Verification of two-dimensional consolidation solution for geotextile tubes considering changes in vertical and horizontal drainage lengths

Hyeong-Joo Kim¹, *Peter Rey Dinoy², Tae-woong Park³, Hyeong-Soo Kim⁴, Jun-Young Kim⁵, and James Vincent Reyes⁶

 ¹⁾ Department of Civil Engineering, Kunsan National University, Gunsan 573-701, Korea
^{2), 4), 5), 6)} Department of Civil and Environmental Engineering, Kunsan National University, Gunsan 573-701, Korea
³⁾ Kunsan National University Institute of Offshore Wind Energy, Gunsan 573-701, South Korea
²⁾ peter_rey@kunsan.ac.kr

ABSTRACT

Geotextile tubes have been applied in shoreline and dewatering applications, and analyzing its consolidation behavior is necessary to be able to predict the project duration. However, time-dependent consolidation solutions for geotextile tubes have been very scarce due to the complex shape of the tube which changes as consolidation progresses. In this study, a two-dimensional consolidation solution for geotextile tubes is proposed considering the changes in vertical and horizontal drainage lengths. Because grid analysis of the geotextile tube is very difficult due to the complex shape of the tube, node analysis was proposed, in which the vertical and horizontal consolidation of the tube were analyzed independently. The input parameters used by the solution proposed in this study can be obtained from scale model tests. The consolidation parameters obtained from a scale model test and the consolidation solution proposed in this study were then verified by comparing the measured and predicted tube height from a field test. The results showed that the method proposed in this study can well-represent the behavior of geotextile tubes in comparison to methods which simplify the solution by only considering the change in tube height.

¹⁾ Professor

^{2), 4), 5), 6)} Graduate Student

³⁾ Ph.D.