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Measurements of collisionless heating effects in the H-mode of an inductively coupled plasma system MUJAHID ZAKA-UL-ISLAM, Physics Department, Faculty of Science, Jazan University, Jazan, 2079, Saudi Arabia, BILL GRAHAM, Centre for Plasma Physics, Queen's University Belfast, Northern Ireland, UK, TIMO GANS, KARI NIEMI, DEBORAH O'CONNELL, York Plasma Institute, University of York, Heslington York, UK — Inductively coupled plasma systems (ICPs) for processing applications are often operated at low pressures, in the near-collisionless regime. In this regime, the electron mean free path is comparable or larger than the plasma dimensions. The electron dynamics in such ICPs has been investigated here, using phase and space resolved optical emission spectroscopy (PROES) and Langmuir probe measurements. The PROES measurements are also used to calculate the Fourier harmonics components of the 2D excitation (in the radial axial plane). The experimental system is a standard GEC cell with the axial gap of $\sim$4 cm, powered by 13.56 MHz RF power supply. The gas pressure was varied between 0.5 – 2 Pa. The PROES measurements and Fourier harmonics components confirm many of the previous simulation results in comparable operational regimes. The results show that in the 2D (radial-axial) plane, the plasma power is deposited in a spatially non-uniform and non-linear manner, with axial layers of positive and negative power absorption. The contribution of these nonlinear effects decreases with an increase in the pressure, as observed in previous experimental and simulation results.

Mujahid Zaka-ul-Islam
Physics Department, Faculty of Science,
Jazan University, Jazan, 2079, Saudi Arabia

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