

Hydraulic Properties of Natural Fibres Bundles for Geotextile Applications

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Abstract: Natural fibres geotextiles have a versatile application in geotechnical engineering. Soil erosion control, reinforcement, road embankment stabilisation, and drainage are a few of the application areas. Synthetic fibres are predominantly used in geotextiles for drainage applications. However, in certain geotextile types, such as prefabricated vertical drain (PVD), natural fibres have an advantage over synthetic fibres where short service life, biodegradability, easy availability, and low cost are desired. Hence, evaluating the hydraulic properties of natural fibres and their blends is important. The hydraulic conductivities of assemblies containing coir, jute, kenaf, coir-jute, and coir-kenaf blended fibres were thoroughly studied. A simple test setup was developed by following ASTM D4716 (constant head permeability), which can be used to evaluate the hydraulic conductivities of the parallelly aligned fibrous bundles. The fibres were first parallelized by repeated combing and converted into a sliver using suitable carding machines. The parallelized fibrous medium was inserted into a sample holder (PVC tube). Water was allowed to pass through the fibrous medium, and the water discharge rate (g/min) was measured using an electronic balance weight and stopwatch. Porosity (ϕ) of the fibrous assemblies was maintained at 0.9, and the hydraulic gradient (i) was kept at 1. Coir fibre shows higher hydraulic conductivity than jute and kenaf fibres.

Keywords: Geotextile for drainage, Hydraulic conductivity, Natural fibres, Porosity, Hydraulic gradient.

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