Numerical Simulation of Hydraulic Fracture Propagation in the Vicinity of a Natural Fracture

Ghassemi, Ahmad [1] (1) Petroleum Engineering, Texas A&M University, College Station, TX.

Hydraulic fracture growth in naturally fractured rock is an important issue for unconventional petroleum reservoir development. An induced fracture can display a complicated behavior in the presence of natural fractures and it is of interest to know how the hydraulic fracture interacts with natural discontinuities to optimize fracturing treatment. In this paper, we present the results of numerical simulations that trace the fracture trajectory near a fault. We consider the influence of in-situ stress, discontinuity properties such as friction and stiffness, and injection rate and study the impact of fault slip on hydraulic fracture trajectory. We will also explore features of cracks trajectories near an interface between rock materials of differing rigidity. In addition, we consider fracture propagation in a poroelastic rock and numerically investigate the impact of pore fluid diffusion and poroelastic stresses on fracture/natural fracture interaction.