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Does the Bohm Criterion have meaning for collisional plasmas?[1]
GREG SEVERN, University of San Diego, Department of Physics, CHI-SHUNG YIP, SIROUS NOURGOSTAR, NOAH HERSHKOWITZ, University of Wisconsin-Madison, Department of Engineering Physics — Theorists view the Bohm criterion as approximately true, holding only for collisionless plasmas. The question of whether there exists a collisionally modified Bohm Criterion (CMBC) is often answered in the negative, and it is only a question of how the Bohm Criterion fails for the case of finite collisionality. The question is of importance considering that nearly all practical plasma processing applications involve plasmas of finite collisionality. There is, however, very little experimental work to help choose between competing models of how Bohm's Criterion fails. The question of critical importance is this: in plasmas of finite collisionality, do ions reach the Bohm speed at the location where the quasineutral plasma ends and where space charge appears? We have begun to examine the question experimentally in single ion species plasmas, and our goal is to vary the ion-neutral mean free path λ within the interval $1 < \lambda/\lambda_D < 10^3$, where λ_D is the Debye length, and to present both plasma potential data and ion velocity distribution function profiles, measured by emissive probes and by LIF, respectively, to help us understand and assess the validity of theoretical claims.

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