

Structures

Damage assessment of RC buildings with vertical geometric irregularity

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Abstract:	<p>Considering the evolution in the construction industry, particularly the construction of irregular structures with vertical geometric irregularity (VGI), research on the seismic resistance of these types of buildings is essential. Although considerable research has been invested in the past, there is no consensus on the seismic performance of VGI buildings compared with regular buildings. In addition, no consideration has been expended on applying VGI in two different directions of a building with a rectangular plan. This research, for the first time, indicates the importance of identifying the optimal direction of the building with a rectangular plan for applying VGI, which causes the least damage. For this purpose, three types of VGI, namely Pyramid-shaped (P), Stepped-frame (S), and L-shaped (L), are selected. The models are investigated separately in both directions of buildings with a rectangular plan and applicable varied heights for the development of variety in irregularity degrees. The results lead to identifying the correlation between irregularity degree and damage severity and the optimal direction for applying VGI causing the least amount of damage. This study also proposes the specified-ratio empirical equation for VGI, which is expressed as a function of the generalized structural irregularity degree particular to structures with a rectangular plan. The new irregularity index correlates directly with the increased damage severity of the irregular frame relative to the regular state and provides a more effective comparison tool.</p>
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