Abstract Submitted
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Theoretical and computational studies of the sheath of a planar, electron emitting wall MARTINA GIRAUDO, GIAN LUCA DELZANNO, ENRICO CAMPOREALE, LANL — We present an investigation of the properties of the sheath near an electron emitting wall in the electrostatic, collisionless limit. Electron emission is modeled with a drifting Maxwellian distribution function whose shift and thermal spread are changed parametrically in order to bridge from beam-like distributions to a Maxwellian at rest. We present an analytic equilibrium theory for this system based on the conservation of particle flux and energy, in connection with non-linear Particle-In-Cell (PIC) simulations. The latter are conducted with CPIC [1], a new electrostatic PIC code that couples the standard PIC algorithm with strategies for generation and adaptation of the computational grid. We also present a linear theory study, based on Ref. [2], in an attempt to interpret some of the oscillations that can be present in the system when the sheath potential profile is non-monotonic.

[1] G.L. Delzanno, E. Camporeale, et al., "CPIC: a curvilinear Particle-In-Cell code for spacecraft-plasma interaction studies," Proceedings of the 12st Spacecraft Charging and Technology conference, 2012.
[2] G.L. Delzanno, "A paradigm for the stability of the plasma sheath against fluid perturbations," Phys. Plasmas 18, 103508 (2011).

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