# Primary and secondary process coupling in non-isothermal fluid flow through deformable porous and fractured media

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Capturing the physics of heat transport, flow of multicomponent multiphase fluids both in the pore space and in fractures of geological media as well as the resulting deformations and stress redistributions is of interest in many geotechnical and geoscientific applications. Geothermal energy extraction, geoenergy storage, carbon sequestration and storage, nuclear waste disposal, and buried cables for high-voltage electricity transfer or pipelines are among the prominent examples of applications with a technical background [1].

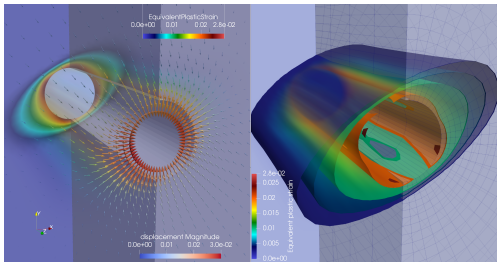

*Figure 1: Excavation-damaged zone around a tunnel in unsaturated clay rock.*

The continuum mechanical description of such phenomena requires a diverse range of constitutive models for the involved fluids, solids and the various process couplings. This leads to the occurrence of primary (process) and secondary (constitutive) coupling effects, the strength of which depends strongly on the constitutive choices made.
In this contribution we highlight modelling approaches for THM problems based on the open-source software package OpenGeoSys [2] and its combination with MFront for constitutive modelling [3, 4]. We highlight different examples, and discuss their specificities. Finally, we also discuss aspects of the OpenGeoSys project itself, continuous integration, code review procedures and ways to get involved.

*References*

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