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A Parametric Study on Lateral Torsional Buckling of European IPN and IPE Cantilevers

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Abstract : IPN and IPE sections, which are commonly used European I shapes, are widely used in steel structures as cantilever beams to support overhangs. A considerable number of studies exist on calculating lateral torsional buckling load of I sections. However, most of them provide series solutions or complex closed-form equations. In this paper, a simple equation is presented to calculate lateral torsional buckling load of IPN and IPE section cantilever beams. First, differential equation of lateral torsional buckling is solved numerically for various loading cases. Then a parametric study is conducted on results to present an equation for lateral torsional buckling load of European IPN and IPE beams. Finally, results obtained by presented equation are compared to differential equation solutions and finite element model results. ABAQUS software is utilized to generate finite element models of beams. It is seen that the results obtained from presented equation coincide with differential equation solutions and ABAQUS software results. It can be suggested that presented formula can be safely used to calculate critical lateral torsional buckling load of European IPN and IPE section cantilevers.

Keywords : cantilever, IPN, IPE, lateral torsional buckling
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