حسام مغربى

شبكة المعلومات الجامعية

بسم اللّه الرحمن الرحيم

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شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

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بالرسالة صفحات لم ترد بالأصل

NONLINEAR MODEL FOR SEISMIC ANALYSIS OF R/C FRAMED STRUCTURES

BY

AHMED HANAFY MAHMOUD SEOUDY

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for Degree of
DOCTOR OF PHILOSOPHY
in
STRUCTURAL ENGINEERING

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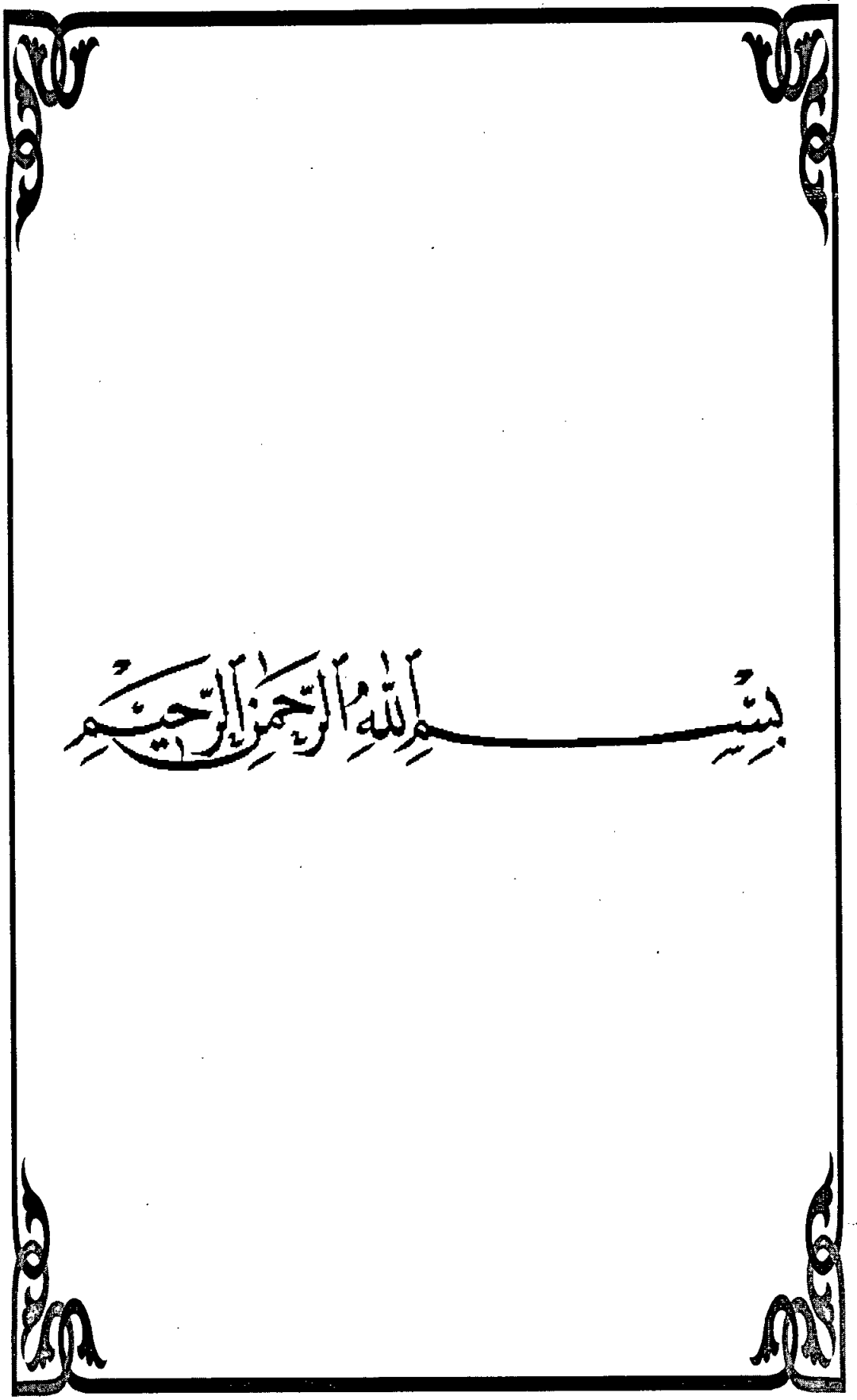
بسم الله الرحمن الرحيم

ABSTRACT

The main objective of this thesis is the extrapolation of **DRAIN-2D** program used for nonlinear seismic analysis of R/C structures. The extrapolation of the program uses an advanced hysteretic model to represent the hysteretic behavior of the structural elements. The modified program is called **SRA-2DS** (Seismic Response Analysis of two-Dimensional Structures). The hysteretic model is the three-parameter model and it is used to model the flexural behavior of the R/C elements. It operates on a tri-linear primary curve and has the capabilities of representing splitting of steel reinforcement from the concrete, strength loss due to highly repetition of loading cycles, and stiffness loss due to crack propagation. The properties of the hysteretic model depend on the parameters α, β& γ. The values of these parameters depend on the physical properties of the structural components and on the intensity of the applied earthquake. Two different approaches are developed to address the values of these parameters. The first approach depends on true/false statement evaluation of the structural components. The other is represented by a closed form expression (Analytical formulation). The results of using the developed approaches in earthquake analysis indicate that they can address the parameters α,β, γ precisely according to the comparison made with some experimental tests. Also, the results of the current version of **SRA-2DS** program are accurate to a satisfactory degree according to the comparison made with some experimental tests and the results obtained from **DRAIN-2DX** program.

The other objectives of the thesis are the development of planer model for analysis of R/C space structures and inclusion of strain rate of loading in the stress-strain relation of steel and concrete. The development of planer model for analysis is based on some experimental tests, which represent the effect of transverse beams and slab on element strength. A closed form expression is developed in a chart form to represent the effect of transverse beams on the strength capacity of the elements. Also, the used model to represent the effect of strain rate on seismic analysis is based on the experimental evaluation of stress-strain relationship for steel and concrete under highly repetition of

loading cycles. The results of the developed models can be considered to be accurate to a satisfactory degree according to the comparison made with **IDARC** program.

Finally, the study discusses the effect of some parameters on the behavior of R/C structures subjected to different ground motions. These parameters can be listed as follows: a) loading rate, b) concrete compressive strength, c) nominal steel yielding strength, d) stirrups spacing, e) reinforcement steel details, f) transverse beam dimensions, and g) longitudinal beam dimensions.