Abstract Submitted
for the GEC13 Meeting of
The American Physical Society

Initial Experiments of a New Permanent Magnet Helicon Thruster J.P. SHEEHAN, BENJAMIN LONGMIER, University of Michigan — A new design for a permanent magnet helicon thruster is presented. Its small plasma volume ($\sim$10 cm^{-3}) and low power requirements ($<$100 W) make it ideal for propelling nanosatellites ($<$10 kg). The magnetic field reached a maximum of 500 G in the throat of a converging-diverging nozzle and decreased to 0.5 G, the strength of earth's magnetic field, within 50 cm allowing the entire exhaust plume to develop in the vacuum chamber without being affected by the chamber walls. Low gas flow rates ($\sim$4 sccm) and high pumping speeds ($\sim$10,000 l/s) were used to more closely approximate the conditions of space. A parametric study of the thruster operational parameters was performed to determine its capabilities as both a thruster and as a plasma source for magnetic nozzle experiments. The plasma density, electron temperature, and plasma potential were measured in the plume to characterize the ion acceleration mechanism.

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Date submitted: 14 Jun 2013 Electronic form version 1.4