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Direct numerical simulation of reactive flow and modeling of pore-scale transport phenomena in porous media MOHAMMAD NOMELI, AMIR RIAZ, University of Maryland — Direct numerical simulation of reactive flow and a long-term geochemical modeling of CO_2 sequestration is carried out in a fractured media to investigate its impact on CO_2 transport and storage capacity. The fracture is modeled by considering flow of CO_2 between finite plates. We study the physics and the critical time of blockage for a fracture to interpret the results. To this end, 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 volume method using a sequential non-iterative approach. It is found that the reactive transport of minerals has an important effect on reservoir porosity and permeability. According to the simulations, the flow of injected CO_2 in the fracture is controlled by changes in the pore-scale permeability. The fracture ceases to be a fluid channel due to geochemical reactions of minerals. In addition, using parameter analysis we also determine the effect of various reaction kinetics on permeability of porous media.

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