

IFM Nano Thruster: High total impulse propulsion for Small- and Nanosatellites enabling interplanetary missions

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High specific impulse electric propulsion systems are capable of providing the necessary high total impulse required for actively propelled interplanetary missions even at compact scales required for small and Nanosatellites. Field-Emission Electric Propulsion (FEEP) thrusters are among the technologies capable of providing high specific impulses close to 10000s. The electrostatic acceleration of ions used in this principle makes FEEP thrusters highly efficient in terms of propellant usage, while the high density of the metal propellant yields high volumetric impulse, enabling uniquely small tank sizes per achieved delta v. The ENPULSION/FOTEC IFM Nano Thruster is a flight ready FEEP propulsion module, that has undergone a first in-orbit test on a Cubesat, which was recently launched in Jan 2018. The thruster is based on technology with exhaustive flight heritage, developed and qualified for agency sponsored science programs, and has been designed to fit into ~0.8U envelope, with a maximum power requirement of 40W. The IFM Nano Thruster uses a metal propellant and is entirely inert during launch, without any moving parts or pressurized propellants. The standard-sized module can provide >5000-10000 Ns of impulse, resulting in >2km/s Δv for a 3kg Cubesat, allowing a variety of different manoeuvres, including significant orbit change. During operation, the thruster can be throttled in terms of thrust, and can be varied in specific impulse from 2000s – 6000s, depending on mission needs and available power. The thruster is modular in design, allowing clustering of thrusters to adapt to different mission needs.

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