بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

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

MONA MAGHRABY

Cairo University

RISK-BASED ASSESSMENT OF THE RESPONSE MODIFICATION FACTOR FOR ADEQUATE-DUCTILITY RC FRAMES

By

Ehab Emad Fawzy Ayad

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
2021

RISK-BASED ASSESSMENT OF THE RESPONSE MODIFICATION FACTOR FOR ADEQUATE-DUCTILITY RC FRAMES

By

Ehab Emad Fawzy Ayad

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. Walid A. Attia
…………………………….

Professor of Structural Analysis and
Mechanics
Structural Engineering Department
Faculty of Engineering, Cairo University

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2021

RISK-BASED ASSESSMENT OF THE RESPONSE MODIFICATION FACTOR FOR ADEQUATE-DUCTILITY RC FRAMES

By

Ehab Emad Fawzy Ayad

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. Walid Abd El Latif Attia, Thesis Main Advisor

____
Prof. Dr. Sherif Ahmed Mourad, Internal Examiner

____
Prof. Dr. Alaa Gamal Sherif, External Examiner
Professor of Reinforced Concrete Structures – Helwan University

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
2021

Engineer's Name: Ehab Emad Fawzy Ayad
Date of Birth: 13 / 1 / 1990
Nationality: Egyptian
E-mail: ehab.emad@live.com
Phone: 01064950725
Address: Hadayek el Aharam, Giza

Registration Date: 1 / 10 / 2014
Awarding Date: / / 2021
Degree: Master of Science
Department: Structural Engineering

Supervisors:

Prof. Dr. Walid A. Attia (Thesis main advisor)

Examiners:

Prof. Dr. Walid A. Attia (Thesis main advisor)
Prof. Dr. Sherif Ahmed Mourad (Internal examiner)
Prof. Dr. Alaa Gamal Sherif (External examiner)
(Professor of Reinforced Concrete Structures – Helwan University)

Title of Thesis:

Risk-based assessment of the response modification factor for adequate-ductility RC frames

Key Words:
R-factor; collapse; fragility; spectral shape; OpenSees

Summary:

The collapse risk of adequate-ductility RC space frames as stipulated in the Egyptian Code of Practice is calculated. Working within the FEMA P695 framework, the conditional probability of is shown to be below the acceptable probability of collapse. This indicates an R-factor of 7 is appropriate. Some discrepancy is shown to be found between the EMME14 project hazard information and the ECP-201 seismic action. Where there is major discrepancy, the site-specific collapse risk is shown to be high – given the hazard curves used. On the other hand, where there is no to little discrepancy, the frames exhibit satisfactory collapse performance suggesting that the R-factor used is appropriate. Assuming the validity of the EMME14's probabilistic seismic hazard analysis results, use of both Type I and Type II response spectra in the Gulf of Aqaba coast is shown to be the appropriate choice of seismic action.

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 references section.

Name: Ehab Emad Fawzy Ayad Date: / / 2021

Signature:

Acknowledgments

I would like to thank my advisor, Professor Walid A. Attia for his support, patience and openness throughout my graduate studies. I also would like to thank my family for their continuous support.

Table of Contents

List of Tables

List of Figures