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THE SEISMIC INVESTIGATION OF BOLTED-FRICTION PIN-FUSE CONNECTION IN MOMENT FRAMES (PIN-FUSE SBC) AND COMPARING IT WITH THE COMMON BEAM-TO-COLUMN JOINT

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The experiences acquired from the past earthquakes, especially the Northridge earthquake in 1994, showed that strengthening the constitutes of a structure led to an increase in earthquake forces and the constitutes of the frame, especially the beam-to-column joints, suffered more damage by increasing the stiffness. After observing the earthquake damages in 2000, FEMA released a documentary, in which it offered the pre-approved joints. Although these modified joints have been successful in improving the structure ductility, the sections of these joints acted inelastically in tolerating the seismic loading and they suffer significant damages. The present study is proposed a pin-fuse model at a distance close to the beam-to-column joint which reduces the incoming request to the connection with a purposeful spin on in the pre-made joint and with a force less than the sections yielding; and by improving the structural performance, it reduces the amount of damages to the connections and joints. In this connection, none of the beam sections reach the plastic level; however, through friction sliding and rotation of the plates used in the upper and lower wings, and by making a change in the dynamic specification of the structure and energy dissipation, they can be reused and repaired after the earthquake. Therefore, it seems that the overall cost of the structure of the building decreases by improving the structural performance. This research has modeled two frames, one with a pin-fuse connection and another in the common connection model, by using Abaqus software, and the results are compared with each other.

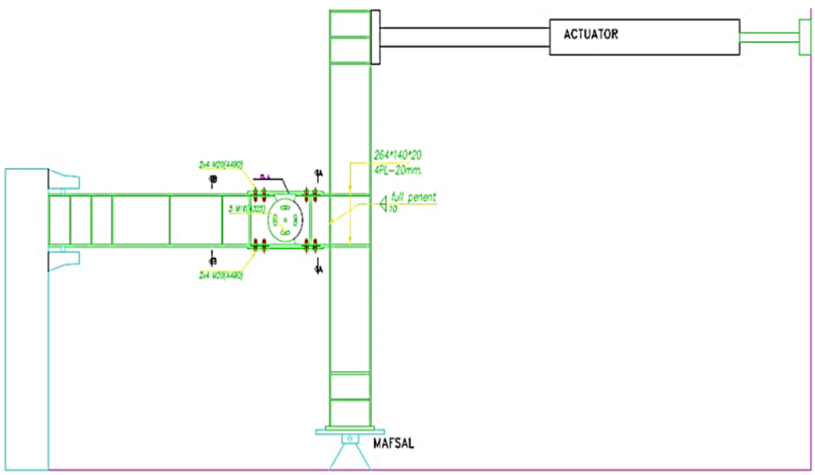

Figure 1. Pin-fuse connection specification equipped with friction damper.

The results of comparing the hysteresis curves of two models indicate that at the beginning of the loading, the stiffness of both connections were almost the same, but in the following, the pin-fuse connection strength and the ductility increased by 11% and 6%, respectively, moreover, it has observed a better torsional resistance, energy absorption and lateral displacement capacity in the pin-fuse connection. It also prevents torsional and local buckling and keeps the structure in an elastic limit without being damaged.

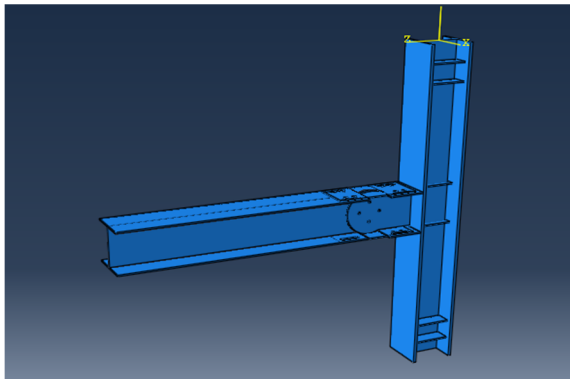

Figure 2. Pin-fuse connection equipped with friction damper in modeling by using Abaqus software.

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