

## Full-Field Estimation of Cyclic Threshold Shear Strain

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**Abstract :** Cyclic threshold shear strain is the cyclic shear strain amplitude that serves as the indicator of the development of pore water pressure. The parameter can be obtained by performing either cyclic triaxial test, shaking table test, cyclic simple shear or resonant column. In a cyclic triaxial test, other researchers install measuring devices in close proximity of the soil to measure the parameter. In this study, an attempt was made to estimate the cyclic threshold shear strain parameter using full-field measurement technique. The technique uses a camera to monitor and measure the movement of the soil. For this study, the technique was incorporated in a strain-controlled consolidated undrained cyclic triaxial test. Calibration of the camera was first performed to ensure that the camera can properly measure the deformation under cyclic loading. Its capacity to measure deformation was also investigated using a cylindrical rubber dummy. Two-dimensional image processing was implemented. Lucas and Kanade optical flow algorithm was applied to track the movement of the soil particles. Results from the full-field measurement technique were compared with the results from the linear variable displacement transducer. A range of values was determined from the estimation. This was due to the nonhomogeneous deformation of the soil observed during the cyclic loading. The minimum values were in the order of 10-2% in some areas of the specimen.

**Keywords :** cyclic loading, cyclic threshold shear strain, full-field measurement, optical flow

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