Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

A comparison of continuum and kinetic simulations of microplasmas integrated with high secondary yield cathodes ARGHAVAN ALAMATSAZ, ABHISHEK KUMAR VERMA, AYYASWAMY VENKATTRAMAN, School of Engineering, University of California Merced, Merced, CA 95343, USA — During the last two decades, microplasmas have become an active area of research in the field of low-temperature plasma science and engineering with a wide range of applications including electronics, nanomaterial synthesis and metamaterials to name a few. Kinetic and continuum methods are commonly employed numerical simulation techniques to study the low temperature plasmas. The uncertainty and imprecision associated with input parameters used in these models impose a constraint on fidelity of the simulation results. In this work, these computational techniques are compared in the context of modeling microplasmas driven by cathodes with high secondary electron emission coefficient. Simulations of argon microplasmas operating at a moderate pd (pressure*distance between electrodes) are performed using particle-in-cell with Monte Carlo collisions (PIC-MCC), and fluid model using the full momentum equations for both electrons and ions. Results obtained for plasma density, potential, electric field and electron temperature using continuum simulations are compared with the corresponding PIC-MCC simulations as benchmark. These numerical experiments provide insights on importance of input parameters in fluid model for high fidelity simulation of microplasma applications.

Abhishek Kumar Verma
Univ of California - Merced

Date submitted: 15 Jul 2016 Electronic form version 1.4