Seismic pounding effects on adjacent buildings in series with different alignment configurations

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Abstract:

Numerous urban seismic vulnerability studies have recognized pounding as one of the main risks due to the restricted separation distance between neighboring structures. The pounding effects on the adjacent buildings could extend from slight non-structural to serious structural damage that could even head to a total collapse of buildings. Therefore, an assessment of the seismic pounding hazard to the adjacent buildings is superficial in future building code calibrations. Thus, this study targets are to draw useful recommendations and set up guidelines for potential pounding damage evaluation for code calibration through a numerical simulation approach for the evaluation of the pounding risks on adjacent buildings. A numerical simulation is formulated to estimate the seismic pounding effects on the seismic response demands of adjacent buildings for different design parameters that include: number of stories, separation distances; alignment configurations, and then compared with nominal model without pounding. Based on the obtained results, it has been concluded that the severity of the pounding effects depends on the dynamic characteristics of the adjacent buildings and the input excitation characteristics, and whether the building is exposed to one or two-sided impacts. Seismic pounding among adjacent buildings produces greater acceleration and shear force response demands at different story levels compared to the no pounding case response demands.

Keywords:

Adjacent buildings in series; seismic pounding; time history analysis; separation gap; response demands; alignment configurations

Published In:

Steel and Composite Structures , Vol. 28 - No. 3 , pp. 289-308