IJG> Vol.1 No.1, May 2010

OPEN ACCESS

Effects of Polypropylene Fibers on the Shear Strength of Sandy Soil

PDF (Size:932KB) PP. 44-50 DOI: 10.4236/ijg.2010.11006

Author(s)

Mousa F. Attom, Adil K. Al-Tamimi

ABSTRACT

This paper presents the effect of two types of polypropylene fibers on shear strength parameters of sandy soil. To achieve the goals of this research, a sandy soil was obtained from a depth of 40 cm from the natural ground surface around American University of Sharjah. Two types of polypropylene fibers; one highly flexible with flat profile and the other with relatively high stiffness and crimped profile were used in this study with four different aspect ratios (L/D) for each type. The initial physical properties of the sand such as specific gravity, angle of internal friction and shear strength were obtained in accordance with American Standard for Testing and Materials (ASTM). The sandy soils were mixed with the two types of fibers at different percentages by dry weight of the sand and four different aspect ratios. The test results of the study showed that the shear strength of the sand increased with increasing the flexible flat profile fibers content. Also it was noticed that by increasing the aspect ratio of the flexible flat profile the angle of internal friction and the shear strength increased. The crimpled profile fiber increased the shear strength of the sand under high normal load and has small or no effect on shear strength of the sand at low aspect ratio under low normal load.

KEYWORDS

Sand, Fibers, Angle of Internal Friction, Shear Strength, Aspect Ratio

Cite this paper

M. Attom and A. Al-Tamimi, "Effects of Polypropylene Fibers on the Shear Strength of Sandy Soil," *International Journal of Geosciences*, Vol. 1 No. 1, 2010, pp. 44-50. doi: 10.4236/ijg.2010.11006.

References

[1] M. F. Attom, "The Effect of Compactive Energy Level on Some Soil Properties," Applied Clay Science, Vol. 12, No. 1-2, 1997, pp. 61-72.

[2] I. Yilmaz and B. Civelekoglu, "Gypsum: An Additive for Stabilization of Swelling Clay Soils," Applied Clay Science, Vol. 44, No. 1-2, 2009, pp. 166-172.

[3] A. A. Al-Rawas, A. W. Hago and H. Al-Sarmi, "Effect of Lime, Cement, and Sarooj (Artificial Pozzolan) on the Swelling Potential of an Expansive Soil from Oman," Building and Environment Journal, Vol. 40, No. 5, 2005, pp. 681-687.

[4] K. M. A. Hossain, M. Lachemi and S. Easa, "Stabilized Soils for Construction Applications Incorporating Natural Resources of Papua New Guinea," Resouces Conservation and Recycling Journal, Vol. 51, No. 4, 2007, pp. 711-731.

[5] E. Kalakn, "Effects of Silica Fume on the Geotechnical Properties of Fine-Grained Soils Exposed to Freeze and Thaw," Cold Regions Science and Technology, Vol. 58, No. 3, 2009, pp. 130-135.

[6] J. D. Nelson and D. J. Miller, "Expansive Soils: Problems and Practice in Foundation and Pavement Engineering," John Wiley and Sons Inc., New York, 1992.

[7] M. M. Abu-Zreig, N. M. Al-Akhras and M. F. Attom, "Influence of Heat Treatment on the Behavior of Clayey Soils," Applied Clay Science, Vol. 20, No. 3, 2001, pp. 129-135.

- Open Special Issues
- Published Special Issues
- Special Issues Guideline

IJG Subscription

Most popular papers in IJG

About IJG News

Frequently Asked Questions

Recommend to Peers

Recommend to Library

Contact Us

[8] K. L. Lee, B. D. Adams and J. M. Vagneron, "Reinforced Earth Retaining Walls," Journal of Soil Mechanics and Foundation Division, ASCE, Vol. 99, No. 10, 1973, pp. 745-764.

[9] S. W. Park, R. L. Lytton and J. W. Button, "Forensic Investigation of Pavement Distortions Using Soil Suction," Journal of Transportation Engineering, Vol. 125, No. 1, 1999, pp. 60-66.

[10] M. N. Fatani, G. H. Bauer and N. Al-Joulani, "Reinforcing Soil with Aligned and Randomly Oriented Metallic Fibers," Geotechnical Testing Journal, Vol. 14, No. 1, 1991, pp. 78-87.

[11] S. Ziegler, D. Leshchinsky, H. I. Ling and E. B. Perry, "Effect of Short Polymeric Fibers on Crack Development in Clays," Japanese Geotechnical Society, Vol. 38, No. 1, 1998, pp. 247-253.

[12] T. Yetimoglu and O. Salbas, "A Study on Bearing Capacity of Randomely Distributed Fiber-Reinforced Sand Fills Overlying Soft Clay," Geotextiles and Geomembranes Journal, Vol. 23, No. 2, 2003, pp. 174-183.

[13] M. Esna-ashari and M. Asadi, "A Study on Shear Strength and Deformation of Sand Soil Reinforced with Tire Cord Waste," Proceeding the Fourth Asian Regional Conference on Geosynthetics, Shanghai, China, 2008, pp. 355- 359.

[14] D. H. Gray and H. Ohashi, "Mechanics of Fiber Reinforcement in Sand," Journal of Geotechnical Engineering, ASCE, Vol. 1109, No. 3, 1983, pp. 335-353.

[15] T. Park and S. A. Tan, "Enhanced Performance of Reinforced Soil Walls by the Inclusion of Short