Abstract

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Numerical Modeling of Geogrid Reinforced Soil Bed under Strip Footings using Finite Element Analysis

This article aims to study the effect of reinforcement inclusions (geogrids) on the sand dunes bearing capacity under strip footings. In this research experimental physical model was carried out to study the effect of the first geogrid reinforcement depth (u/B), the spacing between the reinforcement (h/B) and its extension relative to the footing length (L/B) on the mobilized bearing capacity. This paper presents the numerical modeling using the commercial finite element package (PLAXIS version 8.2) to simulate the laboratory physical model, studying the same parameters previously handled in the experimental work (u/B, L/B & h/B) for the purpose of validation. In this study the soil, the geogrid, the interface element and the boundary condition are discussed with a set of finite element results and the validation. Then the validated FEM used for studying real material and dimensions of strip foundation. Based on the Experimental and numerical investigation results, a significant increase in the bearing capacity of footings due to an appropriate location of the inclusions in sand. The optimum embedment depth of the first reinforcement layer (u/B) equal to 0.25. The optimum spacing between each successive reinforcement layer (h/B) equal to 0.75 B. The optimum Length of the reinforcement layer (L/B) equal to 7.5 B. The optimum number of reinforcement is equal to 4 layers. The study showed a directly proportional relation between the number of reinforcement layer and the Bearing Capacity Ratio BCR, and an inversely proportional relation between the footing width and the BCR. Keywords—Reinforced soil, geogrid, Sand Dunes, Bearing Capacity.