Numerical investigation of steel Built-up Columns Composed of Track and Channel Cold-Formed Sections

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Abstract

In this paper, a relatively new cold formed built-up cross section is proposed. The cross-section is composed of double lipped channels assembled with flanges of double back to back track sections. The nominal thicknesses used range from 1 mm to 2 mm. The sections are assembled using enough bolt interconnectors either at the flanges or at the webs, depending on the sectional configurations. In the present study, columns are subjected to axial compressive loads although the cross section is suitable for bi-axial load application. Numerical Finite Ele-ment model that accounts for both material and geometrical nonlinearities is developed using ANSYS software. Previously tested built-up cold-formed columns are used in the present model verification. Then the model is used to investigate the strength of the built-up columns having different parameters such as the aspect ratios of cross-section components and the overall slenderness ratios with various column lengths. The initial geometric imperfections of each specimen were considered. The FE models were further used to quantify the effect of the fastener interconnector layouts on the combined action and buckling behavior of cold-formed steel built-up columns. In general, modes of failure for different models were local buckling and interactive overall distortional buckling.

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