

Abstract Submitted
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3-D electromagnetic PIC simulations of an electron collecting probe in an ExB drifting plasma¹ JONATHON HEINRICH, DAVID COOKE, AFRL, Kirtland AFB — Positive probe/plasma systems are inherently unstable with complicated dynamics that are not well described by standard probe theories, particularly in ExB drifting plasmas. While work has been done to understand ion collecting probes in ExB drifting plasmas, limited work has been done to understand their positively biased counterpart. Here, we have conducted a series of electromagnetic particle-in-cell simulations of a positive probe in an ExB drifting plasma that shed light on two fundamental problems: current closure in magnetized flowing plasmas and sheath dynamics of a positive probe in an ExB drifting plasma. We report on the results, which indicate the degree of legitimacy in current closure through Alfvén waves, whistler waves, and diffusion (when magnetic field and ExB drift effects are important). Additionally, we report on sheath dynamics of a positive probe in an ExB drifting plasma, which were clearly resolved and indicated electron heating processes that include a quasi-trapped mode.

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