

NASA SBIR/STTR Technologies

NNX09CF59P – Advanced Microwave Electrothermal Thruster (AMET)

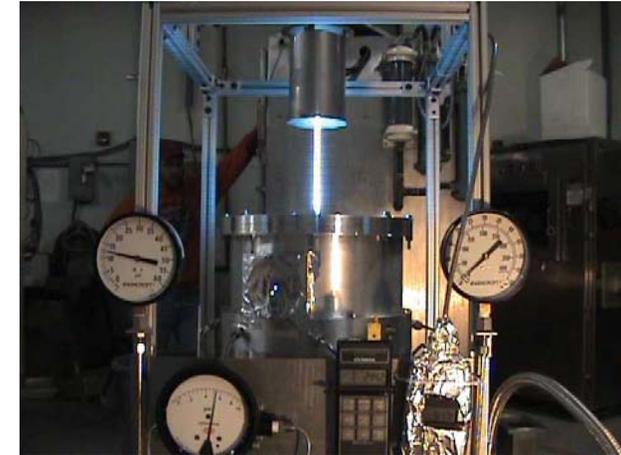
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Identification and Significance of Innovation

Work performed under the Phase I STTR Advanced Microwave Electrothermal Thruster (AMET) established the technical feasibility of the AMET through both experiment and analysis. The AMET uses 915 MHz microwaves in the 75-kW power class to heat water propellant with an electrodeless discharge to the plasma state before it is discharged out a nozzle to produce thrust. The thruster was put through an initial set of hot-firing tests, and the thruster achieved steady operation, demonstrating feasibility. The University of Alabama in Huntsville performed numerical modeling to characterize the flow in the nozzle expansion section. The AMET, unique in its ability to deliver high performance with water propellant, is intended to provide in-space propulsion for manned missions within the solar system, and will be particularly attractive for missions involving stops at the Moon, Mars, or other locations known to hold reserves of water.



**Phase 1 AMET
Hot-Firing Test**

Technical Objectives and Work Plan

- Task 1. Define System Requirements
- Task 2. Identify Appropriate Microwave Source for Phase I Testing
- Task 3. Refurbish Existing 915 MHz Test Article
- Task 4. Design, Fabricate, and/or Purchase Necessary Support Hardware
- Task 5. Conduct AMET Demonstration Hot-Firing Tests
- Task 6. Perform Numerical Modeling of AMET Nozzle Flow
- Task 7. Create Preliminary Design of Phase 2 AMET
- Task 8. Project Management and Reporting

NASA and Non-NASA Applications

NASA applications include space missions to either the Moon or Mars which would benefit from high-performing, in-space propulsion that can use in-situ-derived water propellant.

Non-NASA applications include use of a related, but lower-power, 1-kW Microwave Electrothermal Thruster which ORBITEC is developing for the Air Force Research Laboratory to provide propulsive capabilities for reconnaissance satellites in low Earth orbit.

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NON-PROPRIETARY DATA