

The effect of geocell dimensions and layout on the strength properties of reinforced soil

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Abstract

One of the most disturbing problems that always focus on the minds of civil engineers is finding solutions to improve the strength properties of earth structures. The selection of appropriate materials with acceptable shear strength characteristics and the compaction of soil layers is the easiest and most economical way to obtain the maximum shear strength if possible but neither always there is good access to high quality materials nor the possibility for all the earth's structures to be condensed using conventional methods. Therefore, other strategies must be adopted in order to achieve the desired strength properties, which is the aim of this study. In this paper, both laboratory experiments and numerical analysis of the effect of geocell pocket opening size on the shear strength of reinforced soil in various sections of the reinforced element by finite element method has been investigated and the effect of changes in the ratio of height to diameter of the geocell was also studied using ABAQUS software. Results show that geocell with smaller pocket opening diameter will increase the shear strength of the soil. The maximum increment was up to 31% for the geocell with the smallest pocket opening size of 25 mm. It was also observed that despite the increase in the pocket opening diameter (up to 80%), only a little decrement of 4% occurs in the value of shear strength. By increasing the aspect ratio (height to diameter ratio) of geocell, the interface shear strength between the soil and the geocell edge increases. This increment rate of the interface shear strength between the soil and edge of geocell was linear relative to the unreinforced soil.

Key words: Reinforced soil, Geocell, Direct shear test, Finite element, ABAQUS

1.Introduction

One of the most disturbing problems that has always focused on the minds of civil engineers is finding solutions to improve the strength properties of earth structures. The