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SUPERSONIC ISOTHERMAL TURBULENCE IN MAGNETIZED MOLECULAR CLOUDS

Magnetic fields are believed to play an important role in regulating star formation in turbulent molecular clouds. The nature of highly compressible magnetized turbulence in these clouds, however, remains poorly understood. In my talk I shall present results of large-scale simulations of MHD turbulence at a sonic Mach number of 10 carried out with the Piecewise Parabolic Method on a Local Stencil (PPML) at resolution up to 1024^3 mesh points. Our models explore universal trends in scaling properties of fully developed statistically isotropic turbulence as a function of the magnetic field strength. We show that the rigorous $4/3$ -law of incompressible MHD can be extended to supersonic turbulence if a proper density averaging of the Elsasser fields is included. This illustrates the importance of correlations between various fields involved in nonlinear interactions responsible for the direct energy cascade in compressible MHD. I will also discuss convergence of numerical solutions under mesh refinement, and effects of the driving force and numerical dissipation on the measured turbulence statistics.