VISCOUS AND JOULE DISSIPATION RATIO IN ISOTROPIC MHD TURBULENCE

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The magnetohydrodynamics turbulence is often an object for fundamental and applied studies in electroconductive fluid mechanics. In spite of intensive researches in this field, the small-scale dynamo process at large Reynolds numbers is still difficult to investigate experimentally or numerically. This large spectrum of possible magnetic Prandtl number Pm values implies strong differences between possible generation mechanisms. The kinetic energy spectrum available for generating magnetic energy is controlled value of Pm. When $Pm \geq 1$ the resistive scale is smaller than the viscous scale implying that all velocity scales are available for generating some magnetic field. On the other hand, for $Pm < 1$, only the velocity scales larger than the resistive scale are available for the magnetic field generation. In that case, the velocity scales smaller than the resistive stay passive in the generation process. We focus on statistical property of dissipations (its scaling and ratio) as a proper diagnostic of the kinetic and magnetic field interaction in wide range of scales. MHD shell model used for simulations. We explain the difference in dissipation ratio dependences on Pm that were suggested in [1] and [2]. The effect of nonlocal interactions in scale space is discussed.

References

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