

Analysing the Permanent Deformation of Cohesive Subsoil Subject to Long Term Cyclic Train Loading

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Abstract : Subgrade soils of railway infrastructure are subjected to a significant number of load applications over their design life. The use of slab track on existing and future proposed rail links requires a reduced maintenance and repair regime for the embankment subgrade, due to restricted access to the subgrade soils for remediation caused by cyclic deformation. It is, therefore, important to study the deformation behaviour of soft cohesive subsoils induced as a result of long term cyclic loading. In this study, a series of oedometer tests and cyclic triaxial tests (10,000 cycles) have been undertaken to investigate the undrained deformation behaviour of soft kaolin. X-ray Computer Tomography (CT) scanning of the samples has been performed to determine the change in porosity and soil structure density from the sample microstructure as a result of the laboratory testing regime undertaken. Combined with the examination of excess pore pressures and strains obtained from the cyclic triaxial tests, the results are compared with an existing analytical solution for long term settlement considering repeated low amplitude loading. Modifications to the analytical solution are presented based on the laboratory analysis that shows good agreement with further test data.

Keywords : creep, cyclic loading, deformation, long term settlement, train loading

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