

## **IGNITION DELAY OF KEROSENE/WATER EMULSION**

**R. Dondè<sup>1</sup>, A. Capruzzi<sup>2</sup>, F. Cozzi<sup>2</sup>**

fabio.cozzi@polimi.it

<sup>1</sup> CNR – IENI (Istituto per l'Energetica e le Interfasi), Via Cozzi 53, Milano, Italy

<sup>2</sup> Politecnico di Milano, Department of Energy, Via Lambruschini 4, Milano, Italy

Using an emulsified fuel it is possible to achieve lower emissions of particulate matters and NO<sub>x</sub> and a more efficient combustion with a consequent reduction of UHC. In Diesel engines ignition delay is the main parameter that influences combustion efficiency and emissions production. Within this work it was defined a method to determine the ignition delay from the pressure curve of the combustion chamber. During an extended experimental campaign it was investigated the dependancy of ignition delay on: (a) combustion chamber ambient gas temperature, (b) type of fuel (Jet A1 and Water/Jet A1 emulsion), (c) type of injector nozzle (singlehole - multihole). The main objective of the study was to compare the results for the two type of fuels and to analyze the differences in their combustion process. Also spray penetration curves were obtained by means of imaging analysis. The results presented here show that ignition delay times shortens when increasing combustion chamber ambient gas temperature. The presence of water in the emulsion lengthens the ignition delay time compared to kerosene. The combustion process is also affected by ignition delay: the longer ignition delay is the more sudden and marked is the combustion phase right after the instant of ignition. The analysis of the Arrhenius plots highlighted a transition to a different chemical kinetic at low temperatures (NTC).

10.4405/profic2014.C5