Abstract Submitted
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An algebraic RF sheath model for all excitation waveforms and amplitudes, and all levels of collisionality[1] RALF PETER BRINKMANN, ABD ELFATTAH ELGENDY, HOMAYOUN HATEFINIA, MOHAMMED SHIHAB, TORBEN HEMKE, ALEXANDER WOLLBY, DENIS EREMIN, THOMAS MUSSENBROCK, Theoretical Electrical Engineering, Ruhr-University Bochum — The boundary sheath of a low temperature plasma comprises typically only a small fraction of its volume but is responsible for many aspects of the macroscopic behavior. A thorough understanding of the sheath dynamics is therefore of theoretical and practical importance. This work focusses on the so-called "algebraic" approach which strives to describe the electrical behavior of RF modulated boundary sheaths in closed analytical form, i.e., without the need to solve differential equations. A mathematically simple, analytical expression for the charge-voltage relation of a sheath is presented which holds for all excitation wave forms and amplitudes and covers all regimes from the collision-less motion at low gas pressure to the collision dominated motion at gas high pressure. A comparison with the results of self-consistent particle-in-cell simulations is also presented.

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Ralf Peter Brinkmann
Theoretical Electrical Engineering, Ruhr-University Bochum

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