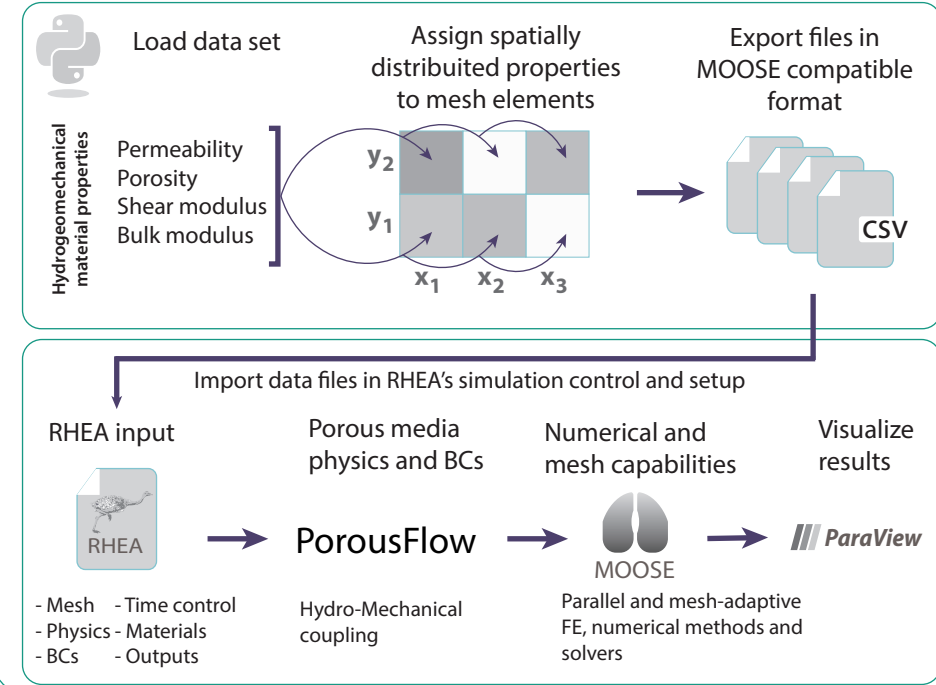


1. Introduction

Modeling of geotechnical applications presents a major challenge for numerical solvers when including realistic heterogeneity. Subsurface properties can vary widely in space which causes divergence. We develop, verify and illustrate a workflow for modelling fully coupled hydro-geomechanical problems allowing the inclusion of hydraulic and geomechanical heterogeneity with sharp gradients inherent to realistic geological systems.

2. Workflow



Reference

Bastias Espejo, J. M., Wilkins, A., Rau, G., and Blum, P.: RHEA v1.0: Enabling fully coupled simulations with hydro-geomechanical heterogeneity, Geosci. Model Dev. Discuss. [preprint], <https://doi.org/10.5194/gmd-2021-45>, in review, 2021.

3. Results

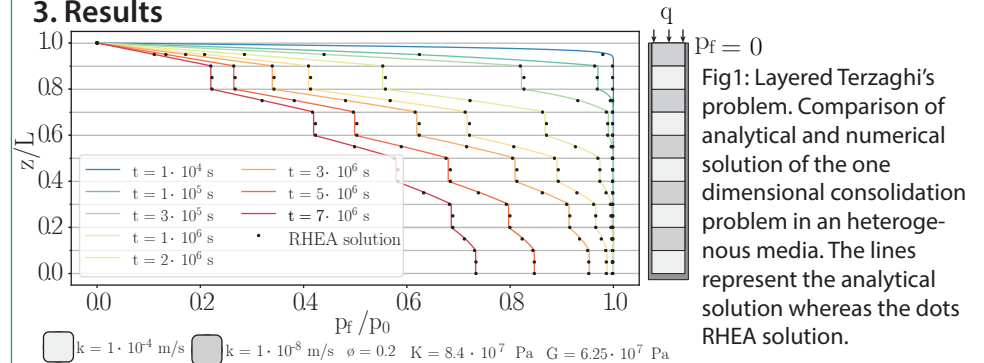
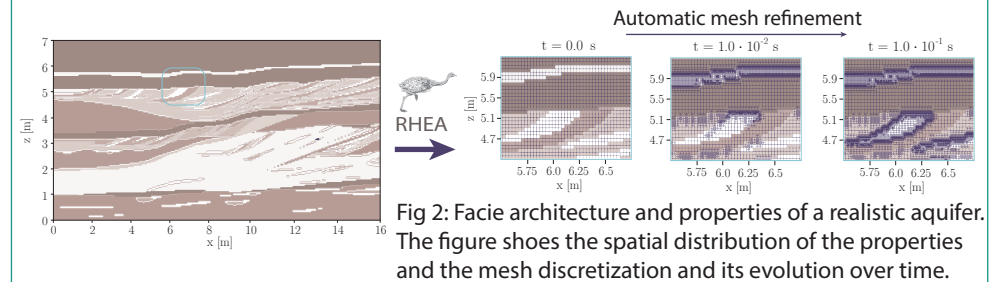
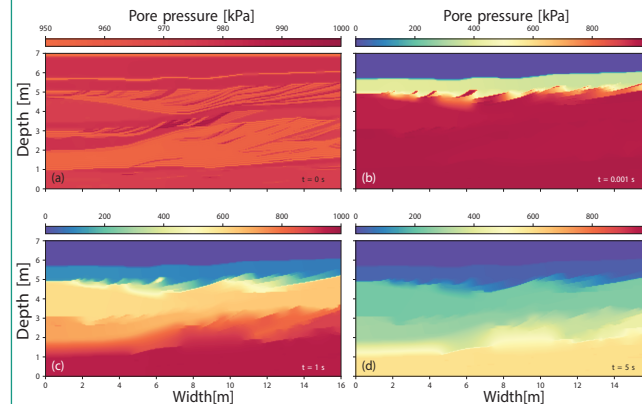


Fig 3: Sequence of snapshots of the consolidation process and pore pressure variation in the aquifer with time.

4. Conclusion

- RHEA has the potential to advance our understanding of real world systems that have previously been oversimplified.
- RHEA offers the integration of high resolution data set with sophisticated numerical implementations.
- Potential numerical instabilities caused by highly heterogeneous systems are handled automatically by combining adaptive meshing capabilities with implicit time stepping.