[구IM-07] PDF properties of ISM turbulence

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Density Probability Distribution Functions (PDFs) are a classic statistical way to study properties of Interstellar Medium (ISM) turbulence. In our three-dimensional MHD simulations, density PDFs of the position-position velocity (PPV) spaces are close to a log-normal distribution. the PDF widths depend on the plasma parameters such as magnetic strength and sonic Mach number. Futhermore, we compare these simulations results to Galactic molecular clouds observed by Jackson et. al (2006). By fitting of the velocity dispersion in the spectral line observation, volume density PDFs of the defined molecular clouds indicate that the sound speeds of the turbulences seem to have a few times larger than the simulation results. In order to understand the inconsistency with general characteristics of turbulence, we consider other simulations inducing the turbulent flow randomly at small driving scales. We find that the density PDF width decreases at more smaller driving scale. Finally, the simulations suggest that sources of ISM turbulence in Galactic molecular clouds can be important on small scales.

[구IM-08] Estimate the Magnetic Field Strength using rotation measure

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Most astrophysical systems are turbulent and magnetized. Magnetic field plays an important role in the dynamics of astrophysical system and influence all of properties of astrophysical system. Therefore, information of magnetic field is very important to understand properties of astrophysical system. One way to obtain information of magnetic field is to use rotation measure. Mean strength of the magnetic field along the line of sight can be estimated from RM/DM, where RM is rotation measure and DM is dispersion measure. For the estimation of magnetic field strength using RM/DM, the correlation between density and magnetic field. When there is no correlation between density and magnetic field the relation gives exact mean magnetic strength. But if the positive correlation, it overestimates the magnetic field strength, while if the correlation is negative, it underestimate the magnetic field strength.

In general, the ICM (intracluter medium) and the ISM (interstellar medium) cases, viscosity has a value greater than magnetic diffusion. We performed compressible MHD turbulence simulations and we studied correlation between density and magnetic field in different values of viscosity and magnetic diffusion. In most cases, we found weak or negative relations between the density and magnetic fields. We discuss implication of our results.