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HEMPT ELECTRIC PROPULSION STRATEGIC STATUS

Abstract

The business unit Electron Devices of Thales Deutschland started at the end of the 90's with the development of a new propulsion technology, the HEMPT (Highly Efficient Multistage Plasma Thruster). Since then, the design has been qualified, has seen an extended life test and the first flight units for the Germany technology satellite H2Sat have been manufactured and delivered. Since the first product development, Thales has carried out a lot of improvements, highlighting the unique advantages (like flexibility, long life behaviour with small thruster, flawless krypton operation, simple and cost effective design) of the HEMPT whilst also improving the core performances of the thrusters. Thales is currently manufacturing the EV0 thruster, for SmallSat applications from 100 kg to 1 ton in LEO, with a robustness that enables it to work at various orbits. The HEMPT provides great benefits to the constellations market due to its unique ability of using different propellants without the need of any modifications and also due to its cost effective design. At 700W and with a 300V acceleration voltage it generates 32mN thrust with a specific impulse of 1330s in high thrust mode. The thruster can also be operated at a higher voltage in the fuel efficient mode. With 800V it reaches an ISP of 1955s with a thrust of 24.7mN. The thruster can be controlled within a range of 700W down to 100W. The thruster's performance is optimal when in use with the Krypton or the Xenon propellant. The Krypton is a much cheaper propellant that allows for a higher ISP by a reduced thrust. With the Krypton propellant the thruster produces 28.2mN of thrust with an ISP of 1425s at 700W and 300V.

This paper will give an update on the development status of the HEMPT family focusing on the EV0 LEO thruster, whilst highlighting the key advantages of this technology for SmallSat applications.