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.

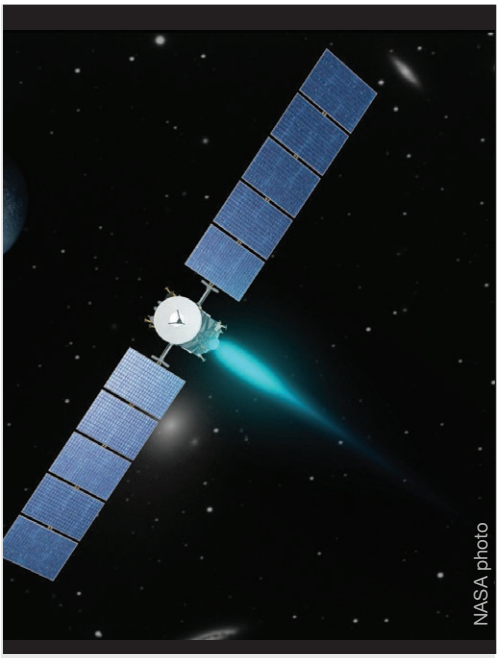
Applications

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

Firm Contact

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