Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Hall Currents in Current Sheets Formed in Magnetic Fields with the *X* Line ANNA FRANK, SERGEY BUGROV, VLADIMIR MARKOV, Institute of General Physics, Moscow, Russia — Current sheets are a key element in magnetic reconnection processes, which play an important part in flare-type phenomena in astrophysics and laboratory experiments. Two-fluid plasma properties and appearing the Hall currents can be essential for the structure and dynamics of current sheets, modifying the properties of magnetic reconnection. We present direct evidences for generating the Hall currents in the current sheets formed in 3D and 2D magnetic configurations with the ***X*** line. It was reported earlier that asymmetric and tilted shape of plasma sheets indicated the Hall current interaction with the guide field [1]. On the base of space-temporal evolution of 3D magnetic fields caused by plasma currents we obtained the current distributions, including distributions in the plane perpendicular to the applied voltage. In the 3D configuration, with the guide field along the ***X*** line, two different processes take place: an enhancement of the guide field inside the sheet, and the Hall current generation [2]. In the 2D configuration (without the guide field) there is only the effect of the Hall currents, which transform the initial 2D magnetic configuration to the 3D one. The structure and time evolution of additional magnetic fields produced by the Hall currents were obtained for plasmas with different ion masses. It was shown that the Hall currents are decaying with time, and the heavier are the plasma ions, the Hall current generation [2]. 1. A.G. Frank, S.Yu. Bogdanov, G.V. Dreiden et al., *Phys. Letters A* **348**, 318-325 (2006). 2. A.G. Frank, S.Yu. Bogdanov, V.S. Markov et al., *Phys. Plasmas* **12**, 052316 (2005).

Joseph Paul Farrell
Brookhaven Technology Group,Inc.

Date submitted: 17 Jul 2006 Electronic form version 1.4