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Hydromagnetic turbulence in computer simulations. (English) Zbl 1016.85002

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Summary: The usefulness of high-order schemes in astrophysical MHD turbulence simulations is discussed. Simple advection tests of hat profiles are used to compare schemes of different order. Higher order schemes generally need less explicit diffusion. In the case of a standing Burgers shock it is shown that the overall accuracy improves as the order of the scheme is increased. A memory efficient 3-step $2N$ -RK scheme is used. For cache efficiency, the entire set of equations is solved along pencils in the yz -plane. The advantage of solving for the magnetic vector potential is highlighted. Finally, results from a simulation of helical turbulence exhibiting large scale dynamo action are discussed.

MSC:

85-08 Computational methods for problems pertaining to astronomy and astrophysics

Cited in **6** Documents

85A30 Hydrodynamic and hydromagnetic problems in astronomy and astrophysics

76F99 Turbulence

76M25 Other numerical methods (fluid mechanics) (MSC2010)

Keywords:

high-order schemes; astrophysical MHD turbulence simulations; standing Burgers shock; helical turbulence

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