From the Experiment to Its Simulation: An Automation of the Process

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Abstract

The change of the geochemical and mechanical behavior of reservoir rocks by using geothermal energy can be simulated on laboratory scale (percolation and batch experiments). Thereby the modelling of this plays an important role in the comprehension of physical and chemical processes which can occur [1]. To model it, a coupling tool is used; that one enabling to formalize in a sequential approach interactions between chemistry, hydraulic, transport and mechanics [2]. The generic formalism, independent of tool specificities, provides an easy way to make simulation comparable. In order to enhance the modelling process and its usage by experimenters we developed an interface of the modelling tool. It is the best way to enrich the dialog between two different "sociological groups", the experimenter and the modeller. This is based on a structured text file, open office/word, describing the experimental conditions, in a first approach, without any modelling semantic specificities apart from the choice of the solvers which can be dependent of the physics to be handled. That open office document is the only input to the simulation tool; the whole necessary structures for simulation being extracted from and "pythonised". For modelling of the experiments, we use two sets of open source codes, PHREEQC [3] to handle the geochemistry and indifferently Elmer [4], OpenFoam [5] or Saturne [6] to handle hydraulic and transport.

References

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