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# Current to Positive Probes in Magnetized Drifting Plasma

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There is no validated and accepted theory for a Langmuir probe in the regime of electron collection from a magnetized drifting plasma. The Space Shuttle experiment, TSS-1R, cleared the field of many speculative models and provided data for future model development. Still, due to many factors, there have been few or no subsequent experiments to independently validate the surviving models. We have chosen to renew investigation into this problem for reasons of both probe theory and its relevance to spacecraft charging/plasma-interactions, and to investigate the momentum coupling between the probe and background plasma. Although the Low earth Orbit probe interaction is expected to be highly electrostatic, the electromagnetic beginnings of research into this problem have led to widely accepted models of momentum coupling that can be challenged or validated as part of a new and combined investigation. Towards these ends, we present the results of electromagnetic particle-in-cell simulations of an electron collecting probe in magnetized ExB drifting plasma. These simulations were run over a broad range of plasma parameters, from underdense strongly magnetized plasma ($\omega_{ce} > \omega_{pe}, r_{probe} > r_{ion}$) to overdense plasma ($\omega_{pe} > \omega_{ce}, r_{probe} > r_e$). Our results detail the current-voltage curve over a range of plasma parameters and drift velocity, the dynamics of non-neutral current wings, and plasma heating. We offer an improved current model that captures the impact of the ion drift potential and describe future experimental efforts in a new EXB drifting magnetized plasma chamber.