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A Comparative Study on Behavior Among Different Types of Shear Connectors using Finite Element Analysis

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Abstract : Composite structures have made significant advances in construction applications during the last few decades. Composite structures are composed of structural steel shapes and reinforced concrete combined with shear connectors, which benefit each material's unique properties. Significant research has been conducted on different types of connectors' behavior and shear capacity. Moreover, the AISC 360-16 "Specification for Steel Structural Buildings" consists of a formula for channel shear connectors' shear capacity. This research compares the behavior of C type and L type shear connectors using Finite Element Analysis. Experimental results from published literature are used to validate the finite element models. The 3-D Finite Element Model (FEM) was built using ABAQUS 2017 to investigate non-linear capabilities and the ultimate load-carrying potential of the connectors using push-out tests. The changes in connector dimensions were analyzed using this non-linear model in parametric investigations. The parametric study shows that by increasing the length of the shear connector by 10 mm, its shear strength increases by 21%. Shear capacity increased by 13% as the height was increased by 10 mm. The thickness of the specimen was raised by 1 mm, resulting in a 2% increase in shear capacity. However, the shear capacity of channel connectors was reduced by 21% due to an increase of thickness by 2 mm.

Keywords : finite element method, channel shear connector, angle shear connector, ABAQUS, composite structure, shear connector, parametric study, ultimate shear capacity, push-out test
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