Abstract Submitted
for the GEC08 Meeting of
The American Physical Society

3-Dimensional Modeling of Capacitively-Coupled Plasmas with Asymmetric Reactor Elements JASON KENNEY, SHAHID RAUF, KEN COLLINS, Applied Materials, Inc. — As plasma processing uniformity requirements grow more stringent, there is an increasing emphasis on the characterization of asymmetric reactor elements which may give rise to azimuthal non-uniformities. Experimental analysis of isolated components is difficult, however, providing impetus for the development of a three-dimensional fluid plasma model. In this model, charged species densities are computed by solving continuity equations for all species (using the drift-diffusion approximation) implicitly in time, in combination with the Poisson equation governing the electrostatic fields. The model also includes the full set of Maxwell equations in their potential formulation, Kirchhoff equations for the external circuit, electron temperature from the electron energy equation, and continuity equations for neutral species, along with non-uniform mesh generation. Using this model, we have investigated azimuthally asymmetric components (e.g., slit valve, off-axis plates, misaligned electrodes) with the potential to perturb the plasma density, ion flux, and electric fields and quantified the perturbations using Fourier analysis.

Jason Kenney
Applied Materials, Inc.

Date submitted: 11 Jun 2008 Electronic form version 1.4