Flexibility, Validity and Susceptibility of Cylindrical Langmuir Probes for CubeSat and Pico-Satellite to Characterize Ionosphere and Thermosphere Plasma

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Nobel Laureate Irving Langmuir pioneered the use of electrostatic probes to measure the electron temperature, number density, floating potential, and plasma potential in ionized gases (in the 1920\'s). Langmuir probe is comprised of an exposed conductor (e.g., wire) immersed within a plasma. The theory of interpreting the data acquired (namely the current drawn from the plasma at a sequence of different bias voltages) from Langmuir probes is well established. Druyvesteyn noted that the second derivative of the probe current with respect to the bias voltage is proportional to the electron energy distribution function. The small size of typical Langmuir probes coupled with their relatively simple theory of operation make them an indispensable and widely used plasma diagnostic. We can constructs custom probes sized to each experiment, commercially available systems do exist. This research paper explore the reliability, validity and susceptibility of small dimensional Langmuir Probe in CubeSat and Pico-Satellite for Ionosphere Characterizations. There is no general theory of Langmuir probes which is applicable to all measurement conditions, because it depends on the probe size and geometry, plasma density and temperature, platform velocity, and other factors. The actual design of the probe is usually determined by considering the relationship between the probe dimensions and the Debye length of the plasma.

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