

A Simple Device for in-Situ Direct Shear and Sinkage Tests

Authors : A. Jerves, H. Ling, J. Gabaldon, M. Usoltceva, C. Couste, A. Agarwal, R. Hurley, J. Andrade

Abstract : This work introduces a simple device designed to perform in-situ direct shear and sinkage tests on granular materials as sand, clays, or regolith. It consists of a box nested within a larger box. Both have open bottoms, allowing them to be lowered into the material. Afterwards, two rotating plates on opposite sides of the outer box will rotate outwards in order to clear regolith on either side, providing room for the inner box to move relative to the plates and perform a shear test without the resistance of the surrounding soil. From this test, Coulomb parameters, including cohesion and internal friction angle, as well as, Bekker parameters can be inferred. This device has been designed for a laboratory setting, but with few modifications, could be put on the underside of a rover for use in a remote location. The goal behind this work is to ultimately create a compact, but accurate measuring tool to put onto a rover or any kind of exploratory vehicle to test for regolith properties of celestial bodies.

Keywords : simple shear, friction angle, Bekker parameters, device, regolith

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