

Effect of confining pressure on particle breakage during shearing stage in consolidated drained (CD) triaxial tests on sand

ABSTRACT

The effect of confining pressure on particle breakage during the shearing stage of quartz sand has been studied in Consolidated Drained (CD) triaxial tests. Experimental investigations have been carried out on saturated sand specimens using standard triaxial apparatus. Two series of triaxial tests were done, firstly without unloading during the shearing stage and second, with unloading at 1% axial strain during the shearing stage. CD triaxial tests have been performed at high and low confining pressures i.e. 50, 100, 150, 200, 300 and 400 kPa. The specimen size is 50 mm in diameter and 100 mm in height and compacted to equal density. On each specimen, the particle size distribution test was carried out before and after the triaxial test was completed to check the number of broken particles. The results show that no definitive peak point was observed in the stress-strain relationship even after 20% axial strain and this is suspected due to particle breakage. As the confining pressure increased, it was found that the maximum deviator stress also increased. This study has shown that the particle breakage is very small. The increment in % finer material (<0.6 mm) ranged from 0.13% to 0.22%. It was found that the particle breakage increased with increasing the confining pressure. The particle breakage was very important in considering the sand's strength and volume change.