Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Experimental Results for Rotating Magnetic Field – Driven Thruster with Constant Amplitude Field[1] CHRISTOPHER SERCEL, JOSHUA WOODS, TATE GILL, BENJAMIN JORNS, University of Michigan — The experimental setup and results are presented for the testing of a rotating magnetic field (RMF) – driven thruster. Two antennae are pulsed out of phase at RF frequencies using a power processing unit developed in conjunction with Eagle Harbor Technologies. This supply maintains constant current amplitude throughout the pulse length by driving the circuit at resonance. This pulsing generates an RMF which entrains electrons in the plasma, inducing an azimuthal current. This current interacts via the Lorentz force with a steady radial magnetic field to produce thrust in the axial direction. Probe data is used to measure plasma temperature and ion energies to determine thermal losses in the device to inform a phenomenological efficiency model. These efficiencies, along with direct thrust data and current waveforms in the circuit, are analyzed and compared to previous testing which used a ringdown to pulse the RMF. From comparison, the minimum current amplitude for the RMF to fully penetrate the plasma can be determined. These results are discussed in the context of future design changes which could improve this thruster's performance.

[1]NSTRF Grant 80NSSC18K1190

Christopher Sercel
University of Michigan

Date submitted: 12 Jun 2020 Electronic form version 1.4