AIN SHAMS UNIVERSITY
Faculty of Engineering

Behaviour of the Reinforced Concrete Beams Strengthened By Externally Bonded Plates

By

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THESIS

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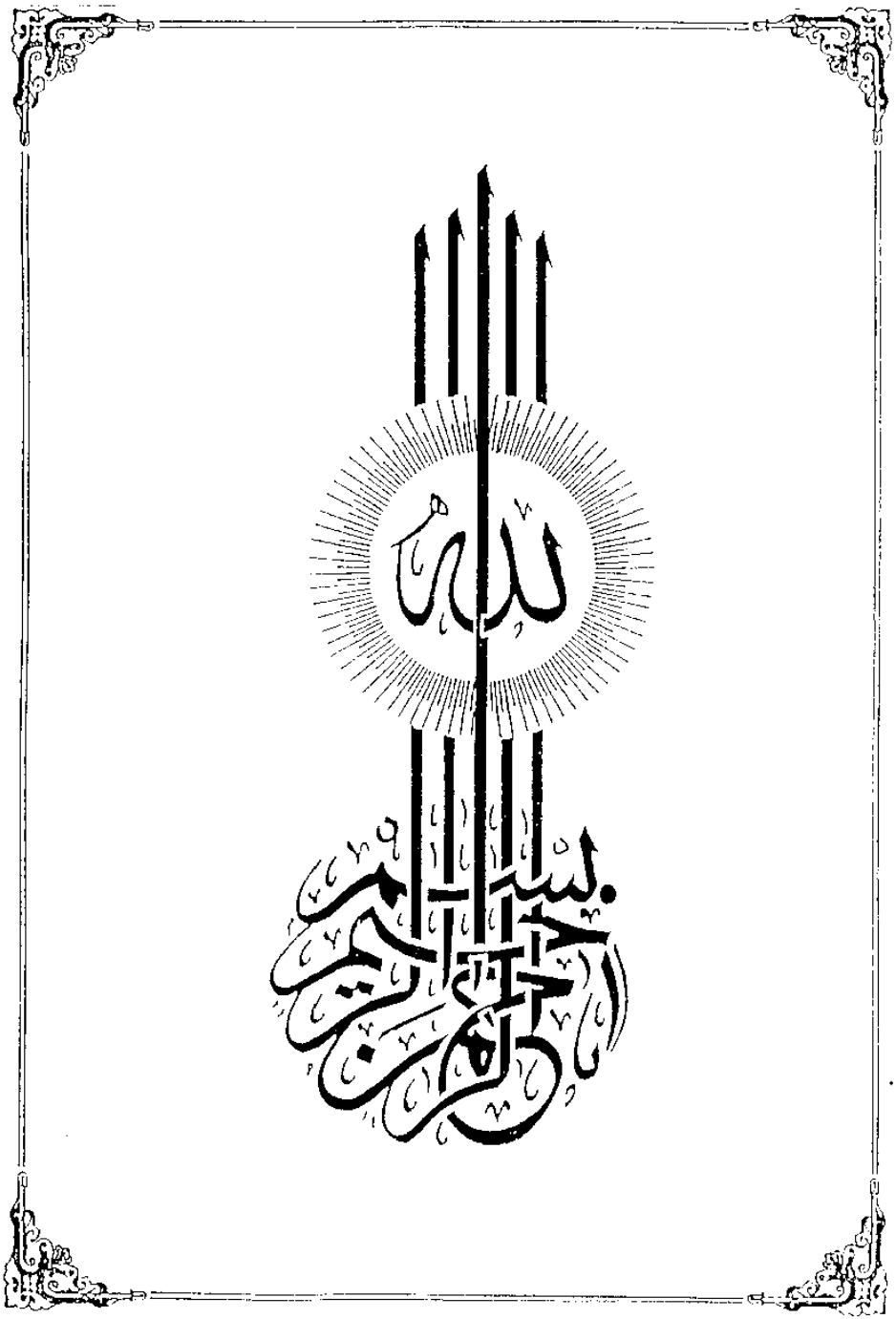

STATEMENT

THIS THESIS IS SUBMITTED TO AIN SHAMS UNIVERSITY FOR THE DEGREE OF MASTER OF SCIENCE IN THE STRUCTURAL ENGINEERING. NO PART OF THIS THESIS HAS BEEN PREVIOUSLY SUBMITTED FOR A DEGREE OR QUALIFICATION.

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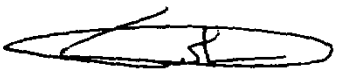
SIGNATURE: 

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Behaviour of Reinforced Concrete Beams Strengthened by Externally Bonded Plates

M. Sc Thesis by Sami Akil Fawzy

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Prof.Dr.Omar Ali Moussa El-Nawawy.

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Abstract

The development of repair plated R.C. beams demanded the theoretical and experimental study for the main factors that affect the bonded beams.

The aim of this thesis is studying the behaviour of externally plated R.C. beams with the aid of a computer program, then verifying the results with the experimental works, then a parametric study is confirmed for studying the main factors influencing the strengthened beams, then modifying the program in order to handle the graphical representations.

The thesis consists of seven chapters and an appendix.

Chapter 1 :

Defining the strengthening of beams technique with its advantages and disadvantages, then a brief review and notes for the previous work pointing on the aim of this thesis.

Chapter 2:

Include a review for the theoretical and experimental works for steel and fiber plates, and a review for Finite element material models studying the effect of cracked and un-cracked concrete models in tension and compression, steel reinforcement representations, bond, shear modulus, dowel action, cracking and crushing criteria.

Chapter 3:

The adopted material models used in the program are discussed in this chapter

Chapter 4:

The computer program is presented in this chapter by a brief discussion for the flow chart and governing equations for each subroutine of the program, then the modified output files are explained to be used for graphical representations.

Chapter 5:

The computer program results are compared with the experimental works in the cases of steel and fiber plates, a good agreement of results is achieved with the use of steel plated R.C. beams.

Chapter 6:

The parametric study includes: the termination of plates, tensile strength of concrete, characteristic compressive strength , load distribution , area of plate, percentage ratio of steel reinforcement. Also there are some factors which affect in the accuracy of program as: tension stiffening, shear modulus, number of load increments, number of iterations, and tolerance.

Chapter 7:

The conclusions, recommendations and suggestions for future work in the case of bonded beams.

Appendix A :

Include a given input and output data files for an experimental test.

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