



Numerical analysis of soil-bags system under shear force

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Abstract

The soil-bag system consists of the soil constrained into a polymeric bag which is defined based on tension strength, size, geometric form of polymeric bag and the characteristics of building materials filling inside it which depend on internal friction angle of the soil. The main purpose of this paper is to study the impact of friction coefficient between the polymer bags, under the effect of shear force. Then the mechanical behavior of the soil bags under shear force has been studied in three-dimensional mode, using the finite element software ABAQUS. The results show that the relative horizontal displacement between the bags reduces by increasing the friction coefficient between the surfaces of the bags.

Keywords: Numerical, soilbag, shear force

1. INTRODUCTION

Soil-bag system consists of polymeric bag with determined dimensions and the soil. This system obtains its strength through elastic resistance of bag and mechanical characteristics of filler building materials. The soil-bag system consists of the soil enclosed into a polymeric bag which is defined based on tension strength, size, geometric form of polymeric bag and the characteristics of soil filling inside it which depend on internal friction angle. When soil-bag system undergoes vertical loading, tension force produced into the bag cover causes to increase vertical force (N), consequently, this causes to increase the force between soil particles (μ = soil friction coefficient and $F=\mu.N$).

The kind of filling materials mostly depends on the application of soil-bag system and availability of materials. The most important characteristic implemented into the structure of soil-bag system is tension strength of the polymer implemented in the bag. Bags implemented into soil-bag system are generally built of polyethylene or polypropylene polymers. The structures equipped with soil-bag system enjoy abundant technical and economic advantages compared to similar concrete and stony structures.

Applications of soil bags

- The construction of emergent structures temporarily
- Equipment in the bed of inner-urban roads in order to decrease the vibrations resulted from traffic
- Equipment of embankment layers in technical buildings including retaining wall and
- Increase in bearing capacity of shallow foundations can be addressed.

The establishment and maintenance of infrastructure such as the roads, embankments and Retaining Wall entail to implement some methods which don't damage the surrounding environment, in addition to cost-effectiveness. This goal can be achieved by exploiting soil-bag system. One of the important factors to select this kind of system is the speed of its construction compared to other systems to establish the emergency structures and its role in Passive defense. Sometimes, it is not possible to stabilize loose soils in civil projects using mechanical machinery due to the existence of roads difficult to pass or hard executive condition of the project. For example, when the road surface is destroyed because of lateral slide in sleep regions; in order to create communicative way within as minimum time as possible, using polymeric bags filled by loose soils of the project site can be an appropriate option to solve the above-mentioned problem.