Abstract Submitted
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Bulk plasma effects of the electron sheath[1] BENJAMIN YEE, Sandia Natl Labs, BRETT SCHEINER, University of Iowa, MATT HOPKINS, EDWARD BARNAT, Sandia Natl Labs, SCOTT BAALRUD, University of Iowa — Electron sheaths are commonly found around relatively small, positively biased boundaries. Conventional analysis treats these structures as local phenomena with little impact on the bulk plasma. We present a theoretical treatment of the electron sheath that suggests an extensive presheath region, many times larger than that of an analagous ion sheath. We also find that the electrons must flow into the electron sheath with a minimum flow speed, which can be considered an electron sheath equivalent of the Bohm criterion. Two-dimensional particle-in-cell simulations are presented, demonstrating the existence of this electron presheath and a global flow of electrons to the positive boundary. Velocity distributions reveal that electron flux across the sheath edge is not random thermal flux, but a Maxwellian electron distribution flow-shifted to meet the minimum flow speed at the sheath edge. Qualitative agreement is found between the density distribution of electrons in simulations when compared to LCIF measurements of a thermionic plasma.

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