Simple Mathematical Approach to Simulate Granular Fill Behavior under Dynamic Compaction

Ahmed M. Ebid

Abstract

improving soil parameters using dynamic compaction of was intensively studied by many researchers since 1980ŝs. Earlier researchers depended on statistical analysis of many case studies and soil dynamic principals to develop empirical formula used in designing dynamic compaction procedure. Recent researchers used different finite element models to describe the behavior of soil under dynamic compaction; those models varied between 1-D simple model and up to 3-D sophisticated ones. The aim of this research is to introduce a simple mathematical approach to simulate ground deformations and soil parameters improvement due to dynamic compaction. The proposed approach consists of two equations, the 1st one used to calculate the ground settlement due to one temper drop, the 2nd one used to calculate the updated soil parameters due to the ground settlement from the previous drop. By applying the two equations successively, both ground settlement and soil parameters improvement could be calculated after each tamper drop. The proposed approach was applied on four case studies and its results were so close to measured ones. The proposed approach could be used in designing or testing the dynamic compaction procedures and also in monitoring the quality of execution by comparing the measured settlement after each drop with calculated one

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