Abstract Submitted
for the GEC05 Meeting of
The American Physical Society

Optical emission and self mode transition of low frequency inductively coupled plasmas driven by crossed internal oscillating currents YUPING REN, PAVLO RUTKEVYCH[1], JIDONG LONG, QIJIN CHENG, SHUYAN XU, PSAC/NIE/NTU, Singapore, KOSTYA OSTRIKOV[2], School of Physics, The University of Sydney, Australia — Optical emission and self induced electrostatic (E)-to-electromagnetic (H) mode transition in a newly-developed plasma reactor are investigated. Volume uniform, high density Ar/N2 plasmas are generated by means of transverse unidirectional currents driven by a low frequency RF power of 460 kHz in a 23 cm height and 32 cm diameter reactor. Plasma properties are investigated using a high-resolution optical emission spectroscope. The measurements reveal that the spatial profiles of the excited atomic naturals and singly ionized ions feature a high degree of uniformity in radial and axial directions. A spatially homogeneous E-mode discharge is observed at a power level as small as 40 W. At RF power exceeding a transition threshold of 230 W, the integral emission intensity suddenly jumps to approximately one order of magnitude (H-mode). Further increase of RF power results in a gradual rise of the optical emission intensity. This phenomenon is reproducible for all discharges under the investigation. Furthermore, a spontaneous E->H mode transition ("self-transition") is observed at input power slightly below the conventional transition threshold value.

[1]Presenting author
[2]Also with: PSAC/NIE/NTU, Singapore

Pavlo Rutkevych
PSAC/NIE/NTU, Singapore

Date submitted: 13 Jun 2005 Electronic form version 1.4