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Drained and Undrained Response of Fully Saturated Specimen in Resonant Column Tests Subjected to Large Number of Torsional Vibrations

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Abstract

In this paper, the drained and undrained responses of the saturated sand specimens have been investigated when subjected to small strain torsional excitation cycles using the resonant column apparatus. The sand specimens were reconstituted at an identical relative density of 40%. The fully saturated sand samples were then subjected to different effective isotropic consolidation stresses of 65, 100, and 150 kPa. For each test, thousands of vibration cycles were applied to the specimen by keeping the amplitude of cyclic driving torque constant. The response of the specimen was evaluated in both drained and undrained conditions. Beyond threshold strain, the undrained response of the saturated specimen demonstrated a considerable increase in porewater pressure and decrease in shear modulus; whereas axial strain increased substantially in case of vibrations applied to the specimen in drained conditions This type of study would be beneficial to determine deformational characteristics of fully saturated sand stratum beneath various vibratory machines which impart small stain and high-frequency vibrations.

Keywords: Resonant column test, Vibration cycles, Porewater pressure