Explanation for pore water pressure build-up process of sandy deposits due to seismic excitement using a numerical tool

Dr. C.W. Lu
Assistant professor, Department of Construction Engineering National Kaohsiung First University of Science and Technology, Taiwan
Email: cwlu@ccms.nkfust.edu.tw

Numerical modeling of excess pore water development of soils using advanced constitutive models and numerical techniques has been the subject of many investigations in recent years. The vast majority of recent works has been based on the use of the generalized Biot formulation along with a plasticity based constitutive model. The numerical models involving Biot formulation and plasticity based constitutive relationships are essentially addressing the stress-strain behavior of the soil skeleton and the flow of pore fluid through the soil. While the interest in improving the capabilities of constitutive models for soils is quite intensive, the effect of pore water flow through the soil in a dynamic problem has received less attention. Therefore, the goal of this paper is to use a numerical model with advanced soil constitutive model in excess pore water pressure development problems and further more to investigate the liquefaction process of sandy soils induced by a seismic excitation. It is also essential to define soil liquefaction in this paper as that the soil deposits have tendency to densify when subjected to earthquake loading. However, when saturated, the tendency to densify causes the excess pore water pressure to increase. This, in turn, results in the effective stress of soil to decrease. As a consequence, the cohesionless deposit will lose a substantial strength and a subsequent reduction in soil volume until the excess pore water pressure has a chance to dissipate. The phenomenon of pore pressure build-up following with the loss of soil strength is known as liquefaction (Committee on Earthquake Engineering in USA, 1985)

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