Contribution ID: **52** Type: **Poster**

Effects of parallel motion on test-particle transport

Monday, 23 December 2019 18:35 (5 minutes)

Transport processes play a significant role in the evolution of non-equilibrium plasmas. Various instabilities which exist in such plasma can generate intense fields that interact with particles and cause the anomalous transport. The intensity of the generated fields can be high enough to cause anomalous transport exceeding the collisional one. The possible explanation of a significant difference between anomalous and collisional transport characteristics is the particle trapping effect.
The particle trapping effect is the crucial feature for a two-dimensional transport across the magnetic field, particularly when random electric field has an infinite correlation time. One of the common methods for a theoretical study of this problem is based on the Taylor relation combined with a certain statistical approximation of velocity correlation function along the trajectories. In our previous work we proposed and validated closure approximation [1] for an infinite correlation time and expanded it to account for finite Larmor radius effects [2] as well as finite correlation time [3]. However, it is also important to study the effect of the particle motion along the magnetic field on the particle transport.
Here we use numerical simulation to study three-dimensional particle motion in constant magnetic and random electric fields. A set of parameters, such as random field correlation time, finite Larmor radius and initial longitudinal velocity are considered. The effect of these parameters on particle transport are discussed.
This work is supported by the Project № 20-04/18-2019 of the National Academy of Sciences of Ukraine.

[1] V.I. Zasenko, A.G. Zagorodny, O.M. Chernyak, Ukr. J. Phys. 56, 1007 (2011).
[2] O.M. Cherniak, V.I. Zasenko, Ukr. J. Phys. 62, 495 (2017).
[3] O.M. Cherniak, V.I. Zasenko, J. Phys. Conf. Ser. 1197, 012003 (2019).

Primary author: CHERNIAK, O.M. (Bogolyubov Institute for Theoretical Physics of the Natioanal Academy of Sciences of Ukraine, Kyiv)

Presenter: CHERNIAK, O.M. (Bogolyubov Institute for Theoretical Physics of the Natioanal Academy of Sciences of Ukraine, Kyiv)

Session Classification: Poster session

Track Classification: Statistical Theory of Many-body Systems