شبكة المعلومات الجامعية
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بسم الله الرحمن الرحيم

HANAA ALY

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The Effect of Soil Structural Interaction on Evaluation of Seismic Response Reduction Factor of Multi-Story Concrete Buildings

A Thesis Presented by

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AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING

The Effect of Soil Structural Interaction on Evaluation of Seismic Response Reduction Factor of Multi-Story Concrete Buildings

A Thesis submitted in partial fulfillment of the requirements of the degree of Master of Science in Structural Engineering

By

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Date: 01 - 12– 2021

STATEMENT

This thesis is submitted in partial fulfillment for the requirements for the degree of Master of Science in Structural Engineering, to be lodged at the Department of Structural Engineering, Faculty of Engineering, Ain Shams University.

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

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The Effect of Soil Structural Interaction on Evaluation of Seismic Response Reduction Factor of Multi-Story Concrete Buildings

ABSTRACT

It has been observed that the seismic behavior of concrete structures is strongly influenced not only by the seismic response of the structure but also by the seismic response of the soil under the foundations. Several studies have been conducted to consider the analysis of the seismic response of the hollow concrete structure, including the structural system of the structure, foundations, and the soil structure interaction. However, these studies are not sufficient to cover the effect of soil structural interaction on the evaluation of seismic response reduction factor of multi-story concrete buildings. Therefore, the fundamental objectives of this research study can be summarized as follows: investigating the previous studies on Soil Structural Interaction and its effect on Seismic Response Reduction Factor; investigating the effects of the SSI on the performance of seismic of multi-story Structures; and investigating the effect of different soil types and the modulus of subgrade reaction (ks) on the seismic design of the structural elements resisting the lateral loads. To achieve these objectives, the methods mentioned in the FEMA 2020 report are used, and a structural analysis has been applied for three buildings consisting of three, six and nine floors before and after implementing the effect of the interaction between the soil under the foundations and the structure in order to calculate the reaction modification factor "R" using the SAP2000 program. The effect of the interaction between the soil models and the fixed ones is determined according to the different types of soil by nonlinear analysis, plotting the base shear curve and displacement and determining the reaction modulation factor (R). The results discussed throughout the provided tables hereinafter together with the graphs and recommendations suggest properly rational values of the response reduction factor for the analyzed multi-story buildings when taking the soil structural interaction, to be considered in the Egyptian Design Code. Conclusions and recommendations for future work have been summarized.

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