

DYNAMICS OF PRESSURE VARIATION DURING AUTOIGNITION AND FORCED IGNITION OF GASOLINE/AIR MIXTURE IN THE ADIABATIC COMPRESSION MACHINE

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Abstract: The article describes operation of the adiabatic compression machine (ACM), which is designed to study high-temperature processes of ignition and combustion of liquid and gaseous fuels under conditions of varying temperatures and compression ratios. The possibility of modeling the processes of gasoline combustion in the Otto and Diesel cycles is demonstrated. The combustion process in one experiment can be initiated either by external ignition or as a result of mixture autoignition, as well as by both methods. The dependence of pressure on time and piston position is obtained when the mixture of gasoline with air burns with direct three- and twelve-phase fuel injection at the compression stroke.

Keywords: adiabatic compression machine; internal combustion engine; pressure; fuel injection phase

References

1. Voinov, A. N., and V. F. Nikolaenko. 1976. Ustanovka dlya issledovaniya obrazovaniya okislov azota v porshnevnykh DVS legkogo topliva [Installation for the study of the formation of nitrogen oxides in light fuel piston ICE]. *Dvigateli vnutrennego sgoraniya* [Internal combustion engines] 24:124–131.
2. Assad, M. S., V. V. Leshchevich, V. N. Mironov, O. G. Penyazkov, K. L. Sevruck, and A. V. Skilond'. 2009. Burning of hydrogenous mixtures in the model of an internal-combustion-engine chamber]. *J. Eng. Phys. Thermophys.* 82(6):1042–1058.
3. Leschevich, V. V., and O. G. Penyazkov. 2013. Samovosplamnenie gazovykh smesey v ustanovke bystrogo szhatiya: problema interpretatsii eksperimental'nykh dannykh [Autoignition of gaseous mixtures in the rapid compression machine: Problem of experimental data interpretation]. *Dokl. Acad. Nauk Belar.* 57(2):102–106.

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