Virtual Cathodes near small electrodes biased near the plasma potential and its effects on Langmuir probes¹ 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 \(A_{\text{plate}}/A_{\text{chamber}} < (m_e/M_i)^{1/2}\) [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.


¹This work is supported by U.S. DOE under the Grant and Contract No. DE-FG02-97ER54437.

Chi-Shung Yip
University of Wisconsin - Madison

Date submitted: 13 May 2015