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FACULTY OF ENGINEERING

ELASTIC STABILITY ANALYSIS OF STRUCTURAL FRAMES SUBJECTED TO EARTHQUAKE LOADING

BY

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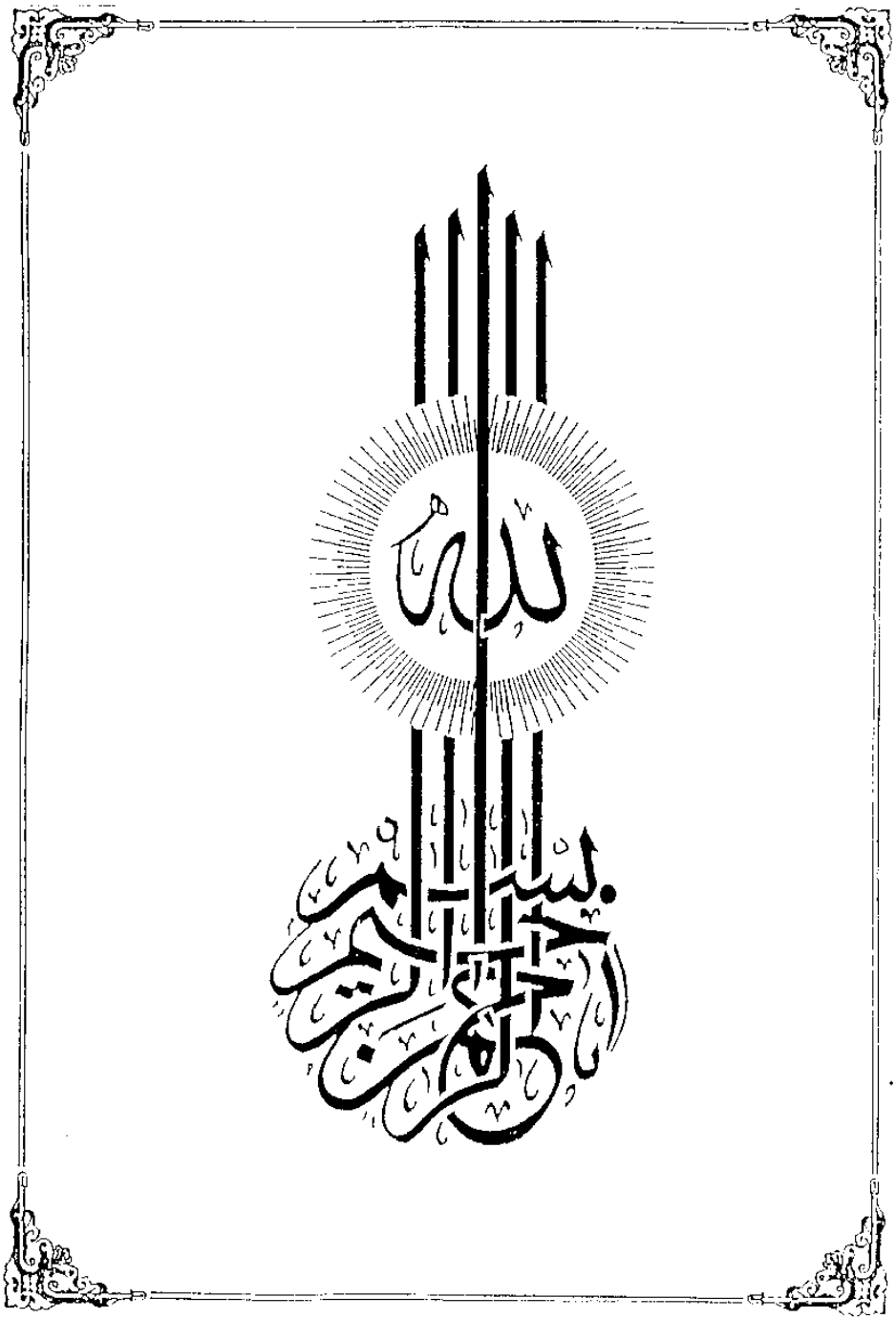

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This dissertation is submitted to Ain Shams University for the degree of **Master of Science** in Civil Engineering (Structural).

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Title **"ELASTIC STABILITY ANALYSIS OF STRUCTURAL FRAMES SUBJECTED TO EARTHQUAKE LOADS"**

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ABSTRACT

The present research work deals with an investigation of the nonlinear static and dynamic behavior of structural frames when subjected to earthquake loading.

The thesis starts with an extensive literature survey of published work concerning the elastic stability analysis of framed structures and also the simulation of artificial earthquake records by various methods.

The nonlinear static analysis by the finite deflection theory is presented with its equilibrium equations for geometrically nonlinear behavior of framed structures. An algorithm based on the finite deflection theory is used to determine the elastic critical buckling loads of frames subjected to earthquake loads.

The dynamic analysis of geometrically nonlinear structures is carried out using the step-by-step time integration methods in the time domain. Two methods are presented : Newmark-β and Wilson-θ methods. The analytical procedures are explained and implemented in a computer program.

An analytical procedure for simulating artificial earthquake records using the auto-regressive AR model is presented. A proposed technique for simulating earthquake records by the modified auto-regressive model is explained in detail. Applications have been performed on different structures in order to determine their dynamic response when subjected to real and simulated earthquake records. The efficiency of the proposed technique (the modified auto-regressive method) is also examined for practical design.

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