

# Experimental Analysis and Numerical Simulation of Ignition Delay Time of Diesel Fuel Using a Shock Tube

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## Abstract

The present work consisted in developing computational routine for prediction and characterization ignition delay time in shock tube. The work was the development of computational routines to characterize the shock wave parameters the ignition delay times of diesel to validate the experimental tests carried out in shock tube conducted by Santana and compare it with the experimental tests and numerical simulations carried out by others authors available in the literature. A linear regression of the experimental tests conducted by Santana et al [3] with conventional diesel was performed to obtain the Arrhenius equation for numerical simulation of the ignition delay time of diesel under the following conditions: temperatures from 880 to 1300K, pressures 24 bar and equivalence ratio 1. The results show good prediction between experimental and simulations. Were found delay times ranging from 425 to 1890 $\mu$ s. Considering all temperature range, the difference between the experimental and simulated test was approximately 15%, this difference also can be explained by the measurement in the shock tube, that the ignition delay time was calculated by the time difference between the passage of the shock wave by the pressure sensor and the start of the ignition detected by the luminosity detection sensor.

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