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Plasma diagnostics by optical emission spectroscopy on argon and comparison to Thomson scattering D.L. CRINTEA, U. CZARNETZKI, Institute for Plasma and Atomic Physics, Ruhr-University Bochum, 44780 Bochum, Germany, S. IORDANOVA, I. KOLEVA, Faculty of Physics, Sofia University, 5, J. Bourchier Blvd., BG-1164 Sofia, Bulgaria, D. LUGGENHÖLSCHER, Institute for Plasma and Atomic Physics, Ruhr-University Bochum, 44780 Bochum, Germany
— A novel optical emission spectroscopy (OES) technique for the determination of electron temperatures and densities in low-pressure argon discharges is compared to Thomson scattering (TS). The emission spectroscopy technique is based on the measurement of certain line ratios in argon and a collisional-radiative model (CRM) including metastable transport. The investigations are carried out in a planar inductively coupled neutral loop discharge over a wide range of pressures, $p = 0.05$ Pa – 5 Pa. The discharge is operated in pure argon at a frequency of $f = 13.56$ MHz and powers varied between $P = 1$ kW and 2 kW. Both diagnostics, OES and TS, are applied in parallel. Electron densities and temperatures obtained by both diagnostic techniques are compared. Further, absolute numbers of the metastable densities are derived. Excellent agreement is found throughout if depletion of the neutral gas density by increase of the gas temperature and electron pressure is included in the CRM. Electron pressure is the dominant depletion mechanism at gas pressures $p \leq 0.1$ Pa and rf powers $P > 1$ kW.

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