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Effects of Asymmetric Secondary Emission on Plasma Properties of ExB Discharges HONGYUE WANG, Beihang University; Princeton Plasma Physics Laboratory, MICHAEL CAMPANELL, IGOR KAGANOVICH, ALEXANDER KHRABROV, YEVGENY RAITSES, Princeton Plasma Physics Laboratory, DMYTRO SYDORENKO, University of Alberta, GUOBIAO CAI, Beihang University — In low-pressure devices, the electron mean free path exceeds the size of the system; therefore, the secondary electrons penetrate the bulk plasma and exit to the opposite wall without undergoing collisions. Thus, secondary electron emission (SEE) fluxes affect the charged particle flux balance on walls far from their origination source. As a result, the sheathes at opposite walls are not independent of each other. In this paper, the emission and recollection of electrons by walls is studied using a 1-D model with the asymmetric secondary emission from the inner and outer walls of the ExB device. Plasma properties in a typical ExB discharge channel were simulated using particle-in-cell EDIPIC code. The potential profile becomes significantly asymmetric with decrease of the left SEE yield as compared to the right one. A large proportion of beam electrons moving towards left are reflected by the left sheath. Simulations results for the sheath potential near the right wall show that it is almost constant and is independent of emission from the left wall. However, change in the SEE at the left wall strongly affects the sheath potential at this wall. The analytic relation between the wall potentials and the SEE yields is derived. SEE asymmetry leads to increase of ion energy loss to the walls due to increase of the sheath potential near the wall with smaller emission.

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