

FINITE ELEMENT ANALYSIS OF ONE DIMENSIONAL CONSOLIDATION IN CLAY USING MODIFIED CAM CLAY MODEL

Abstract—The use of Terzaghi's theory of consolidation is limited to cases in which the applied load is normal to the soil body, the thickness of the soil is uniform and the permeability is constant throughout the consolidation process. The assumption of a linear relationship between stress and strain does not comply with the reality where the best-fit line between the void ratio and vertical stress in the oedometer consolidation test is a nonlinear curve. Also, the decrease in permeability of soil due to a decrease in the void ratio in the soil during the progress of consolidation is not regarded in Terzaghi consolidation theory. Terzaghi consolidation theory not being based upon any constitutive model, the analysis of consolidation under complex loading conditions such as isolated footing and pile foundations where the assumption of onedimensional loading or only principal state of loading are not applicable, becomes impossible by the sole use of Terzaghi consolidation theory. This paper describes the use of the Modified Cam Clay constitutive model along with coupled pore-fluid pressure dissipation analysis for simulation of oedometer consolidation test and compares the performance of MCC model with non-linear onedimensional consolidation theory.

Keywords—*Constitutive model, MCC, Critical state line, oedometer consolidation test.*