Deformation of cohesionless soils under repeated loading

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Abstract

In this thesis, the characteristics of a selected local sand have been determined under repeated-loading conditions in order to generate useful laboratory data that may depict the performance of sand material under moving loads.

Static and repeated-load triaxial compression tests were carried out on laboratory prepared sand samples of different preparation methods and at different relative densities. The preparation methods deployed were: Dry Vibration, Wet tapping and Pluvial Compaction Through Air.

The experimental results supported the use of a simple hyperbolic relationship that relates permanent axial strain to applied deviator stress and number of repeated stress applications. Additionally, effect of confining pressure and built-in stress history on the growth of permanent and resilient deformations were also investigated.

The analysis of the permanent axial deformations data along the lines of previously documented work, permits the use of a simple characterization model. The input parameters of the model may be utilized in conjunction with an existing software package bsed on elastic multi-layer theory to predict total accumulation of permanent deformation (rutting) as a result of a prescribed surface loading. Model parameters were found to depend on preparation method and relative density.