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Type: oral

Gas breakdown investigation and mitigation in complex geometries

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Increasing satellite bus voltages from 28-100 V to 300-600 V is presently under investigation [1]. High voltages will be required to power new generations of ion and Hall effect thrusters [2], with higher power efficiencies, lower power system costs and substantial mass savings. At the same time, increasing bus voltage could lead to a higher risk of electrical breakdown for several satellite components, in particular for solar panels and slip ring assemblies (SRAs). Gas breakdown inhibition in satellites is a technological challenge. Satellites experience a wide range of pressure, from atmospheric pressure before the launch to high vacuum ($\leq 10^{-8}$ mbar) in orbit. Many poorly-defined physical parameters and pressure fluctuations characterize the environment surrounding a satellite during its operating life.

This work focuses on gas breakdown on the standard cylindrical configuration of a SRA, which ensures the electrical power transmission between the rotating solar panels and the rest of the satellite. The SRA features a complex geometry, including gold-plated brushes slipping on a stack of gold-plated rings, surrounded by a conducting housing at the ground reference voltage of the satellite. Optimization studies of the SRA design to inhibit gas breakdown will be presented [3].

[1] T. Yoke, *et al.* IEEE Trans. on Plasma Science **41**, 3477 (2013).

[2] A. Leporini, *et al.* "DEVELOPMENT OF A 20 kW-CLASS HALL EFFECT THRUSTER", Proceedings of Space Propulsion, (2016).

[3] R. Schnyder, *et al.* J. Phys. D: Appl. Phys. **46**, 285205 (2013).

Type of contribution

Poster

session

Applications - materials and devices

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