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Effect of Different Plan Shapes on the Load Carrying Capacity of a Steel Frame under Extreme Loading

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Abstract : An increase in accidental explosions in recent years has increased the interest on investigating the response and behavior of structures in more details. The present work focused on finite element analysis of multistory steel frame structures with different plan shapes subjected to blast loadings. In order to study the effect of the geometry of the building, three different shapes for the plan of the building were modeled and studied; Rectangular, Square and L shape plans. The nonlinear dynamic analysis was considered in this study. The relocation technique was also used to improve the behavior of structure. The accuracy of the multistory frame model was confirmed with those of the existing study in the literature and they were in good agreement. The effect of span length of the buildings was also considered. Finite element analysis of various scenarios for relocating the plastic hinges and improving the response of the structure was performed. The base shear versus displacement curves were compared to reveal the best possible scenarios to provide recommendations to designers and practitioners.

Keywords : nonlinear dynamic analysis, plastic hinge relocation, Retrofit, SAP2000
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