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**Electron Density Measurements in Nitrogen-Containing Pulse-Repetitive Microwave Discharge** MILKA NIKOLIC, ANA SAMOLOV, ALEXANDER GODUNOV, SVETOZAR POPOVIC, LEPOSAVA VUSKOVIC, Old Dominion University, Department of Physics, Center for Accelerator Science, Norfolk, VA 23529 — A simple, time and space-accurate technique for absolute measurements of the electron density in pulse-repetitive microwave discharges in air is proposed. It is a non-intrusive method based on analysis of molecular bands on Nitrogen Second Positive System $C^3\Pi_u \rightarrow B^3\Pi_g$ (0-0) at 337.1 nm. The electron density is obtained from a numerical solution to the time-dependent equation for the population rate of $N_2$ $C^3\Pi_u$ (v=0) using the measured temporal waveforms of the absolute $C^3\Pi_u \rightarrow B^3\Pi_g$ (0-0) band intensity, and the measured forward and reflected microwave power densities. The applicability of the method was tested in the surface plasma generated at the aperture of the horn antenna by a pulse repetitive microwave beam. The discharge was generated in air at 1.6 kPa with a X-band microwave generator using 3.5 $\mu$s microwave pulses at peak power of 210 kW. The electron density was time resolved on sub microsecond scale, within a single 3.5 $\mu$s pulse. We obtained (90 $\pm$ 0.6) $\times 10^{13}$ cm$^{-3}$ for the peak value and (5.6$\pm$ 0.6) $\times 10^{13}$ cm$^{-3}$ for the pulse average electron density in 1.6 kPa of air.

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