

Stress Concentration of Simply Supported Box Girder with Longitudinal Stiffeners Including Shear Lag Effect

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ABSTRACT: This study is focused on stress concentration of longitudinally stiffened box girder accounting for shear lag effect by three-dimensional finite element analysis. For the practical design of steel box girders, longitudinal stiffeners are incorporated to add buckling strength of the girders. There were a few studies on shear lag effect of stiffened box girder reported in the past literatures. In the present study, the longitudinal stiffeners are added to the top and bottom flange plates of simply-supported box girder in order to examine the shear lag of flange plates. The size and number of stiffeners are designed according to AASHTO code. The loading conditions consist of concentrated loads at mid span and uniformly distributed loads along the girder length. The parametric studies on geometry of box girder are performed. The finite element mesh is paid attention through the use of multi-mesh extrapolation method to improve the solution accuracy. Based on the numerical results, stress concentration factors of box girders with stiffeners including the effect of shear lag are discussed. The empirical formulas are proposed to evaluate the stress concentration including effect of shear lag.

KEYWORDS: Shear Lag, Finite Element Analysis, Longitudinal Stiffener, Simply-supported box girder, Stress Concentration