Investigation of the electron drift dynamics at the boundary of magnetized low temperature plasmas

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Magnetized low temperature plasmas have many applications in research and industry. High power impulse magnetron sputtering (HiPIMS) geared to deposit thin films of superior quality and Hall-effect thrusters used for spacecraft propulsion are two important examples. One peculiar phenomenon in such discharges are rotating patterns, sometimes called spokes, which develop under certain conditions. As self-organized symmetry breaking structures, these patterns can only be understood by 3d models. To formulate a consistent 3d model, an appropriate boundary condition at the plasma walls must be utilized. Therefore, we investigate the interaction of magnetized electrons with the plasma boundary sheath by means of a 3d kinetic single electron model, thereby focusing on the drift of the guiding center. For this particular aspect of the interaction dynamics we can observe a good agreement between applying a specular reflection model and a more physical Bohm sheath model.

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