EVALUATION OF NUMERICAL APPROACHES FOR ANALYSING LATERALLY LOADED PILES

By

Ahmed Mahmoud Abd-El-Razek El-baz

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
Civil Engineering-Public Works

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Title of Thesis:

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Key Words: **Strain Wedge Model, Liquefaction, Soil structure interaction, Laterally Loaded Pile**

Summary:

In order to properly analyze a laterally loaded pile foundation in soil/rock, a nonlinear relationship needs to be applied that provides soil resistance as a function of p-y curves or pile deflection. This thesis indicates that p-y curves are not unique and change according to any variation in soil and pile properties.

This thesis evaluates one of the most popular softwares known to analyze laterally loaded piles, LPILE and compares between its performances and that of less known but more sophisticated software, SWM. Those programs which employ unique p-y curves (such as LPILE) do not provide realistic solution for varying soil pile condition. This thesis presents several case studies to highlight the problems with conventional p-y analysis, advantages of strain wedge(SW) model analysis, and factors affecting lateral performance (such as generic condition, depth effect, the shadow effect of adjacent piles in group, and behavior in liquefiable soil).

The SWM6.2 program focuses on some of soil mechanics principles that are accepted such as the analysis of stress soil and the relationship of (stress-strain-strength)comparing with other softwares that are based on few tests and developed empirically. This fundamental difference lead to several advantages of the SWM program over the typical LPILE program.

DISCLAIMER

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: Ahmed Mahmoud Abd El-Razek El-Baz Date: / /

Signature:

DEDICATION

To the fountain of patience and optimism and hope

To each of the following in the presence of God and His Messenger, my mother dear

To those who have demonstrated to me what is the most beautiful of my brother's life

To the big heart my dear father

To the people who paved our way of science and knowledge

All our teachers Distinguished

To the taste of the most beautiful moments with my friends

I guide this Thesis

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