

Multiscale Modeling Of Rock Fracturing During CO₂ Sequestration

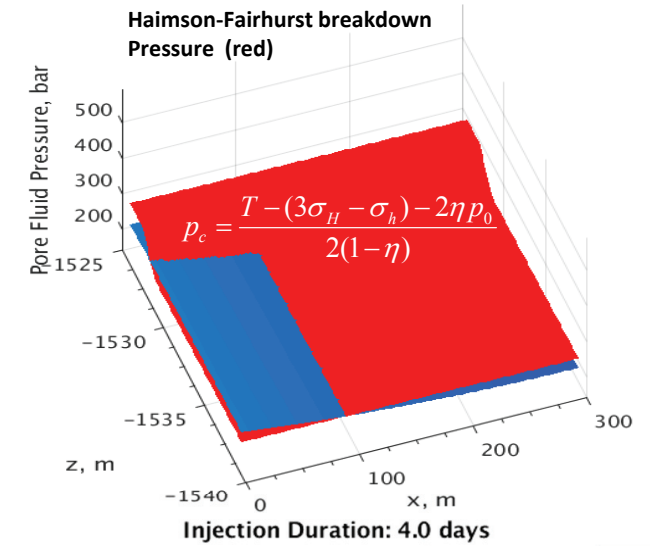
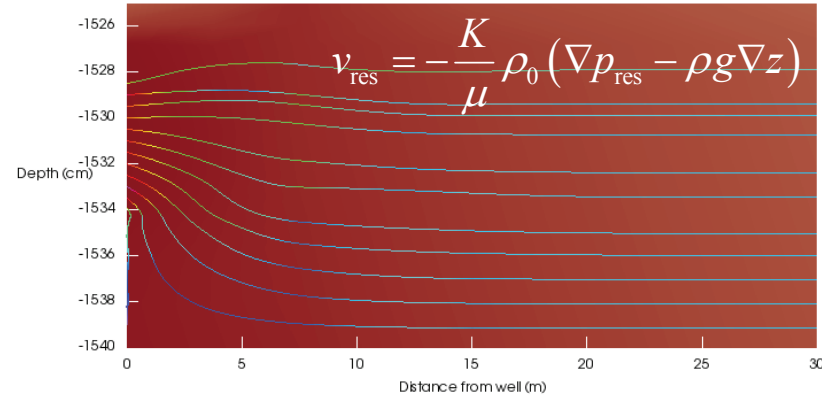


Geologic CO₂ sequestration holds great promise to prevent CO₂ from reaching the atmosphere and contributing to climate change. We are developing software models to accurately model the fate of CO₂ injected into deep saline reservoirs over periods of thousands of years. This research utilizes coupled

models for reactive-transport, thermoelastic and poro-elastic 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 CO₂ leak-off and maximize the amount of CO₂ converted to an immobile solid mineral phase.

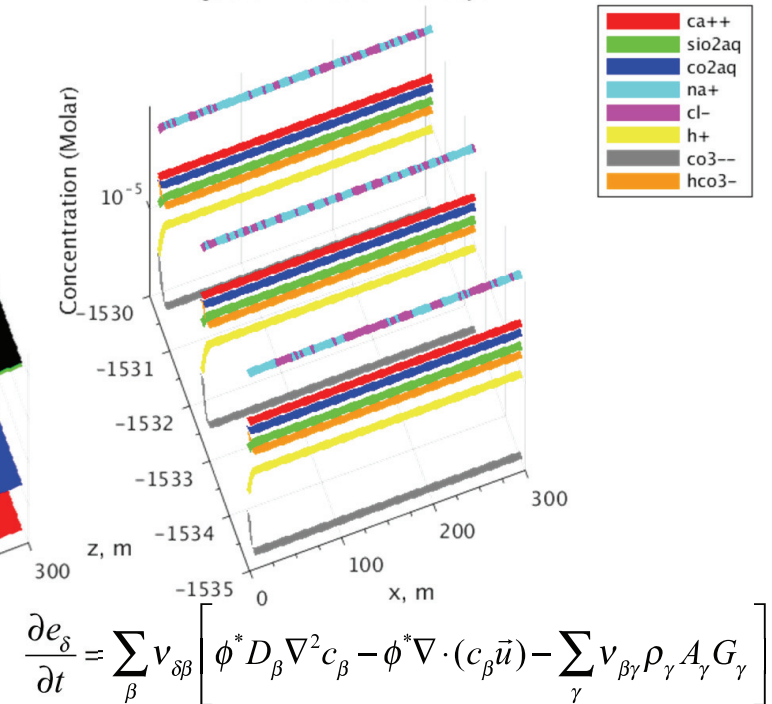
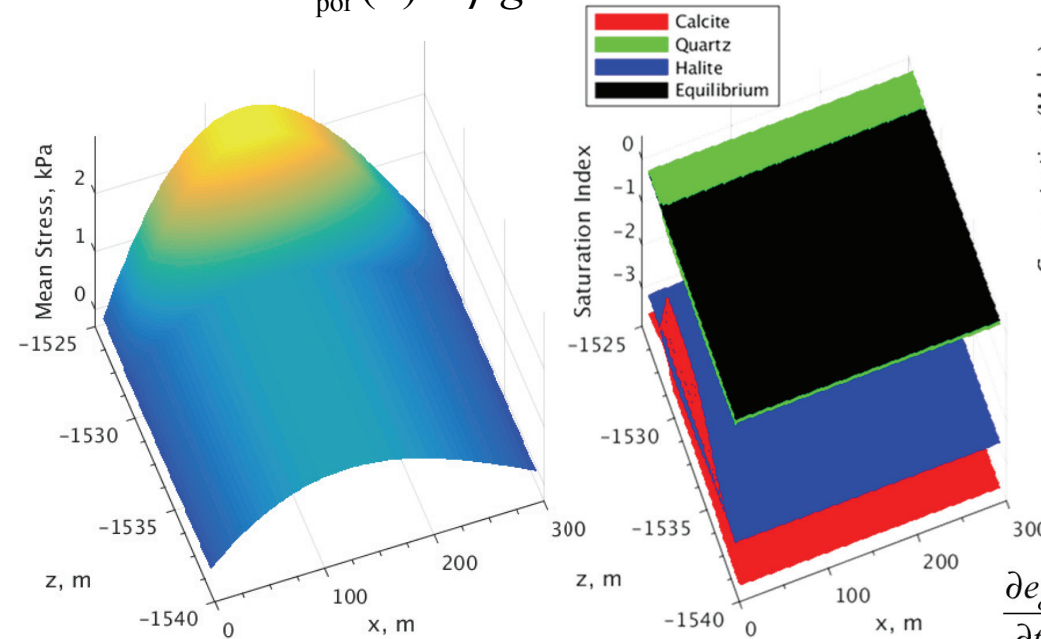
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$$\sigma_{\text{por}}(u, p) = \lambda(\nabla \cdot u)I + 2G\epsilon(u) - \alpha pI$$

$$-\nabla \cdot \sigma_{\text{por}}(u) = \rho g$$



$$\frac{\partial e_\delta}{\partial t} = \sum_\beta v_{\delta\beta} \left[\phi^* D_\beta \nabla^2 c_\beta - \phi^* \nabla \cdot (c_\beta \bar{u}) - \sum_\gamma v_{\beta\gamma} \rho_\gamma A_\gamma G_\gamma \right]$$