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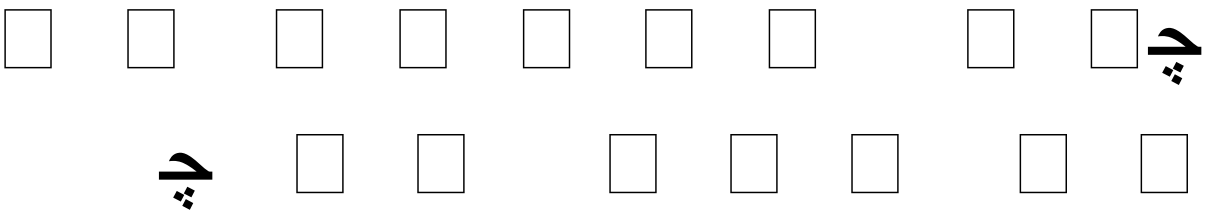

صدق الله العظيم

سورة نوح الاية (٢٨)

Dedication

This research is dedicated to:

The soul of my father

My mother.

My family.

Acknowledgment

First and foremost , I thank Alla for endowing me with health, and knowledge to complete this work.

A lot of thanks are due to my colleagues who provided me with the very useful information .

Also I really thank Dr. Nuha Moawia Akasha for her very helpful guides and comments.

My thanks are extended to Eng. Amal Muhammad.

Abstract

This research describes, manual calculation methods to analyze and design 2-dimensional reinforced concrete frames as part of forty story framed tube building. The building is composed of reinforced concrete walls, slabs, beams, and columns. It was analyzed under various load cases, the loads such as gravity loads, (dead and live loads) and lateral loads, (wind loads) were calculated. Linear elastic analysis was carried out using moment distribution and cantilever methods as manual approximate methods, and an analysis was done using computer program (ETABS$_v$9.5.0). Moreover, the results of the 2-dimensional frame analysis program and manual calculations are included in the comparative study.

The models are prepared as bare frame and shear wall. Some design requirements such as common assumptions for the structural analysis of tall buildings and sway limitations are discussed. The behavior of some structural systems for tall buildings subjected to horizontal forces is then considered, and one frame and shear wall were designed. The design strength was also checked for all members and it was determined that the members were adequate.

Comparison included wind loads per story level and analysis results of bare frame such as shear forces, bending moments and axial forces were also considered. These results are displayed on tables.

Based on comparison results, manual approximate methods are more conservative methods comparing with (ETABS) program.

تجريد

يتناول هذا البحث طرق حسابية يدوية لتحليل وتصميم هيكل خرساني مستوي كجزء من مبنى خرساني هيكلي أنبوبي لعدد اربعين طابقاً. المبنى يتكون من عدة عناصر (اعمدة، عارضات، حوائط قص وبلاطات)، حلل المبنى تحت تاثير مجموعة من الاحمال كالاحمال التثاقلية (حية وميتة) والأحمال الافقية (أحمال الرياح)، حيث تم التحليل بطريقة المرونة الخطية باستخدام الطرق اليدوية التقريبية كطريقة توزيع العزوم لحساب القوى الناتجة من الاحمال التثاقلية، وطريقة الكابولي لحساب القوى الناتجة من الاحمال الافقية، وتم عمل نموذج طبقت فيه هذه الاحمال باستخدام برنامج الحاسوب (ETABS 9.5.0) وتمت مقارنة نتائج التحليل اليدوي مع نتائج البرنامج وإيجاد نسب الإختلاف.

تمت دراسة هيكل مستوي وحائط قص كنماذج تصميم للمبنى حيث تمت مناقشة الفرضيات الاساسية لتحليل المباني العالية ومتطلبات التصميم، وتمت أيضا مناقشة الازاحة الجانبية المسموح بها وسلوك بعض الانظمة الإنشائية والمباني العالية المعرضة لقوى افقية، وحسبت المقاومة التصميمة لكل عناصر الهيكل فكانت كافية لمقاومة الاحمال الواقعة عليها.

شملت المقارنة أحمال الرياح على مستوى الطابق، قوى القص، عزوم الإنحناء والقوى المحورية للعارضات والاعمدة، ثم عرضت هذه النتائج على شكل جداول.

وعلى ضوء نتائج المقارنة، تعتبر الطرق اليدوية التقريبية طرق تقريبية جداً مقارنة مع برنامج (ETABS).

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NOTATION

A_g = gross cross sectional area of a concrete member

A_s = area of non-pre-stressed tensile reinforcing

A'_s = area of compression reinforcement

A_{st} = total area of longitudinal reinforcement

A_v = cross sectional area of shear reinforcing in a distance s in a flexure member

a = depth of compression block

b = width of the compression face of a flexural member

c = depth of neutral axis

C_p = external pressure coefficients

d = effective depth of a section measured from extreme compression fiber to centre of tensile reinforcement

d′ = distance from extreme compression fiber to centre of compression steel

d_b = bar diameter

DL = factored dead load

E_c = modulus of elasticity of concrete

E_s = modulus of elasticity of reinforcement

f'_c= specified compressive strength of concrete

f_y= specified yield strength of flexural reinforcement

f_{ys} = specified yield strength of shear reinforcement

G = gust effect factor

GC_{pi} = internal pressure coefficient

G_f= Gust-effect factor for Flexible or Dynamically Sensitive Structure

h = overall depth of a column section

I = important factor

I_g= moment of inertia of gross concrete section about central axis

k = effective length factor

k_d = directionality factor

k_z = pressure exposure coefficient

k_{zt} = topographic factor

l = clear span of beam

LL = factored live load

M_u = factored moment at a section

P = design wind pressure

P_u = factored axial load at a section

q_z = velocity pressure

r = radius of gyration of a section

V = basic wind velocity

V_p= shear force computed from probable moment capacity

V_s = shear forces resisted by steel

V_u = factored shear force at a section

WL = wind load

α = reinforcing steel over strength factor

β_1 = factor for obtaining depth of compression block in concrete

ε_c = compression strain allowed extreme in concrete

ε_s = tensile strain in reinforcing steel

$\emptyset$ = strength reduction factor

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