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Collisionless current collection by a spherical particle in a flowing, weakly magnetized plasma LEONARDO PATACCHINI, IAN H. HUTCHINSON, MIT Plasma Science and Fusion Center — Collisionless-plasma current collection by a spherical object such as a dust particle or probe under weakly magnetized conditions (Larmor radius larger than particle radius) is an important, long-studied, but analytically intractable problem. We solve it computationally by means of the hybrid Boltzmann/Particle-in-Cell code SCEPTIC[1] for a wide range of parameters, with finite Debye length. In addition to reducing the ion current, the magnetic field is shown to cancel the ion focusing effects present in an unmagnetized plasma when the drift velocity is comparable to the sound speed. Thus, the magnetic field prevents such phenomena as the reversal of angular flux density asymmetry (greater collection on the downstream side) or the local maximum of the drag force. The floating potential dependence on the ratio of the probe radius to Larmor radius is computed using a newly developed empirical formula for the electron current, which is also documented.
[1] I.H. Hutchinson, *Plasma Phys. Control. Fusion* **45** (2003)

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