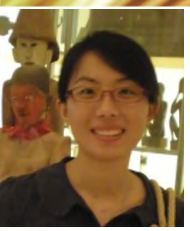
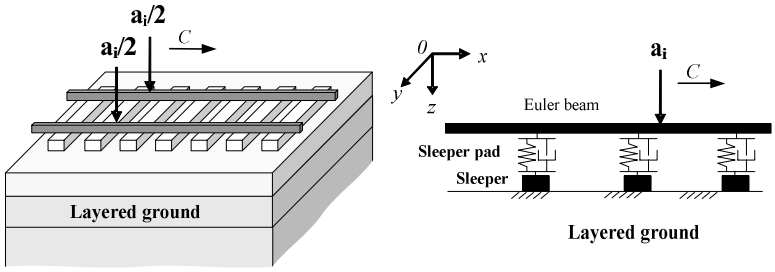


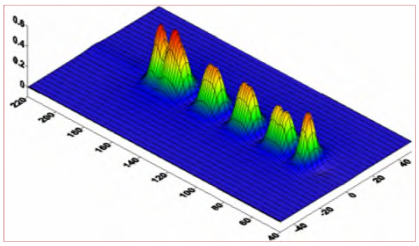
Dr Xueyu Geng

High-Speed Railway Embankment Stabilisation

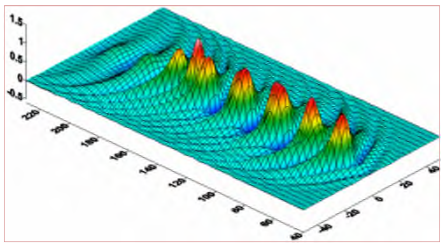
WARWICK
SCHOOL OF ENGINEERING

Stress Distribution and deformation caused by train loads

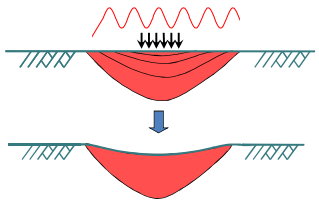




Low speed train (v = 150km/h)



High speed train (v = 350km/h)

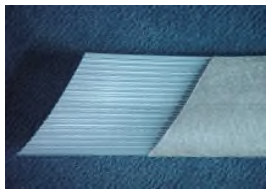


Long-term settlement induced by train

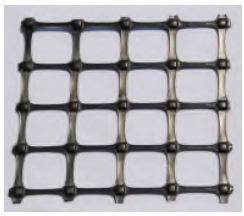
For low speed train, the stress inside ground is confined in a local area beneath the track, but for high-speed train, the affected area expanded to a wider and deeper area. Furthermore, the stress amplitudes increase dramatically, which means high-speed train will cause post-construction settlement more easily, especially for the embankment constructed on soft ground.

Ground Improvement Techniques

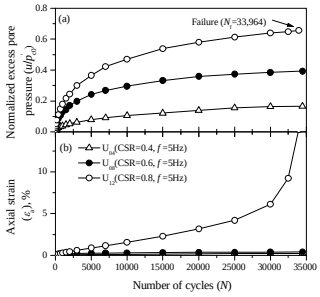
Vertical drain system accelerates soil consolidation by shortening the drainage path. By applying a vacuum pressure to the soil, the resulting negative pore pressure along the drains and on the soil surface can further speed up consolidation.



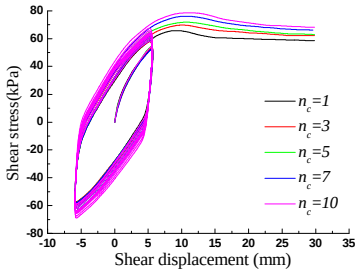
PVD
(for vertical movement)



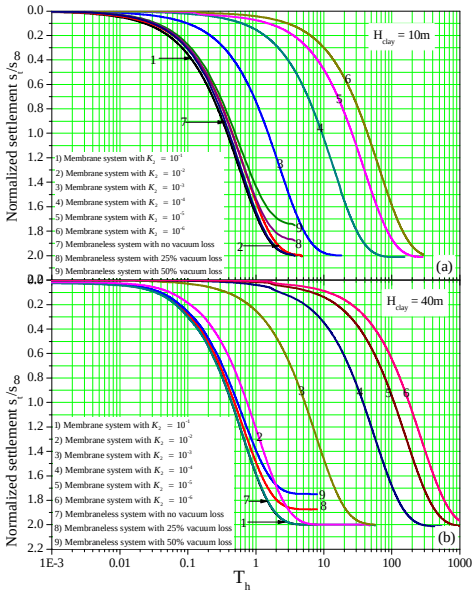
Geogrid
(for horizontal movement)



Normalised pore pressure and axial strains under f =5 Hz



Shear stress-displacement
(sand-geogrid interface with different number of cycles)



Normalized degree of consolidation for Membrane and membraneless system