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Basic research of electron dynamics in low pressure capacitively coupled plasmas SEBASTIAN WILCZEK, JULIAN SCHULZE, RALF PETER BRINKMANN, Ruhr University Bochum, ZOLTN DONK, Wigner Research Centre for Physics, JAN TRIESCHMANN, THOMAS MUSSENBROCK, Brandenburg University of Technology Cottbus-Senftenberg — At low pressures, capacitively coupled plasmas operate in a nonlocal regime. Electrons interact with the space- and time dependent electric field and traverse a certain distance without any collisions. Consequently, the EVDF becomes anisotropic and the discharge exhibits complex electron dynamics. In the last decades, various terminologies have been introduced which are based on theoretical, experimental and computational work in order to study the electron power absorption at low pressure. The goal of this work is to demonstrate a basic strategy of how to investigate the electron dynamics for a universal electropositive CCRF discharge scenario (3 Pa, argon). 1D3V PIC/MCC simulations provide spatio-temporal diagnostic methods in order to illustrate the interplay between the fundamental plasma parameters, such as densities, fields, currents and temperatures. The analysis shows how current conservation is ensured and how it is linked to the generation of electrostatic waves. Electron distribution functions are discussed and the importance of energetic beam-like electrons is addressed. A detailed analysis of the momentum balance equation shows, how the electron power absorption really works. [1] S. Wilczek et al. (2020) Journal of Applied Physics, 127(18), 181101.

Sebastian Wilczek
Ruhr University Bochum

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