A New Developed Formula to Determine the Shear Buckling Stress in Welded Aluminum Plate Girders

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Abstract : This paper summarizes and presents main results of an in-depth numerical analysis dealing with the shear buckling resistance of aluminum plate girders. The studies conducted have permitted the development of a simple design expression to determine the critical shear buckling stress in aluminum web panels. This expression takes into account the effects of reduction of strength in aluminum alloys due to the welding process. Ultimate shear resistance (USR) of plate girders can be obtained theoretically using Cardiff theory or Höglund's theory. USR of aluminum alloy plate girders predicted theoretically using BS8118 appear inconsistent when compared with test data. Theoretical predictions based on Höglund's theory, are more realistic. Cardiff theory proposed to predict the USR of steel plate girders only. Welded aluminum alloy plate girders studied experimentally by others; the USR resulted from tests are reviewed. Comparison between the test results with the values obtained from Höglund's theory, BS8118 design method, and Cardiff theory performed theoretically. Finally, a new equation based on Cardiff tension-field theory proposed to predict theoretically the USR of aluminum plate girders.
Keywords : shear resistance, aluminum, Cardiff theory, Höglund's theory, plate girder
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