Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

**Fast, Kinetically self-consistent simulation of RF modulated plasma boundary sheaths**[1] MOHAMMED SHIHAB, RALF PETER BRINKMANN, Institute for Theoretical Electrical Engineering, Ruhr University Bochum, D-44780 Bochum, Germany — A mathematical model is presented which enables the efficent, kinetically self-consistent simulation of RF modulated plasma boundary sheaths in all technically relevant discharge regimes. The model consists of a set of kinetic equations for the ions, Boltzmann's relation for the electrons and Poisson's equation for the electrical field. Boundary conditions specify the ion flux at a point deep in the bulk and a periodically modulated sheath voltage or sheath charge. The equations are solved in a statistical sense. However, it is not the well-known particle-in-cell (PIC) scheme that is employed, but an alternative iterative algorithm termed ensemble-in-spacetime (EST). Three modules are called in a sequence: a Monte Carlo module, a harmonic analysis module, and a field module. The iteration is started with the potential values of a self-consistent fluid model and terminates when the updates become suffifficiently small, i.e. when self-consistency is achieved. A drastic reduction of the computational effort compared with PIC calculations is achieved. As a first application of the new model, the influence of ion inertia on the dynamics of a collisionless sheath is studied and a comparison of the simulated ion energy distribution with published analytical solutions is performed.

[1]The financial support from the Federal Ministry of Education and Research within the framework of the project "Plasma-Technology-Grid" and the support of the DFG via the collaborative research centre SFB-TR87 is gratefully acknowledged.

Mohammed Shihab
Institute for Theoretical Electrical Engineering,
Ruhr University Bochum, D-44780 Bochum, Germany

Date submitted: 12 Jun 2012 Electronic form version 1.4