

Abstract Submitted  
for the DPP07 Meeting of  
The American Physical Society

**Investigation of Plasma Potential and Electron Dynamics in the Near-Field of Hall Plasma Thrusters** ANDREW SMITH, MARK CAPPELLI, Stanford University — A 3-D map of the plasma potential in the near-field of a laboratory  $E \times B$  Hall thruster has been experimentally obtained. The tested thruster channel spans radially from 35mm to 47mm. The measurements lie within a cubic volume 100mm on a side centered on the central axis of the thruster. The results of a 3-D discrete electron transport simulation are presented for the near-field of the thruster. For a prescribed magnetic and electric field distribution in the near-field, a staggered leapfrog time-integrating method is utilized to track electrons launched from a simulated cathode. Inter-particle collisions and field instabilities are ignored though collisions with surfaces are treated. Spatial maps of the relative electron density, mean electron energy, and estimated local Hall parameter are presented. The model results indicate that measured channel to beam current ratios may be largely governed by the field structure in the near-field, and that the local Hall parameter is anisotropic in the domain with a mean value on the order of 1.

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Date submitted: 11 Jul 2007

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