ELECTRICAL CHARACTERIZATION OF THE PLASMA JET GENERATED BY PLASMA PENCIL*

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Recent studies have shown that low temperature atmospheric pressure plasma jets are formed by the propagation of small plasma bullets traveling at very high velocities in ambient air. In this paper we report on the spatial evolution of the plasma jet properties investigated from the jet current density, where the jet current was measured by placing a lab-made probe along the jet propagation axis. The plasma jet was generated by a plasma pencil powered with high voltage short-duration pulses. The average current density, power density, electric field and electron density for every 0.5 cm plasma jet segment along the jet propagation trail were measured. The average peak current density, power density, and the electric field of the plasma jet were respectively 0.64 (A/cm^2), 6.6 (kW/cm^3) and 11.5 (kV/cm). The drift velocity of the electrons was calculated for the measured electric field along the jet axis and it showed a good agreement with the plasma jet's front velocity measured by ICCD image tracking. It also shows that the helium gas plays an important role in the jet propagation. The estimated average electron density in the plasma jet is $4.8*10^{11}$ cm^{-3}.

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