

Fuzzy Logic Model to Determine Minimum Seismic Separation Gap

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Abstract: Adjacent structures should be separated from each other to behave freely during ground motions. In case of insufficient separation gap, earthquake-induced structural pounding may cause serious damages. Seismic codes all over the world stipulate seismic separation gap based on different methods, however unpredictable strong ground motions may cause collision between them as a result of unsynchronized vibration. This paper proposes fuzzy logic method, which is an effective tool by means of coupling a number of parameters of structures and earthquakes, to obtain minimum seismic separation gap between structures to prevent pounding. Different structural configurations of two ten-storey adjacent buildings have been examined under severe ground motions. Soil effect, structural nonlinearity and ground motion characteristics have been accounted to constitute the fuzzy logic model. The efficiency of model has been verified through parametric analyses of the structures with different dynamic characteristics changing mass and stiffness parameters in addition to storey numbers. Comparison of the results obtained in this study with the methods in the codes demonstrates the superiority of the fuzzy logic model.

Keywords: seismic separation gap, fuzzy logic, structural pounding, structural nonlinearity