

Space Magneto-Inductive Plasma Thruster

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Diversified Technologies, Inc. (DTI) designed, developed, and demonstrated a Magneto-Inductive Plasma Engine (MIPE), an electromagnetic high-power electrodeless thruster. The MIPE is a non-electrostatic, electrodeless, high power alternative to classical Electric Propulsion and chemical thrusters. It is the first of its type to be successfully tested and validated on a thrust stand. Its basic geometry is a tubular linear induction motor with multiple phased coils. DTI demonstrated significant performance levels during in-house and AFRL prototype testing, and it is suitable for multi-mode operation using a wide range of propellants. Measured parameters on a non-optimized MIPE include high I_{SP} (2300 s) and high thruster efficiency (37%) in the low mass flow regime, and thrust which increased monotonically with mass flow rate (up to at least 100 mN).

Primary attractive features of MIPE are: it is electrodeless; any propellant may be used including standard hydrazine, liquids, or gases collected during space travel; and the ability to seamlessly change operating modes from high I_{SP} and high efficiency to high thrust.

The development met or exceeded all parameters defined in prior similar NASA work and achieved many new major milestones. Testing was performed at AFRL/SPEF (Edwards AFB).