

Abstract

The static and the dynamic properties of an untreated and a lime treated fly ash have been investigated by means of unconfined compressive strength tests, triaxial compression tests and resonant column tests in the laboratory. Cyclic triaxial tests have been also carried out on the fly ash to investigate the liquefaction potential of the fly ash. The static and the dynamic properties of a local river sand have also been determined in the laboratory and compared with the published results on other sands. The liquefaction potential, dynamic shear moduli and the damping ratio of the fly ash have been compared with the corresponding values for the sand. Based on the experimental investigation, simple empirical relationships are developed to predict the maximum dynamic shear modulus and the damping characteristics of the sand and the fly ash. A number of correlations have been developed to predict the maximum dynamic shear modulus of the sand and the fly ash from the triaxial compression tests. The shear strength characteristics of the fly ash are studied with the addition of 4, 6, 8 and 10% lime to it. The effects of the lime content and the confining pressure on the dynamic shear modulus and the damping ratio have been investigated after 3, 7, 14 and 28 days of curing. A regression analysis has been performed on the experimental data and simple empirical formulae are developed to predict the maximum dynamic shear modulus of the lime treated fly ash after 3, 7, 14 and 28 days of curing. Empirical formulae are also developed to predict the maximum dynamic shear modulus of the lime treated fly ash from the results of the unconfined compressive strength tests and the triaxial compression tests. It is found that the dynamic shear modulus of the fly ash increases as the lime content, curing period and the confining pressure increase. It is observed that the damping ratio of the fly ash increases due to the addition of lime, but increase in lime content from 4 to 10% does not have any significant effect on the damping. It is also observed that the curing period does not affect the damping behaviour of the lime treated fly ash.

Keywords: Fly ash; Lime treatment; Resonant column test; Dynamic triaxial test; Shear modulus; Damping ratio.