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Application of high-voltage pulsed-driving discharge to ignition and detonation initiation K. KORYTCHENKO, V. BOLYUKH, O. STAHOVSKIY, National Technical University "KhPI" — The new system producing a driving pulsed arc is offered in this report. It permits to create an efficient thermal source, the volume of which exceeds 5 mm^3 with the energy deposition about 1 J. High efficiency of the designed system is achieved due to the change of the voltage applied across the discharge gap during the pulsed arc development. It is shown that the forced change in the field strength inside the pulsed arc by an external electric circuit involves: 1) a rise in a resistance of the discharge channel by diminishing the plasma conductivity; 2) an increase in a rate of gas heating by the discharge current due to the growth in electron-ion collision rate; 3) an approach of the ionization degree of the plasma to the thermally equilibrium one through limitation of the electron temperature. Therefore the drive of the field strength into a pulsed arc allows not only fulfilling the growth condition of the energy fraction deposited into the discharge gap but it advances the efficiency of the electric energy transformation into thermal one of the gas-discharge environment. The calculation of optimal strength of the field is done on the basis of a balance equation of electrons energy, a state equation, an equation of Sakha and taking into account the process of dissociation. The two-temperature model of highly-ionized plasma is used where the electrons temperature is differ from ions one. The calculation results concerned the discharge into oxygen environment show that the field strength necessary to reduce when the channel temperature increases.

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