

Thermal Properties Of Malaysian Cohesive Soils

ABSTRACT

The thermal properties of soils surrounding energy piles are required for the efficient and optimal design of shallow geothermal energy pile systems. In this study, the thermal conductivity, thermal resistivity and volumetric specific heat of two types of Malaysian cohesive soil were obtained through a series of laboratory experiments using a thermal needle probe. This study was conducted to determine the effect of moisture content on the thermal conductivity, thermal resistivity and volumetric specific heat values of the cohesive soil at a given value of soil density. For soils with low to medium moisture content, a linear increase in the thermal conductivity and volumetric heat capacity was observed as the moisture content gradually increased, while the thermal resistivity values of the soil had decreased. Meanwhile, for soils with high moisture content, the thermal conductivity was observed to have decreased, and a marked increase was seen in the thermal resistivity. This is due to the disruption of the thermal flow continuity in the soil matrix with the presence of moisture in the soil which adversely affects the thermal conductivity.