Function comparison between moment frame and moment frame with centrically braces in high-rise steel structure under the effect of progressive collapse

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ABSTRACT

Steel moment system and steel moment with centrically braces are two common systems. Many of regulations related to this structures explained in details to design structures against earthquake loads but they didn't mention methods about dynamic load such as blast or car crash. However, the mentioned parameters may cause key member fracture such as column that result total or partial damage. Therefore, investigation about these structures seems necessary. This paper presents a numerical study of 20 story steel building with two different lateral systems and two column removal scenarios using Abaqus. Three dimensional modeling, using the finite element method was developed and investigated to understand the progressive collapse of 20 story buildings with composite steel frames. Numerical result verified with experimental results. The response of the building was studied in detail and results are recommended to mitigate progressive collapse in future designs. The results of this study show that corner column case removal is more critical than side case removal from view point of increasing axial force and moment. Also the results indicated that behavior of different structures systems against progressive collapse is NOT remarkable. To avoid potential progressive collapse, it suggests that the columns were designed and controlled for double of service loads.

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