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Plasma-assisted ignition at high temperatures ILYA KOSAREV, NICKOLAY ALEKSANDROV, SVETLANA KINDUSHEVA, SVETLANA STARIKOVSKAYA, Moscow Institute of Physics and Technology, ANDREI STARIKOVSKII, Drexel University — Non-equilibrium plasma of a pulsed nanosecond discharge can be used as an initiator of combustion process in gaseous mixtures. It was shown that, at the temperatures close to the ignition threshold, the time between the start of the experiment and a sharp increase in gas temperature and radical concentrations in combustible mixture (the autoignition delay time) decreases significantly when a short pulsed high-voltage discharge is applied to the system in the beginning of the experiment. Based on a detailed description of the gas discharge and combustion kinetics the kinetic mechanism of the plasma effect on ignition delay has been proposed. The production of electrons, ions, atoms, radicals and excited particles in the discharge and its near afterglow was calculated using the experimental data on $E/N(t)$ and $I(t)$ in the discharge. The analysis showed that by the beginning of the ignition process all active particles have been transported into atoms and radicals. The combustion kinetics was calculated using the standard mechanisms with additions of these species. A good correlation has been obtained between the experiments and calculations for the decrease in the ignition delay time.

Andrei Starikovskii
Drexel University

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