EARTHQUAKE RUPTURE MODELING OF ROUGH FAULT IN ROCK LAB EXPERIMENTS

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Fault roughness is present at various scales. From limestone samples taken at fault outcrops, Candela et al. (2009) has characterized scaling properties of fault roughness covering 6 orders of magnitudes of fault-topography wavelengths (40 m to 40 m). The fault topography perturbs the local stress field and produces heterogeneities of slip and rapid acceleration and deceleration of the rupture front (Dunham et al., 2011). As a result, roughness enhances high seismic frequency radiation and more complexity on the rupture process. However, roughness not only affects ground motion and rupture propagation but It also has an impact on the nucleation process. In fact, recent rupture modeling on rough faults makes use of rate and state friction with aging (tal et al., 2018) and slip law (Ozawa et al., 2019) to investigate the effect of fault roughness on the nucleation process. This work follows these approaches and perform earthquake cycle and rupture modeling for rough faults obtained from rock lab experiments of Selvadurai et al. (2015, 2016). To include fault roughness measured in the lab, we make use of the H-matrix methods and rate and state friction to mimic the rupture and nucleation process recorded during rock lab experiments.