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عنوان مقاله:

Effects of bolt pre-tension on seismic performance of column-tree MRFs with reduced beam section

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نویسندگان: Rasoul Gharebaghi - *Student of Structural Engineering, University of Tehran*

Abdollah Hosseini - Assistant professor, College of Civil Engineering, University of Tehran

خلاصه مقاله:

In this paper, effects of bolt pre-tension level on seismic performance of column-tree moment resisting frames with reduced beam section were investigated. Column-tree and reduced beam section systems are widely used after Northridge and Kobe earthquakes in order to precise supervision of the welded connections and to reduce demands on beam to column connections. However, results of single/double lap single/multi bolt connections show that bolthole clearance and change in the bolt pre-tension level can affect the behavior and stress distribution of the connection. In a typical constructional environment, manufacturing tolerances and field situation cause inappropriate positioning of bolts in their corresponding holes in bolted connections, so bolt-hole diameter increases by incorrect methods like acetylene gas cutting method. On the other hand, bolt relaxation during the lifetime of the connection, bolt and washer thread conditions, surface hardness of bolt and washer, non-linear local behavior the connection elements and effects of dynamic friction during the bolt pre-tensioning process cause wrong evaluation of bolt pretension level. In order to investigate these problems, models of column-tree connections with standard and oversized holes (2 and 6 millimeters bolt-hole clearance, respectively) with three bolt pre-tension levels (fully pre-tensioned, 10% and 40% reduction in bolt pre-tension force) subjected to cyclic loading were developed and analyzed with 3D finite element method and their hysteresis curves are compared with column-tree moment resisting frame without bolthole clearance and loss of bolt pre-tension. Results show that reduction in the bolt pre-tension especially along with .bolt-hole clearance can affect the behavior of moment resisting frames and reduce the flexural capacity

کلمات کلیدی:

Bolt Pre-tension, Seismic performance, MRFs

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