

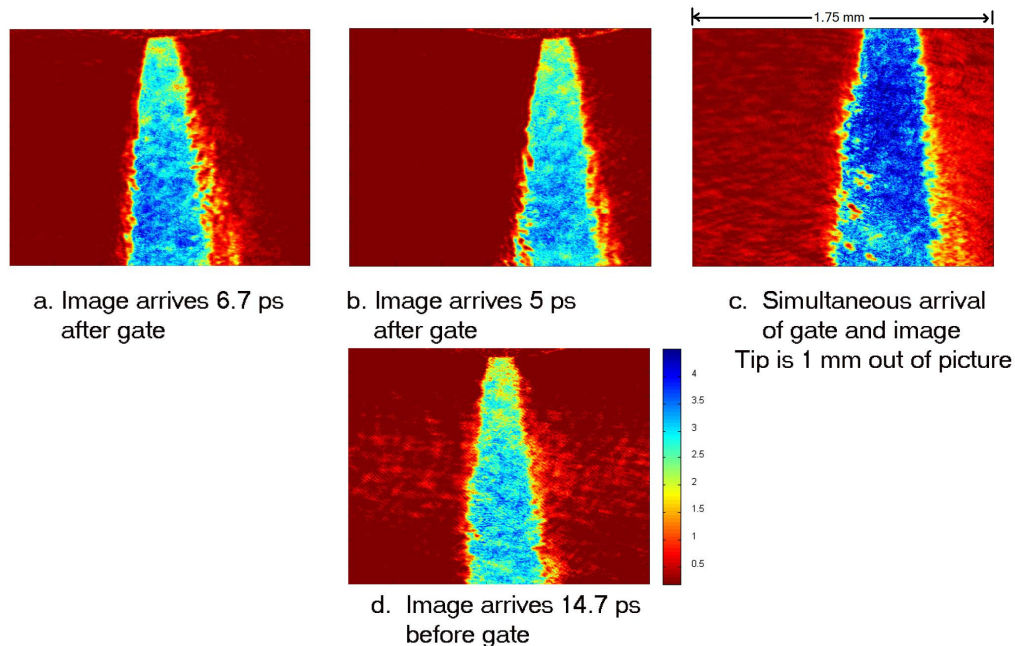
Gate time effects on ballistic imaging of Diesel sprays

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Abstract

Diesel engines are an important aspect of our transportation infrastructure, whose performance is greatly affected by the characteristics of the spray from their injectors. Characterization of the injector's sprays is therefore imperative to produce clean-running efficient diesel motors. Recently, ballistic imaging has been applied to the study of diesel sprays using the optical Kerr effect (OKE). These studies have required the use of not commonly available femtosecond capable pulse lasers. In this study, an attempt is made to use a more common ~15 ps pulsed Leopard D-10 laser along with an OKE gate to achieve ballistic imaging capabilities. By varying the temporal overlap of the gate and imaging beams an effective high speed shuttering effect is obtained. We are able to show that it is possible to produce ballistic images when the OKE gate turns on early relative to the arrival time of an imaging pulse. When the OKE gate turns on late relative to the arrival time of an imaging pulse the images contain much less apparent structure. Additionally, through the use of the ballistic imaging capabilities of the 15 ps pulse laser, basic information about the transient cross-section of the spray is obtained.



Images taken at 1.700 ms after start of spray in which the image beam arrives at OKE cell at different times after OKE gate beam. Please see CD for color images.

Key words: diesel sprays, diagnostics

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