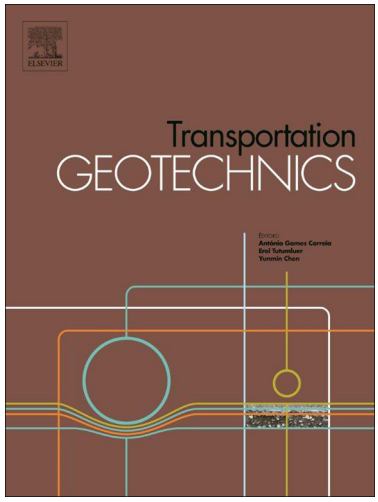

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Role of Suction Stress on Service State Behavior of Geosynthetic-Reinforced Soil Structures

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Abstract

Several design guidelines adopt limit state methods (e.g., earth pressure or limit equilibrium slope stability methods) to estimate the reinforcement loads for Geosynthetic-Reinforced Soil Structures (GRSSs). Field measurements usually reveal lower tensile loads in the reinforcements than that predicted by conventional design methods. Consequently, limit state methods have been criticized for being conservative or inaccurate. However, these lower-than-expected loads are primarily due to redundancy in design, attributed to several factors such as toe resistance, soil volumetric dilation, underestimation of soil shear strength, and the effect of suction stress. While these factors commonly contribute to the performance of the GRSSs, they are not accounted for in design procedures. This disregard is accredited to complexities and uncertainties associated with reliable quantification of these factors during the life span of the structure. By properly quantifying the role of suction stress, this study aims to quantitatively explain a part of the discrepancy which exists between the tensile loads in the reinforcement,