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Langmuir probes in flowing plasmas PETER SHEERIN, MILES M. TURNER, Dublin City University — Electrostatic probes are a classic method for inferring plasma parameters in many circumstances. Such probes are not easy to interpret when the plasma is flowing with respect to the probe, because there is not a clear theory based on elementary assumptions. Mach probes are a commonly accepted method, but the theory of such probes is not clearly founded on first principles. This paper considers an alternative theory, which is firmly based on first principles. We discuss the basis of this approach, and we present self-consistent particle-in-cell simulations with two space-dimensions as a benchmark for the analytical theory. In particular, we discuss the validity of the theory in the limit of small Mach number, which is the critical case.

> Miles Turner Dublin City University

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