AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
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GRILLAGE ANALOGY FOR CRACKED R.C. SLABS

BY

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A THESIS
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STATEMENT

This dissertation is submitted to Ain Shams University for the degree of Master of Science in Civil Engineering (structural) .

The work included in this thesis was carried out by the author in the department of Civil Engineering (Structural Division) , Ain Shams University , from Nov.1989 to Feb. 1997.

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

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DEDICATION

To my sweet wife and my sons Islam & Tarek

To my family: my beloved mother and father without whose love I could not have continued with this study.

To my friends, without their help, advice, and encouragement, this work would not have been possible.

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ABSTRACT

Name **Usama Mohammed Nabil Nagy .**

Title **" Grillage Analogy for Cracked Reinforced Concrete Slabs " .**

Master of Science Dissertation , Faculty of Engineering , Ain Shams University .

The thesis presents the response of Reinforced Concrete slabs after cracking and prior to failure using the grillage analogy . A simplified numerical method is developed to study their behavior up to failure using the stiffness method . The effect of the material non linearity due to change in the structural rigidity (flexural & torsioral rigidities) is incorporated .

The flexural rigidity is represented by a trilinear moment-curvature relationship . The torsional rigidity is represented by a trilinear relationship taking into account the shear-torsion-flexure interaction . A computer program is prepared and various shapes of beams and slab are studied using the applied computer algorithm . The results have been compared with the published experimental data ; and , the load-displacement curves are plotted .The comparison has shown a good agreement . Thus , a simple approach has been presented to determine the ultimate load of slabs , this load is close to that obtained by the yield line theory .

Key Words : **reinforced concrete , beams , slabs , grillage analogy , grids , ultimate , analysis , stiffness method , torsion .**

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