Abstract Submitted
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Thermal and energetic study of nanosecond sparks for application to plasma-assisted combustion[1] NICOLAS MINESI, SERGEY STEPANYAN, ERWAN PANNIER, GABI-DANIEL STANCU, CHRISTOPHE LAUX, EM2C Laboratory, CNRS UPR288, CentraleSuplec — Nanosecond Repetitively Pulsed (NRP) discharges are widely used for ignition and stabilization of lean combustible mixtures because of their interesting chemical, thermal and hydrodynamic effects. While the chemical and thermal effects have been extensively studied, the hydrodynamic effects have received much less attention. Yet, they provide a unique means to increase the combustion velocity by redistributing active species and heat over a large volume of gas. The aim of the present work is to understand the mechanism of hydrodynamic coupling in NRP discharges in order to maximize its effects. Parametric studies were performed in atmospheric pressure air with electrodes in pin-to-pin geometry. Time-resolved Schlieren diagnostics, optical emission spectroscopy (OES), and electrical measurements at different frequencies (0-100 kHz) have been conducted to study the dependence of the hydrodynamic effects on the energy deposited per pulse, the inter-electrode space, and the pulse repetition frequency, both in quiescent and flowing air. The potential of these discharges for combustion of lean mixtures or flow control will be discussed.

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