AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
STRUCTURAL ENGINEERING DEPARTMENT

BEHAVIOR OF REINFORCED CONCRETE SHEAR WALLS

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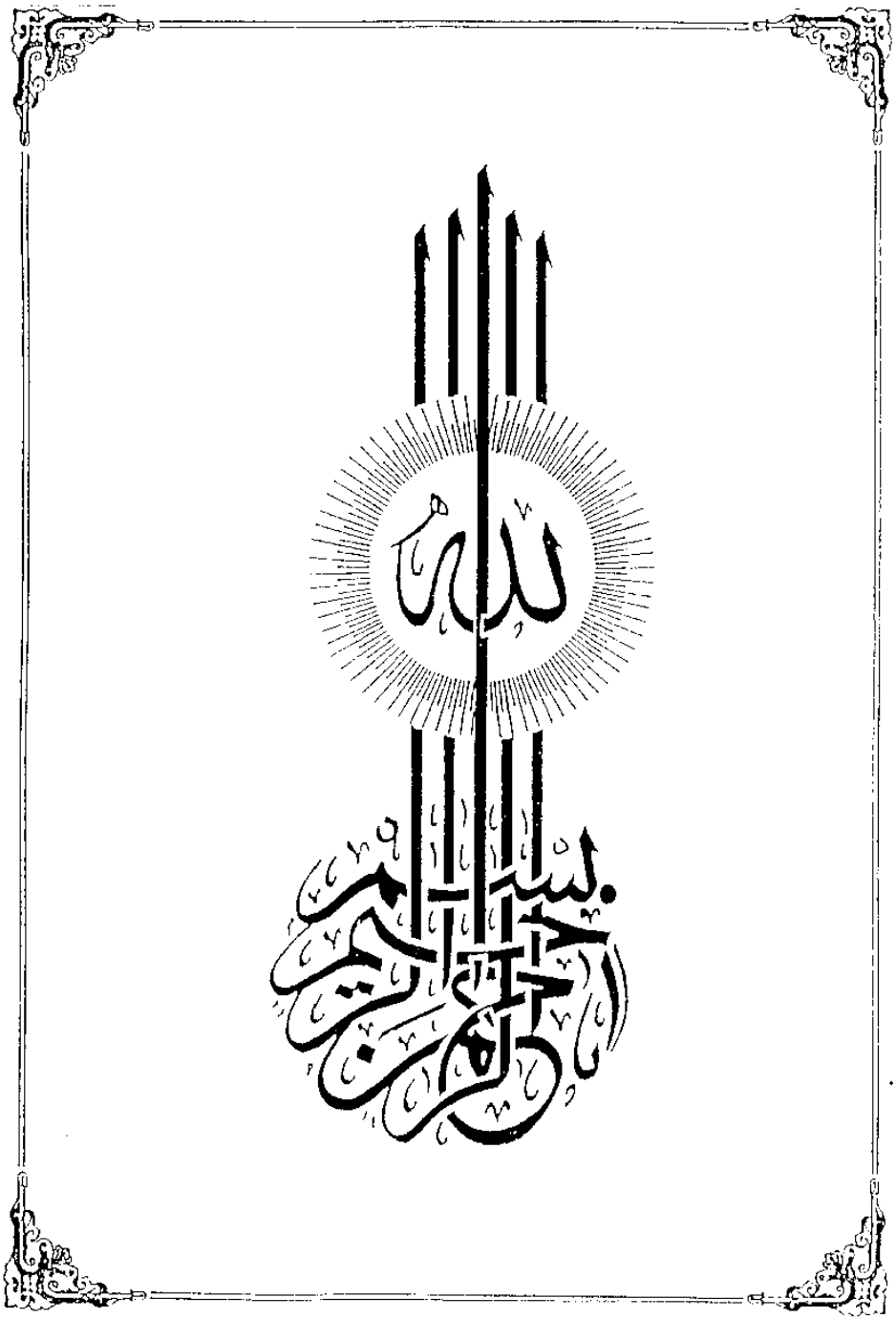
بسم الله الرحمن الرحيم

علم الإنسان ما لم يعلم

صدق الله العظيم



STATEMENT

This dissertation is submitted to Ain Shams University for the degree of M.Sc. in Civil Engineering.

The work included in the thesis was carried out by the author in the Department of Structural Engineering, Ain Shams from october 1989 to december 1994.

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

Date : 24/12/1994

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BIOGRAPHY

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ABSTRACT

A finite element analysis using isoparametric plane concrete element with a frame of steel bars on the perimeter is applied to analyze reinforced concrete models of shear walls. This model takes into account the behavior of concrete under biaxial stresses in the linear as well as in the nonlinear region. The simulation of concrete cracking through modification of stiffness properties of the affected elements and the representation of the aggregate interlock due to friction between the two sides of crack, have been considered by the proposed model.

The load is applied incrementally, and non-linearities due to material nonlinear behavior and cracking are solved through an iterative procedure. The load deflection curve, stress - strain curve, crack pattern and failure load obtained completely agree, with a great accuracy, with the available experimental results.

The validity of assumptions imposed throughout the analysis are proved by the ability of the model to predict, with great accuracy, the load deflection curve, the failure load and the crack pattern of reinforced concrete structures.

A computer program for linear and nonlinear analysis is prepared. The program has been tested and its accuracy has been demonstrated. Tests have been carried out on non-slender reinforced concrete model of shear wall (h/l = 2.4) with a low percentage of steel reinforcement.

Results obtained through models of parametric study on shear walls (h/l=4) with and without openings determined with the proposed model are compared. The research reveals the importance of putting steel reinforcement around the openings, especially inclined steel, to reduce crack propagation and increase safety.

But when applying this program on a real model, a high memory computer, with a high capacity, is needed with the use of the proposed model of concrete and steel elements which gives accurate results.

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