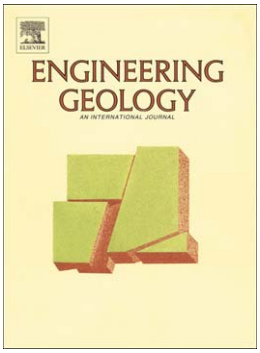

Experimental study on soil-water characteristic curve for silty clay with desiccation cracks

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Experimental study on soil-water characteristic curve for silty clay with desiccation cracks

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ABSTRACT

Cracks are ubiquitous in soils and can provide preferential pathways for rainfall infiltration and contaminant transport. The soil-water characteristic curve (SWCC) for a cracked soil is required when conducting seepage analysis. However, measuring SWCCs for cracked soils is difficult due to two reasons: (1) The presence of cracks leads to a significant change in the water content at extremely low suctions that cannot be controlled accurately; (2) The full development of cracks generally requires a large apparatus to accommodate the representative elementary volume of a crack network. This study aims to develop an experimental method to measure the SWCC for a silty clay with desiccation cracks. A large apparatus, 350 mm in diameter and 280 mm in height, was developed, which is capable of controlling extremely low suctions (<0.01 kPa) at an accuracy of 0.005 kPa and accommodating a clay sample with fully developed crack networks. The crack development in the soil sample was observed, providing necessary parameters for the prediction of SWCCs based on a theoretical model for cracked soils. The drying and wetting SWCCs for a silty clay with desiccation cracks were measured in the suction range from 0.01 kPa to 300 kPa, and compared with the SWCCs predicted using the theoretical model.

Keywords: Crack, unsaturated soil, soil-water characteristic curve, hydraulic conductivity, seepage

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