AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
STRUCTURAL ENGINEERING DEPARTMENT

FINITE ELEMENT ANALYSIS OF MAT FOUNDATIONS RESTING ON NONLINEAR ELASTIC MEDIUM

BY

Eng. MAHMOUD ABDEL HAMED HASSANEN
High DIPLOMA, Construction Project Management
Faculty of Eng. - Ain Shams University, 1990
B.Sc. Civil Engineering
Ain Shams University, 1987

A Thesis
Submitted in Partial Fulfillment of the
Requirements for the Degree of
Master of Science
in
Structural Engineering

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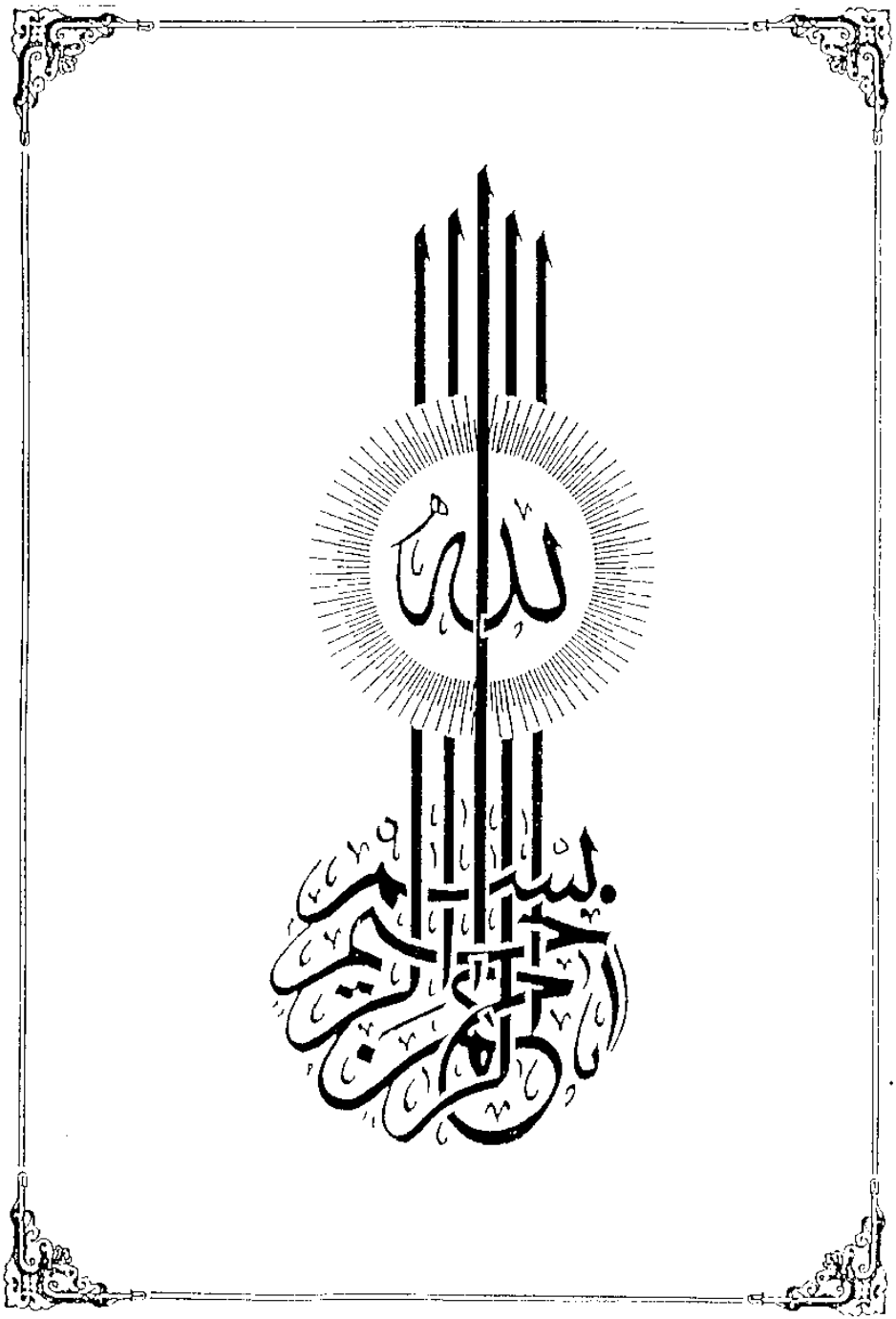

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Date : 31 / 10 / 1993

STATEMENT

This dissertation is submitted to **AIN SHAMS University** for the degree of Master of Science in Structural Engineering.

The work included in this thesis was carried out by the author in the Department of Structural Engineering, Ain Shams University, from October 1990 to October 1993.

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

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Ain Shams University
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Dept. of Structural Engineering
Abstract of the M.Sc. thesis submitted by
Eng. Mahmoud Abdel Hamed Hassanen

Title of thesis **Finite Element Analysis of Mat Foundations Resting on Nonlinear Elastic Medium.**

Supervisors : 1. Prof. Dr. Hassan M. Hosny
2. Prof. Dr. Mostafa Zidan
3. Dr. Abdel Salam A. Mokhtar

Registration Date : 10/12/1990 Examination Date : 31/10/1993

Abstract :

This thesis studies the effect of nonlinear behavior of soil medium supporting mat foundations on the contact pressure distributions , internal force distributions and deformations in the mat foundations subjected to gravity loads.

soil medium has been represented by individual springs with constant modulus of elasticity at certain points of the mat or by infinite number (bed) of springs with variable modulus of elasticity. In each case, a soil mathematical model has been considered.

The theoretical assumptions utilized to deduce the stiffness matrix of rectangular plate in bending resting on bed of springs with variable modulus of elasticity has been presented and the stiffness matrix has been deduced. Also, a computer program is developed and checked to analyze mat foundations by the proposed method of analysis.

Different types of mat foundations such as mat with and without openings and mat with inverted beams has been analyzed using both the proposed method and the conventional method. A comparison study between both methods of analysis for contact pressure distributions, internal forces and deformations has been performed.

Keywords :
finite element method, plate in bending, nonlinear soil behavior, subgrade reaction model, nonlinear analysis, elastic model, mat foundations, raft foundations.

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