

Effect of Column Stiffness and Orientation on Seismic Behaviour of Buildings with Vertical Irregularities

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Abstract : In the modern day, structures are designed with a lot of complexities due to economical, aesthetical, and functional needs causing various levels of irregularities to be induced. In the past, several studies have repeatedly shown that irregular structures suffer more damage than regular structures during earthquakes. The present study makes an effort to study the contribution of the orientation of columns in the seismic behaviour of buildings with vertical irregularities namely, soft storey irregularity, mass irregularity and geometric irregularity. The response of the various models is analysed using sap2000 version 14. The parameters through which a comparative response is investigated are displacement, variation in the stiffness contribution, and inter-storey drift. Models with different configurations of column orientations were studied for each vertical irregularity and it was observed that column orientation contributed significantly in affecting a better seismic response. Square columns of the same cross-sectional area showed a good response as compared to that of rectangular columns. The study concludes that as displacement values for buildings with a soft storey and mass irregularity are very high, square columns could be used to minimise the effect of displacement in x and y-axis. In buildings with geometric irregularity, exterior column orientations can be played with to enhance the stiffness in the shorter direction to control the displacement and drift values in both x and y directions.

Keywords : soft storey, mass irregularity, geometric irregularity, column orientation, square column

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