

Temperature effects on hydro-mechanical characteristics of Kaolinite Temperature effects on hydro-mechanical characteristics of Kaolinite

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The concern of thermal effect on geo-mechanical behaviors of soils is growing especially due to the applications of ground source heat pumps (GSHP) as well as nuclear waste disposal facilities in geo-environment. The effects of temperature variation on hydro-mechanical characteristics of clay (Kaolinite) were investigated by using a modified oedometer test. The standard oedometer apparatus was modified by installing heat coils, bender elements, and water tanks, which enable the sequential measurements of consolidation characteristics, shear modulus, and hydraulic conductivity for the sample under different consolidation pressure and temperature conditions. In this study, pre-consolidated Kaolinite (ASP 100 clay) samples (6cm diameter with 10cm height) were used to perform consolidation tests at three temperatures (5°C, 15°C, 40°C). Under each consolidation pressure, the greater saturated hydraulic conductivity (K_s) was observed at higher temperature whereas the void ratios were almost similar at the same consolidation pressure. Further measurements of shear modulus, pore size distribution, and surface areas analysis will be performed for the samples during consolidation tests at different temperature conditions. The hydro-mechanical characteristics of kaolinite induced by temperature such as volume change behaviors and hydraulic property will be discussed with information on the micro-scale pore structure of the samples.

キーワード: temperature, hydro-mechanical characteristics, Kaolinite, modified oedometer

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