Contributed Talk

Splinter Computation

Towards Fast High-Order Magnetohydrodynamics in the AREPO Code

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I present our latest developments on MHD schemes for the cosmological hydrodynamical simulation code AREPO. The code implements finite volume solvers for hydrodynamics and MHD, and can operate on two major types of grids: either a fully dynamic quasi-Lagrangian unstructured Voronoi mesh, or an octree-based adaptive mesh refinement (AMR) grid. The moving mesh solver is based on a second-order unsplit Godunov scheme. For AMR grids, we implemented a higher-order discontinuous Garlerkin (DG) hydrodynamics solver, which we have extended to MHD based on locally divergence-free basis functions. I discuss some challenges to achieve a robust and efficient implementation of high-order methods for MHD that can be applied to astrophysical problems. I also highlight some key aspects of DG schemes for computational efficiency on modern CPU architectures.