

Second-order direct analysis of steel structures made of tapered members

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Abstract

Mild steel hot-rolled sections are commonly prismatic because of the rolling process with a furnace, but welded sections made from steel plates do not have such a constraint, especially when robotic welding machines are used. The weight saving could be very significant by, say, using wide flanged section at mid-span and a small flanged section at ends of a simply supported beam. However, design codes do not provide formulae for buckling check of tapered members. This paper proposes a code-free second-order direct analysis for stability design of steel frames made of tapered members. The design is further applied to a single layered mega space frame of 136m span. In the whole design process based on the concept of Second-order Direct Analysis, no uncertain effective length and independent member buckling checking are required.

Keywords: *tapered members; stability design; buckling; steel frames*