

**Title: ANALYSIS OF THE EFFECTS OF THE ADDITION OF ETHANOL TO DIESEL FUEL ON THE PARAMETERS OF FUEL SPRAY IN COMMON RAIL INJECTION SYSTEM OF DIESEL ENGINE**

**SUMMARY**

The dissertation investigates the effects of the addition of ethanol to diesel fuel on the parameters of fuel spray in common rail injection system of diesel engine. The subject matter of the dissertation covers issues which correspond to the current advancements in means of road transport, related to the search for more efficient drive systems and alternative power sources.

Alternative or modified fuels have different physicochemical properties than diesel fuel, which determines the formation of the fuel spray, and this impacts the functioning of the internal combustion engine, its operating parameters, and the purity of the exhaust gases emitted into the environment. To make sure this type of fuel can be used in diesel engines, it is necessary to gain a thorough understanding of the phenomena and relationships occurring during fuel injection.

The purpose of the research work was to investigate the effects of ethanol added to diesel fuel on the parameters of fuel spray macrostructure in common rail injection system. To achieve the objective, the research was designed to identify the physicochemical properties of fuels containing ethanol and diesel mixed in different proportions, and it also included visualisation tests of the injection process of these mixtures in order to determine the geometry of the spray pattern of the fuel.

In addition to the formulation of the problem, the desk analysis of the subject matter, the definition of the aim, scope and scientific hypotheses of the dissertation, the work mainly comprised experimental research. This mainly involved identification of physicochemical characteristics and visualisation as well as recording of the injection process related to the fuels investigated. Findings of the extensive research were applied to formulate theoretical and practical conclusions as well as implications for further development.

The dissertation is divided into six chapters presenting the characteristics of injection systems, the atomisation process, the formation of the combustible mixture, as well as the requirements for drive systems in diesel engines. Finally, the aim and the hypotheses of the dissertation are presented. Moreover, the fuels used to power compression-ignition engines and the requirements placed on them are characterised, and the parameters of the fuel atomisation process and methods for their evaluation are presented.

The experimental study determined the physicochemical properties of diesel blends with different proportions of ethanol, and assessed the effects of injection parameters on the macrostructure of the fuel spray by means of visualisation tests, for which a suitable workstation with built and equipped with various devices.

As a result of the research, the relationship between the macrostructure of the fuel spray and the injection parameters was determined; this will make it possible to select appropriate control parameters in common rail injection system using diesel and ethanol blends as fuel.