The impact of non-stationary electric field on homogeneous hydrocarbon flames

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It is known that hydrocarbon flames are sensitive to external electric field. This is due to reactions of chemiionization when burning [1], and in the zone of reaction is the high concentration of charges (10^{12} sm^{-3}). The carrier of negative charge are electrons, the carrier of positive charge are positive ions (for example, H_3O^+). The large difference in mobility of charges leads to hydrodynamic imbalance when applying an electric field to the flame. From the literature [2,3] it follows that can be implemented three different mechanism of field effect on the combustion: ohmic heating, the change in the kinetics of the reactions and electrohydrodynamically impact. For weak electric fields ($E < 10^3$ V/sm^2) the first two mechanisms do not play a significant role.

The paper presents data showing, then for pre-mixed hydrocarbon-air mixtures the influence of external electric field on the combustion front is localized in the area of chemical reactions and leads to a change in the degree of stretching of the flame. Experimental results are consistent with calculations performed by M. Scobina for homogeneous propan-air flame, in an electric field of axial symmetry.

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