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Potential Barrier around an Emitting Body an a Plasma ANTONIO BRUNO, Burning Plasma Research Group, Politecnico di Torino, GIAN LUCA DELZANNO, Los Alamos National Laboratory, GIANFRANCO SORASIO, GOLP, Istituto Superior Tecnico, GIOVANNI LAPENTA, Los Alamos National Laboratory
— We present a self-consistent, kinetic theory for the charging and shielding of an object at rest in a collisionless plasma [1]. The body is an electron emitter according to thermionic emission, photoemission or secondary emission. The theory is formulated for positively charged bodies, derived under the assumption of spherical symmetry so that conservation of energy and angular momentum can be used to calculate the plasma distribution functions at any given point in phase space. Far away from the body the plasma is assumed unperturbed, described by a Maxwellian distribution function at rest. Thus, the unperturbed plasma acts as a source of particles balancing the absorptions from the body and a steady state is eventually reached. The theory is shown to be in good agreement with PIC simulations [1-2]. Further on, several cases (focusing on parameters typical of laboratory experiments) are presented for the three different emission mechanisms, showing that shielding potentials having an attractive well are possible for all of them.
[1] G. L. Delzanno, A. Bruno, G. Sorasio, G. Lapenta, Phys. Plasmas 12, 062102 (2005).
[2] G. L. Delzanno, G. Lapenta, M. Rosenberg, Phys. Rev. Lett. 92 (3), 035002 (2004).

Giovanni Lapenta
LANL

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