Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Effects of sheath instability on plasma properties in a Hall thruster discharge DMYTRO SYDORENKO, ANDREI SMOLYAKOV, University of Saskatchewan, Saskatoon, SK, Canada, IGOR KAGANOVICH, YEVGENY RAITSES, Princeton Plasma Physics Laboratory, Princeton, NJ, USA — The sheath near the electron-emitting surface may become unstable if it is characterized by the negative current-voltage characteristic, which occurs in presence of strong secondary electron emission. A 1d3v particle-in-cell code is applied to study the sheath instability effects on plasma-wall interaction in Hall thrusters. It is found that in stable stationary plasma state the final phase of cyclotron rotation of secondary electrons emitted from the thruster walls is not arbitrary but belongs to the discrete set of stability intervals [Kaganovich et al., Phys. Plasmas 14, 057104 (2007); Sydorenko et al., submitted to Phys. Plasmas (2007)]. In the limit of high discharge voltages, a new regime with relaxation oscillations is identified. In this regime, the plasma constantly switches between a state with non-space charge limited emission and a state with a space charge limited emission [Sydorenko et al., IEPC-2005-078].

Dmytro Sydorenko

Date submitted: 05 Sep 2007 Electronic form version 1.4