

ON A POSSIBILITY OF THE EXISTENCE
OF DUSTY PLASMA OSCILLATIONS
IN THE FRONT OF AN ALUMINUM
PARTICLE FLAME

*N.I. Poletaev, A.V. Florko, Yu.A. Doroshenko,
D.D. Polishchuk*

Institute of Combustion and Advanced Technologies,
Mechnikov Odesa National University
(2, Dvoryans'ka Str., Odesa, Ukraine;
e-mail: *incomb@ukr.net*)

S u m m a r y

The occurrence of dusty plasma oscillations in the combustion zone of an aluminum laminar dust flame in a constant electric field is experimentally found. The characteristics of thermoemission plasma in the combustion zone such as the electron concentration $n_e \sim 10^{12} \text{ cm}^{-3}$, charging numbers $Z_k = 100 - 150$ of Al_2O_3 particles with the diameter $d_{30} = 0.16 \text{ }\mu\text{m}$, and the most probable oscillation frequency $\nu_k = 24.5 \text{ kHz}$ are determined. Due to the injection of easily ionizable additions to the initial fuel, we vary the dispersion of condensed-phase particles. The dependence of the dusty plasma oscillation frequency on the condensed-phase particle size is shown. The reason for oscillations is analyzed. The occurrence of oscillations is related to the current instability of charge carriers, electrons and Al_2O_3 particles, arising as a result of the large difference of their drift velocities in an electric field.