

Undrained Monotonic and Cyclic Triaxial Loading Behaviour of Solani Sand

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Monotonic loads are those in which direction of load of application does not change, whereas cyclic loading involves combination of increasing and decreasing loads, thus the direction of load also changes. Using Cyclic Triaxial Test apparatus, sample can be tested under both monotonic and cyclic loading, under both drained and undrained conditions. Drained condition occurs when pore pressure is allowed to drain out causing volume change in the sample. Conversely, undrained condition occurs when pore pressure is not allowed to drain out of the soil, which causes generation of excess pore pressure. Past studies by Hyodo et al.(1994), Guzman et al.(1988), Mohamad and Dobry (1986), reported flow deformation of sands having contractive behaviour and results were predicted using stress path.

The behaviour of saturated and dry samples of Solani sand is studies using Cyclic Triaxial. Both monotonic and cyclic triaxial tests were conducted under undrained condition. Results shows that strain at which samples fail, following initiation of strain softening behaviour, depends on confining pressure at which test is conducted. Reduction in shear strength of soil due to positive pore pressure generation and further gain in strength during strain hardening when pore pressure gets negative is also discussed.

For this study, a test plan was prepared and test results are used to analyse the difference in behaviour of soil. Water sedimentation method was used to prepare the sample at 50 % relative density. Strain controlled tests conducted for monotonic loading, were performed at strain rate 1 mm/min. For cyclic loading, tests were performed at 1% shear strain. Tests were conducted at four different confining pressures of 50 kPa, 100 kPa, 150 kPa and 200 kPa. Comparison of results is shown via shear strength and pore pressure plots with respect to strain values.

Keywords: Monotonic & Cyclic loading, Drained & Undrained Condition, Cyclic Triaxial Test, Strain Softening