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Title: Computational Challenges in Astrophys. Fluid Dynamics

Abstract.

Present numerical codes for astrophysical fluid dynamics appeal to a consolidated theory based on finite volume or finite difference schemes. These schemes are particularly intended for high Mach number flows and are based on the solution of Riemann problems at cell interfaces. In this context, I review the basic discretization methods and algorithms used as building blocks in most modern state-of-the-art numerical codes employed in astrophysics. In several circumstances, an adequate description may require very high resolution and/or the possibility to resolve great scale disparities that may simultaneously arise. These challenges are discussed and illustrated through a series of applications to jets, radiative shocks, accretion disks and magnetohydrodynamics turbulence.