

IAF SPACE PROPULSION SYMPOSIUM (C4)  
Electric Propulsion (2) (6)

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HT100 ELECTRIC PROPULSION FLIGHT EXPERIENCE ON MICROHETSAT

**Abstract**

The MicroHETSat (micro- Hall Effect Thruster Satellite) is a mission based on SITAEL micro satellite platform (<75kg), designed to equip and operate, in the frame of a dedicated IOD-IOV mission, a low power (100W class) electric propulsion system based on Hall Effect Thruster, internally developed. Starting from an initial 517 km altitude orbit, achieved with a Falcon 9 launch on December 1st 2023, the main propulsion system goals of the mission are to achieve at least 1000 ignition cycles, a total cumulating firing time of at least 250 hours and a single ignition to surpass 600 seconds. The propulsion sub-system consists of three main elements all designed and built by SITAEL:

- HT100 Hall-Effect Thruster, including internally developed HC1 hollow cathodes;
- Xenon Pressure Vessel and related fluidic system (PMA, Propellant Management System), including the thermal control equipment needed for the propellant conditioning;
- Power Processing Unit (PPU) and Propulsion Control Unit (PCU).

The entire propulsion sub-system has been developed and qualified internally, at Sitael electric propulsion premises in Pisa. The units of the flight model have been proto-flight accepted, and integrated into the propulsion subsystem, that demonstrated in its end-to-end tests its firing capability before launch.

MicroHETSat has been released to its orbit by a Falcon 9 rideshare mission on December the 1st, 2023, and at the date of the present abstract submission, MicroHETSat is fully operational, and its mission is ongoing, with more than 4 km orbit raising accumulated to date.

The present paper will report the in-flight system performance, key for the in-orbit-validation of the HT100 Hall Effect Thruster. In addition to the HT-100 Thruster Unit, the entire propulsion sub-system elements behavior in orbit will be presented, including the Propellant Management Assembly -PMA, the Power Processing Unit (PPU) and the Propulsion Control Unit (PCU). Flight telemetries will be elaborated and compared to ground test results and to numerical prediction models.

The flight experience of HT100 based propulsion system will be the basis for all the next planned missions and will provide invaluable information for current ongoing developments and in particular for the new HT400 Hall Effect Thruster (400-1000 W class) and its PPU.