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DEVELOPMENT OF A LOW POWER CYLINDRICAL HALL THRUSTER PROPULSION SYSTEM FOR MICROSATELLITES

Abstract

As the demand for highly capable microsatellite missions continues to grow, so too does the need for small, low power satellite technologies. One area which needs to be addressed is advanced propulsion systems capable of performing on-orbit manoeuvres, station keeping and deorbit burns with minimal propellant. A low power Cylindrical Hall Thruster (CHT) is being developed at the University of Toronto Institute for Aerospace Studies (UTIAS) Space Flight Laboratory (SFL) specifically to meets the low power and size requirements of microsatellite missions. The development of SFL's sub 200 Watt, 26 mm hall thruster will permit more capable microsatellite missions while minimizing the required propellant and thruster mass. The development program is funded by the Canadian Space Agency and aims to produce a CHT qualified to Technology Readiness Level (TRL) 6 by the end of 2015. This paper presents the test results from the three phase low power Cylindrical Hall Thruster development campaign and discusses the statues of the program and future plans. The first development phase focused on a highly configurable prototype design which facilitated optimization of performance parameters such as thrust, specific impulse and power consumption. The second phase incorporated lessons learned from prototype testing into the development of a proto-flight model. Further work will focus on packaging and qualifying a standalone flight unit including all electrical interfaces and the propellant feed system. Evaluations of alternative propellants such as Krypton and Argon against the baseline Xenon propellant will also be performed.