

A model of rupturing lithospheric faults with re-occurring earthquakes

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An isothermal small-strain model based on the concept of generalized standard solids is devised, combining Maxwell-type rheology, damage, and perfect plasticity in the bulk. An interface analogue of the model is formulated at the lithospheric faults, exploiting concepts of adhesive contacts with interfacial plasticity. The model covers simultaneously features as rupturing of the fault zone accompanied with weakening/healing effects and also seismic waves emission and propagation connected with the sudden ruptures of the fault or a fluidic-like aseismic response between the ruptures. Stable numerical strategy based on semi-implicit discretisation in time is devised and its convergence is shown. Numerical simulations documenting the capacity of the model to simulate earthquakes with repeating occurrence are performed by using the so-called single-degree-of-freedom slider.