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Direct Numerical Simulation of pore scale flow and reactive transport of CO_2 in saline aquifers MOHAMMAD ALIZADEH NOMELI, AMIR RIAZ, University of Maryland — A long-term geochemical modeling of subsurface CO_2 storage is carried out in a single fracture to investigate its impact on CO_2 transport and storage capacity. We model the fracture by considering flow of CO_2 between finite plates. CO_2 is initially dissolved in the brine and then precipitates during the geochemical reactions between H_2O-CO_2 and minerals. We study the physics and the critical time of blockage for a fracture to interpret the results. We employ direct numerical simulation tools and algorithms to simulate incompressible flow along with necessary transport equations that capture the kinetics of relevant chemical reactions. The numerical model is based on a finite difference method using a sequential non-iterative approach. It is found that mineral precipitation has an important effect on reservoir porosity and permeability. The fracture ceases to be a fluid channel because of the precipitation of minerals. In addition, using parameter analysis we also determine the effect of various mineral precipitates on porosity of fractures.

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