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The Asymmetric Current Mirror Probe J.E. MAGGS, T.A. CARTER, Department of Physics and Astronomy, UCLA — The difference in floating potential, between two closely spaced probe tips, is often used as a measure of the electric field in plasmas. This technique assumes a thermal Maxwellian distribution for plasma electrons and is unreliable in the presence of a fast non-Maxwellian electron tail. The influence of fast-tail electrons on floating potential measurements can be mitigated by using emissive probes or probes of unbalanced collection area. These probes have floating potentials that are closer to plasma potential than the floating potential of a standard Langmuir probe. An example of an unbalanced area probe is the ball-pen probe [Schrittwieser, et al., Rom. Journ. Phys., Vol. 50, 2005], in which the ion collection area is substantially larger than the electron collection area. The asymmetric current mirror probe achieves the effect of unbalanced collection area electronically, by amplification of the current drawn to the ion tip. Comparisons of radial profiles of floating potential in the LAPD at UCLA, measured using a Langmuir probe, ball-pen probe and asymmetric mirror probe are presented. The effects of using differences in floating potential, measured by these various probes, to determine the electric field is discussed.

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