Differential Infrared Thermography of Gasoline Direct Injection Sprays

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Abstract

Advances in experimental techniques and simulations are necessary building blocks for the overall effort to reduce the CO_2 and pollutant emissions of future Gasoline Direct Injection (GDI) engines. Wall wetting and inhomogeneous fuel distribution are two known causes of particulate emissions whose prediction within three dimensional computational fluid dynamics (3D CFD) can be made more reliable based on accurate droplet temperature data. Results from Differential Infrared Thermography (DIT) of a hollow cone and multi-hole gasoline direct injector are presented. Compared to previous applications of DIT, the data processing and temperature calculation methods have been refined. Interpretation of the results is supported by ray tracing simulations based on the light scattering and absorption properties of small droplets given by Mie theory.

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