

Design of non-linear semi-rigid steel frames with semi-rigid column bases

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ABSTRACT

This article presents an analysis and design method for steel frames with semi-rigid connections and semirigid column bases. The analysis takes into account both the non-linear behaviour of beam-to-column connections and $P-\Delta$ effects of beam-column members. The Frye and Morris polynomial model is used for modelling of semi-rigid connections. The members are designed according to the specifications of American Institute of Steel Construction (AISC) Allowable Stress Design (ASD). The design process is interactive, and gives choices to the designer, to change member cross-sections and connection parameters for economical and practical reasons, interacting with computer. Two design examples with various type of connections are presented to demonstrate the efficiency of the method. The semi-rigid connection modelling yields more economical solutions than rigid connection modelling. The semi-rigid column base modelling also results in lighter frames. It is also shown that changes in the stiffness of the connections may result in economical solutions and alteration in the sways of the frames.

KEYWORDS

Allowable stress design; Non-linear analysis; Semi-rigid connections; Steel design; Unbraced frame; Semirigid column base
