شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
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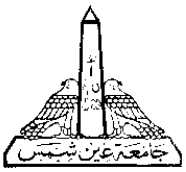
بالرسالة صفحات لم ترد بالأصل



AIN SHAMS UNIVERSITY

FACULTY OF ENGINEERING

Structural Engineering

Vibration Behavior of Post-Tensioned Concrete Flat Slabs

A Thesis submitted in partial fulfillment of the requirements of the degree of

Master of Science in Civil Engineering

(Structural Engineering)

by

Fady Ibrahim Ezzat Aziz

Bachelor of Science in Civil Engineering

(Structural Engineering)

Faculty of Engineering, AUC The American University in Cairo, 2017

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Statement

This thesis is submitted as a partial fulfilment of Master of Science in Civil Engineering, Faculty of Engineering, Ain shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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Thesis Summary

Post-tensioned concrete flat slabs are susceptible to vibration problems for high span-to-depth ratios. Although the issue was addressed in many research, there is no final agreement for the effect of prestress level on the fundamental frequency of post-tensioned concrete flat slab. Thus, this research discusses the different perspectives presented in past research in relation to this point. Through numerical modelling using ABAQUS-SIMULA software, this research presents the modal shapes for slabs of different aspect ratios, and the effect of prestressing forces on the fundamental frequencies of these slabs. Comparing the results of models with linear elastic materials behavior and those for cracked and uncracked post-tensioned concrete slabs with nonlinear materials behavior, it is concluded that prestress level has no impact on frequencies of uncracked post-tensioned concrete flat slabs. The models reveal that no compression softening occurs; however, the frequencies of cracked post-tensioned concrete flat slabs increase with prestressing forces. This research also examines the applicability and the accuracy of the available methods and mathematical models of the international codes of practice and other references for different slab geometries and different applied loads. Finally, the research presents two newly proposed mathematical models created by Neural Designer program. The first model is to estimate the fundamental frequencies of uncracked concrete slabs of inputs "*Sustained Loads (kN/m^2)*" and its corresponding "*Deflection (mm)*" without considering the prestress force camber, and it generates values of higher accuracy than the currently available equations and mathematical models. The second proposed model is to estimate the peak acceleration of uncracked concrete slabs of inputs "*Fundamental Frequency (Hz)*" and "*Initial Displacement (mm)*" due to service loads including the prestress force camber. This model is applicable for dynamic motion of human walking of forcing frequency 2Hz, and damping ratio 2%.

Keywords: Vibration, Finite Element Analysis, Prestressed Concrete, Post-Tensioned Concrete Floors, Flat Slabs, Static Deflection Method, Fundamental Frequency, Peak Acceleration