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Floating potential and collisionless ion drag force on a spherical grain under weakly magnetized conditions LEONARDO PATACCHINI, IAN H. HUTCHINSON, MIT — The interaction of a spherical object with a collisionless plasma under weakly magnetized conditions is investigated by means of the PIC code SCEPTIC [1]. The key features of this 2D3v electrostatic ion kinetic code are a spherical geometry accurately resolving the collector's edge, and a Boltzmann treatment of the electrons, whose current is calculated using a recently developed empirical formula accounting for their magnetization [2]. By asymmetrically reducing the ion and electron fluxes to the collector, the magnetic field ($\mathbf{B}$) has a strong influence on the floating potential (ϕ_f). The non monotonic dependence of ϕ_f on $\mathbf{B}$ is documented for a wide range of plasma parameters relevant to probes and dust particles. The magnetic field is also shown to reduce the ion focusing effects present in an unmagnetized plasma when the drift velocity is non negligible, thus the electrostatic part of the ion drag force. This effect is compared with the variation of the electron-ion Coulomb collision frequency with the local magnetic field.

[1] I.H. Hutchinson PPCF 47, 71-87 (2005)
[2] L. Patacchini et al. Phys. Plasma 14, 062111 (2007)

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