Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

**Efficiency increases in a Low-Power Electron Cyclotron Resonance Thruster using Custom Input Waveforms**[1] BENJAMIN WACHS, BENJAMIN JORNS, Univ of Michigan - Ann Arbor — Small satellite missions often require on-board propulsion for orbital insertion, station keeping, and deorbit. While many technologies are under development to address this need, none has emerged as a definitive solution. Magnetic nozzle thrusters are an ideal architecture for small satellite propulsion, as they offer operational simplicity, durability, and flexibility in terms of propellant, input power, and thrust level. These thrusters operate by using RF or microwave power to ionize, heat, and expel propellant through an expanding magnetic field. Despite their promise, testing has shown very low efficiencies at powers under 100 W. The most promising of these devices have used ECR to reach a thrust efficiencies over 10%. Drawing from this work, our experiment seeks to improve performance by using custom input waveforms to heat the plasma. Specifically, we mix and pulse two microwave signals, with frequencies from 800 to 2500 MHz and combined power under 40W, and measure thrust using a hanging pendulum thrust stand. The thrust values for each test point are fed into a global optimization algorithm, which automatically selects new test points. The results of this experiment will be presented and discussed in detail in this work.

[1]NASA Space Technology Research Fellowship grant 80NSSC17K0157

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Date submitted: 04 Jun 2020 Electronic form version 1.4