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DYNAMIC INTERACTION BETWEEN TWO NEIGHBORING PILES UNDER HARMONIC LOAD

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ABSTRACT

The present work studies the effect of interaction between two neighboring piles. The piles considered in a soil half space. The effects of soil type, the distance between piles, the excitation frequency of the dynamic load and the size of soil half space investigated. The analysis performed using the finite element method utilizing in the Ansys 12.0 software and the dynamic analysis is considered. Two types of dynamic analysis adopt. The first is the free vibration analysis which is employed to predict the natural frequencies and their corresponding modes shapes in two cases. The first case for the pile alone with fixed boundary conditions along its base and for the whole system. system which include the piles and surrounding soil. The resulted effect of soil types, also distance between piles and the size of soil half space on the natural frequencies are investigated. The second is the forced vibration analysis (harmonic analysis) which is performed to predict the effect of the excitation which transmits by soil from the dynamic source (from the loaded pile – first pile which loaded with harmonic load at the head of pile) before interaction with the second pile also after the interaction between two piles due to applied harmonic load on the head of second pile have the same magnitude of the load applied at the head of first pile before interaction but in opposite direction (so we have two piles under equally harmonic load but in opposite direction). This type of analysis is utilized to study the effect of several factor such as soil type also the distance between pile the excitation frequency of dynamic load and the size of soil half space before and after interaction. Result showed that the dynamic response of embedded piles to vibration through the soil is highly dependent on the soil type where the response of embedded piles on the half space of soft silty clay is greater than those on half space of medium silty clay and dense sand-gravel soil respectively. The response of embedded piles on the half space of layered soil consist of soft silty clay above dense sand gravel is greater than layered half space consist of medium silty clay above dense sand gravel. The displacement of pile head decrease with increasing distance between piles before interaction but the displacement of pile head increase with increasing distance between piles after interaction. For all cases the response of piles in lager half space always greater as compare with smaller half space. Resulted showed that it is important to include the soil-structure interaction in the analysis of the system dynamic response in order to correctly simulate the dynamic problems for controlling on the resonance phenomena.

KEYWORDS: Dynamic Interaction, Piles, Harmonic Load