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Lateral Torsional and Distortional Buckling of Coped Beams with Different End Conditions

By

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Abstract of PH. D. Thesis submitted by: Seham Ahmed El -Sa'eed Mohamed
Title: " **Lateral Torsional and Distortional Buckling of Coped Beams with Different End Conditions"**

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ABSTRACT

Elastic lateral torsional buckling was investigated by a number of researchers. They proposed a set of interaction equations to evaluate the elastic lateral torsional buckling capacity of coped steel beams based upon the interaction of lateral torsional buckling of coped "T-section" and un-coped region. However, very little theoretical data are available for inelastic lateral torsional buckling of coped I-beams. This research discusses both elastic and inelastic lateral torsional buckling of coped built-up steel I-beams.

A brief introduction and literature review of the previous work in the field of lateral buckling of coped beams is presented. As well, different types of reinforcing to increase the buckling capacity of coped region are presented.

A total of six full-scale tests were conducted to investigate the inelastic lateral torsional capacity of coped beams. The main test parameters included in the experimental program are the aspect ratio of cope depth and cope length.

Verification of numerical models versus problems chosen from previous experimental work is performed and presented. The finite element program used to solve the current problem is ANSYS V.11. The accuracy of the adopted analytical model is studied. A comparison between the experimental and finite element models is presented.

A parametric analysis to study the effect of coping on the buckling capacity of beams was conducted. Different numerical –analytical models are presented to study the effect of coping. A proposed method in case of inelastic lateral torsional buckling has been introduced. A comparison between the modified equation for coped specimen and the experimental results is presented

Different methods of retrofitting and strengthening of coped beams region are presented, like adding horizontal stiffeners or vertical stiffeners or both. A parametric study is performed to discuss the effect of stiffening on the buckling capacity of coped beams, and a simplified mathematical model is also introduced for the strengthened beam capacity.

Finally, a summary of the work carried out in this thesis, along with the general conclusions obtained from this study and recommendations for future research in this field are presented.

To Our Generous Prophet and His Gracious Family (Ahl-Elbayt)

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STATEMENT

This dissertation is submitted to Ain Shams University for the degree of doctor of philosophy 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 September 2008 to 2013.

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

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