Abstract Submitted
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Plasma-Based Mixing Actuation in Airflow, Quantitated by Probe Breakdown Fluorescence[1] SERGEY LEONOV, Ohio State University, ALEXANDER FIRSOV, MICHAIL SHURUPOV, DMITRY YARANTSEV, JIHT RAS, OHIO STATE UNIVERSITY TEAM, JIHT RAS TEAM — Effective mixing of fuel and oxidizer in air-breathing engine at compressible conditions is an essential problem of high-speed combustion due to short residence time of gas mixture in the combustor of limited length. The effect of the mixing actuation by plasma is observed because of the gasdynamic instability arisen after the long filamentary discharge of submicrosecond duration generated along the contact zone of two co-flown gases. The work is focused on detail consideration of the mechanism of gas instability, promoted by plasma, on effect of the discharge specific localization, and on diagnostics development for qualitative and quantitative estimation of the mixing efficiency. The dynamics of relative concentration of gas components is examined quantitatively by means of Probe Discharge Breakdown Fluorescence (PBF). In this method an optical emission spectra of weak filamentary high-voltage nanosecond probe discharge are collected from local zone of interest in airflow. The first measurements of the mixing efficiency in vicinity of wall-injected secondary gas are presented. It is shown that the method of PBF could deliver experimental data on state of the two-component medium with <1mcs and <5mm of time and spatial resolution, correspondingly.

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