

High-Power, High-Thrust Ion Thruster (HPHTion)

For near-Earth applications

Advances in high-power photovoltaic technology have enabled the possibility of reasonably sized, high-specific power solar arrays. At high specific powers, power levels ranging from 50 to several hundred kilowatts are feasible. Ion thrusters offer long life and overall high efficiency (typically >70 percent efficiency). In Phase I, the team at ElectroDynamic Applications, Inc., built a 25-kW, 50-cm ion thruster discharge chamber and fabricated a laboratory model. This was in response to the need for a single, high-powered engine to fill the gulf between the 7-kW NASA's Evolutionary Xenon Thruster (NEXT) system and a notional 25-kW engine.

The Phase II project matured the laboratory model into a protoengineering model ion thruster. This involved the evolution of the discharge chamber to a high-performance thruster by performance testing and characterization via simulated and full beam extraction testing. Through such testing, the team optimized the design and built a protoengineering model thruster. Coupled with gridded ion thruster technology, this technology can enable a wide range of missions, including ambitious near-Earth NASA missions, Department of Defense missions, and commercial satellite activities.

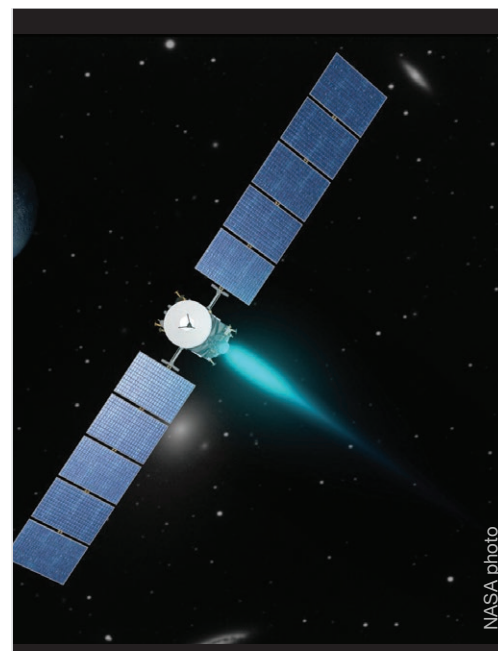
Applications

NASA

- ▶ Cargo propulsion requirements with power levels extending from 30 kW to 300 kW
- ▶ Space science endeavors

Commercial

- ▶ Satellites
- ▶ Orbit transfer needs
- ▶ Propulsion systems



Phase II Objectives

- ▶ Evaluate prototype discharge chamber with simulated beam extraction
- ▶ Characterize performance of discharge chamber with full beam extraction
- ▶ Design and fabricate stainless steel protoengineering model
- ▶ Complete performance characterization of protoengineering model

Benefits

- ▶ Long life
- ▶ High thrust-to-power ratio (~50 mN/kW)
- ▶ Low system complexity

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