An Analytical Study on Rotational Capacity of Beam-Column Joints in Unit Modular Frames

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Abstract : Modular structural systems are constructed using a method that they are assembled with prefabricated unit modular frames on-site. This provides a benefit that can significantly reduce building construction time. Their structural design is usually carried out under the assumption that the load-carrying mechanism is similar to that of a traditional steel moment-resisting system. However, both systems are different in terms of beam-column connection details which may strongly influence the lateral structural behavior. Specially, the presence of access holes in a beam-column joint of a unit modular frame could cause undesirable failure during strong earthquakes. Therefore, this study carried out finite element analyses (FEM) of unit modular frames to investigate the cyclic behavior of beam-column joints with the structural influence of access holes. Analysis results show that the unit modular frames present stable cyclic response with large deformation capacities, and their joints are classified into semi-rigid connections.

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