ASSESSMENT OF SEISMIC RESPONSE REDUCTION FACTOR OF MULTISTOREY REINFORCED CONCRETE STRUCTURES WITH SHEAR WALLS RESISTING SYSTEM USING NONLINEAR DYNAMIC ANALYSIS

By

Mohamed Adel Mohamed AbdElnabi

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
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Under the Supervision of

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**FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

Assessment of seismic response reduction factor of multistorey reinforced concrete structures with shear walls resisting system using nonlinear dynamic analysis.

Key Words:

Response Reduction factor, ductility, over-strength, Redundancy, AEM, ELS, seismic design.

Summary:

Many studies have endeavored to quantify the potential of the structural system to delimit the seismic force level imposed by virtue of their ductility and energy absorption capacity. The response modification factor (R) is defined as the ratio of the absolute maximum linear elastic base shear to the absolute maximum nonlinear base shear of structure subjected to the same earthquake acceleration. The response modification factor (R) depends on over-strength (Rs), ductility (R_{μ}), and redundancy (R_r). In the current study, the R factor is investigated for multistory reinforced concrete flat slab structures where the lateral forces are resisted solely by shear walls. A non-linear time-history dynamic analysis based on the Applied Element Method was carried out on ten stories RC flat slab structure with shear wall resisting system for lateral loads. A parametric study was carried out to investigate the effect of different parameters on the R factor such as earthquake acceleration magnitude, height of the building, reinforcement ratio of shear walls, and material strength. The results showed that the value of (R) depends not only on structure dynamic properties but also on its nonlinearity and on earthquake magnitude which is not considered in the current world wide design codes.

Dedication

I dedicate this work to my Father, Mother, Brother, and Sister for their continuous help, encouragement and support.

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Thanks to ALLAH for helping me finish this work.

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