
An investigation of gasoline spray characteristics in a constant volume combustion chamber

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The gasoline spray characteristics were investigated through Schlieren photography and planar laser-induced fluorescence – particle image velocity (PLIF-PIV) techniques. Injection pressure was handled by a conventional common rail diesel system while ambient pressure (back pressure) was controlled by supplying nitrogen gas into the constant volume combustion chamber (CVCC). The effects of injection and ambient pressure on the gasoline spray were clarified by taking advantage of image processing. In addition, the magnitude of spray variation was compared with the variation of diesel spray. The results show that the spray penetration tip of gasoline increased with the increased injection pressure and decreased with the increased ambient pressure as the diesel spray. The cone angles for both fuels decreased with the increased injection pressure. However, the injection pressure had the effect on the diesel spray higher than gasoline at the low ambient pressure. The cavitation seemed to induce for gasoline injection. Moreover, PLIF-PIV images show the remarkable turbulent structure of gasoline spray under the higher injection pressure.

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