Abstract Submitted
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Student Excellence Award Finalist: Differences between Cartesian and spherical 1d3v Particle-In-Cell simulations SEBASTIAN WILCZEK, JAN TRIESCHMANN, JULIAN SCHULZE[1], RALF PETER BRINKMANN, Ruhr University, Bochum, Germany, ZOLTAN DONKO, Wigner Research Centre for Physics, Budapest, Hungary, THOMAS MUSSENBROCK, Brandenburg University of Technology, Cottbus, Germany — 1d3v Particle-In-Cell (PIC) simulations of capacitively coupled radio frequency (CCRF) discharges are usually considered to be symmetric, which implies a Cartesian grid is used. However, in most CCRF systems the driven electrode is smaller compared to the grounded electrode (grounded chamber walls have to be taken into account). In such a situation, different current fluxes at both electrodes can be observed and a DC self-bias develops. The plasma boundary sheaths at the driven and grounded electrode exhibit different dynamics (e.g. sheath potential and sheath size). Especially in very asymmetric scenarios, most of the RF power is coupled into the plasma at the smaller driven electrode. In order to investigate such an asymmetric electrode configuration within 1d3v PIC simulations, a spherical grid is implemented. In this work, the differences between symmetric and asymmetric 1d3v PIC simulations of CCRF discharges are investigated. Particularly, the electron power gain and loss mechanisms (e.g. nonlinear electron resonance heating, power gain due to secondary electrons, ambipolar heating) are studied for different discharge conditions.

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