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بسم الله الرحمن الرحيم

HOSSAM MAGHRABY

شبكة المعلومات الجامعية

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

HOSSAM MAGHRABY

شبكة المعلومات الجامعية

جامعة عين شمس

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قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها

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HOSSAM MAGHRABY

Ain Shams University
Faculty of Engineering
Structural Engineering

STRENGTH-PERFORMANCE CORRELATION FACTOR FOR SEISMIC DESIGN OF INFILLED MOMENT RESISTING RC FRAMES

A Thesis submitted in partial fulfilment of the requirements of the degree of

Master of Science in Civil Engineering

(Structural Engineering)

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Date: 25 May 2021

STATEMENT

This thesis is submitted as a partial fulfilment of Master of Science in Civil Engineering, Faculty of Engineering, Ain-Shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or a qualification at any other scientific entity.

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To My Parents....

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ABSTRACT

Unreinforced masonry (URM) infills are seldom included in numerical analysis of reinforced concrete structural systems and are generally considered as non-structural components. On the contrary, URM infill can increase the strength, stiffness, and energy dissipation of concrete structures; whilst drastically helping in reducing the deformations and hence ductility demands for the structural members. Owing to the complexity it introduces to analysis, URM is generally kept unaccounted for.

This research investigates the effects of URM infills on 2D frames using performance-based design (PBD) approach and developing a performance factor (P) meeting different performance levels of infilled frames.

Conventional building seismic codes are based on a linear force-based design (FBD) approach to ensure satisfactory performance of structures during earthquakes. Seismic forces are reduced by a response modification factor (R), which is related to the structure's ability to undergo inelastic deformations and to dissipate the earthquake input energy through hysteretic behavior. Herein, FBD approach is strength based rather than a displacement-based design, yet the displacement (drift) limit is satisfied.

On the other hand, performance criterion in the performance-based design (PBD) approach provides a better view on the performance of the structure based on the expected non-linear response during seismic events. A new factor namely the performance factor (P) is developed in this research to help engineers use the conventional FBD approach in designing and evaluating structures under lateral loading without the need to undergo tedious iterations of non-linearity while meeting the intended performance.

Keywords: Seismic Analysis, Non-linear Pushover Analysis, Performance Factor, Response Modification Factor, Masonry Infills, RC Moment Resisting Frames

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