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EFFECT OF THE ADDITION OF HYDROGEN-CONTAINING GAS ON INDICATED AND EFFECTIVE PARAMETERS OF A GASOLINE ENGINE

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ABSTRACT
The article presents the results of a study of the effect of the addition of hydrogen-containing gas on the indicator and effective indicators of a gasoline engine. Experimental and numerical analysis studies of the combustion process in a gasoline engine when operating without additives and with the addition of different quantities of hydrogen-containing gas have been carried out. As a result, it was found that the addition of a hydrogen-containing gas leads to a reduction in the duration of the combustion process and an improvement in engine performance. The addition of hydrogen-containing gas leads to an increase in the indicated efficiency of the engine, the heat utilization factor, and an increase in the indicated power. As a result of bench tests, an increase in the effective power and a decrease in the brake specific fuel consumption of the engine were found.

Keywords: hydrogen, hydrogen-containing gas, H_2/O_2, combustion process, indicated parameters, gasoline engine.

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HYDROGEN AND OXYGEN (HHO) GAS INFLUENCE ON ENGINE CHARACTERISTICS WHILE FUELED ON PETROL ANT BIOETHANOL LEAN MIXTURES

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ABSTRACT
As ecological requirements getting stricter and the new manners of decreasing emissions of pollutants are being researched. One of them is to focus the usage none or small count of carbon fuels as a fuel for internal combustion engine. Therefore, usage perspective of bioethanol with HHO gas as an additive fuel to petrol lean mixtures, is presented in this research. Ecological (CO, CO_2, HC, NO_x) and energetic (M_B, B_f, *BTE*) parameters were measured when using petrol ant bioethanol mixtures (E10 and E70) enriched with HHO gas. Experimentation was done by using spark ignition engine changing the ignition timing from 16° to 42° BTDC and changing stoichiometric mixture (λ = 1.0) to a lean (λ = 1.1; 1.2; 1.3; 1.4). Hydrogen and oxygen gases are produced using mobile electrolysis unit – HHO gas generator. It was concluded that for all air / fuel ratios tested the maximum torque was reached with 70% bioethanol additive to petrol, HHO gas has positive effect when mixtures are lean. The NO_X emission has increased; however, CO, CH and CO_2 were lower when HHO was supplied.

Keywords: petrol, bioethanol, HHO, hydrogen, combustion.

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EXPERIMENTAL STUDY ON SPRAY CHARACTERISTICS OF INTERNAL MIXED HYDROGEN-ASSISTED FUEL INJECTION SYSTEM

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ABSTRACT
Hydrogen-assisted diesel injection is suitable for low-power and high-power-to-weight ratio in-cylinder piston direct injection engines. The jet characteristics of hydrogen-assisted diesel direct injection have an important effect on engine performance. The effects of fuel injection duration and mixture duration, hydrogen pressure and fuel/hydrogen premix time on spray penetration distance and diffusion area were qualitatively analyzed by high-speed photography on a constant volume chamber test bench. The results show that increasing the fuel injection duration increases the penetration distance and decreases the spray projection area. Increasing hydrogen pressure will increase both penetration distance and spray projection area. Increasing the duration of air injection will increase the penetration distance and decrease the spray area. The spray area increases with the increase of fuel/hydrogen premixing time and tends to be stable when the premixing time is 3ms, which has no effect on the spray penetration distance.

Keywords: Piston engine, Hydrogen-assisted injection system, Direct injection, Diesel, Spray characteristics