

Studying Frame-Resistant Steel Structures under Near Field Ground Motion

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Abstract : This paper presents the influence of the vertical seismic component on the non-linear dynamics analysis of three different structures. The subject structures were analyzed and designed according to recent codes. This paper considers three types of buildings: 5-, 10-, and 15-story buildings. The non-linear dynamics analysis of the structures with assuming elastic-perfectly-plastic behavior was performed using Ram Perform-3D software; the horizontal component was taken into consideration with and without the incorporation of the corresponding vertical component. Dynamic responses obtained for the horizontal component acting alone were compared with those obtained from the simultaneous application of both seismic components. The results show that the effect of the vertical component of the ground motion may increase the axial load significantly in the interior columns and consequently, the stories. The plastic mechanisms would be changed. The P-Delta effect is expected to increase. The punching base plate shear of the columns should be considered. Moreover, the vertical component increases the input energy when the structures exhibit inelastic behavior and are taller.

Keywords : inelastic behavior, non-linear dynamic analysis, steel structure, vertical component

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