Ain Shams University
Faculty of Engineering
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AXIAL COMPRESSIVE STRENGTH OF WEB-TAPERED MEMBERS

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Statement

This dissertation is submitted to Ain Shams University for the degree of Master of Science in Structural Engineering.

The work included in this thesis has been carried out by the author in the Department of Structural Engineering, Ain Shams University, from June 2012 to June 2014.

No part of this thesis has been submitted for a degree or a qualification at any other university or institution.

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Abstract

The current practice for the design of I-columns in different design codes is based on local stability of individual plate elements (web and flanges), global stability of the whole member, and local-global stability interaction. The current procedure for column design in North American specifications is tested against verified finite element model results. One method is chosen; possible improvements for this method are suggested.

The common practice of steel building frames' manufactures is to use tapered welded built-up members with doubly symmetric and/or singly symmetric cross sections. The current North American specifications AISC 2010 and AISI 2007 address only a small range of practical design situations for frames with web-tapered members. As a result, steel building manufacturers have tended to develop their own methods for design of the wide range of nonprismatic member geometries and configurations encountered in practice.

Hence, a wide range parametric study was conducted to study the behavior of axially loaded tapered members subject to local buckling, global buckling, and local/global buckling interaction, showing all possible modes of failure. Based on the results of this study, the author reported his comments on current design equations in AISC, AISI specifications and recommendations for making the best use of these equations.

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