Inelastic effects on dynamic in-plane shear rupture in thermoporoelastic media

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We have studied dynamic anti-plane shear rupture in thermoporoelastic media and found that slip-weakening behavior and gradual slip onset of slip can be observed in the anti-plane crack because of thermal pressurization. We study here dynamic in-plane shear rupture in the thermoporoelastic media. Since in-plane dynamic shear crack growth ought to excite a large number of micro-tensile cracks in its neighborhood, we assume inelastic change in the porosity, which leads to changes in the bulk modulus, permeability and other poroelastic parameters. A simple relation is assumed for the inelastic change of porosity because there is no reliable information. Such changes in these poroelastic parameters cause a spatio-temporal change in fluid pressure, which affects the stress drop on the crack surface. This will tend to reduce the slip velocity. Slip-weakening distance also changes when the inelastic effects are taken into accoumt. Breaking of symmetry in the stress fields is also a characteristic in the thermoporoelastic media; the normal stress around the crack surface loses symmetry because fluid pressure increase induces the change in the stress. Hence, the normal stress generally affects the crack growth.