Ain Shams University
Faculty of Engineering

THE FAILURE BEHAVIOUR OF HIGH STRENGTH CONCRETE BEAMS

BY
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A Thesis
Submitted in Partial Fulfillment
For The Requirement of The Degree of Philosophy of Doctoral in Civil Engineering (Structural)

Supervised By

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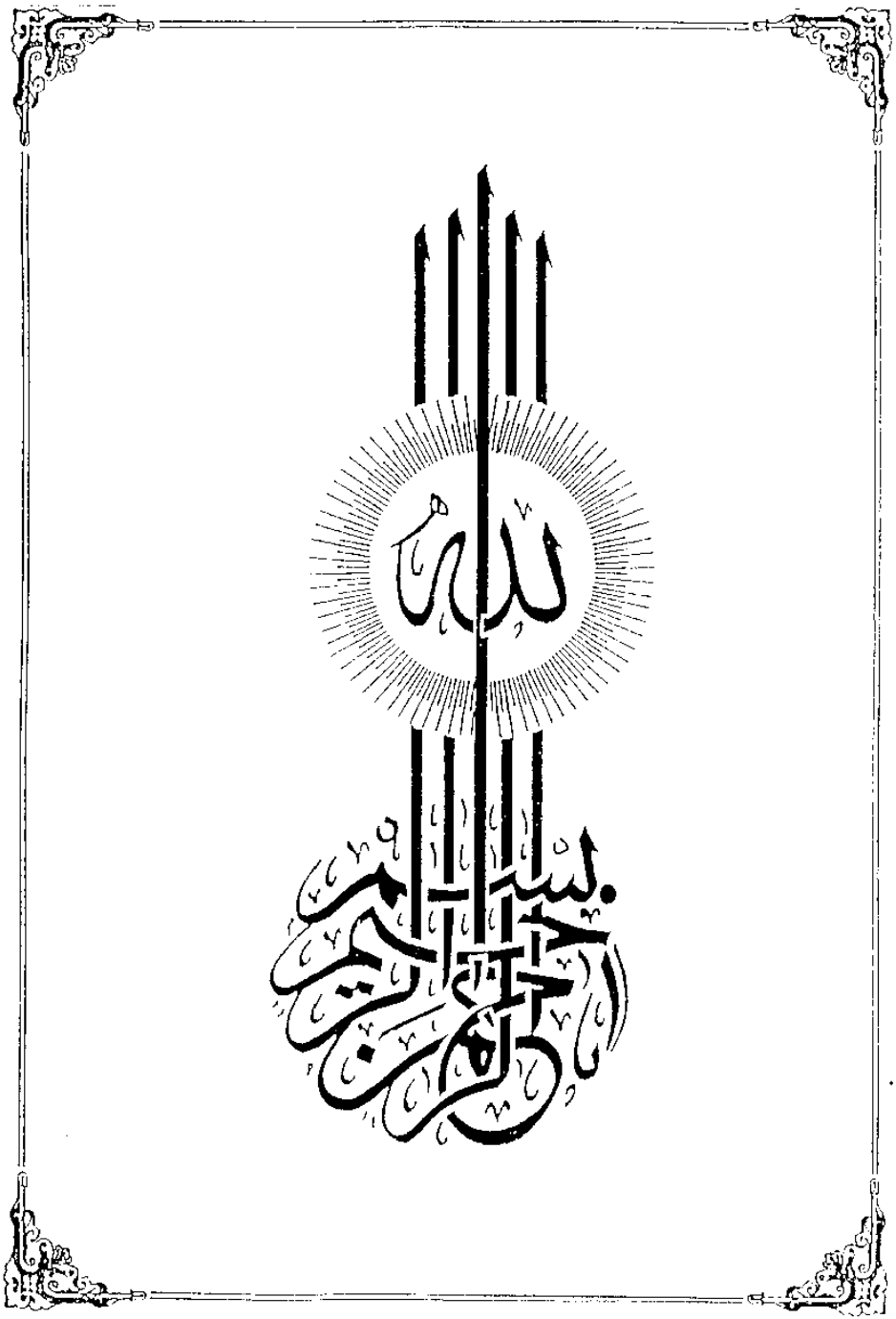


بسم الله الرحمن الرحيم

To My Father

To My Mother

To My Son and My Wife

To My Brothers

Amr Zaher
April 1996

Examiner Committee

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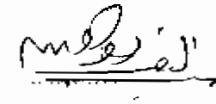
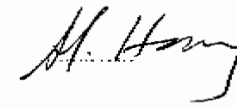
3- Prof. Dr. Abdel - Wahab Abo El-Ainien Professor of R.C. structures Ain Shams University	
4- Prof. Dr. Abdel-Hady H. Hosny Professor of R.C. structures Ain Shams University (Supervisor)	

STATEMENT

This Dissertation is submitted to Ain Shams University, Faculty of Engineering

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The work included in this thesis was carried out in the department of Structural Engineering, Faculty of Engineering, Ain Shams University ,from June 1990 to June 1996.

No part of this thesis has been submitted for a degree or qualification of any other University or Institution.

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ABSTRACT

An experimental and theoretical investigation work was conducted to study general deformational behaviour of reinforced high strength concrete beams under pure flexural moments using silica fume. Different silica fume to cement content ratios were studied.

The beams were simply supported with span 2.4 ms and cross section 0.12 x 0.25 ms and tested under the effect of two concentrated loads with spacing of 0.6 m .

These beams represent four groups G1, G2, G3 and G4 with different ratios of silica fume to cement content. The values of silica fume-cementations ratios for groups were (0.0 , 5.0 % , 10.0 % , 15 %) respectively .

Each group consists of nine beams with three different values of percentage of steel reinforcement 0.5 % (2ϕ10), 0.9 % (2ϕ13) and 1.3 % (2ϕ16). Each value of steel percentage represents three beams with three different spacing of 6 mms stirrups 5.0 cm, 12.5 cm and 20.0 cm .The top reinforcemant of beams was kept unchanged and equal to 0.34 % of concrete area (2ϕ8) .

The general deformational behaviour of the tested beams were examined and reported (cracking, crack propagation, deformations, strains).

In the theoretical phase of this thesis, these beams were analyzed using the finite element method, taking into consideration the nonlinear stress- strain curve of concrete and steel.

Finally the results of this investigation were combined with other available information to formulate some recommendations for the analysis and design of this type of structures.

Key words: High strength concrete, Silica fume, Behaviour, Silica Fume-cementations ratio, Steel ratio, Spacing of Stirrups, Finite Element, Material Nonlinearity.

TABLE OF CONTENTS