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Modeling the Dynamics of Remobilized CO2 within the Geologic Subsurface[1] ERIK HUBER, DONALD KOCH, ABRAHAM STROOCK, Cornell University — Long after CO_2 is injected into a brine aquifer, most reservoir-scale fluid dynamic simulations predict large fractions of the original plume will become immobilized via capillary trapping and dispersed throughout the formation. We begin our analysis with a reservoir in this state and consider the effects caused by a depressurization of the domain (e.g. from a nearby production well or newly formed fracture between neighboring reservoirs). Using supercritical CO_2 density data from NIST and an assumed knowledge of the minimum residual saturation of CO_2, we demonstrate that even a large decrease in reservoir pressure is likely to only result in a small mass fraction of remobilized CO_2. Once mobile, this volume of CO_2 will rise in the reservoir and concentrate beneath the caprock of the domain. We show that a model of relative permeability that takes account of insights from percolation theory near the minimum CO_2 saturation leads to much more rapid rise of remobilized CO_2 than a traditional empirical correlation such as the Brooks-Corey model.

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