

Three Dimensional Analysis of Piles on Sloping Ground Subjected to Passive Load Induced by Surcharge

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Abstract

Pile foundations are slender structural elements used to transfer loads from structures into deep hard strata below the ground level. It is time consuming and expensive to carry out field test over the piles in larger lengths. Computer simulations of Finite Element/Finite Difference Modelling will allow for in depth studies to analyze the pile – soil interaction of laterally loaded piles on sloping ground under passive loading. This paper presents a three dimensional finite difference analysis for the lateral response of pile located at the horizontal ground and crest of slopes of 33 degrees 40 min, 26degrees 33min, 18 degrees 27min with relative densities of 30%, 45%, and 70%. The soil stratum is represented as elastic-plastic Mohr-Coulomb model and pile is represented as beam element. The results of Model test are analyzed and compared. Based on the results of model test, conclusions are drawn regarding the application of the analytical method to study the effect of slope on laterally loaded pile under surcharge load. An equation is developed to calculate the depth of fixity for single pile in sloping ground considering the effect of slope, relative density and embedded length of the pile using the finite difference analysis results.

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