FATIGUE OF REINFORCEMENT BENT BARS

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B.Sc., M.Sc. (Structure Eng.)

THESIS
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APPROVAL SHEET

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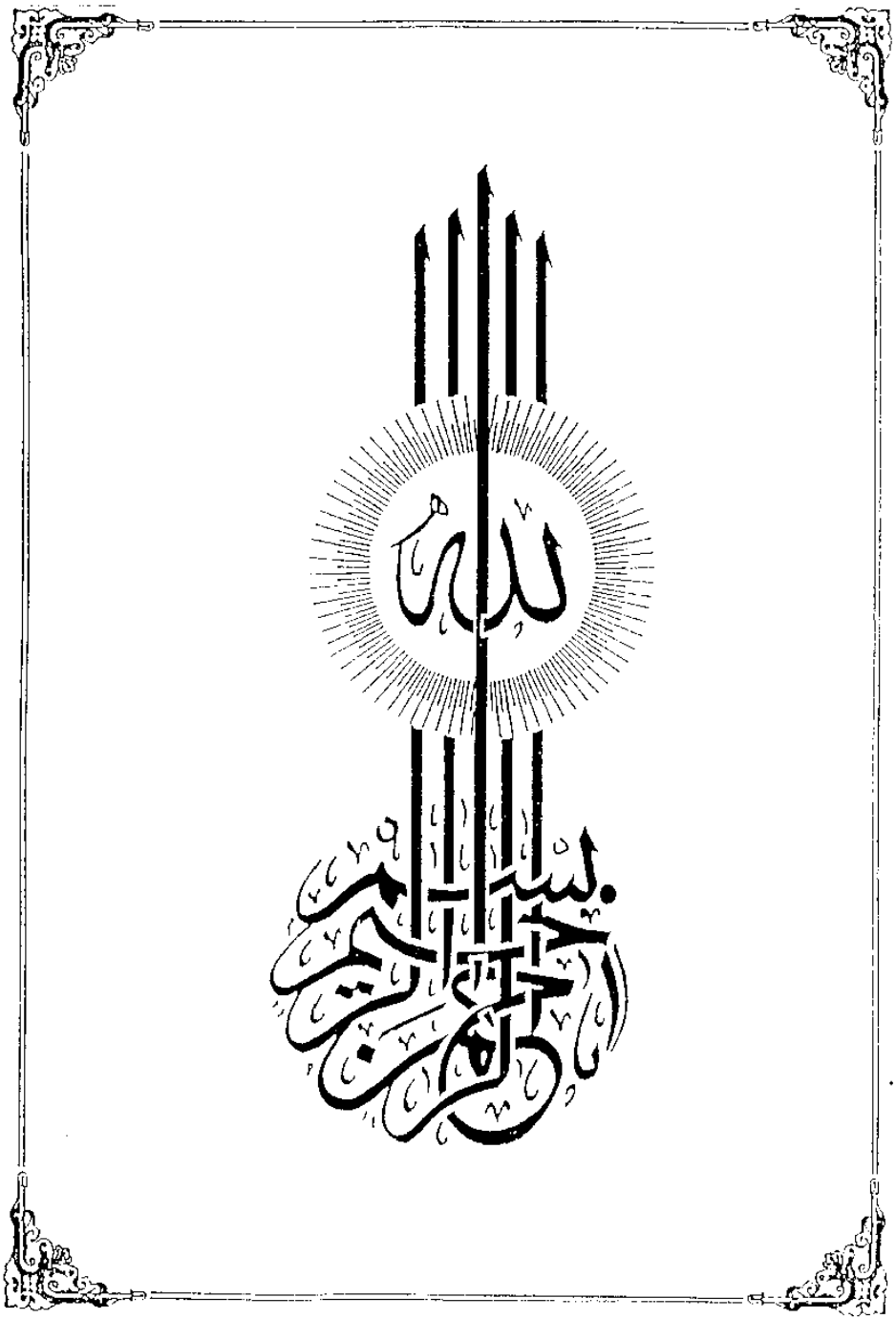

STATEMENT

This thesis is submitted to Ain Shams University for the Degree of Doctor of Philosophy in the Structural Engineering.

This work included in this thesis was carried out by the author in the department of Structural Engineering, Ain Shams University.

No part of this thesis has been previously submitted for a degree or qualification.

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TO MY FAMILY

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ABSTRACT

A three-dimentional finite element model was developed to determine the stress concentration factor of a bent bar embedded in the tension zone of a reinforced concrete beam. The effect of the bending process on the presence of fine cracks in bent deformed bars was studied using metallographic investigation and non-destructive testing.

The constants of fatigue crack growth presented by Paris law were determined using the rotating-beam fatigue testing machine and the potential drop crack monitoring technique. The fatigue properties of deformed steel bars locally manufactured in Egypt and the values of the stress concentration factor in bent bars made it possible to predict the fatigue life of steel reinforcing bars embedded in concrete elemets applying a fracture mechanics approach.

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