

Abstract Submitted
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Flame generation and maintenance by non-stationary discharge in mixture of air and natural gas¹ HENRIQUE DE SOUZA MEDEIROS, University of Paraiba Valley, JULIO SAGAS, PEDRO LACAVA, Technological Institute of Aeronautics — Plasma assisted combustion is a promising research field, where the high generation of reactive species by non-equilibrium plasmas is used to modify the combustion kinetics in order to improve the process either by increasing the production of specific species (like molecular hydrogen) or by decreasing pollutant emission. One typical issue observed in plasma assisted combustion is the increase of inflammability limits, i.e the observation of combustion and flame in situation where it is not observed in conventional combustion. To study the effect of a non-stationary discharge in flame generation and maintenance in a mixture for air and natural gas, the air mass flow rate was fixed in 0.80 g/s and the natural gas flow rate was varied between 0.02 and 0.14 g/s, resulting in a variation of equivalence ratio from 0.4 to 3.0. It is observed a dependence of inflammability limits with the applied power. The analysis by mass spectrometry indicates that the increase of inflammability limits with plasma is due not only applied power, but also to hydrogen production in the discharge. Visual analysis together with high speed camera measurements show a modification in spatial distribution of the flame, probably due to modifications both in flow velocity and flame velocity.

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