Abstract Submitted
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Electron density measurements in inductively coupled plasmas using phase resolved optical emission spectroscopy[1] TIMO GANS, DEBORAH O'CONNELL, VICTOR KADETOV, UWE CZARNETZKI, Institute for Plasma and Atomic Physics, Ruhr-University Bochum, Germany — The optical emission from radio frequency (rf) discharges exhibits temporal variations within the rf-cycle. Neglecting these variations in classical time averaged optical emission spectroscopy (OES), based on balance equations, can result in serious misinterpretation. The effect of neglecting temporal changes is not as pronounced in inductively coupled plasmas (ICPs) as in capacitively coupled plasmas (CCPs). However, even the relatively small modulations in ICPs can be exploited as a novel access for plasma diagnostics. The modulations of the optical emission are caused by temporal changes of the electron energy distribution function (EEDF). These modulations can be described within the two-term approximation of the Boltzmann-equation. This allows us to determine the induced electric field in the discharge. The penetration of the field into the plasma is determined by the Helmholtz-equation. A spatially resolved measurement of the amplitude and phase of the induced electric field, therefore, yields a 2-dimensional spatial map of the electron density.

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