PRESSURE WAVE PROPAGATION IN A SATURATED SOIL LAYER WITH SPECIAL REFERENCE TO SOIL LIQUEFACTION

PRATER,E.G.

Of considerable interest to engineers is the phenomenon of liquefaction in water-saturated soil media due to seismic or artificially induced shock loading. Most previous investigations of pressure wave propagation in the ground have considered the soil to be single-phased. Useful as these studies were - and it should be mentioned that various refinements in nonlinear stress-strain behavior have been considered - they give no direct information on the generation of pore water pressures or the variation of effective stresses in the soil. The liquefaction phenomenon is closely related to nonlinear material behavior in the solid phase. In the present paper Biots theory of propagation of elastic waves in fluid-saturated porous media has been made a starting point for the development of a nonlinear theory suited to soils. For a uniformly loaded ground surface one dimensional behavior may be assumed. Firstly, for a linear elastic solid phase comparisons are made between the results obtained by two numerical methods: the characteristics and the finite difference methods. The latter is developed for the nonlinear analysis of soil with locking behavior and permanent compressive strains. The theory is applicable to seismic and blast loading.