NUMERICAL STUDY ON THE BEHAVIOR OF CFRP-STRENGTHENED COLD-FORMED STEEL BEAMS

By

Essam Gamal El-Din Soliman Mohammed Eissa

A Thesis Submitted to the
Faculty of Engineering, Cairo University
In Partial Fulfillment of the
Requirement for the Degree of
MASTER OF SCIENCE
In
STRUCTURAL ENGINEERING

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Under the Supervision of

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Title of Thesis:

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Key Words:
Cold-formed steel; Moment resisting frame; Monotonic behavior; fiber reinforced polymer; Carbon fiber reinforced polymer strengthening.

Summary:

The thesis presents an analytical investigation of the cold-formed steel in the through plate moment connection with and without CFRP-strengthening. The cold-formed steel beams are strengthened with both CFRP plates and sheets to enhance the behavior and increase the capacity of the cold-formed sections. Three dimensional non-linear finite element analyses have been performed for cold-formed steel beam-to-column through plate moment connections under monotonic loading. Several parameters have been examined: cold-formed steel profile slenderness, strengthening with different CFRP plate configurations, strengthening with different CFRP sheets configurations, the type of the CFRP sheet, the number of layers of the CFRP sheet. The effect of CFRP-strengthening has presented by plotting the relation between the normalized (M/Mp) moment against the rotation angle(Ɵ) for the cold-formed steel sections with and without strengthening.

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