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Linear Buckling Analysis of Perforated Cold-Formed Steel Storage Rack Columns by Means of the Generalised Beam Theory

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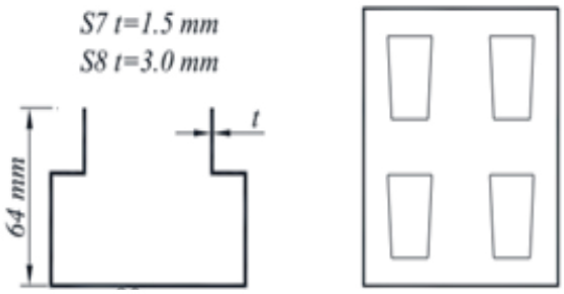

The investigation attempts to adapt a beam finite element procedure based on the Generalized Beam Theory (GBT) to the analysis of perforated columns. The presence of perforations is taken into account through the use of two beam elements with different properties for the non-perforated and perforated parts of the member. Each part is meshed with its corresponding finite element and, afterwards, they are linked by means of constraint equations. Linear buckling analyses on steel storage rack columns are carried out to demonstrate how the proposed procedure should be applied. Some practical issues are discussed, such as the GBT deformation modes to be included in the analyses, or the optimum finite element discretization. The resulting buckling loads are validated by comparison with the values obtained in analyses performed using shell finite element models. Finally, it is verified that the buckling loads produced with the proposed method are rather accurate.

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