Investigating the Effect of Boundary Conditions on the Evaluation of Seismic Response Modification Factor of Steel Frames

BY

MASOOD MAJED MOHAMMED IRHEEM

A Thesis Submitted to the

Faculty of Engineering at Cairo University

In Partial Fulfillment of the

Requirement 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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Key Words:
Response modification factors, Ductility reduction value, Overstrength value, steel frames, non-linear static analysis.

Summary:

This study investigates the effects of boundary conditions as “support type of column and direction of strong axis of column” on the response modification factor “R-factor” for steel frames. Besides, other parameters as number of bays, story number and position of bracing. All steel frames are designed according to Egyptian Code. Based on the results, for each different boundary condition there is different R value, that’s mean, the R-factor is unique for each steel frame and depended on stiffness of the frame system; R-factor increases when fundamental period is decreased and braced frames have value smaller than un-braced frames. Types of support of column have high effect on fundamental period for un-braced frames and less for braced frames. Direction of column has effect on R-factor for both types of frames. Egyptian Code gives limited R-value for steel frames comparing to this study. The minimum value of R-factor for each frame in this study is close to the value in the Code, which means the Code is more conservative.

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