

End-of-Mission Characterization of the Ion Thruster on DS1

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NASA's Deep Space 1 (DS1) mission was the first use of ion propulsion for primary propulsion on a deep space mission and successfully validated this technology for future science missions. The ion engine on DS1 accumulated 16,265 hours of operation and processed approximately 72 kg of xenon. At the end of the Extended Mission for DS1, which successfully flew by the comet Borrelly, NASA executed the Hyper-Extended Mission that was designed to evaluate the wear on the ion engine after extended operation in space. This paper describes the results of this characterization, which included electron-backstreaming tests, perveance measurements, neutralizer characterization, discharge chamber performance curves, and direct thrust measurements.