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Study of Influence of Rapid Pressure in MHD Turbulence SAIKISHAN SURYANARAYANAN, AARTHI SEKARAN, Texas A&M University —
Turbulence, under the influence of magnetic field is characterized by anisotropy. Relatively limited work has been done in understanding and modeling magnetohydrodynamic (MHD) turbulence.The rapid distortion theory (RDT), which has been employed to study hydrodynamic turbulence, is a limiting case where the gradients of the mean velocity are very high compared to the gradients of the fluctuating field. When analyzed in a spectral framework, this leads to the independent evolution of each Fourier mode. RDT has been used to understand production and more importantly the "rapid" part of the pressure strain redistribution, as the other terms in the Reynolds stress evolution equation become negligible in the rapid distortion limit. Earlier work attempts to characterize the effect of the rapid pressure based on the geometry of the symmetric part of the mean velocity gradient tensor. This work deals with the application of RDT to MHD turbulence. The application of Elsasser variables reorganizes the MHD equations in a form similar to conventional Navier-Stokes. The current work is a numerical study of the Elsasser variable evolution equation in the rapid distortion limit and attempts to understand the role of the rapid magnetic pressure in the evolution of the Reynolds stresses for different mean distortions and magnetic fields.

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