braced Infilled Frame (EBIF), Concentrically Braced Infilled Frame (CBIF) and both Eccentrically and Concentrically Braced Infilled Frame (ECBIF). Infills have been modelled as multi-linear plastic tie links with a pre-defined force-displacement relationship. It has been observed that URM infills and their modelling configuration considerably affect the seismic performance of RC framed buildings. As evident from the results, it increases the lateral stiffness and decreases the fundamental period of vibration. Also, variation in strength, stiffness and effect of infill walls and its modelling techniques on capacity curve parameters has been compared.

Keywords: Infilled RC frame building, Unreinforced masonry walls, Braced infilled frame, Modelling of URM infill walls