A DEVELOPED FEM-BEM PRACTICAL TECHNIQUE TO CONSIDER SSI IN THE LATERAL ANALYSIS FOR MULTISTORY BUILDINGS

By
Abdelrahman Mohamed Ibrahiem Ali Elmeliegy

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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DEDICATION

To whom I would never be without their guidance and support
To my mother, father, brother and sisters

A.M.Elmeliegy
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Keywords:

BEM; Soil-structure interaction; static condensation; foundation-soil flexibility; static soil-structure interaction.

Summary:

In this thesis, a new practical technique for the analysis of buildings including soil-structure interaction is suggested. The new analysis is based on sub-structuring approach where the system is partitioned into two main parts which are the superstructure part and the raft-soil part. A static condensation technique is implemented at the column-raft interface. A developed algorithm representing the column-raft interface is implemented to ensure compatibility and equilibrium at that interface. Current practical analysis of SSI is implementing the static condensation at the raft-soil interface which is time consuming and tediously job. The new analysis has shown less time and effort in the modeling and analyses. This technique of analysis is presented here only for linear analysis. However, this technique can be extended to include nonlinear analysis such as no tension SSI, soil nonlinearity SSI.

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