

Behavior of Geogrid-Sand Interface in Direct Shear Mode

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Abstract: The contribution of transverse ribs to the soil-geogrids interaction under pullout mode has been well documented. However, the contribution of transverse ribs to the soil-geogrid interaction under direct shear mode is, at best, unclear. Consequently, this paper presents the results of a comprehensive direct shear testing program aimed at evaluating the contribution of transverse ribs to the interface shear. The direct shear tests involved Ottawa sand and several polyester geogrids with a variety of material tensile strength, percent open area, and aperture pattern. The test results show that the shear strength of sand-geogrid interfaces under direct shear mode is significantly higher than that of sand-geotextile interfaces. Analysis of shear displacement-strength response of the interfaces indicates that, in addition to interface shear components due to sand-rib friction and sand-sand shear at the location of the openings, the transverse ribs provide additional contribution to the overall sand-geogrid interface resistance. Specifically, analysis of the results reveals that the transverse ribs of the geogrid used in this study provide approximately 10% of interface shear resistance. This contribution is positively correlated with the tensile strength and the stiffness of geogrid ribs, but is negatively correlated with the percent open area of the geogrid. A simple model is proposed to quantify the contribution of transverse ribs to the interface shear strength under direct shear mode.

Full reference:

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