

Abstract Submitted
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Observation of electron series resonance in transversely magnetized 13.56 MHz CCP discharge JAY JOSHI, Institute for Plasma Research, HBNI, SHIKHA BINWAL, Jamia Millia Islamia (A central university), SHANTANU KARKARI, SUNIL KUMAR, Institute for Plasma Research, HBNI — Electron series resonance (ESR) is a condition which is observed in capacitive coupled plasma (CCP) discharges when the usually dominant capacitive reactance of the sheaths and the inductive reactance of the bulk plasma balance each other to present the plasma as a purely resistive electrical load. This is desirable in many circumstances as it is a condition of minimum voltage V_{min} across the electrodes for a given RF power level and RF matching for the plasma load also becomes simpler. In a conventional parallel plate CCP discharge, for plasma densities in the typical range of $10^{16} m^{-3}$, this resonance condition has been reported for a very high frequency of 135.6 MHz.

In the present work, we report observation of ESR in a transversely magnetized (7.0 mT) parallel plate CCP argon discharge at 13.56 MHz for range of neutral gas pressure (1-5 Pa). A theoretical model to reveal the underlying reason for observing resonance condition at 10 times lower frequency is also presented. The conductivity model obtains a modified resonance condition for a transversely magnetized CCP. Moreover, it also predicts resonance condition for range of neutral gas pressure with RF power (plasma density).

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