ON THE UTILIZATION OF KINETIC ENERGY OF DETONATION PRODUCTS

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Abstract: The possibility of utilizing the kinetic energy of detonation products by a pulse turbine of the simplest water-wheel-like design during the implementation of the Zel'dovich thermodynamic cycle with pulse detonation combustion of fuel is investigated computationally and experimentally. The coefficients of utilization of the momentum and kinetic energy of detonation products in the pulse turbine with unoptimized mass and dimensions are found to be as low as 8%–16%. To improve the efficiency of the pulse turbine, it is necessary to take measures for eliminating unnecesary reflections of shock waves, to select the optimal mass and dimensions of the turbine rotor and the number of blades, to profile the blades and to select the optimal angle of attack, to optimize the size of the lateral gap between the rotor and the housing, and to select the optimum location of the exhaust duct.

Keywords: Zel'dovich thermodynamic cycle; pulse detonation combustion; kinetic energy of detonation products; utilization coefficient; pulse turbine

DOI: 10.30826/CE18110407

Acknowledgments

This work was supported by the subsidy given to the N. N. Semenov Institute of Chemical Physics, Russian Academy of Sciences (State Tasks No. 0082-2016-0004 and No. 0082-2016-0011, State Registration No. AAAA-A18-118031590088-8 and No. AAA-A17-117040610346-5).

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Received October 19, 2018

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