ESTIMATION OF THE TORSION EFFECT ON BUILDINGS SUBJECTED TO SEISMIC LOAD

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Abstract:

Nowadays, buildings with irregular forms are often constructed, in which torsion phenomenon is induced during seismic loading. This phenomenon is not simple to define due to the fact that its causes and effects are multiple. In the building codes, the torsion effects are considered as equivalent static forces applied at distances e_d from the centre of stiffness. The effect is then added to shear forces and moments. This eccentricity could vary between 5 to 10% in the direction perpendicular to that of ground motion. In this work, we propose to study the effects of induced torsion on the behaviour of an asymmetrical structure. Two types of structures are considered, one symmetrical and other asymmetrical in terms of rigidity. They are one floor reinforced concrete buildings with rigid slab and frame columns. In order to estimate the influence of the torsion effect we use a finite element code which takes into account the nonlinear behaviour of the structural elements. A data base of 106 seismic hazards is used. These signals represent earthquakes with a variable magnitude between 6.2 and 7.3. The responses of the buildings subjected to the seismic hazard are compared in terms of: top displacement (Drift), the ductility and the reduction factor. According to our results, the torsion phenomenon reduces the strength in terms of capacity and increases the vulnerability of the structure under different seismic hazards. This demonstrates that it is very important to take into account the torsion in the design of buildings subjected to seismic load.