

Abstract Submitted  
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**Experimental Study of the Microdischarge Plasma Thruster (MDPT)**<sup>1</sup> UTSAV KC, PHILIP VARGHESE, LAXMINARAYAN RAJA, Department of Aerospace Engineering and Engineering Mechanics, The University of Texas at Austin, Austin, TX 78735 — Small satellite propulsion requirements dictate the need for a scaled down propulsion device capable of providing low thrust with small impulse bits. We have designed and studied a simple miniaturized thruster called Microdischarge Plasma Thruster (MDPT). It comprises a tri-layer sandwich structure with a dielectric layer sandwiched between two electrode layers, and a contoured through hollow drilled into the structure. Each layer is 100's microns in thickness and the hole diameter of the same order. Argon is used as the propellant gas with flow rates of  $\sim 1$  SCCM. The pressure is adequate to produce a stable microdischarge between the electrodes even with modest voltages ( $\sim 1000$  V). The microdischarge adds heat to the supersonic portion of the flowing gas which is shown to produce additional thrust over the baseline cold gas flow. The studies have also demonstrated that the MDPT exhaust plume is composed of ions albeit at low concentrations, suggesting possibility of MDPT to be operated in a mixed electrothermal/electrostatic mode. We present discussion of multiple discharge operating modes and electrical characteristics of the MDPT. Spectral measurements of the plume are used to determine its composition and calculate its temperature. The momentum thrust of the MDPT is measured with a torsion balance.

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