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Lateral buckling of box beam elements under combined bending and axial forces

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The effect of distortional deformation on the elastic lateral buckling of thin-walled box beam elements under combined bending and axial forces is investigated in this paper. For the purpose, an analytical model is developed for the stability of laterally unrestrained box beams according to higher order theory. Ritz and Galerkin's methods are applied in order to discretize the governing equilibrium equations and then the buckling loads are obtained by requiring the singularity of the tangential stiffness matrix. The different solutions are discussed and then compared to the finite element simulation using Abaqus software where shell elements are used in the mesh process. The numerical results reveal that classical stability solutions as those adopted in Eurocode 3 overestimate the real lateral buckling resistance of thin-walled box beam members, particularly for the ones with high ratios between the height and the thickness of the cross-section. Numerical study of incidence of compressive forces on lateral buckling resistance of thin-walled box beam is investigated.

Biography

Abdelkader Saoula is a State Engineer in Civil Engineering since 2001. He had his Magister Diploma in 2005, a diploma in Post-graduation in Civil Engineering, Structure Option. His Magister thesis was on the use of expert systems for diagnosis of bridges. He has completed his PhD in Option Structures and Materials, from Djillali Liabes (Algeria) University in Civil Engineering. His doctoral thesis is on the study of the instability of steel beams - the subject was an analytical and numerical study using the software ABAQUS.

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