Abstract Submitted
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PlasmaPIC: A tool for modeling low-temperature plasma discharges[1] NINA SARAH MUEHLICH, MICHAEL BECKER, ROBERT HENRICH, CHRISTIAN HEILIGER, Justus-Liebig-University Giessen, Institut fuer Theoretische Physik — PlasmaPIC is a three-dimensional particle in cell (PIC) code. It consists of an electrostatic part for modeling dc and rf-ccp discharges as well as an electrodynamic part for modeling inductively coupled discharges. The three-dimensional description enables the modeling of discharges in arbitrary geometries without limitations to any symmetry. These geometries can be easily imported from common CAD tools. A main feature of PlasmaPIC is the ability of an excellent massive parallelization of the computation, which scales linearly up to a few hundred cpu cores. This is achieved by using a multigrid algorithm for the field solver as well as an effective load balancing of the particles. Moreover, PlasmaPIC includes the interaction of the neutral gas and the plasma discharge. Because the neutral gas and the plasma simulation are acting on different time scales we perform the simulation of both separately in a self-consistent treatment, whereas the neutral gas distribution is calculated using the direct simulation Monte Carlo method (DSMC). The merge of these features turns PlasmaPIC into a powerful simulation tool for a wide range of plasma discharges and introduces a new way of understanding and optimizing low-temperature plasma applications.

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Nina Sarah Muehlich
Justus-Liebig-University Giessen, Institut fuer Theoretische Physik

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