Geophysical Research Abstracts, Vol. 9, 04289, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04289

Sensitivity analysis of CO2 injection processes in brine aquifers

A. Kopp (1), A. Ebigbo (1), H. Class (1), R. Helmig (1)

University of Stuttgart, Institute of Hydraulic Engineering, Dept. of Hydromechanics and Modelling of Hydrosystems

When investigating CO2 storage in saline aquifers in large depths by numerical experiments, the uncertainty of the necessary input parameters influencing e.g. pressure build-up, plume migration, solubility in brine etc. can be quite large. So when reliable results need to be obtained a large number of model runs is necessary to cover the entire range of parameter uncertainty. This is not economical or sometimes not even possible. A principal understanding of the relevance of input parameters, ongoing processes and acting forces in CO2 storage can help to reduce necessary runs, e.g. by neglecting uncertainty ranges for non-influencing parameters. In this work we investigated the sensitivity of the input parameters to the outcome of numerical experiments. Investigations where sensitivity measures are needed for could be on the arrival time of the CO2 plume, on pressure build-up below the caprock and on cooling effects due to expansion of the CO2 after injection. Parameters varied include permeability, depth of the reservoir, dipping angle of the caprock and several others. Furthermore this investigation is accompanied by an investigation of relevant processes and acting forces by a dimensional analysis of the governing balance equations.

In this work the numerical simulator MUFTE_UG is used. MUFTE_UG is a code for the simulation of non-isothermal multi-phase multi-component flow and transport processes in porous media. CO2 fluid properties are implemented for sub- and supercritical conditions. Non-isothermal processes are taken into account by solving an energy equation which includes the internal energy of the system. Chemical reactions are not considered.