Ain Shams University
Faculty of Engineering

EFFICIENT STRUCTURAL ANALYSIS OF VERTICALLY IRREGULAR TALL BUILDINGS

By

Moustafa Abdel Rahman Mahmoud Dawood
B.Sc. 2003, Structural Division
Civil Engineering Department

Thesis
Submitted in Partial Fulfillment for the Requirements of Degree of
Master in Science in Structural Engineering

Supervised by:

Prof. Dr. Abdel Salam Ahmed Mokhtar
Professor of Structural Engineering,
Faculty of Engineering,
Ain Shams University

Prof. Dr. Ayman Hussein Khalil
Professor of Structural Engineering,
Faculty of Engineering,
Ain Shams University

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بسم الله الرحمن الرحيم

"و ما أوتيتم من العلم إلاّ قليلا"

الإسراء (85)

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING

Researcher name:

Moustafa Abdel Rahman Mahmoud Dawood

Thesis Title:

Efficient Structural Analysis of Vertically Irregular Tall Buildings

Supervisors:

Prof. Dr. Abdel Salam Ahmed Mokhtar
Professor of Structural Engineering,
Faculty of Engineering, Ain Shams University

Prof. Dr. Ayman Hussein Khalil
Professor of Structural Engineering,
Faculty of Engineering, Ain Shams University

To

My Mother

My Father

My Brothers

My Wife

My Daughter

To everybody give me a hand

"بسم الله الرحمن الرحيم"

AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
STRUCTURAL ENGINEERING DEPARTMENT

Abstract of the M.Sc. Thesis submitted by

Eng. Moustafa Abdel Rahman Mahmoud Dawood

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Supervisors:

Prof. Dr. Abdel Salam Ahmed Mokhtar
Professor of Structural Engineering,
Faculty of Engineering, Ain Shams University

Prof. Dr. Ayman Hussein Khalil
Professor of Structural Engineering,
Faculty of Engineering, Ain Shams University

ABSTRACT

Composite construction is one of the most suitable techniques used in many types of buildings. High-rise buildings are one of these types and composite construction may be the best way to create large spans with suitable clear height. Virandeel is a structural system used in tall buildings to create wide spans for conference halls or any other purpose. Also it is a convenient system which can be used in residential buildings because there is no diagonals contained in this system. So it doesn't waste internal areas.

This thesis discusses the behavior of virandeel system as a composite structure. A 3-D finite element model is proposed and verified with previous numerical and experimental studies in order to simulate the composite virandeel structure. The study is based on statically gravity loads and full interaction between steel section and concrete slab. This study includes a discussion for the effective width evaluation and comparison with Eurocode and Egyptian code. The reason for discussing concrete slab width is to investigate the effect of normal forces in virandeel girders on the slab width estimation obtained from codes. An observations and commentary on the results of the finite element models are presented.

A development is proposed to the composite virandeel system by making the connection between chord members and columns partially fixed. This proposal allows the composite chord to behave with its maximum capacity and it is found that it improves the composite section capacity by 6 percent.

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