Creep characteristics of local sands

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Abstract

In this research, the creep characteristics of saturated locally available silica sands have been studied under different stress states. Series of tests were performed on identically prepared triaxial specimens in the laboratory at a constant average relative density per series. The variables considered in this study were: mean effective pressure, deviatoric stress and relative density.

Silica sands obtained from dunes were used for this study. Samples were prepared by pluvial air compaction technique. Axial loads were applied by means of a lever-arm arrangement using table top consolidation device that had been converted to accommodate 2.8 inches triaxial cell. Volume change and axial strains were measured as a function of time.

Experimental data was compiled and analyzed in an attempt to verify the rheological model for sands proposed by Murayama et'al (1983). The experimental results showed that the ratio of elastic limit stress to isotropic precompression stress is independent of the value of precompression stress. At lower stress state, the creep strain rate shows a linear relationship with respect to time but at a higher stress, it can be depicted by polynomial relationship. The results show that the creep strain behavior can be uniquely expressed by the ratio of principal stress difference to the mean effective principal stress. It is found that elastic limit stress and failure strength of sand increases with relative density. Also, effect of variation of mean effective principal stress on creep behavior was studied. The results of these tests are consistent with those predicted by the equations proposed by Murayama et'al (1983) based on his rheological model for sands.