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Generation and Diagnostics of Atmospheric Pressure Dielectric Barrier Discharge in Argon/Air

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Abstract : In this paper, a technique for the determination of electron temperatures and electron densities in atmospheric pressure Argon/air discharge by the analysis of optical emission spectra (OES) is reported. The discharge was produced using a high voltage (0-20) kV power supply operating at a frequency of 27 kHz in parallel electrode system, with glass as dielectric. The dielectric layers covering the electrodes act as current limiters and prevent the transition to an arc discharge. Optical emission spectra in the range of (300nm-850nm) were recorded for the discharge with different inter electrode gap keeping electric field constant. Electron temperature (Te) and electron density (ne) are estimated from electrical and optical methods. Electron density was calculated using power balance method. The optical methods are related with line intensity ratio from the relative intensities of Ar-I and Ar-II lines in Argon plasma. The electron density calculated by using line intensity ratio method was compared with the electron density calculated by stark broadening method. The effect of dielectric thickness on plasma parameters (Te and ne) have also been studied and found that Te and ne increases as thickness of dielectric decrease for same inter electrode distance and applied voltage.

Keywords : electron density, electron temperature, optical emission spectra,
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