Seismic Evaluation of Liquefaction Potential of Soil Interacting by Single Pile

Previous studies show that liquefaction induced large lateral displacement has imposed severe damages to many structures supported on pile foundations during earthquakes. So, evaluating the potential for instability caused by the development of excess pore pressure is an important consideration to safe and resistant design of deep foundation against this event. In this study the liquefaction potential of saturated sand interacting by single concrete pile and the dynamic behavior of pile simulates by means of finite difference method. A nonlinear effective stress analysis is used to evaluating soil liquefaction and the soil-pile interaction is considered by using interface elements. The parameter Ru was defined as the pore water pressure ratio to investigate liquefaction in the soil mass during time. A set of numerical models carried out by three types of soil mass with various condensation (loose, semi-dense and dense) under three ground motion with different predominant frequencies and peak accelerations. Effect of these parameters is studied by the excess pore pressure, lateral movement and settlement time histories of liquefiable deposits at near pile and free-field. It is found that for various soil and various earthquake characteristics, the depth of soil liquefaction and it’s triggering, varies.