

## **Effect of injection conditions on the spray characteristics of GDI injectors with different multi-hole configuration**

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### **Abstract**

This study investigates the spray characteristics of multi-hole injectors with two different nozzle hole configurations for a gasoline direct injection (GDI) engine according to the various injection conditions. Two GDI multi-hole injectors with a different location and injection angle of six symmetric holes located around the nozzle axis were used for this investigation on the spray characteristics injected six individual plumes. The spray behaviors such as the spray development process, the spray tip penetration (axial and diagonal direction) from the nozzle tip, and spray cone angle were analyzed from the spray images obtained by using the high speed camera. Also, the local Sauter mean diameter (SMD) according to the axial distance from the nozzle tip and the overall SMD were measured by the droplet measuring system for the comparison between atomization performances of two injectors. It was found that the spray tip penetration and cone angle increase as the injection pressure increases. In the comparison of results between two injectors, test injector with symmetric holes positioned on the periphery of a larger imaginary circle than the other injector, shows small values in the spray tip penetration and cone angle. In the atomization characteristics, the local SMD makes difference according to the axial distance. The effect of injection pressure on atomization of both sprays at the test injectors showed that as the injection pressure increased, local and overall SMD show the decreasing patterns.

Key words: spray characteristics, Gasoline direct injection (GDI), Multi-hole injector, injection condition

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