Geophysical Research Abstracts
Vol. 18, EGU2016-2743, 2016
EGU General Assembly 2016

Evaluating gyro-viscosity in the Kelvin-Helmholtz instability by kinetic simulations

Takayuki Umeda, Natsuki Yamauchi, Yasutaka Wada, and Satoshi Ueno
Institute for Space-Earth Environmental Research, Nagoya University, Nagoya, Japan (taka.umeda@nagoya-u.jp)

In the present paper, the gyro-viscous term [W. B. Thompson, Pep. Prog. Phys. 24, 363-424 (1961)] is evaluated by using a full kinetic Vlasov simulation result of the Kelvin-Helmholtz instability (KHI). The average velocity (velocity field) and the pressure tensor are calculated from a high-resolution data of the velocity distribution functions obtained by the Vlasov simulation, which used to approximate the gyro-viscous term according to Thompson (1961). The direct comparison between the pressure tensor and the gyro-viscous term shows a good agreement. It is also shown that the off-diagonal pressure gradient enhanced the linear growth of the KHI when the inner product between the vorticity of the primary velocity shear layer and the magnetic field is negative, which is consistent with the previous Finite-Larmor-Radius(FLR)-MHD simulation result, but not with the previous kinetic simulation results. This result suggest that it is not enough for reproducing the kinetic simulation result to include the gyro-viscous term only in the equation of motion in fluid simulations.