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Adaptive triangular discontinuous Galerkin schemes for tsunami propagation and inundation

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A tsunami simulation framework is presented, which is based on adaptive triangular meshes and a finite element discontiuous Galerkin discretization. This approach allows for high local resolution and geometric accuracy, while maintaining the opportunity to simulate large spatial domains. The dynamically adaptive mesh is generated by the grid library amatos, which is based on a conforming tree based refinement strategy. While the tsunami propagation in the deep ocean is well represented by the nonlinear shallow water equations, special interest is given to the near-shore characteristics of the flow. For this purpose a new mass-conservative well-balanced inundation scheme is developed.

This work is part of the ASCETE (Advanced Simulation of Coupled Earthquake and Tsunami Events) project, which aims to better understand the generation of tsunami events. In this course, a simulation framework is developed which couples physics-based rupture generation with hydrodynamic tsunami propagation and inundation.