Mathematical modeling of soot generation and burnout in a 2Ch 10,5/12,0 diesel cylinder operating on rapeseed oil and ethanol

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We consider one of the promising methods of decreasing diesel exhaust gas opacity, namely using alternative fuels, employing which makes it possible to replace petroleum fuel. We present a mathematical model for soot generation in a diesel cylinder during rapeseed oil and ethanol combustion. The model is based on the chemical kinetics for pyrolysis of fuel hydrocarbons and a high-temperature acetylene mechanism. We suggest a soot generation chemism for diesels operating on rapeseed oil and ethanol, based on contemporary understanding of the soot particle precursor formation mechanism in diesel combustion chambers. Calculation results for the exhaust gas opacity level of the 2Ch 10,5/12,0 diesel using rapeseed oil and ethanol show that while operating on alternative fuels under nominal conditions, soot concentration in exhaust gases decreases by 3.7 times as compared to using diesel fuel. The results of theoretical computations obtained are in satisfactory agreement with the experimental data.

Keywords: *diesel, rapeseed oil, ethanol, combustion chamber, pyrolysis, dual fuel supply system, soot, exhaust gas opacity*

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