Contribution ID: **681** Type: **Oral 20 Minutes**

Modeling induced seismicity with coupled poroelasticity on discrete fracture networks with evolving hydraulic diffusivity and Mohr-Coulomb failure

Thursday, 17 May 2018 10:02 (15 minutes)

Injection-induced seismicity (IIS) depends on pore pressure, in-situ stress state, and fault orientation; generally occurs in basement rock that contains fractures and faults; and moves away from the injection well as a nonlinear diffusion process. Therefore to numerically model IIS, a code should incorporate coupled flow and geomechanics, the presence of fractures and faults, and the capability for hydraulic diffusivity to evolve with effective stress and failure history. We use DFNWorks and a novel hybrid equivalent porous medium/discrete fracture network approach to generate and map fracture networks to a continuum grid where the fully coupled poroelastic equations are solved by PFLOTRAN. Hydraulic diffusivity has different constitutive relationships for fracture and matrix grid cells, and the seismic cloud can be tracked based on a Mohr-Coulomb failure calculation on each fracture. We discuss details and challenges in code development, including how the Bandis model can be used to calculate hydraulic diffusivity and stiffness for fractures within this framework. We apply our model to understand IIS at Greeley, CO and Paradox Valley, CO. The computational tools presented here can be applied to understand IIS, nuclear waste disposal, carbon sequestration, unconventional oil and gas production, and groundwater remediation.

References

Acceptance of Terms and Conditions

Click here to agree

Primary authors: BIRDSELL, Daniel; RAJARAM, Harihar (University of Colorado, Boulder); Dr KARRA, Satish

Presenter: BIRDSELL, Daniel

Session Classification: Parallel 9-C

Track Classification: MS 2.19: Advances in Observation and Modeling of Coupled Flow and Deformation in Fractured Rock