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Numerical Analysis Of Stainless Steel Beam To Column Joints With Bolted Flush End Plates

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Abstract : The mutual connection in joints has a significant impact on the safe and cost-effective design of steel structures. Generally, the end plates are welded at the end of the beam and columns are bolted with the end plates. Thus, the moment will be transferred at the interface, which is a critical segment at the connection. 3-D Finite Element Models (FEM) has been developed using ABAQUS 2017 software to predict the yield capacity of the end plate connections. The parameters used in this study are the depth, width, and thickness of the end plate, dimensions of the bolt, sectional and material properties of beams and columns. The influence width, depth, and thicknesses of the end plate connection on yield capacity were investigated through parametric studies. The results showed that, for increasing plate thickness from 0.3 inch to 0.8 inch by an increment of 0.1 inch the yield capacity increased by 2.85% on average, for decreasing the end plate depth from 13 inch to 11 inch the yield capacity increased by 25.4 %, and for decreasing the end plate width from 6.5 inch to 5.75 inch the yield capacity increased by 35.4%. Variation in yield capacity was also found by changing the beam and column section. Besides, the numerical results showed a good agreement with published experimental literature with an average variation of less than 8.3 % in yield capacity. So the study allows for a more effective combination of beam, column, and end plate dimensions.

Keywords : steel beam-column joints, finite element analysis, yield moment capacity, parametric study, ABAQUS, bolted joints, flush end plates, moment vs rotation curves
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