

Addressing industrial challenges in the numerical modeling of flow and geomechanics in porous media

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Short Description

In industry, the numerical simulation of multiphase and multicomponent processes plays a significant role in the field development life cycle starting from the planning phase all the way to predicting the field performance, and the ultimate recovery. As more unconventional resources are being utilized nowadays, the underlying numerical models should be coupled with other physical models, such as geomechanical models, in order to simulate coupled processes involving CO₂ sequestration, hydraulic fracturing, enhanced oil recovery, and wellbore stabilities. In this minisymposium, we will shed some light on several industrial challenges faced throughout this whole process, and how can they be mitigated from a practical point of view. Since this is an interdisciplinary problem, the challenges can be classified into three main categories: mathematical challenges, numerical modeling (or physical) challenges, and computational challenges. From a pure mathematical point of view, the underlying algorithms should be convergent and lead to the accurate and unique solution of the coupled problem. From the physical point of view, the underlying models should be able to address the different physical processes interacting with each other at the subsurface level. Finally, from a pure computational point of view, the implementation should be stable, efficient, and can run on top of the state-of-art hardware available in the HPC market.