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Dynamic Rupture Benchmarking of the ADER-DG Method

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We will verify the arbitrary high-order derivative Discontinuous Galerkin (ADER-DG) method in various test cases of the 'SCEC/USGS Dynamic Earthquake Rupture Code Verification Exercise' benchmark suite (Harris et al. 2009).
The ADER-DG scheme is able to solve the spontaneous rupture problem with high-order accuracy in space and time on three-dimensional unstructured tetrahedral meshes. Strong mesh coarsening or refinement at areas of interest can be applied to keep the computational costs feasible. Moreover, the method does not generate spurious high-frequency contributions in the slip rate spectra and therefore does not require any artificial damping as demonstrated in previous presentations and publications (Pelties et al. 2010 and 2012). We will show that the mentioned features hold also for more advanced setups as e.g. a branching fault system, heterogeneous background stresses and bimaterial faults.
The advanced geometrical flexibility combined with an enhanced accuracy will make the ADER-DG method a useful tool to study earthquake dynamics on complex fault systems in realistic rheologies.

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