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## STUDY OF THE INFLUENCE OF NANOPARTICLE ADDITION IN DIESEL-ETHANOL BLEND ON FUEL JET CHARACTERISTICS

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### Abstract

Adding nanoparticles to different diesel fuel blends may be an efficient way to reduce pollutant emissions and improve the performance and efficiency of diesel engines. The use of nanoparticles as additives in diesel fuel impacts the jet development within the engine combustion chamber, but its mechanism is still not enough understood. The goal of this research paper was to evaluate some of the jet characteristics, such as spray penetration, cone angle, and Sauter mean diameter, which are greatly involved in fuel-air mixture formation. Based on the fuel properties before and after the addition of CeO<sub>2</sub> nanoparticles in fuel, information existing in dedicated literature, the actual results were obtained with the AVL HydSim v2021.1 simulation tool. The reference fuel used in this study was the Diesel-Ethanol blend DE20, consisting of 80% vol. diesel fuel and 20% vol. ethanol in the Diesel-Ethanol mixture. Compared to the original DE20 fuel blend, the highest fraction of CeO<sub>2</sub> nanoparticles (100 ppm in fuel) led to an 8.2% reduction in penetration, a 9.5% decrease in cone angle, and a 6.1% increase in Sauter mean diameter at the reference event represented by the start of combustion moment.

*Key words:* diesel-ethanol blend, nanofuel, simulation model, spray development

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