[구IM-03] Long-Term Evolution of Decaying MHD Turbulence in the Multiphase ISM

Chang-Goo Kim, Shantanu Basu
Department of Physics and Astronomy, University of Western Ontario

Supersonic turbulence is believed to decay rapidly within a flow crossing time irrespective of the degree of magnetization. However, this consensus of decaying magnetohydrodynamic (MHD) turbulence relies on local isothermal simulations, which are unable to investigate the role of global magnetic fields and structures. Utilizing three-dimensional MHD simulations including interstellar cooling and heating, we investigate decaying MHD turbulence within cold neutral medium sheets embedded in warm neutral medium. Early evolution is consistent with previous studies characterized rapid decay of turbulence with the decaying time shorter than a flow crossing time and power-law temporal decay of turbulent kinetic energy with slope of -1. If initial magnetic fields are strong and perpendicular to the sheet, however long term evolutions of kinetic energy shows that a significant amount of turbulent energy still remains even after ten flow crossing times, and decaying rate is reduced as field strengths increase. We analyse power spectra of remaining turbulence to show that incompressible, in-plane motions dominate.

[구IM-04] High-Resolution Simulations of the Nuclear Star-Forming Ring

Sungsoo S. Kim[1], Takayuki R. Saitoh[2], Junichi Baba[2]
[1]Kyung Hee University, [2]Tokyo Institute of Technology

We have performed a set of high-resolution simulations of nuclear star-forming ring that results in an inward gas migration from the galactic disk. Our simulations consider gas heating/cooling, star formation, and supernova feedback. The galactic potential was obtained from a snapshot of a 6.3 million particle simulation of a galactic disk at 1 Gyr, which manifests spiral arms and pseudo-bulge. The potential was modeled with a combination of 3-dimensional spherical (for the pseudo-bulge) and 2-dimensional cylindrical (for the disk) multipole expansion technique. With such a potential model, one can easily set up various realistic 3-dimensional potential models by slightly changing the expansion coefficients. We have performed a set of simulations with a few million gas particles covering the central ~6 kpc of the disk for different pseudo-bulge sizes and non-axisymmetry, and we report the dependence of the gas inflow rate, size of the star-forming ring, and star-formation rate in the ring on the size and strength of the non-axisymmetry in the bulge.