

## Numerical Investigation of Soft Clayey Soil Improved by Soil-Cement Columns under Harmonic Load

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**Abstract :** Deep soil mixing is one of the improvement methods in geotechnical engineering which is widely used in soft soils. This article investigates the consolidation behavior of a soft clay soil which is improved by soil-cement column (SCC) by numerical modeling using Plaxis2D program. This behavior is simulated under vertical static and cyclic load which is applied on the soil surface. The static load problem is the simulation of a physical model test in an axisymmetric condition which uses a single SCC in the model center. The results of numerical modeling consist of settlement of soft soil composite, stress on soft soil and column, and excessive pore water pressure in the soil show a good correspondence with the test results. The response of soft soil composite to the cyclic load in vertical direction also compared with the static results. Also the effects of two variables namely the cement content used in a SCC and the area ratio (the ratio of the diameter of SCC to the diameter of composite soil model,  $a$ ) is investigated. The results show that the stress on the column with the higher value of  $a$ , is lesser compared with the stress on other columns. Different rate of consolidation and excessive pore pressure distribution is observed in cyclic load problem. Also comparing the results of settlement of soil shows higher compressibility in the cyclic load problem.

**Keywords :** area ratio, consolidation behavior, cyclic load, numerical modeling, soil-cement column

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