



BEHAVIOR OF RECTANGULAR REINFORCED CONCRETE COLUMNS STRENGTHENED WITH STEEL JACKET USING FINITE ELEMENT ANALYSIS

By

Mohamed Fahmy Mostafa Mohamed El-Baraga

A thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science
In
Structural Engineering

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Under the Supervision of

Prof. Dr. Walid Abdel Latif Attia
Professor of Structural Analysis and Mechanics
Faculty of Engineering
Cairo University

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**Approved by the
Examining Committee:**

Prof. Dr. Walid Abdel Latif Attia

- Professor of Structural Analysis and Mechanics - Cairo university

Prof. Dr. Akram Mohamed Abdel Halim Torkey

- Professor of Concrete Structures - Cairo university

Prof. Dr. Mohamed Ragae Kotp Badr

- Professor of Structure - Housing and Building National Research Center

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2016

Engineer: Mohamed Fahmy Mostafa Mohamed El-Baraga
Date of Birth : 9 / 12 / 1990
Nationality : Egyptian
E-mail : van21_m@yahoo.com
Phone. : 01065862019
Address : El-Mojowra 9, Om Kalthoum St. , Bldg.6 , Apt13,
10th Of Ramadan city, Ash Sharqiyah ,Egypt
Registration Date : 1 / 10 / 2013
Awarding Date : / / 2016
Degree : Master of Science
Department : Structural Engineering



Supervisors : Prof. Dr. Walid abdel Latif Attia

Examiners : Prof. Dr. Walid abdel Latif Attia
Prof. Dr. Akram Mohamed Abdel Halim Torkey
Prof. Dr. Mohamed Ragee Badr (Professor of Structure - Housing and
Building National Research Center)

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Finite Element Analysis)

Summary :

This research deals with behavior of rectangular reinforced concrete columns strengthened with steel jacket using finite element analysis using ANSYS12.0. Based on the results of an experimental study on seven rectangular reinforced concrete column divided into two specimens used as control columns and five strengthened specimens. A nonlinear finite element modeling using ANSYS12.0 was verified with the experimental results to conduct parametric study of this research and study all possible variables without time consuming. An excellent match was observed in results for both experimental test specimens and finite element models using ANSYS12.0. A parametric study on twenty strengthened reinforced concrete columns was carried out using the finite element model with the aim of analyzing the behavior of R.C columns strengthened by steel jacket. The results of the study are used to analyze the influence that various parameters have on the behavior of the strengthened column and the ultimate capacity load such as cross section of steel angles, size and shape of strap plates, spacing between strap plates, the compressive strength of concrete, the yield stress of the steel jacket, percentage of longitudinal steel bars area, the cross section area of stirrups in column, sides of corner angles, and the different aspect ratio of RC columns which are 1:2 and 1:4. The results obtained from the parametric study allow a series of guidelines to be established.

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