Multiscale Modeling Of Rock Fracturing During CO\textsubscript{2} Sequestration

Geologic CO\textsubscript{2} sequestration holds great promise to prevent CO\textsubscript{2} from reaching the atmosphere and contributing to climate change. We are developing software models to accurately model the fate of CO\textsubscript{2} injected into deep saline reservoirs over periods of thousands of years. This research utilizes coupled models for reactive-transport, thermoelastic and poroelastic geomechanics, thermodynamics, and propagation of micro and macro scale fractures. We seek to utilize these models to optimize site selection and injection rates to minimize CO\textsubscript{2} leak-off and maximize the amount of CO\textsubscript{2} converted to an immobile solid mineral phase.

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This research is supported by the US Department of Energy, National Energy Technology Laboratory (DE-FOA-0000032) grant, and the Computational Science Research Center (CSRC) at San Diego State University

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\sigma_{\text{por}}(u, p) = \lambda(\nabla \cdot u)I + 2G\epsilon(u) - \alpha pI
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- \nabla \cdot \sigma_{\text{por}}(u) = \rho g
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