

Visualization of diesel fuel sprays in a high pressure, high temperature cell under engine-like conditions

The Eindhoven high pressure, high temperature cell has a cubic inner volume of 108^3 mm³ and can withstand a maximum pressure of 10 MPa. The windows are made of 50 mm thick quartz and allow an unobstructed view of \varnothing 100 mm diameter. For these experiments three windows are mounted in the cell: an entrance and exit window and a side window, all of equal size. All cell walls are electrically heated to 200° C, except for the top surface in which the injector is mounted. This top surface is cooled to about 80° C to prevent premature fuel vaporization. The fuel used is regular, commercially available Diesel fuel (EN590), in order for the experiments to be as realistic as possible. The fuel pump is an air driven pump connected to a common rail system, capable of delivering a rail pressure of up to 200 MPa. The injector is an 8-hole Bosch heavy duty Diesel engine Common Rail sack-hole injector, with \varnothing 0.184 mm orifices and a length/diameter ratio of 5. In order to study a single fuel spray from this 8-hole injector, a thimble is constructed, which covers all but one orifice. The fuel delivered by the 7 covered orifices is led to the bottom of the cell by a drainpipe. The setup for shadowgraphy is straightforward, a Xenon target light (AEG XSW30) is used as light source. The signal is recorded by a high speed camera (Phantom v7.1 high speed CMOS camera). A typical example of a shadowgraph image is given in figure 1.



Figure 1 Typical shadowgraph of a diesel fuel injection

For more information about this subject:

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