شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

بعض الوثائق الاصلية تالفة

بالرسالة صفحات

لم ترد بالاصل

Menoufiya University
Faculty of Engineering
Civil Engineering Department

NON-LINEAR 3-D-FINITE ELEMENT ANALYSIS OF FIBROUS REINFORCED CONCRETE BEAMS

By

Ehab Abdul-Mageed Mohamed Ahmed Emam

B. Sc. Civil Engineering Department
Menoufiya University, 1997.

A THESIS

SUBMITED IN PARTIAL FULFILLMENT FOR THE REQUIREMENTS OF THE DEGREE OF MASTER OF SCIENCE IN ENGINEERING
(STRUCTURAL ENGINEERING-CONCRETE)

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2002

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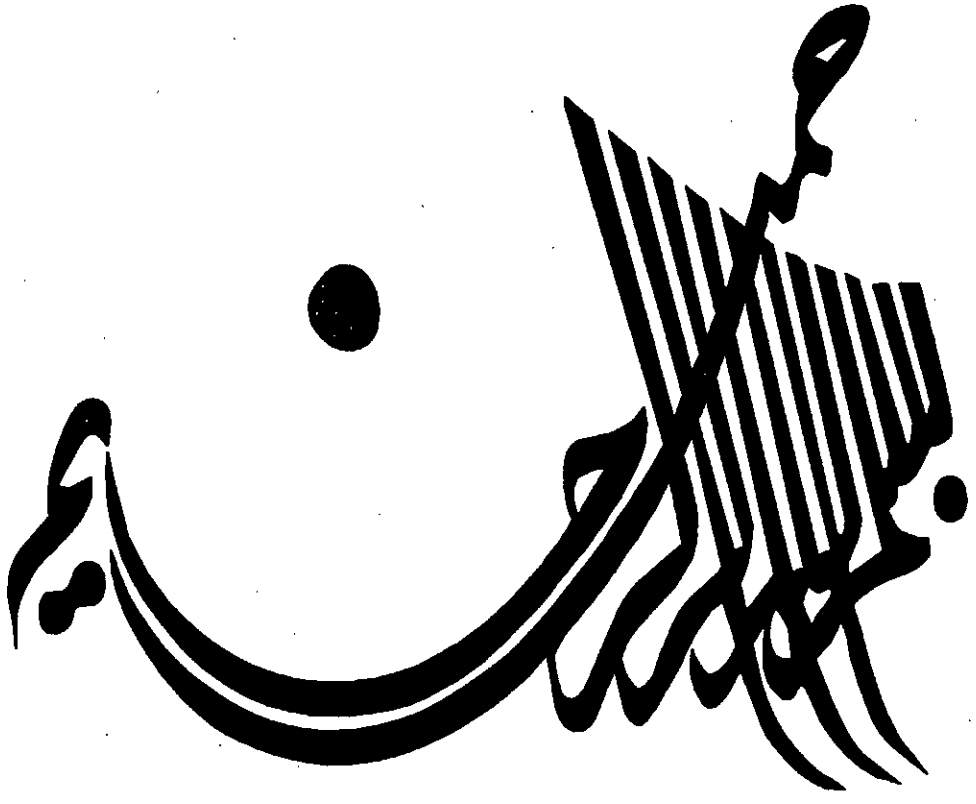
2002



Statement

This thesis is submitted to the Department of Civil Engineering, Faculty of Engineering, Menoufiya University, for the award of the degree of M.Sc.
Thesis Title:

"NON-LINEAR 3-D-FINITE ELEMENT ANALYSIS OF FIBROUS REINFORCED CONCETE BEAMS".

The work included in this thesis has been carried out by the author in the Department of Civil Engineering, Faculty of Engineering, Menoufiya University.

No part of this thesis has been submitted to any other University or Institute for the award of a degree or a qualification.

Author's Name: **Ehab Abdul-Mageed Mohamed Ahmed Emam**
Signature:
Date:

The Above statement has been signed by the author.

Supervisors

Head of the Department

To My Mother,

Father,

And Sisters.

NON-LINEAR 3-D-FINITE ELEMENT ANALYSIS OF FIBROUS REINFORCED CONCRETE BEAMS

M.Sc. Thesis in Engineering

Civil Engineering Department - Menoufiya University

By

Ehab Abdul-Mageed Mohamed Ahmed Emam

ABSTRACT

Fiber reinforced concrete is one of the most promising new construction materials. Investigation carried out in this thesis dealt with the effect of adding discrete steel fibers to the reinforced concrete beams. Various fiber volume fractions were used. An experimental program was executed to investigate the behavior of twelve SFRC beams under the effect of concentrated loads at third points. These beams were classified into three groups. The first group contained four beams to investigate the modulus of rupture of steel fiber reinforced concrete. The second group contained four beams which were tested to investigate the behavior of SFRC beams with stirrups. The third group contained four beams to investigate the behavior of SFRC beams without stirrups. The failure load, deflections, and strain values at different loading stages as well as the crack propagation patterns for the tested beams were recorded.

A nonlinear computer program based on the 3D finite element technique was extended to study the behavior of steel fiber reinforced concrete beams. The material nonlinearities taken into consideration included the stress-strain relationships for steel fiber reinforced concrete and reinforcing steel, concrete cracking, and tension stiffening effect. An isoparametric element with 20 nodes was used in the analysis. Each node has three degrees of freedom. The reinforcing steel was represented by embedded bars in the concrete elements.

The efficiency and accuracy of the F.E. computer program for the analysis of fibrous reinforced concrete beams were tested by comparing its results with those obtained experimentally. There was a good agreement between both the numerical and the experimental results.

Recommendations for practical applications and suggestions for future research works in the field of fiber reinforced concrete analysis were introduced.

Keywords:

Beams, Steel Fibers, Stirrups, Fiber Reinforced Concrete, Finite Element, Nonlinear Analysis, Isoparametric Element, Fiber Volume Fraction, Concentrated Loads.

Supervisors:

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