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Optimal Design of Tensile Steel Members by Improving the Regulations of Codes Regarding the Correction of Shear Lag

The non-uniform stress distribution that occurs in a tension member adjacent to a connection, in which all elements of the cross section are not directly connected, is commonly referred to as the shear lag effect. This effect reduces the design strength of the member because the entire cross section is not fully effective at the critical section location. This phenomenon has long been taken into account in various structural codes, however the rules of the codes used are somewhat conservative and it seems that they need to be reviewed. In this research, a series of steel box section connected through two wings and plate sections were studied through finite element method using ABAQUS software, and the ultimate member capacity was obtained. It can be seen that in this regard the relationship between the rules is somewhat conservative and optimized relationships have been proposed to address this issue. Parameters used include connection length, axial force eccentricity, and weld size. The results show that the length of the connection, the gusset plate thickness and also the eccentricity have a significant influence on the shear latency coefficient.

Keywords: Shear Lag, Tensile members, Net cross section failure, Box section, Welded connection.

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