CORRELATIONS FROM CONE PENETRATING TEST AND STANDARD PENETRATING TEST USING ARTIFICIAL NEURAL NETWORKS

By

Ahmed Gamal Eldin Mahmoud Mahgoub

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
Public Works Engineering

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Approved by the
Examining Committee

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FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

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Key Words: Cone penetrating test; Standard penetrating test; General regression neural network; angle of internal friction; Soil modulus of elasticity

Summary:

In-situ tests generally investigate a much greater volume of soil more quickly than possible for sampling and laboratory tests, and therefore they have the potential to realize both cost savings and increased statistical reliability for foundation design. The principle objective of this study is to demonstrate the feasibility of using artificial neural networks (ANNs) to predict different correlations from CPT and SPT results considering the uncertainties and non-linearity of the problem. ANN is used to predict CPT results from SPT results and to estimate the angle of internal friction and soil modulus of elasticity, which are important soil parameters, from CPT and SPT results considering the additional factors to improve the correlations. A large amount of field and experimental data including SPT/ CPT results, grain size distribution of different samples and a calculated data of overburden pressure was obtained. This data was used for the training and the validation of the neural network.
A comparison has been made between the obtained results from artificial neural networks (ANNs) approach, and some common traditional correlations of predicting CPT results (qc) from SPT results (N), angle of internal friction and soil modulus of elasticity from SPT results and angle of internal friction and soil modulus of elasticity from CPT results with respect to the actual results of the collected data.

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Dedication

To my parents,

Gamal Eldin Mahgoub and Iman S. Emara

To my beloved wife, sisters ,brother and my daughter

Samaa Saad, Walaa G. Mahgoub, Aya G. Mahgoub, Ibrahim G. Mahgoub and Beso

Thanks for your endless love, support and encouragement

To my thesis supervisor,

Prof. Mostafa A. Abukiefa and Dr. Dahlia H. Hafez

Thanks for your effort, excellent guidance and confidence in me

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