

Abstract Submitted  
for the GEC06 Meeting of  
The American Physical Society

**On the E to H and H to E transition mechanisms in inductively coupled plasmas** MINHYONG LEE, KYEONGHYO LEE, CHINWOOK CHUNG, Dept. of Electrical Engineering, HanYang University — Inductively coupled plasmas (ICP) exhibit two mode operations of capacitive coupling (E mode) and inductive coupling (H mode), and the density jump and hysteresis have been reported during the transition between these modes. In this study, the total power transferred to the plasma by capacitive and inductive coupling is calculated from Maxwells equations and global model, and from this, conditions required for stable E and H mode operations are obtained. The E to H and the H to E transitions occur when the system reaches critical electron densities. Analytical criterion for stable H mode operation that the skin depth should be smaller than  $\sqrt{\frac{2}{3}}R$  at low pressure, and  $\frac{2}{\sqrt{3}}(\omega/\nu)R$  at high pressure is derived from the calculation. The dependence of transition electron densities and powers of E to H and H to E transitions on the pressure and discharge dimension is also discussed.

ChinWook Chung  
Dept. of Electrical Engineering, HanYang University

Date submitted: 16 Jun 2006

Electronic form version 1.4