

Abstract

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Effect of Web Dimensions on the Critical Buckling Stress of T Sections under Axial and Combined Loads

The aim of this paper is to clarify the influence of different levels of initial imperfections and the effect of web dimensions for T stiffener on the estimation of the critical buckling stress of stiffened panels under axial and combined loads using Ansys software. The post buckling behavior of the plate-stiffener combination consisting of a T girder with the attached effective plating between two adjacent transverse frames is investigated in case of longitudinal axial load and of combined longitudinal axial load and lateral pressure as normally encountered in bottom and deck panels. To accomplish the intended parametric study, the sections modeled have been classified into two sets according to different values of web depth and different values of web thickness. Two different levels of initial imperfections attributed to the plate and to the web were taken into account. The finite element model is attempted using the element SOLID45 for its advantages in the non-linear analysis. The square deflection method is used to estimate the critical stress for the FEM models the results are seen to be in good agreement with Perry-Robertson formulation. It has been concluded that the web depth of T-section greatly affects the value of critical buckling stress in case of combined load. The proposed model can be useful to determine the minimum web depth to be adopted if a minimum value of the critical stress is intended. The influence of the level of initial imperfections on the post buckling behavior of the plate-stiffener combination is assessed.