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Electrostatic wave propagation in the presence of secondary electrons in low pressure capacitively coupled plasmas KATHARINA NOESGES, JULIAN SCHULZE, MATE VASS, Ruhr University, Bochum, Germany, ZOLTAN DONKO, PETER HARTMANN, Wigner Research Centre for Physics, Budapest, Hungary, THOMAS MUSSENBROCK, Brandenburg University of Technology, Cottbus, Germany, RALF PETER BRINKMANN, SEBASTIAN WILCZEK, Ruhr University, Bochum, Germany — In capacitively coupled radio frequency (CCRF) discharges, the expanding plasma sheath generates electrostatic waves which propagate through the plasma bulk. This wave propagation is frequently evidenced in Particle-In-Cell / Monte Carlos collisions (PIC/MCC) simulations in the low pressure regime ($p \approx 1$ Pa) by the spatio-temporal distribution of the displacement current density. By considering ion induced secondary electron emission, electrons are generated at the plasma boundary surface and are accelerated by the RF-oscillating sheath electric field. This leads to a stronger excitation of the waves, in which the amplitude of the displacement current density increases by raising the secondary electron (SE) emission yield. In addition, the dynamics of the SEs are also coupled with the wave propagation. By including SEs, a particular spatio-temporal ionization structure develops in which the velocity corresponds to that of the electrostatic wave and intensifies the ionization process. In this low pressure regime the beam of SEs can bounce multiple times through the discharge and lead to nonlocal effects, especially at the boundary sheaths. In order to study this phenomenon, 1d3v PIC/MCC simulations of a symmetric CCRF discharge are performed.

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