Geophysical Research Abstracts
Vol. 13, EGU2011-6101, 2011
EGU General Assembly 2011

Model for the dependence of conditions at the injection well head and the reservoir during CO2 injection

Jacob Bensabat (1), Myra Kitron-Belinkov (2), Kristina Rasmusson (3), Maria Rasmusson (3), Auli Niemi (3), and Jacob Bear (2)

(1) EWRE, Environmental & water resources engineering Ltd., PO Box 6770, Haifa 31067, Israel (jbensabat@ewre.com), (2) Technion – Israel Institute of Technology, Department of Civil, Environmental and Water Resources engineering, Technion City, Haifa 32000 Israel., (3) Uppsala University – Department of earth sciences, Villavagen 16, S-75236 Uppsala, Sweden.

Highly controlled field injection experiments are necessary for demonstration, for scientific understanding and for quantification of the relevant processes of CO2 geological storage.
The preparation of such an experiment requires reliable information on both the hydraulic, thermal and chemical properties of the target layer and the formation fluid as well as on the injection discharges and their associated pressure build-up in the reservoir. For this, there is a need to determine the state variables of CO2 in the injection tube near the well head, which can produce the desired mass flow rates given the condition at the reservoir, while respecting pressure buildup constraints.
A model connecting the multiphase flow and transport processes in the target layer (based on the well-known TOUGH2/ECO2N model) at the vicinity of the injection well with those occurring in the injection tube (solving the one dimensional equations mass, momentum and energy conservation) has been developed. To this model the injection tube is a boundary condition. Once the reservoir pressure build-up resulting from the injection discharge is known, there is a need to determine the necessary injection conditions at the wellhead. For this purpose we apply the 1-D tube model, which provides the solution of the conditions in the injection pipe, given the injection rate and the pressure at the reservoir.
These two linked models, the porous medium model and the pipe model, are applied to the planning of the Heletz injection experiment to be carried out in the frame of the EU-FP7 funded MUSTANG project.
Sensitivity analyses are carried out with regard to uncertainty in the target layer permeability and the temperature of the injected CO2, which depends on the thermal heat transfer coefficient in the injection tube.