



# **RAPID COMPRESSION MACHINE STUDY OF AUTO-IGNITION AND COMBUSTION OF LIQUID FUELS WITH ULTRADISPERSE ADDITIVES**

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## **ABSTRACT**

The uses of ultra disperse additives offers a promising means of adjusting the reactivity and improving the combustion properties of liquid fuels. This work outlines the development of a rapid compression machine technique for studying the impact of different ultra disperse additives on reducing the ignition delay time and increasing the combustion rate of liquid fuels. Several techniques were used to synthesize nanosized carbon additives to a primary fuel. Ethanol was selected as a model fuel, because it is widely used as a biofuel. Several techniques were used to synthesize nanosized carbon additives to a primary fuel. In the first case ultradisperse additives were produced by depositing graphitized films from a CH<sub>4</sub>/He mixture onto a nickel surface in a gas discharge. Thereafter, the films were separated from the substrate and dispersed in ethanol by treating in an ultrasonic bath. In the second case nanosized particles were synthesized during the exposure of ethanol to an electric d.c. discharge. Obtained fuels were studied under different experimental conditions: heterogeneous and homogeneous fuel-air mixtures. In the first case a specimen of liquid fuel was placed in a bowl put into the combustion chamber before compression event. It was found that the rate of fuel combustion after electrical discharge treatment can be increased substantially (about 10 %). Any significant changes in ignition delay time were not observed in these experiments.

**Keywords:** combustion, auto-ignition, ethanol, carbon nanoparticles