

Difficulty to Apply DC probe measurement to a small satellite Mission and its Solutions

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Tiny satellite such as a CubeSat is expected to be useful for scientific purpose, especially if the mission is organized as a constellation. One field is ionosphere research. DC Langmuir probe has been used since 1945 to measure two basic parameters (T_e and N_e). The measurement with DC probe works only when the conductive surface of reference electrode (satellite surface) is large enough compared with the surface area of the electrode. However, this requirement is not fulfilled for tiny satellite. Accordingly, this leads to a serious problem by two reasons: (1) potential of the satellite changes as the voltage of DC Langmuir probe is swept, and (2) contamination of both satellite and electrode can't provide us reliable measurement values. The paper discusses problems described above and proposes two possible solutions.

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