شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

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

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

Cairo University

INVESTIGATING DESIGN CODES CRITERIA FOR POST TENSIONED CONCRETE SLABS

By

AHMED MAGDY ABD ELMONEM BARAKA

A Thesis Submitted to the

Faculty of Engineering at Cairo University

In Partial Fulfillment of the

Requirements for the Degree of

MASTER OF SCIENCE

In

Structural Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY

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Title of Thesis:

INVESTIGATING DESIGN CODES CRITERIA FOR POST TENSIONED CONCRETE SLABS

Key Words:

Finite element analysis - Deflection – Stresses – Cost analysis – Programming

Summary:

Numerical model for post tensioned slab using the finite elements programs (RAM), (ADAPT) and nonlinear finite element program (ANSYS v19) and its verification with experimental counterpart will be presented. Linear and non-linear analysis for reinforced concrete elements can be obtained by (RAM), (ADAPT) programs and ANSYS software. This is a study of both ACI code [19] and BS code [21] in design post tension slab system by using of Ram program and Adapt program. Making two models of slab having three spans ranging between (9-10-9)m for model 1 and (9-5-9)m for model 2 to save a code requirements as columns distribution , columns dimension and opening requirements. And then design slab model by using ACI code [19] and BS code [19] by using Ram program and Adapt program. The ECP 203-2018 code [23] is not clear when it comes to designing post tensioned concrete slabs in terms of the requirements to be followed, the permissible limits and also the design method. So some conditions and equations will be proposed that help in designing post-tensioned concrete slabs by using the ECP 203-2018 code [23]. A cost benefit analysis may be a procedure by which organizations can analyze results, techniques or projects, or determine a worth for intangibles. Making a model having area equal 2755 m2. Using model to affirm that using P.T system saving 10% to 20% of total cost and can increase. Solving model by using (Ram) program. Writing a simple computer program to design uncomplicated post-tensioned floor systems taking into consideration the recommendations of the ACI code [19] and BS code [21].

Disclaimer

I hereby declare that this thesis is my own original work, and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the reference section.

Name: Date:

Signature**:**

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Ahmed Baraka
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Abstract

Post tensioned slabs started to be widely used instead of flat slabs specially in long span floors. There is weakness in the analysis of post tensioned slab systems in terms of the choice of design code and analysis software. In this research, the finite element programs RAM and ADAPT are used to analyze post tensioned slabs with different configurations. Two models are analyzed according to the requirements of the ACI [19] and the BS [21] building codes. The parameters considered include span of the slab, column size, slab thickness, and pre-stressing forces. The results of the RAM and ADAPT programs are also verified against those of the nonlinear finite element program ANSYS. The analytical results are also verified against recommendations of international construction firms working in this field in Egypt. The comparison of results includes deflections, straining actions, and stresses. The ECP 203-2018 code [23] is not clear when it comes to designing post tensioned concrete slabs in terms of the requirements to be followed, the permissible limits and also the design method. So some conditions and equations will be proposed that help in designing post-tensioned concrete slabs by using the ECP 203-2018 code [23]. A cost analysis is performed to compare between post-tensioned slabs and the corresponding reinforced concrete flat slabs. The research also includes writing a simple computer program to design regular post-tensioned floor systems taking into consideration the recommendations of the ACI code [19].