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Accurate reconstruction of non-Maxwellian electron energy distribution functions[1]

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Low temperature plasmas, particularly those used for materials processing, are likely to have electron energy distribution functions (EEDF's) that are non-Maxwellian. Analysis of Langmuir probe voltage-current (VI) characteristics using the Druyvesteyn relationship has provided researchers with a means of obtaining these distributions to study phenomena in areas ranging from plasma chemistry to RF heating. Two aspects of obtaining non-Maxwellian EEDF's with Langmuir probes are reviewed. The first is how to address the ill-posed nature of the integral Druyvesteyn problem to obtain an accurate representation of the actual EEDF. The second is how to incorporate non-Maxwellian distributions into more advanced probe models, specifically models that account for conditions where the bias sheath on a Langmuir probe approaches the physical extent of the probe itself, commonly referred to as the thick sheath approximation. In collaboration with Ahmed Elsaghir, North Carolina State University.

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