IAF SPACE PROPULSION SYMPOSIUM (C4)
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# REGULUS ELECTRIC PROPULSION SYSTEM INTEGRATION IN UNISAT-7 MICROSATELLITE AND IN A 6 UNIT CUBESAT FOR IOD AND TESTS

**Abstract**

REGULUS Electric propulsion (EP) system has been designed and manufactured to get the best compromise among the following parameters: technical performance, costs, simplicity (that is directly related to costs and reliability), robustness (small changes in technical requirements do not have to translate in consistent re-design, manufacturing and testing efforts), flexibility (customizations should be made with low non-recurrent activities). In fact nano, micro and small satellites may need to move in space for different reasons: to (I) reach the right orbit (when the satellite carrier does not have propulsion capabilities), (II) maintain the right orbit, (III) achieve the right relative position and (IV) change their orbit. As it's now clear that space is going to be crowded, these satellites will need (V) the capability to leave their orbit and reenter in atmosphere. Moreover, when operating in VLEO, micro satellites need (VI) to have propulsion for drag compensation. REGULUS thruster technology does not require electrodes-grids-neutralizer, thus it doesn't have elements subjected to erosion. Iodine propellant can be used in a compact and no pressurized tank. REGULUS FM is expected to perform acceptance tests in May 2020 and to be integrated in UniSat-7 GAUSS' nanosatellites deployer system. During the mission, scheduled for October 2020, REGULUS will be tested in orbit to prove UniSat-7 capabilities of orbital

maneuvers and drag compensation. Another REGULUS FM is going to be integrated in a 6 Unit CubeSat realized by the Polytechnic of Turin and will undergo performance tests in the vacuum chambers at the University of Padua and ESA facilities in ESTEC. Once the mechanical and electrical integration with the satellite platform will be completed, the following measurements will be performed: thrust, plume and plasma performance, EMI/EMC/RF interaction, high power and peak power required from the platform, thermal environment (especially for long duration thrusting), contamination (i.e. when iodine is adopted) and plume shape. This will be the first time that REGULUS will be tested integrated in a real 6U platform. The present paper describes such integration activities and test campaigns with a particular focus on the tests results. Overall, the exploitation of such activities aims to increase the micro satellites community confidence in EP systems integration in satellite platforms and to reduce the risks of operations in space.