

IAF SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (4)

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VERIFICATION OF MINIATURIZED ELECTRIC PROPULSION SYSTEMS THROUGH A SMALL
TEST PLATFORM**Abstract**

The growing interest of the market on nano-satellites is pushing the technology associated with development of these small platforms. Among the enabling technologies, miniaturized electrical propulsion systems (ePS) deeply increase the range of missions performed with multi-unit cubesats (6U+). Actually, the level of readiness of the ePS technologies is still low, due to the lack of effective and safe processes and facilities to verify and validate them for In-orbit Demonstration. In particular, one of the major issues is to assess what is the mutual impact of an electric propulsion system and the small spacecraft technology, in order to avoid loss of on board functionalities and anomalies or misbehaviors. The present paper deals with the verification campaign of a versatile test platform based on Cubesat-like technology, able to host a wide range of miniaturized ePS already available on the market or ready for the qualification tests. In fact, the platform provides a wide range of interface for data communication, a power supply up to 60 W and a operative voltage regulated in the range [5 28] V, and 4U completely devoted to hold the ePS and support equipment. The platform is equipped with sensors and tools, i.e. temperature sensors (NTC), current and voltage sensing circuits, strips of open resistors, magnetometers, silica wafers mounted on the cubesat faces, and a very precise (24-bit resolution) acquisition system. The platform already fits with the Small Plasma Facility (SPF) at the Electric Propulsion Laboratory of ESA-ESTEC. The final set-up of the platform and Ground Support Equipment (i.e. faraday cups and Magnetic Field Mapper) contributes to assess the functional behavior of the integrated system (ePS and platform) in terms of internal thermal fluxes, power consumption in different mode of operation of the platform and of the ePS, electrostatic surface charging and magnetic fields, contaminant and chemical particles type and quantity. The test platform has already been integrated with SPF and the functional test campaign has been successfully performed, demonstrating that the test platform is ready for final tests. The first ePS in under integration and the related verification campaign will be completed in the second quarter of 2019 making available the first measured data about the influence of an ePS on the cubesat technology (and viceversa).