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Numerical Solution For 1-D Consolidation Of Partially Saturated Soil Under Cyclic Loading

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Abstract

The distribution of consolidating load in a partially saturated soil is directly related to the dispersion of pore-water and pore-air pressures within the soil matrix. This paper presents a numerical solution to 1-D consolidation equation proposed by Fredlund and Hasan's for two layered partially saturated soil subjected to various cyclic loadings. It is assumed that during consolidation process rate of volume change and coefficient of permeability remain constant. Particularly, an implicit finite-difference method is used to find numerical solution. A computer program is developed and based on the developed formulation the response of pore-air, pore-fluid and soil-mass along with degree of consolidation for pore-air and pore-water is presented. Validation for analytical method is also presented for constant loading using numerical techniques.

Keywords: Partially saturated soil, Finite-difference method, 1-D consolidation, Numerical solution, Cyclic loading