

**M. Ahmadi\***

Department of Civil  
Engineering, Ayatollah  
Boroujerdi University,  
Boroujerd, Iran

**e-mail:** masoud.ahmadi@abru.ac.ir

**M. Ebadi-Jamkhaneh**

Department of Civil  
Engineering, School of  
Engineering, Damghan  
University, Damghan, Iran

**e-mail:** m.ebadi@du.ac.ir

## **An Investigation on Irregular Steel Moment-Frame Structure Under Different Column Removal Scenarios**

*This research examines the effect of plan irregularities on the progressive collapse of steel structures. Firstly, the three structures, regular and irregular are designed. Secondly, the effect of the two plan irregularities on the progressive collapse of moment resisting frame assessed. The collapse patterns of the buildings are analyzed and compared under seven loading scenarios using non-linear dynamic and pushdown analyses. In the non-linear dynamic analyses, node displacements above the removed columns and the additional force on the columns adjacent to them are discussed. Furthermore, the strength and capacity of the columns are compared to determine their susceptibility to collapse. In the non-linear static analyses, the pushdown curve and yield load factor of the structures are obtained after column removal. The results indicate that an irregular structure collapses in most of the column removal scenarios. Moreover, when comparing regular and irregular structures, the demand force to capacity ratio ( $D/C$ ) of the columns in the irregular structures is on average between 1.5 and 2 times that of the regular ones.*

**Keywords:** Progressive Collapse, Irregularity, Steel Building, Non-linear Dynamic Analysis, Pushdown Analysis.

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\* Corresponding author

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