



Simulations of perturbation effects on Langmuir probe measurements

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An approach is presented to improve the interpretation of Langmuir Probes in situ measurements in terms of space plasma parameter. Algorithms based on theoretical models used to interpret data generally do not account for several physical effects at play in space, such those related to magnetic fields, anisotropic distribution functions, and the proximity of obstacles related to the geometry of the satellite. The same analytic algorithms as reported in a recent paper (Knudsen, et al. JGR Space Physics.) are applied to particle-in-cell simulation results, accounting for realistic physical processes and spacecraft geometry, in order to quantitatively assess the effect of these in the interpretation of probe characteristics in terms of plasma parameters. Examples of the modifications caused by environmental conditions on probe measurements, and their impact on calculated space plasma parameters, demonstrate the necessity to account for more realistic physical processes than can be included in analytic models.