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PROCEEDINGS

Influence of Stress and Hydraulic History on Water Retention Curve of Natural Loess in the Suction Range of 0-367.5MPa

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ABSTRACT

Natural loess is a kind of kaolin wind-deposited soil. The different layers of loess experienced different overburden pressures and wetting-drying cycles, resulting in different water retention behaviors. The axis translation technique and the vapor equilibrium technique to determine the water retention behavior of the three different sediment depth natural loess during drying and wetting process. In addition, the microstructure evolution experienced wetting and drying cycles also characterized by mercury intrusion porosimetry. The saturation and air entry value increased with the sediment depth increased because deeper sediment depth means lower initial void ratio. The water retention curve shows that there is almost no hysteresis observed around the natural suction, and in relatively low suction range (0-450 kPa) has a larger degree of hysteresis than the larger suction range(3.29 MPa-367.5 MPa). The three different sediment depth loess exhibited different average degrees of hysteresis, this is mainly because the different sediment depth loess has experienced different in-situ hydraulic history (seasonal changes, change of water table). The microstructure evolution was investigated by mercury intrusion porosimetry. It appeared that the cumulative intrusion void ratio is increased after wetting-drying cycles, and the drying-wetting cycles mainly affect population of small pores. This study can help us understand the memory of stress history and hydraulic history on the water retention curve of natural loess.

KEYWORDS

Natural loess; water retention curve; stress and hydraulic history; microstructure evolution

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