

Nonwoven geotextile-sabkha and -sand interface friction characteristics using pull-out tests

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Abstract: Sabkha soil is abundant along the Arabian Gulf and Red Sea coasts and is a problematic soil due to its acute water sensitivity and chemical aggressiveness. In many situations, it is required to improve the load carrying capacity of sabkha, and the use of geotextiles was found appropriate. The objectives of this research were to study frictional characteristics of sand-geotextile-sand and sabkha-geotextile-sand interfaces and to compare the pull-out resistance of locally available nonwoven geotextiles taking into account different test parameters. An experimental setup was developed to conduct the pull-out tests. These test results have indicated the existence of three stages of deformation in the geotextile under pull-out testing, which ultimately lead to the slippage of the entire geotextile strip. The use of the pull-out plate reduces the effects of the lateral earth pressure developed on the front wall of the pull-out box and ensures that the free geotextile is kept within the box and, thus, under the required confinement throughout the test. The pull-out tests results indicated that high tensile strength geotextiles require a large pull-out force in the case of the sand-geotextile-sand interface, whereas the least extensible geotextile requires the maximum pull-out force in the case of the sabkha-geotextile -sand interface. It was also found that the geotextile surface texture and extensibility are the two main factors, in addition to the mass per unit area of the geotextile, in the case of sabkha-geotextile-sand interface.