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Virtual Cathodes near small electrodes biased near the plasma potential and its effects on Langmuir probes[1] CHI-SHUNG YIP, NOAH HERSHKOWITZ, University of Wisconsin - Madison, GREG SEVERN, University of San Diego — Movable small (3cm x 3.8cm) plates biased near the plasma potential are immersed in a filament discharge in a multi-dipole chamber. The plates are small ($A_{plate}/A_{chamber} < (m_e/M_i)^{1/2}$) [1] such that an electron sheath is possible. Plasma potential and IVDF's near the plate are measured, and virtual cathodes, a double layer consists of an ion sheath and an electron sheath, was found to form. Ion velocities are determined by Laser-Induced Florescence, the electron temperature and electron density are measured by a planar Langmuir probe and the plasma potential is measured by an emissive probe. Effects of the virtual cathode on Langmuir probe I-V characteristics were predicted through estimating the current collection of an electrode in the presence of the virtual cathode, and was experimentally investigated by comparing I-V characteristics of the small plate and a 0.6cm diameter Langmuir probe.

[1] S. D. Baalrud, N. Hershkowitz and B. Longmier, Phys. Plasmas 14, 042109 (2007)

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Chi-Shung Yip
University of Wisconsin - Madison

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