Engine Development Status for NEXT: NASA's Evolutionary Xenon Thruster

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A NASA Glenn Research Center-led team has been selected to develop the next generation of ion propulsion system technology. The NEXT (NASA's Evolutionary Xenon Thruster) team is composed of NASA GRC, the Jet Propulsion Laboratory, General Dynamics Space Propulsion Systems and Boeing Electron Dynamic Devices, with significant participation by the Applied Physics Laboratory, University of Michigan and Colorado State University.

The central feature of the NEXT system is an engine that inherits the knowledge gained through the NSTAR ion thruster (that successfully propelled the Deep Space 1 to asteroid Braille and comet Borrelly) while more than tripling the input power level and yielding significant improvements in performance.

The engine, which has been demonstrated in laboratory experiments, effectively doubles the ion beam area by increasing the diameter from the 30 cm used on NSTAR to 40 cm. The goal is to develop a high-performance, 1-8 kW throttle-able ion engine appropriate for both earth-orbit applications of national interest, and for primary propulsion for deep-space interplanetary missions. Performance goals for the engine include: a 1–8 kW power-throttling envelope; a variable specific-impulse capability of ~2500-4100 seconds specific impulse for earth-space mission applications, and 4100 seconds and 70%+ efficiency for deep-space applications; a mechanical design envelope comparable to that of the NASA NSTAR 30 cm thruster; and a mass less than state-of-the-art commercial 25 cm thruster technology. This paper discusses the design, performance, and development status of the engine.

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