

Free Shape Optimisation of Cold Formed Steel Sections

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Abstract : Cold-formed steel sections are popular construction materials as structural or non-structural elements. The objective of this paper is to propose an optimisation method for open cross sections targeting the maximum nominal axial strength. The cross sections considered in the optimisation process should all meet a determined critical global buckling load to be considered as a candidate for optimisation process. The maximum dimensions of the cross section are fixed and limited into a predefined rectangular area. The optimisation process is repeated for different available coil thicknesses of 1 mm, 2.5 mm and 3 mm to determine the optimum thickness according to the cross section buckling behaviour. A simple-simple boundary is assumed as end conditions. The number of folds is limited to 20 folds to prevent extra complicated sections. The global buckling load is considered as Euler load and is determined according to the moment of inertia of the cross-section with a constant length. The critical buckling loads are obtained using Finite Strip Method. The results of the optimisation analysis are provided, and the optimum cross-section within the considered range is determined.

Keywords : shape optimisation, buckling, cold formed steel, finite strip method

Conference Title : ICCEM 2017 : International Conference on Construction Engineering and Management

Conference Location : Toronto, Canada

Conference Dates : June 15-16, 2017