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MODELING COMPLEX FLUID AND SOLID DYNAMICS DURING EARTHQUAKE RUPTURES

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ABSTRACT

Earthquakes and other rock fracturing processes are challenging events to study and simulate with numerical models. Their complexity arises from the coupling between various phenomena governed by significantly different time and length scales. Some of these include the elastodynamic deformation of the solid rock, the failure processes controlling faults creation, as well as the frictional response and rheology of pre-existing fault cores. A compelling body of evidences also suggests that underground fluid flow has a direct impact on each of the listed phenomena and explains the increasing need for performant coupled numerical models. The objective of this mini-symposium is to take advantage of the ECCOMAS congress to gather contributions from the computational geophysics, solid and fluid mechanics communities around the modeling of crustal systems (before, during and after an earthquake). Topics of interest for the proposed symposium include among others:

- Modeling of fluid and fracture interactions (Krauklis waves, hydraulic fracturing)
- Modeling of fractured reservoirs during geothermal operations or CO_2 capture and storage
- Fault formation, rheology and frictional response (rate-dependent friction, gouge formation)
- Complex flow in porous and fractured media
- Large-scale earthquake dynamics models (multiple faults, coupling with tsunami models)
- Machine learning algorithms to untangle rock failure and earthquake processes

We welcome contributions highlighting newly developed computational frameworks as well as original physical insights into earthquake problems obtained from numerical models.

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