NUMERICAL MODELLING OF AXIALLY LOADED PILES IN LAYERED MEDIA

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MOHAMED THAMBY ATHAM BAWA

DEPARTMENT OF CIVIL ENGINEERING
UNIVERSITY OF MORATUWA
SRI LANKA

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ABSTRACT

Numerical analysis of axially loaded piles in stratified soil media has been carried out by using a simple interface finite element based on the principle of linear elasticity to model shear stress transfer at the pile-soil interface. The pile and soil materials are considered as linear elastic materials. The shear stress distribution profile at the interface and the axial load variation within the pile along the pile length are determined numerically for varying thickness of weak layer sandwiched between two competent layers at the top and bottom of the pile. A parametric study is carried out for a range of values of the constitutive parameter used in the interface elements to represent the interface resistance.

A theoretical approach is proposed to evaluate the value of the constitutive parameter used in the interface elements to represent adhesion and friction by considering various factors such as soil disturbance due to installation of pile under drained and undrained conditions. The results are obtained using the theoretically derived values for the constitutive parameter used in the interface elements and these are compared with the results obtained earlier in the parametric study done by varying the value of for the constitutive parameter for interface resistance.

The effect of angle of friction and cohesion of the weak layer sandwiched between two competent layers at the top and bottom of the pile under drained condition for bored piles is investigated with the theoretically derived value for the constitutive parameter. The distribution of interface shear stress and the axial load transmitted along the pile are obtained for a range of thickness of the weak layer. The results are presented in graphical form for convenience in comparison.

C O N T E N T