NON-LINEAR SEISMIC ANALYSIS OF R.C. COUPLED SHEAR WALLS

By

Islam Hussain Ahmed Hussain

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
GIZA, EGYPT
2018

NON-LINEAR SEISMIC ANALYSIS F R.C. COUPLED SHEAR WALLS.

By
Islam Hussain Ahmed Hussain

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

Under the Supervision of

Prof. Dr. Waleed Abd El-Lateef Atya

....

Professor of Structural Engineering Department
Faculty of Engineering,
Cairo University

Associate Prof. Dr. Bahaa El-Din Hanafy Mahmoud

....

Associate Professor of Structural Engineering Department
Faculty of Engineering,
Cairo University

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2018

NON-LINEAR SEISMIC ANALYSIS OF R.C. COUPLED SHEAR WALLS.

By

Islam Hussain Ahmed Hussain

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

Approved by the
Examining Committee

____

Prof. Dr. Waleed Abd El-Lateef Atya, Thesis Main Advisor
Structural Engineering Department
Faculty of Engineering, Cairo University

____

Assoc. Prof. Dr. Bahaa El-Din Hanafy Mahmoud, Advisor
Structural Engineering Department
Faculty of Engineering, Cairo University

____

Prof. Dr. Ahmed Hassan Amer, Internal Examiner
Structural Engineering Department
Faculty of Engineering, Cairo University

____

Prof. Dr. Hatem Hamdy Ghith, External Examiner
- National Building Research Center

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2018

Engineer's Name: Islam Hussain Ahmed Hussain
Date of Birth: 8/2/1991
Nationality: Egyptian
E-mail: Islamhh2006@yahoo.com.
Phone: 01093335640
Address: Issa Homosany St., Maryoutia Faisal, Giza

Registration Date: 1/10/2013
Awarding Date: …./…./2018
Degree: Master of Science
Department: Structural Engineering

Supervisors:

Prof. Dr. Waleed Abd El-Lateef Atya
Assoc. Prof. Dr. Bahaa El-Din Hanafy Mahmoud

Examiners:

Prof. Dr. Hatem Hamdy Ghith (External examiner) – National Building Research Center.
Prof. Dr. Ahmed Hassan Amer (Internal examiner).
Prof. Dr. Waleed Abd El-Lateef Atya (Thesis Main advisor).
Assoc. Prof. Dr. Bahaa E. H. Mahmoud (Advisor).

Title of Thesis:

Non-linear seismic analysis of R.C. coupled shear walls

Key Words:
Coupling beams, coupled shear walls, time history analysis, pushover analysis - high rise buildings.

Summary:
In multi-story buildings, there are different types of systems to resist seismic and wind loads. One of these systems is coupled shear wall. This system consists of two reinforced concrete walls which are connected by coupling beams. This system is used in medium and high rise buildings. In this range they provide an efficient structural system for resisting the lateral loading effects .In this research we studied the behavior of coupled shear walls under seismic loads using SAP2000 program. The coupled shear walls were analyzed using pushover analysis and time history analysis. Three different actual earthquakes were used in time history analysis. A parametric study were performed under both time history and pushover analyses. These parameters are wall length, beam span, beam depth, wall reinforcement, beam reinforcement and building height. The results show that the behavior of the coupled shear wall depends on these parameters.

Acknowledgments

All my thanks and gratitude goes for ALLAH, who helps me to finish my research.

I would like to express my sincere appreciation and gratitude to Prof. Dr. Waleed Abd El-Lateef, He gave me a lot of advices for my study, and he is very supportive whenever I need help. He give me a lot of advices for my study.

I would like to express my sincere appreciation and gratitude to Assoc. Prof. Dr. Bahaa El-Din Hanafy Mahmoud, for serving me as my advisor and helping me through the development of this thesis during the past years. I am very much thankful to him for the guidance and the motivation he provided during my studies at Cairo University.

I would like to express my deep appreciation to my family for their encouragement and support during my life. They helped me. They helped me to be concentrated only in my researches .So, I owe a lot to them.

I would like to thank my previous lecturers: Dr.Mashhour A. Ghoniem, Dr. Nasser El shafei, Dr. Ahmed Mohamed Farahat, and Dr.Mohamed Rabie. They teach me a lot, and make me interested in concrete studies.

I would like to express my thanks to my friends Dr.Eng.Mohamed Ashraf Elsayad and Ass.teacher.Abdel Rahman Mohamed Hamdi ,Ass.teacher.Ibrahim Sallam, Eng.Emad Abdullah Elsayed Shall and to Eng.Yasser Salah. They give me big supports and encouragement in my research.

I would like to mention my educational place, cairo University. And I would like to mention my work place , Thebes Higher Institute for Engineering .I am so happy to belong to these places , where I got my experiences and did my studies. Also, I would like to thank my teammates in these two places for their support and advice.

Dedication

I wish to dedicate my thesis to the soul of Mr.Salah El-Din Sofy Othman, Prof. Dr. Mohamed Elmarzoky, and My supervisors especially Assoc. Prof. Dr. Bahaa El-Din Hanafy Mahmoud.

Table of Contents

List of Tables

List of Figures