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Ion Energy and Angular Distribution Functions at the Material Wall of a Magnetized Plasma Sheath DAVIDE CURRELI, RINAT KHAZIEV, Nuclear, Plasma, and Radiological Engineering Department, University of Illinois at Urbana Champaign, USA — We present a calculation of the ion energy distribution and the ion angular distribution at the material wall of a magnetized plasma sheath. The calculation has been done using two different techniques: a Monte-Carlo method, propagating the trajectories of a Maxwellian population of ions across the ExB field of the magnetized sheath, and a Particle-in-Cell, giving a self-consistent treatment of the plasma behavior from the quasi-neutral region to the material boundary. Data are presented for magnetic fields inclined at angles from 0.0 to 88 degrees with respect to the normal to the surface, and field magnitudes up to 1.0 Tesla. The plasma sheath accelerates the ions up to energies scaled with the electron temperature. The ion angular distributions exhibit surprising non-linear trends, depending on both the plasma conditions and magnetic field. Ions can hit the wall at angles close to the surface normal with single-lobe IADF's, or at grazing angles with double-lobe IADF's. The energy-angle distributions strongly affect the material response, comprising electron secondary emission and material sputtering.

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