A High-Order Discontinuous Galerkin Solver with Dynamic Adaptive Mesh Refinement to Simulate Cloud Formation Processes

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We present a high-order discontinuous Galerkin (DG) solver of the compressible Navier-Stokes equations for cloud formation processes. The scheme exploits an underlying parallelized implementation of the ADER-DG method with dynamic adaptive mesh refinement. We improve our method by a PDE-independent general refinement criterion, based on the local total variation of the numerical solution. Our generic scheme shows competitive results for both classical CFD and stratified scenarios. While established methods use numerics tailored towards the specific simulation, our scheme works scenario independent. All together, our method can be seen as a perfect candidate for large scale cloud simulation runs on current and future super computers.

Keywords: ADER-DG, Navier-Stokes, Adaptive Mesh Refinement.