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SHEAR STRENGTH TEST ON UNSATURATED SOIL USING NATURAL MICROSCOPIC SURFACE TENSION FORCE

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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ABSTRACT

The shallow infiltration influence slope failure is a complex soil mechanical behavior according to geotechnical engineers. This is because it is very difficult to obtain factor of safety less than unity according to conventional slope stability method for the shallow type of slope failure. The process involves the propagation of wetting front into the unsaturated soil zone. This involved the mechanics of saturated and unsaturated soil. The soils shear strength tests for saturated soils is well established and straight forward however the strength tests for unsaturated soils involves a very complex procedure. The procedure includes equalization, consolidation and shearing stages. The equalization process is a slow and tedious process where pore air and pore water pressure subjected to the partially saturated specimen are maintained and wait for the slow movement of the specimen water to travel through the ceramic disk attached at the base of the specimen until the flow ceased. The main aim of this thesis is to establish a simpler method of testing when the test makes use of natural microscopic surface tension force that exist in the unsaturated soil specimen. The study is to verify that this method produce the same stress-strain behavior as compared to the conventional axis-translation method using double walled triaxial cell. The study incorporates the state–of-the-art knowledge on the landslide behavior applying the curvi-linear failure shear strength behavior incorporating the effect of infiltration and soaking which is normally neglected in slope stability analysis. This approach allows the understanding of the occurrence of shallow infiltration induced landslide. By this understanding the potential slope failure can be reliably identified and mishaps can be prevented to salvage life and properties.

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