**Numerical simulations of magnetic reconnection in SPERF-AREX device (Harbin Institute of Technology).**

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In this study we present results of three-dimensional PIC simulations of the laboratory magnetosphere dynamics in the Space Plasma Environment Research Facility (SPERF, Harbin, China). Magnetosheath plasma is formed by ionization of background gas and moves when the magnetic flux is pumped by large, 2m-diameter MS coils. This approach allows setting the required magnetic field and plasma drift velocity. The calculations are performed by the parallel code iPIC3D, which implements a semi-implicit Particle-in-Cell method. The main improvement in the presented model of the AREX (Asymmetric REConnection) experiment was the addition of a new module with an internal boundary condition; the plasma in the computational domain moves self-consistently by changing the current in the main MS coils. The study analyzes the signatures of magnetic reconnection on kinetic scales of the order of the electron gyroradius, with parameters typical for the asymmetric dayside reconnection in the AREX-SPERF experiment. The configuration of the current sheet in the diffusion region is studied; appearance of a region with electron jets and significant non-gyrotropy and a magnetic Hall field is shown. We apply the **FOTE** (First-Order Taylor Expansion) method to analyze the magnetic topology and detect an X-line on the dayside. It is shown that the **FOTE** method will allow us to isolate the passage of the null points and reconnection region vicinity in the experimental data.

The work was supported by the Russian Science Foundation, project No. 23-47-00084 "Magnetic Reconnection in Space and Laboratory Plasmas: Computer Simulations and Empirical Modeling".