ON THE ONE-DIMENSIONAL CONSOLIDATION UNDER CYCLIC LOADING

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Abstract

Presented and discussed in this seminar are three solutions for one-dimensional consolidation of a clay deposit having a permeable top and bottom (abbreviated as PTPB) or a permeable top and impermeable bottom (PTIB) subjected to haversine cyclic loading.

The analytical solution for excess pore-water pressure is developed using infinite series, while the finite difference solution is obtained using implicit finite difference technique.

The third solution is a finite element solution using the finite element program PLAXIS. For this solution, twenty triangular six node elements are used. The time variation of excess pore-water pressure at the bottom of PTIB case, is presented showing pronounced oscillation indicating changes of sign of excess pore-water pressure. Similarly, the time variation of effective stress at the bottom of PTIB case is shown indicating that a "steady state" is achieved at a dimensionless time factor of about $T_v = 1.5$.

Included also in this work is the effect of rest period of haversine cyclic loading on the consolidation process. The study reveals that the negative excess pore-water pressure is less (in absolute value) than that of zero rest period and that the average effective stress converges always to the corresponding average of the related haversine cyclic loading with rest period.

***** Everyone is invited – refreshments will be available*****

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