Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Modeling of Plasma Detachment from a Magnetic Nozzle[1] COLIN GLESNER, BHUVANA SRINIVASAN, Department of Aerospace and Ocean Engineering, Virginia Tech — The detachment of plasma from a magnetic nozzle is examined using numerical simulations based on the discontinuous galerkin method. Plasma detachment is of interest for its role in the development of plasma based space propulsion systems. The simulation parameters used, modeled after the computational and experimental work of Winglee et al,[2] result in $\beta \approx 0.01$, and $Re_m \approx 0.3$. In this low-β regime perturbation of the initially imposed magnetic field is expected to be small. To more effectively study these perturbations, the ideal magnetohydrodynamic equations are modified by linearizing the magnetic field. The perturbative component is then evolved in the simulation rather than the total magnetic field, allowing for a clearer resolution of changes in the magnetic field produced by the plasma. Because of the intermediate range of magnetic Reynolds number present in this plasma configuration, the effect of introducing resistivity in the simulation is also examined. Further work will investigate the effect of varying the configuration of the magnetic field.

[1]Supported by a grant from the Virginia Space Grant Consortium
[2]R. Winglee, et al, Physics of Plasmas **14**, 063501 (2007).

Colin Glesner
Department of Aerospace and Ocean Engineering, Virginia Tech

Date submitted: 24 Jul 2015 Electronic form version 1.4