Abstract Submitted
for the GEC14 Meeting of
The American Physical Society

Fast-imaging and spectroscopic analysis of atmospheric argon streamers for large gap arc breakdown[1] MICHAEL PACHUILO, FRANCIS STEFANI, ROGER BENGTSON, LAXMINARAYAN RAJA, Univ of Texas, Austin
— A non-equilibrium plasma source has been developed to assist in the low-voltage arc breakdown of large electrode gaps. The source consists of a dielectric embedded wire helically wound around a confining cylindrical quartz chamber. Annular electrodes cap the ends of the quartz chamber. An argon feed gas is used to provide a uniform environment and exhausts to ambient atmospheric conditions. A negative polarity 50 kV trigger pulse is applied to the embedded trigger wire to initiate the arc breakdown. Application of the trigger pulse produces a localized coronal discharges along the inner surface of the quartz tube. The corona provides seed electrons through which streamers propagate from one of the main discharge electrode along the quartz surface until it reaches the opposite electrode to bridge the gap. Once the gap is bridged a spark over occurs and robust arc discharge is formed in the chamber volume. Fast imaging of the streamer propagation establishes its velocity in the range of $\sim$ 100 km/s. Spectroscopy of the streamer discharge in atmospheric argon has been conducted and electron temperature and number density estimated from a collision radiative model. Argon spectrum is dominated by neutral argon lines in the 650-950 nm range, and singly ionized argon lines are observed in the ultra-violet to near UV (300-400 nm).

[1]Research was performed in connection with AFOSR contract FA9550-11-1-0062.

Michael Pachuilo
Univ of Texas, Austin

Date submitted: 13 Jun 2014 Electronic form version 1.4