FACULTY OF ENGINEERING
CIVIL ENGINEERING (STRUCTURES)

NON-LINEAR FINITE ELEMENT MODELING OF SHEAR CRITICAL REINFORCED CONCRETE ELEMENTS

Thesis

Submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

CIVIL ENGINEERING (STRUCTURES)

By

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Cairo - 2014

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STATEMENT

This thesis is submitted as partial fulfillment of M.Sc degree in Civil Engineering (Structures), Faculty of Engineering, Ain Shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or qualification at any other scientific entity.

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THESIS SUMMARY

This research presents an analytical study on the modeling of shear critical reinforced concrete beans model using the finite element method. The research investigates two modeling strategies; the first of which is the well established smeared cracking modeling approach. The experimental test results from a wide range of beans tested by other researchers were used for model verification. This research presents a mixed modeling approach in which the smeared cracking model was used in conjunction with a discrete cracking modeling shear in an effort to reach a better correlation with experimental data. This is achieved by introducing specific plans at the suspected plans of failure for shear critical beans. Analytical results have shown that the proposed modeling approach is capable of better simulation of the observed experimental response in terms of strength, stiffness, simulation as well as capturing the post-peak response of the beans. A total of thirty three simple reinforced concrete beams previously tested through experimental programs of researches, were used to achieve the goal of these study. ABAQUS v6.10 is the finite element program used for modeling through this study.

Key Words:

Beams, Shear Critical, Smeared Cracks, Discrete Cracks, Stirrups.

ACKNOWLEDGEMENT

First of all, I thank GOD who guided and helped me to finish this work in the proper shape.

So many people have helped me out during my masters' studies, that it is impossible to list them all in one single page of acknowledgements.

I extend my sincerest gratitude to my masters' supervisors; Professors; Amr Hussein Zaher and Hussein Osama Okail. Their invaluable guidance and experience made the work described herein possible.

k8I also wish to thank Professors Mostafa Zedan and Hisham Arafat for their open door policy.

My sincerest thanks go out to my sisters; Dr.Dahlia and Dr.Sally, also to my little brother Eng.Osama for their continuous support.

I want to offer my sincerest thanks to my mother, Eng.Nehad Zaki, for her love, understanding and constant support during my graduate student career. And then, of course, there is my little daughter Jna, who makes everything worthwhile.

This thesis is dedicated in loving memory of my father, Eng. Muhammad Fathi. (GOD bless his soul)

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