

Model Quality of Interaction Phenomena between RC Frame and Masonry Infills under Horizontal Cyclic Loading

Past and current damaging earthquakes have repeatedly shown that unreinforced masonry (URM) infill walls on one hand contribute to the global behavior and stiffness of the structure and on the other hand dominate the damage pattern of reinforced concrete (RC) frame structures with URM infill walls. During an earthquake structures are subjected to a three dimensional acceleration field. Thus the URM infill walls undergo simultaneous in- and out-of-plane loading. Therefore, convenient modeling of URM infill walls and their impact on RC frames is fundamental to assess the seismic response of RC frames with URM infill walls.

In this research, a comprehensive literature review of the available numerical macro models for predicting in-plane and especially out-of-plane response is presented. The beam column type macromodel for URM infill walls are elaborated and then, given the problems associated with the beam column element model a new calibration procedure proposed. Experimental results from a 1:2.5 scaled and 1:1 scale laboratory test are utilized for the assessment and validation of the existing and proposed adapted models. Finally, the newly proposed infill model is implemented in a set of RC frame structures with URM infill walls. The considered RC buildings with different number of stories and material properties are subjected to a set of time history earthquake records. Then, a numerical damage assessment/evaluation of the representative frame structures under the consideration of out-of-plane failure pattern is achieved in accordance to the damage description of the EMS-98.



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