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Finite deformation elasto-plastic consolidation analysis of soft clay by the weak form quadrature element method

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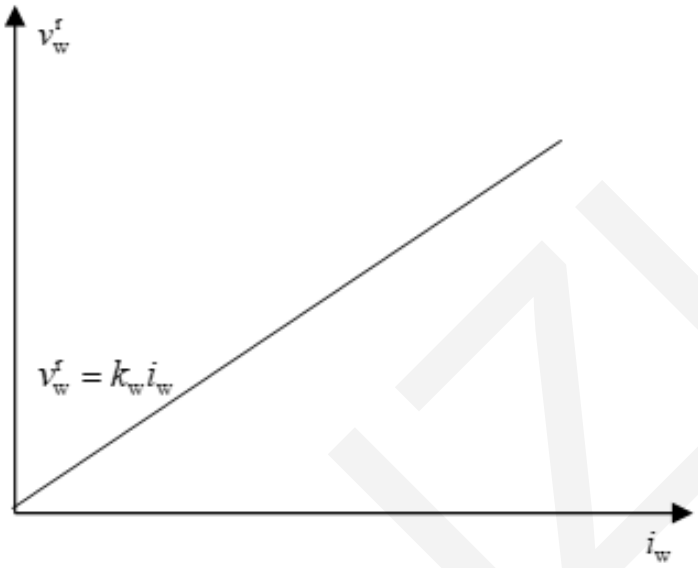
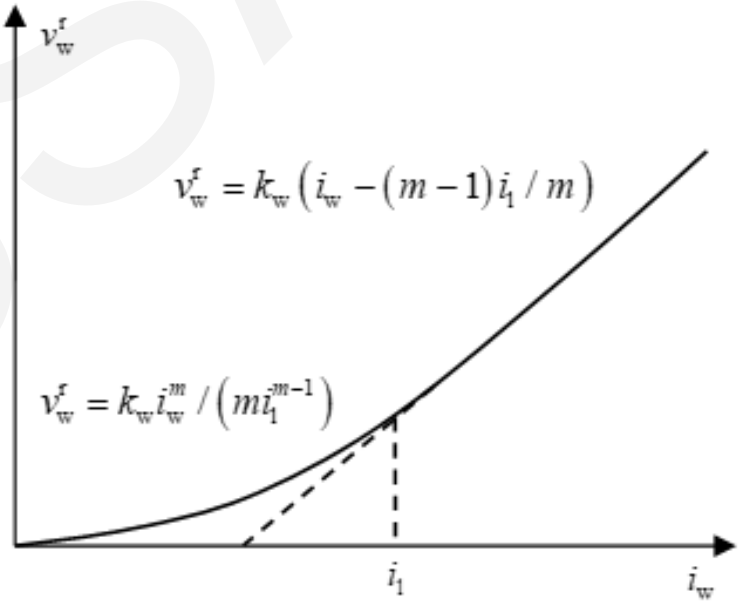
Darcy flow and Non-Darcy flow

Darcy flow

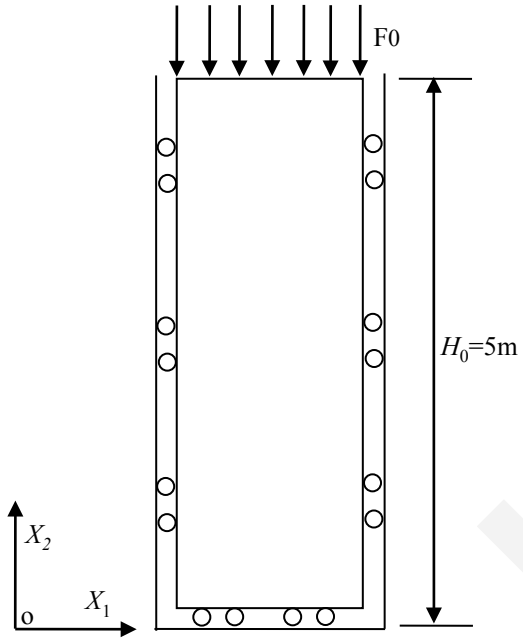


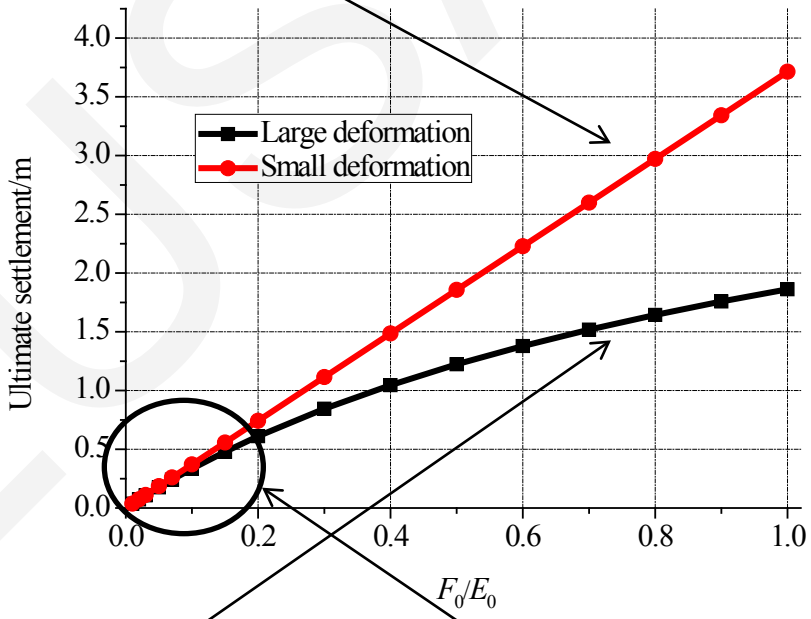
Non-Darcy flow



Large deformation consolidation of soft clay

Small deformation

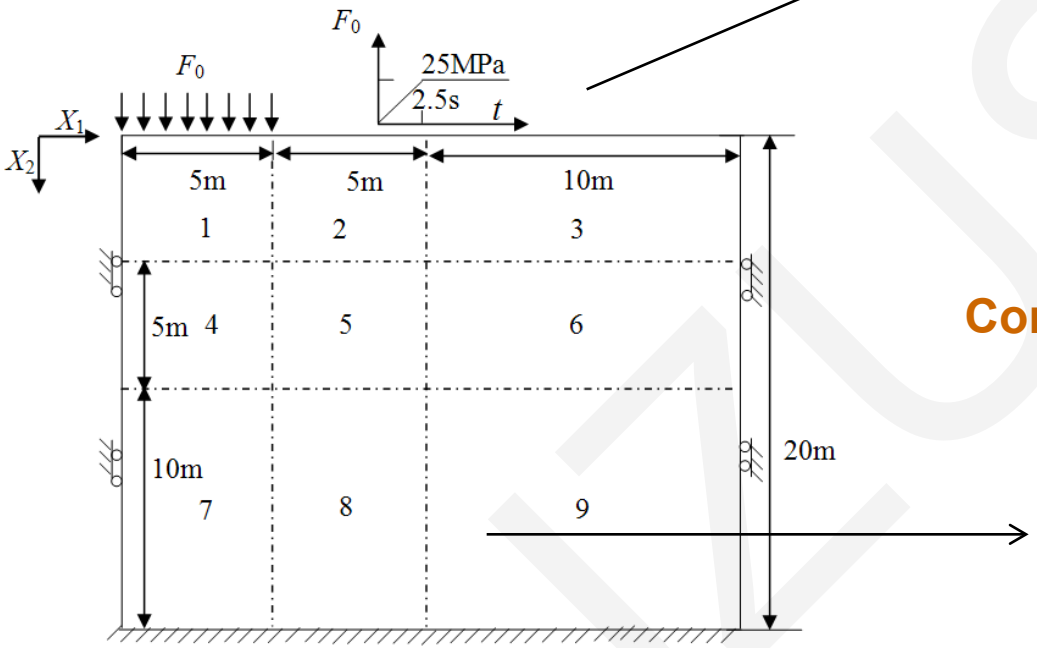


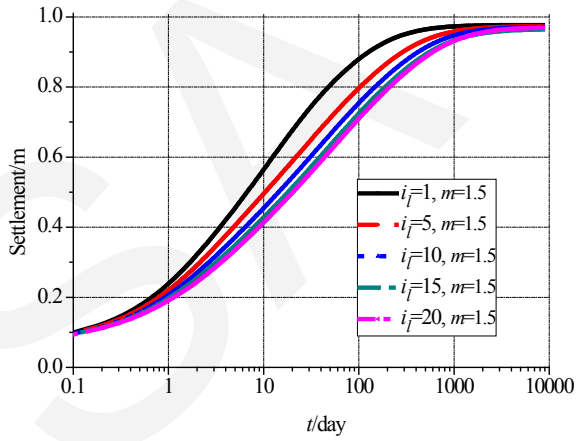


Large deformation

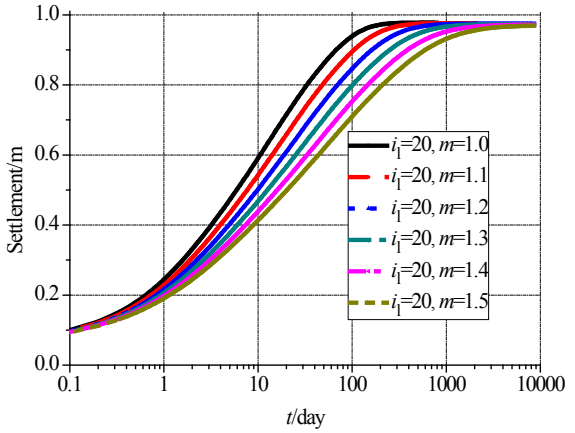
The range where small deformation theory can be applied

Effect of non-Darcy flow on elasto-plastic consolidation





Consolidation history of soft clay



Conclusions

- A much faster convergence is achieved by the QEM than with the FEM, reducing the number of degrees of freedom significantly.
- In small deformation consolidation analysis, the ultimate settlement varies linearly with the external loads; in finite deformation consolidation analysis, however, the settlement increases rather moderately due to the stiffening of the soil skeleton.
- With the increase of the non-Darcian model parameters, the rate of consolidation and the differential settlement decrease.