Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

Implementation of a polytropic model for two-dimensional hybrid Hall thruster simulations EUNSUN CHA, Stanford University, EDUARDO FERNANDEZ, Eckerd College, MARK CAPPELLI, Stanford University — A polytropic model for Hall discharge simulations is developed and tested against data for a laboratory Hall thruster. 2-D hybrid particle-in-cell (PIC) simulations, widely used to describe plasma properties of Hall thrusters, solve the electron energy equation for electron temperature requiring electron mobility as a specified parameter. Motivated by experiments that suggest a simpler polytropic relation between the electron density and electron temperature, we have adopted a 2-D hybrid-PIC to use this relationship as a means of relaxing the need to specify the electron mobility. By removing the usual ad-hoc assumptions of the form of the electron mobility, the polytropic model, if transportable to other operating conditions and Hall thruster designs, can be a powerful performance estimator and optimization tool. In this presentation, we discuss the implementation of this model and early results.

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Date submitted: 15 Jun 2012 Electronic form version 1.4