Abstract Submitted
for the GEC18 Meeting of
The American Physical Society

**Symmetry Breaking in a High Frequency, Low Pressure, Symmetric Capacitive Coupled Plasma (CCP) Reactor**[1] E. KAWAMURA, M.A. LIEBERMAN, A.J. LICHTENBERG, Univ of California - Berkeley — Radially propagating surface wave modes in symmetric (equal electrode areas) CCP's can be either symmetric or anti-symmetric. In the former, the upper and lower axial sheath fields ($E_z$) are aligned, while in the latter, they are opposed. At high frequencies, the radial wavelengths of either mode can become comparable to the reactor dimensions, leading to standing waves. We use a fast 2D axisymmetric fluid-analytical code to study the discharge equilibrium, including the electromagnetic (EM) effects, in a low pressure (7.5 mTorr argon), low density ($\sim 3 \times 10^{15}$ m$^{-3}$) symmetric capacitively coupled plasma (CCP) reactor in the frequency range of 55 to 100 MHz, which encompasses the first anti-symmetric spatial resonance, but is well below the first symmetric spatial resonance. At frequencies below the resonances, the symmetric discharge is in a stable symmetric equilibrium. At higher frequencies, near or above the antisymmetric resonance, a non-symmetric equilibrium appears, which can be stable or unstable. We develop a nonlinear lumped circuit model of the CCP to better understand the various discharge equilibria. The circuit model results agree well with the fluid simulation results, indicating that the stable non-symmetric equilibria consist of a combination of

[1]This work was partially supported by the Department of Energy Office of Fusion Energy Science Contract DE-SC0001939.

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Date submitted: 12 Jun 2018 Electronic form version 1.4