

Particle acceleration in relativistic shear flow turbulence

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Relativistic jets have been observed in a variety of astronomical objects, e.g., AGNs, microquasars and GRBs, etc. Shear flows and turbulence arise around a jet, and some observations indicate the emission of accelerated particles in such regions.

We examine how particles are accelerated in relativistic shear flow turbulence. Some previous studies have shown the test particle calculation in given MHD turbulence field or shear velocity. But, these calculations might not be appropriately able to produce relativistic shear flows and turbulence, because of the static turbulence power spectrum or the static discontinuous shear velocity.

To verify the particle acceleration in more realistic relativistic shear flow turbulence, we calculated a 2D Kelvin-Helmholtz(KH) instability of relativistic MHD(RMHD) simulation and then computed test particle simulations with the electromagnetic field obtained from the RMHD simulation.

We find that a part of particles is stochastically accelerated and this acceleration process is interpreted as the acceleration by gradient B drift along the border of the different magnetic field strength arising from the growth of KH instability. We will report the more detailed consideration of our calculation results.

Keywords: Relativistic shear flow, Turbulence, RMHD simulation, Particle acceleration