**Multi-physics Approaches for Hydro-Geomechanical Coupling in CO2 Storage**

 M. Darcis, B. Flemisch, and H. Class

*Department of Hydromechanics and Modeling of Hydrosystems, University of Stuttgart, Stuttgart, Germany*

Risk assessment and feasibility studies for CO2 storage projects require the numerical simulation of a complex interplay of hydraulic, thermal, geomechanical and potentially also geochemical processes.

However, simulation tools, which allow to describe this large complexity are rare and computationally expensive. Moreover, modeling the long-term fate of the injected CO2 or the regional effects of the injection induced pressure build-up, requires the description of large temporal and spatial scales, which further increases the computational costs.

One way to increase model efficiency without neglecting relevant processes, are multi-physics approaches, which apply the models according to the temporal or spatial changes of dominating physical processes, instead of using a full complexity model for the whole simulation time or for the entire model domain.

Here, a spatial multi-physics approach will be presented with the example of a hydro-geomechanical coupling. The injection-induced geomechanical processes in the well region are described with a geomechanical model, whereas the far-field processes are simulated with a hydraulic model.

For an efficient application of the coupling scheme, different coupling conditions are investigated. Further, the speed-up and the coupling error are studied in order to determine coupling criteria.