Abstract Submitted for the GEC05 Meeting of The American Physical Society

A comparison of lifted jet diffusion flame stabilization using corona, dielectric barrier, and repetitively- pulsed plasma discharges WOOKYUNG KIM, HYUNGROK DO, GODFREY MUNGAL, MARK CAP-PELLI, Stanford University — Three different types of discharges are applied to a lifted jet diffusion flame in coflow, and their abilities regarding flame stabilization enhancement are compared. First, a single-electrode corona discharge is obtained between a crown shaped platinum electrode and the flame base. It is observed that the flame is maintained at 20% higher coflow speed. Also, it is shown that the discharge direction is self-adjusting with varying electrode position. Second, an asymmetric dielectric barrier discharge is implemented and results in increased flame stabilization; here a flame stably resides at up to 50% higher coflow speed. In addition, the nonthermal aspect of the DBD is verified by a spectral line analysis and simulation of the nitrogen 2^{nd} positive system. Finally, an ultra short pulse generator (pulse width of ~ 10 ms), is used in an opposed platinum electrode configuration. This approach further enhances the stability limit by nearly ten-fold. As discussed in the presentation, the degree of nonequilibrium of this pulsed discharge is found to be higher than the DBD.

> Wookyung Kim Stanford University

Date submitted: 10 Jun 2005

Electronic form version 1.4