Applications of Microthrust Systems for Microspacecraft, Drag-Free, and Precision Constellation Stationkeeping Missions

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Abstract

We present a survey of microthrust propulsion systems with applications to microspacecraft, drag-free, and precision constellation stationkeeping missions. For this study, we examine microthrust systems capable of providing 1-100 μN including colloid and micro-colloid thrusters, field emission electric propulsion (FEEP) and liquid metal ion sources (LMIS), vaporizing liquid microthrusters (VLM), ablative and gas-fed pulsed plasma thrusters (PPT), vacuum arc thrusters (VAT), and laser ablation thrusters (LAT). The performance of each system is presented along with a discussion on the current state-of-the-art developments. Each propulsion system is examined in terms of applications to upcoming NASA missions including LISA, ST-3, ST-7, TPF and others. Results from a recent Integrated In-Space Transportation Planning (IISTP) study of secondary propulsion are also included.