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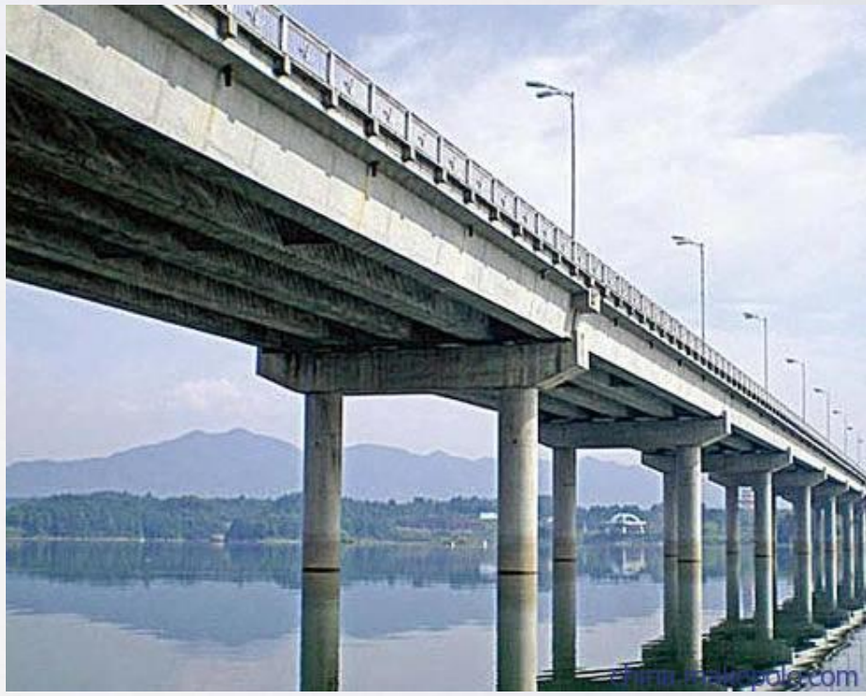
A new approach for time effect analysis in the settlement of single pile in nonlinear viscoelastic soil deposits

Key words:

Settlement, time effect, Hyperbola model, Idealized elastoplastic model, Viscosity, Wave equation analysis program

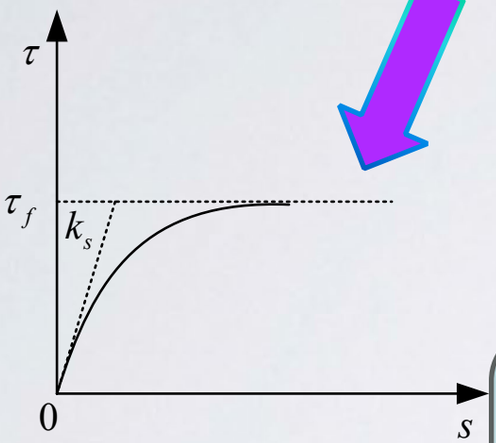
Prediction of the time effect of single pile settlement is of great importance



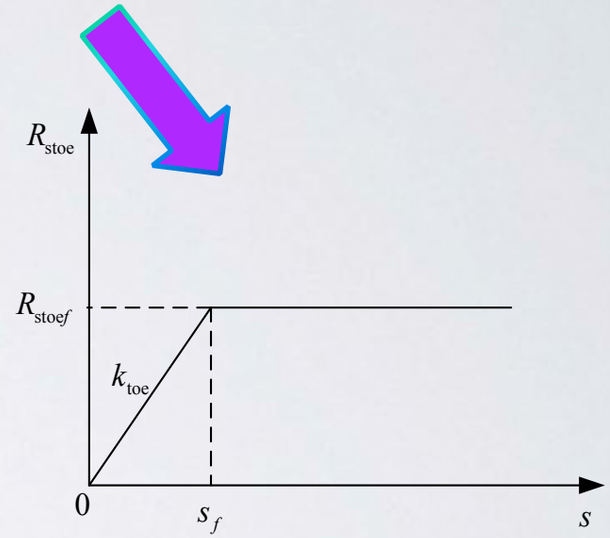
New approach presented in this paper

Pile lateral soil: hyperbola model

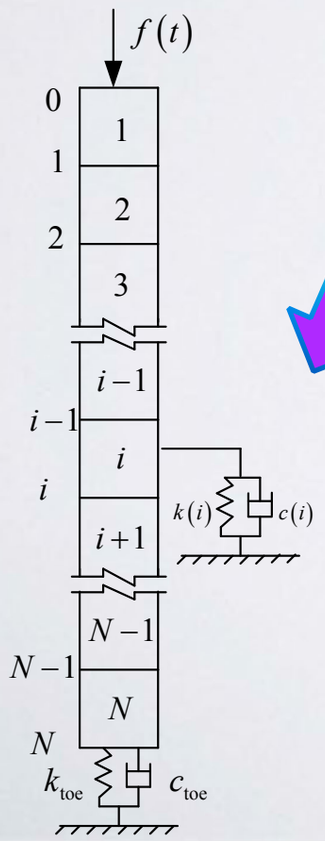
Pile end soil: idealized elastoplastic model



Viscosity of soil: linear damper



Wave equation analysis program based on traveling wave decomposition



Settlement, shaft resistance and axial force of the pile

conclusions

- The new approach can not only analyze the time effect of the settlement of a single pile but also obtain the distributions of the pile shaft resistance and pile axial force
- The time effect of settlement of a single pile is quite obvious
- Soil parameters have a more significant influence on the settlement behavior of a single pile than the concrete strength grade of the pile body

Field test

Vertical static load test

The comparison of the calculated results and the measured results shows that the approach presented in this paper is effective to simulate the settlement behavior of single piles driven in multilayered soils.