

# Aerospace Engineering Thesis Defense

Propellant Mass Scaling and Decoupling and Improved Plasma Coupling in a Pulsed Inductive Thruster

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## abstract

Two methods of improving the life and efficiency of the Pulsed Inductive Thruster (PIT) have been investigated. The first is a trade study of available switches to determine the best device to implement in the PIT design. The second is the design of a coil to improve coupling between the accelerator coil and the plasma. Experiments were done with both permanent and electromagnets to investigate the feasibility of implementing a modified Halbach array within the PIT to promote better plasma coupling and decrease the unused space within the thruster. This array proved to promote more complete coupling on the edges of the coil where it had been weak in previous studies. Numerical analysis was done to predict the performance of a PIT that utilized each suggested switch type. This model utilized the Alfvén velocity to determine the critical mass and energy of these theoretical thrusters.