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Measurements of the Characteristics of Plasma Plume Generated by Low Energy Surface Flashover

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Due to their high feasibility and flexibility CubeSats has found increasingly extensive applications in various research fields, and with an on-board propulsion system the capabilities and service lifespan can be significantly enhanced. Electrical propulsion system recommended by its high efficiency and low threat to the primary payload is a promising candidate and usually utilizes an ignitor subsystem to provide the seed plasma and initiate the main discharge. It has been demonstrated in previous work that Low Energy Surface Flashover (LESF) ignitor subsystem can sustain extended operation of the same assembly for >1.5 million pulses. Experiments incorporating LESF with models of Pulsed Plasma Accelerator and Vacuum Arc Thruster confirmed the successful ignition by LESF. In this work the characteristics of the plasma plume generated by LESF were investigated by simultaneous measurements of three double Langmuir probes in individual LESF events. The three double probes were positioned at three linear distances from the LESF assembly for the time-of-flight measurements and at three polar angles for the angular distribution measurements. Preliminary results showed that the plasma expansion velocity is ~ 5cm/μs and the plasma plume generated by the LESF is primarily concentrated within 60 degrees above the assembly.

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