Numerical study of fault sliding under fluid injection

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Seismicity associated with fluid injection into the subsurface is one of the most important issues worldwide. Fluid injection into or near a fault could lead to the fault sliding and to moderate or even hazardous seismic events. In the presented research, we study the single fault behavior under action of a single well injection near the fault. Various cases of initial conditions, system geometry, and friction properties of the fault are considered. To describe the friction on the fault we use two-parameter rate-and-state law. The fault has zones characterized by velocity-weakening and velocity-strengthening friction behavior. We analyze how location and size of the velocity-weakening zone and parameters of the friction law influence the fault sliding dynamics. We also consider how the fault sliding is changed when taking into account the rock poroelastic effects. As the result, we get conditions that are favorable for the occurrence of noticeable seismicity.