

Inelastic response of one-storey asymmetric-plan systems subjected to bi-directional earthquake motions

Abstract

The inelastic response of one-storey systems with one axis of asymmetry subjected to bi-directional base motion is studied in this paper. The effect of the system parameters on response is also evaluated: uncoupled torsional-to-lateral frequency ratio, stiffness eccentricity, and yield strength of the lateral resisting elements. The ensemble of earthquake records used consists of 15 two-component strong ground motions. The response to uni-directional excitation is considered first to examine the influence of the system parameters and to serve as a basis to examine the results of the bi-directional case, which are presented in terms of average spectra for bi-over uni-directional lateral-deformation ratios. It is shown that the effect of inelastic behaviour is, on the average, noteworthy for stiff structures, in turn, the same structures are the most affected by the action of bi-directional ground motions. The effect of the relative intensity of the two orthogonal ground motion components is also studied.