

Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Direct Simulation Monte Carlo Study of Neutral and Ion Transport in an Inductively Coupled Plasma¹ MASASHI SHIMADA, GEORGE R. TYNAN, ROBERT CATTOLICA, UCSD, Center for Energy Research — A hybrid type direct simulation Monte Carlo (DSMC) method was applied to a one-dimensional electrostatic plasma in Argon/Nitrogen mixtures to simulate neutral and ion transport in a radial symmetric inductively coupled plasma. The ambi-polar electrostatic field obtained from the measured plasma density profile was imposed in the simulation, and electrons were treated as background particles with measured electron density and temperature profiles. Neutral gas depletion observed in both the experiment and simulation is in excellent agreement and indicates that gas heating and the required pressure balance is responsible. The gas heating is mainly due to ion-neutral collisions with the ions accelerated by the ambi-polar electric field and neutral collisions with Frank-Condon dissociated atoms.

¹This work supported by grant DE-FG03-95ER-54301 from the US DoE.

Masashi Shimada
UCSD, Center for Energy Research

Date submitted: 23 Jul 2006

Electronic form version 1.4