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Seismic performance of corroded reinforced concrete moment-resisting frame structures

For reinforced concrete (RC) structures located in seismic zones, reinforcement corrosion over time has adverse effects on their seismic performance. It is necessary to evaluate the effect of reinforcement corrosion on the seismic performance of RC structures. At first, an experiment on corroded RC moment-resisting frames was carried out to investigate the effect of longitudinal reinforcement corrosion on the seismic behavior of RC frames. Six 1/2-scaled frame specimens, including five corroded frames and one frame without corrosion, were tested under quasi-static cyclic loading. The corrosion ratio of longitudinal reinforcement and the axial compression ratio were the main variable parameters. Secondly, Finite element models of corroded RC beams, columns and frames were developed with the aid of the finite element software ABAQUS. Detrimental effects of steel corrosion on the structural performance were considered in the numerical model. The computation simulation results agree well with the test results. Thirdly, by using the calibrated numerical model the deformation limits for all performance levels of corroded RC beams and columns were derived by a large amount of parametric study. Finally, A four-story RC moment-resisting frame was designed according to the current Chinese seismic design code. Based on the deformation limit value corresponding to the individual performance level of RC frame previously derived, the exceeding probability of each performance level of the structure under specific ground motion level was calculated. The seismic fragility curve of each performance level for the structure was developed by the nonlinear least square method. The research results obtained in this study can be utilized for life-cycle oriented seismic performance evaluation of RC structures.

Biography

Jiang Huanjun is working as a Professor at Tongji University, China. His research interest includes- RC Structures, Steel-concrete Composite Structures, and Earthquake Resistance of Engineering Structures. He has published many papers in reputed Journals.

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