

Abstract

iEPSat: Cubesat propelled to lunar space by ionic liquid electro spray thrusters

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We present a potential mission application of the ionic liquid electro spray propulsion technology developed at the Space Propulsion Laboratory of the Massachusetts Institute of Technology. Over the past year, MIT's highly miniaturized electro spray thrusters have been thoroughly characterized and matured up to a recent verification test in space. The thrusters feature porous substrates with 480 emitter tips per square centimeter, with a specific impulse >1000 s and throttleable thrust of approximately 12uN per square centimeter of active thruster surface. Parallel operation of multiple thrusters has been demonstrated, allowing for thrust scalability according to mission requirements. This way, the electro spray propulsion emitters developed at MIT have the capability to deliver significant Δv to a Cubesat allowing for orbit raising capability from a suitable initial orbit to lunar space. Studies on the capability of an up-scaled propulsion system based on the electro spray thruster technology are presented and explored in the context of different initial orbits.