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The effect of carbon-nanofiber and hydrated lime on weak soil stability
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Abstract
Stabilization of soils is the most common way of improving soil engineering properties like permeability, compressibility, durability, strength and plasticity. In this study, all the experiments were carried out to investigate the effects of Carbon-Nanofiber and lime on the soil stability. Soil was collected from Kajang, Malaysia. According to the American Association of State Highway and Transportation Officials (AASHTO), the soil is classified as Clayey soil which is considered as weak soil. The percentage of the optimum water content was found for the native soil using the proctor test. Atterberg's limit and soil classification tests were conducted to characterise the native soil while Unconfined Compressive Strength test was conducted to evaluate the soil-lime-nano mixture. Hydrated lime was added by 5% by weight of the soil and three different percentages of Carbon-Nanofiber which are 0.05%, 0.075% and 0.1% were chosen to be mixed with soil-lime mixture. The apparatus of Ultrasonic Homogenizer was used to mix the nano with water to become homogenous and to make sure that the CNF is not agglomerated. Three different curing times were chosen to be 7, 14 and 28 days. It was found that the optimum water content of the native soil is 17%. The UCS results show that adding lime to the native soil could not improve the soil strength sufficiently. However, adding CNF improves the soil-lime mixture. Increasing the CNF percentage and curing time improve the strength of the soil. The bridge-connecting effect of CNF shown by FSEM images served as a bridge across voids and cracks, besides assuring load transfer in the case of tension. In conclusion, Carbon-Nanofiber has a significant potential to improve the strength of weak soil which is stabilized with lime.

Author Keywords
Carbon; Curing; Fibres; Lime; Mechanical Properties; Nano; Strength of Materials

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