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Velocity Distribution and Plasma Density Measurements in an Inductive Microthruster Plume DAVID PETERS, TIMOTHY ZIEMBA, ROBERT WINGLEE, University of Washington — The plume characterization of an inductive microthruster called μPIT is presented. Under development at the University of Washington, μPIT combines elements of PPTs and PITs to efficiently deliver a precise impulse bit. The system uses Teflon as a propellant, similar to a PPT, but provides additional acceleration of the propellant through inductive RF heating of the plasma. This paper details the change in performance when the inductive heating is applied. Additional acceleration of the plasma through the use of a magnetic nozzle is also investigated. A retarding field energy analyzer is used in conjunction with an asymmetric double Langmuir probe to characterize the velocity distribution of the plasma plume. In addition to a total impulse measurement, these data also provide information about the degree of plume divergence and thruster efficiency. These measurements confirm that the antenna continues to ionize and accelerate late-time neutrals after the initial breakdown, which leads to higher energy efficiency and greater specific impulse than PPTs operating at similar energy levels.[1]

[1]Spanjers, G. G. et al. "AFRL MicroPPT Development for Small Spacecraft Propulsion," AIAA Paper 2002-3974

David Peters

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