THE BEHAVIOR OF DIFFERENT RCC JOINTS UNDER VARIOUS LOADING CONDITIONS: A REVIEW

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Abstract

For the analysis of reinforced concrete frames, beams-column joints are generally assumed as rigid. In practice much attention is not given and the joint is usually neglected for specific joint core design, with attention being restricted to anchorage for longitudinal reinforcement in beams. This is quite acceptable for structures designed for gravity loading only, where the frame is not subjected to seismic loads. The collapse of structures during the past earthquakes has indicated the importance of proper joint design for lateral forces.

Hence an attempt is made to understand the behavior of joints under different loading conditions and summarize their behavior through this study.

Keywords: Axial loading; Beam column joints; Cyclic load; Eccentricity; Knee joint

1. INTRODUCTION

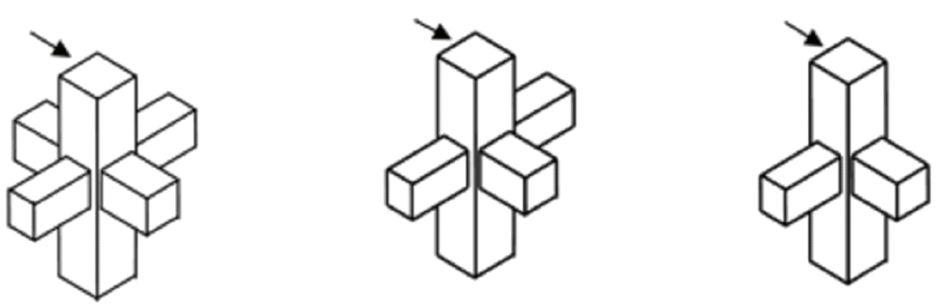
Recent earthquakes tested the susceptibility of existing framed structures to strong ground motions. The size of beams and columns near the joints in framed structures are critical, and the influence of strong earthquake motion, causes large bending moments and shear forces. The junctions in moment resisting frames controls the effective transmission of forces in the structure. Under seismic loading, it's important for RC building to possess lateral resistance capacity against brittle failure.

Under lateral loading, the beams connecting a joint are subjected to moments in the same (clockwise or counter clockwise) trajectory. Under these moments, the upper joint reinforcement are pulled in one direction; whereas, the bottom ones in the other way. These forces are balanced by the bonding of concrete and steel within the joint region. If the column is not wide enough or if the strength of concrete with in the joint is low, debonding failure of the core is observed where the bar slips inside the joint region causing joint failure. Beam column joints are divided into three variety based on the number of beams framing into the column. Interior joint is the joint where four beams connect to the vertical direction of the column. Exterior joint is the joint where three beams connect to the vertical direction of the column. Corner joint is the joint where two beams connect to the two adjacent vertical faces of a column as shown in Figure 1.

2. REVIEW OF JUNCTIONS BASED ON THEIR LOCATION

2.1 Exterior beam–column connections

Pauletta *et al.* (2020) [1]; Risi, and Verderame, (2017) [2] investigated full-scale exterior beam-column joint specimens designed for high ductility, without the required horizontal ties inside the joint panel with plain reinforcing bars in beams and columns, which differ for joint aspect ratio and beam longitudinal reinforcement ratio. The performance of the joints were tested



(a) Interior joint (b) Exterior joint (c) Corner joint

Figure 1: Different types of beam-column joints

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