An adaptive spectral element method for systems of conservation laws

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A novel method for the solution of systems of conservation laws is presented. For the space discretization, the scheme considers high-order continuous finite elements stabilized via subgrid modeling, as well as highly anisotropic adaptive meshes in order to capture any sharp features in the solution with the minimum number of mesh elements. Time integration is carried out via linearly implicit formulas, which allow for large time steps and require only the solution of a few linear systems per solved time interval. Numerical experiments, which include a hard case of nonconvex flux and the Euler equations for compressible flows, were performed with up to eighth-degree elements and a third-order time marching formula in order to assess the capabilities of the method.



*Figure 1:* Numerical solution of the triple-point test. Left: contour plot for the density and adaptive mesh. Right: contour plot for the internal energy.