

# Simulation of sedimentation and overpressure with ELFEN

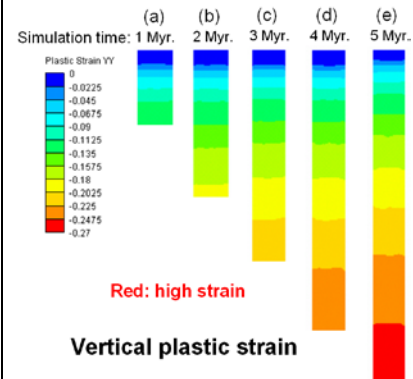
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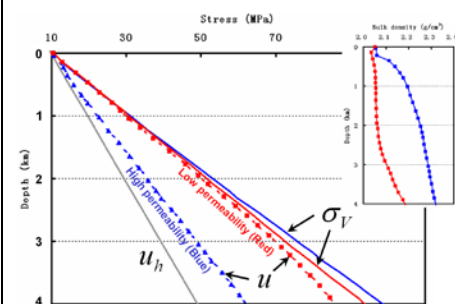
## ABSTRACT

Traditional basin modeling does not address large strain coupled consolidation under generalized states of stress. However, next generation models have the potential to produce complex evolutionary models that simulate the full stress state. Here, we apply ELFEN finite-element software to exercise large strain stress-pore pressure coupled models and simulate stresses and pore pressures during sedimentation. Our model results show that ELFEN could successfully run both drained and coupled models. We compare ELFEN model results with 1-D Gibson solution during sedimentation, and find that ELFEN large-strain model results deviate much from small-strain 1-D Gibson solution, up to 200~300%.

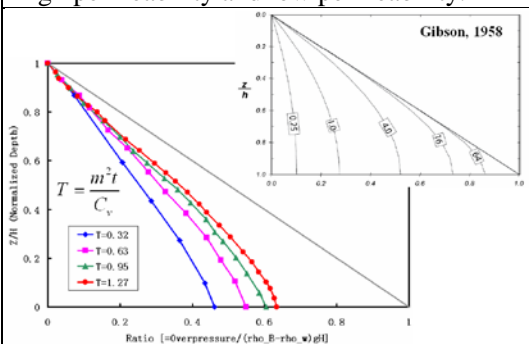
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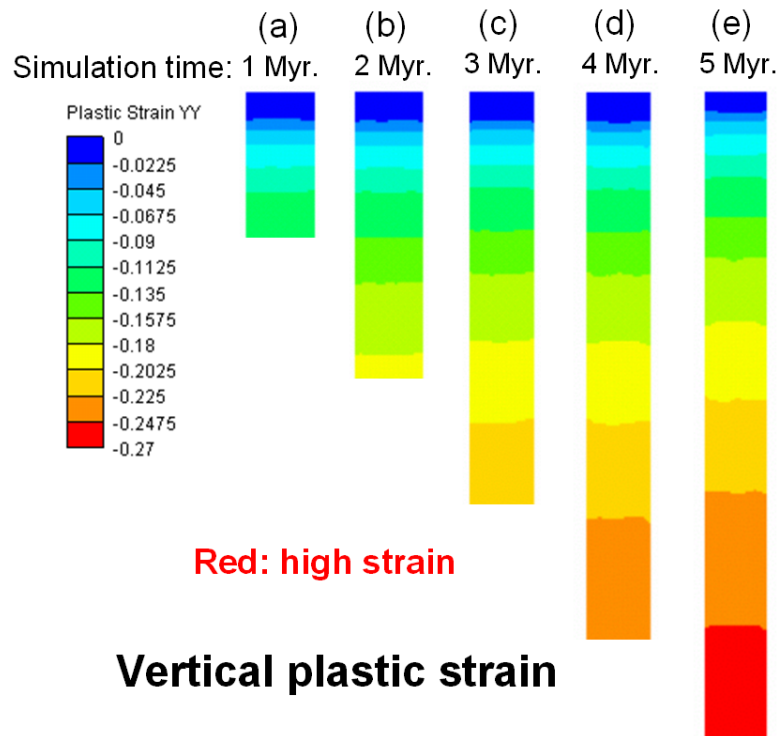
**Fig. 1:** Evolution of vertical plastic strain during sedimentation in a drained case. (a)-(d): 4 Myr., 3 Myr., 2 Myr., and 1 Myr. before current time; (e): Current time.



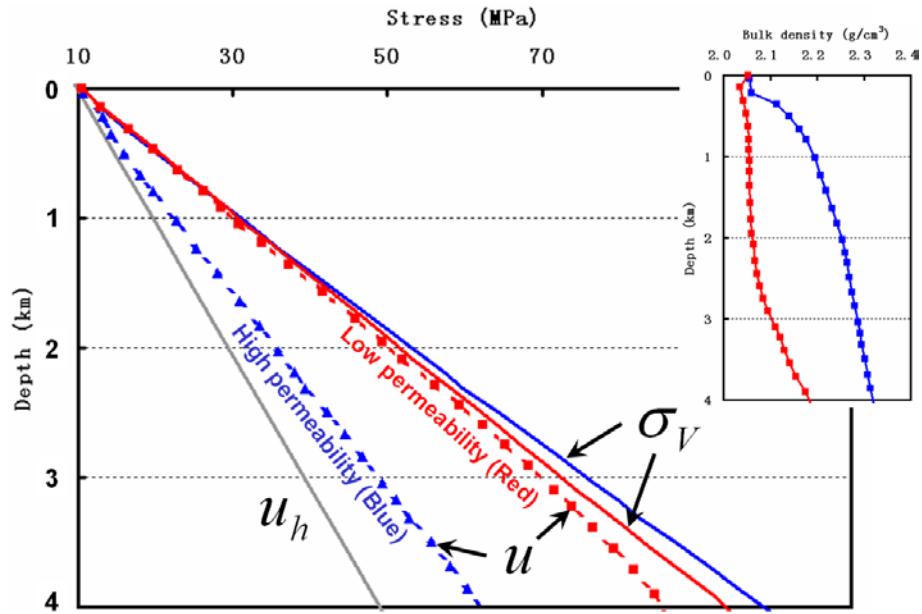
**Fig. 2:** Comparison of vertical total stresses and pore pressures in coupled cases with high permeability and low permeability.



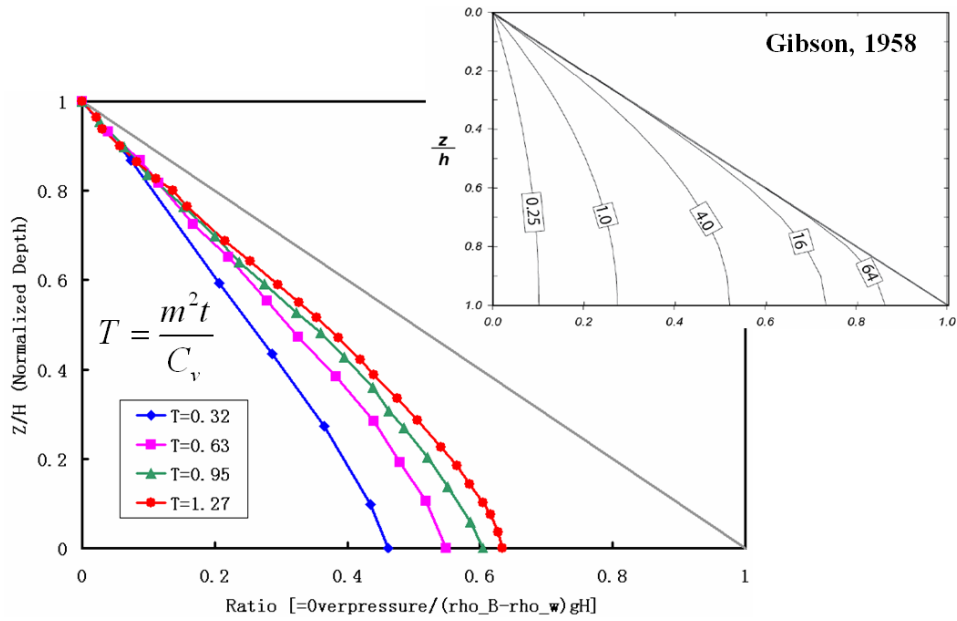
**Fig. 3:** Comparison of ELFEN model results with 1-D Gibson solution.



**Fig. 1:** Evolution of vertical plastic strain during sedimentation in a drained case. (a)-(d): 4 Myr., 3 Myr., 2 Myr., and 1 Myr. before current time; (e): Current time. Red colors show shortening.



**Fig. 2:** Comparison of vertical total stresses and pore pressures in coupled cases with high permeability and low permeability. Gray line shows hydrostatic pore pressure. Blue colors show the case with high permeability and red colors show the case with low permeability.



**Fig. 3:** Comparison of ELFEN large-strain model results with small-strain 1-D Gibson solution. Inset is Gibson solution (1958). ELFEN model results deviate much from Gibson solution.