

Improving the Compaction Properties and Shear Resistance of Sand Reinforced with COVID-19 Waste Mask Fibers

Authors : Samah Said, Muhsin Elie Rahhal

Abstract : Due to the COVID-19 pandemic, disposable plastic-based face masks were excessively used worldwide. Therefore, the production and consumption rates of these masks were significantly brought up, which led to severe environmental problems. The main purpose of this research is to test the possibility of reinforcing soil deposits with mask fibers to reuse pandemic-generated waste materials. When testing the compaction properties, the sand was reinforced with a fiber content that increased from 0% to 0.5%, with successive small increments of 0.1%. The optimum content of 0.1% remarkably increased the maximum dry density of the soil and dropped its optimum moisture content. Add to that, it was noticed that 15 mm and rectangular chips were, respectively, the optimum fiber length and shape to maximize the improvement of the sand compaction properties. Regarding the shear strength, fiber contents of 0.1%, 0.25%, and 0.5% were adopted. The direct shear tests have shown that the highest enhancement was observed for the optimum fiber content of 0.25%. Similarly to compaction tests, 15 mm and rectangular chips were respectively the optimum fiber length and shape to extremely enhance the shear resistance of the tested sand.

Keywords : COVID-19, mask fibers, compaction properties, soil reinforcement, shear resistance

Conference Title : ICEGGD 2023 : International Conference on Environmental Geotechnics and Geotechnical Design

Conference Location : Rome, Italy

Conference Dates : January 16-17, 2023