

Young's modulus of peat soil under cyclic loading

ABSTRACT

Peat soil classified as high organic content with diverse range of fibers, distinctive intrinsic properties with low shear strength. The behaviour of peat soils under dynamic loading conditions has been studied. Therefore, a series laboratory of cyclic triaxial test on peat soil carried out to determine the effect of cyclic loading to the peat soil behavior after subjected to cyclic loading is presented. In this study, the frequencies applied for the dynamic testing on the peat soil samples were focused and simulated on traffic vehicle loading frequencies, earthquakes and machine operations. Peat soil sample used from Parit Nipat, Malaysia (PNpt) with natural moisture content, $m = 603\%$ and liquid limit of $w_l = 231\%$. A series of undrained cyclic triaxial test were performed on undisturbed peat soil sample under isotropically consolidated specimens. In addition, the strain of amplitude applied is 0.1% to investigate the effectiveness of large strain amplitude response by allowing the generation of cyclic pore pressure and developed stress-strain cycle during cyclic loading. Correspondingly, the undrained Young's modulus of the undrained shear strength subjected to cyclic loading in this study in the range of 60 to 70 for hemic peat soil. The specimen loaded into specific frequency causes in reduction of Young's modulus related to stiffness and more pronounced in softening behaviour. The hysteresis-loops profile with regard to E parameters from 1st cycle to 100th cycles of Young's modulus, E (MPa) for PNpt degrades precisely to an applied effective stress, 0.4 MPa (25 kPa) and 0.4 MPa (50 kPa). Cyclic loading frequencies resulted in decreases of the Young's Modulus of peat soil that related to stiffness and more pronounced in softening behaviour. The result indicates that a reduction effect in the stress-strain cycle occurs in a peat soil from the initial stage of cyclic loading towards the end of 100th cycles due to the repeated loading application.