Geometry considerations for EEDF measurements using Langmuir probes[1] STEVEN SHANNON, AHMED EL SAGHIR, ELIJAH MARTIN, NC State University — Langmuir probes are currently the only practical diagnostic for the measurement of electron energy distribution functions in low temperature plasmas, particularly at low densities. The electron energy distribution function is obtained from a probe's electrical characteristic through the integral relationship originally presented by Druyvestyen in 1930 for a planar probe configuration.[2] In this current work, a formulation of Druyvestyen's integral relationship that considers typical probe geometries such as infinite cylindrical, spherical, and finite cylindrical systems will be presented. These integral solutions will be compared to the planar derivation typically employed to look at the effect of geometry on electron energy distribution function measurement from the electrical characteristics of various probe geometries for typical plasma conditions, including non-maxwellian EEDF's. These integral formulations are then used to look at the impact of probe geometry in EEDF measurements made in a toroidal RF source.

[2]Druyvesteyn M.J.,"Der Niedervoltbogen" Z. Phys.,vol. 64,1930, pp. 781-798

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