第５号様式

論文審査の要旨

博士の専攻分野の名称	博　士　（　　工学　　）	氏名	駱　洪亮
学位授与の要件	学位規則第４条第[1]・２項該当		

論　文　題　目

Adhesion Characteristics of Fuel Spray Impinging on Flat Wall for Gasoline Engine
（平板壁面に衝突するガソリン噴霧の液膜形成に関する研究）

論文審査担当者

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〔論文審査の要旨〕

Spray-wall impingement is a widespread phenomenon applied in many fields, inlcuding spray-wall cooling precess, spray coating process and fuel spray atomization in internal combustion engines. Although the spray impingement has been investigated for decades, the mechanisms of the interaction between spray and wall are still far from being fully understood. In gasoline direct injection (GDI), it is difficult to avoid the fuel adhesion on the piston and sylinder surfaces. The wet wall caused by impingement affects the air-fuel mixture formation process, which is a possible source of unburned hydrocarbons (UHC) and particulate matters (PM), making it difficult for direct injection spark ignition (DISI) engines to meeting the future requirements of particle number (PN) regulations.

The novelty of this study lies in the correlation between the impinging spray and fuel adheion formation together to better understand the spray-wall impingement in gasoline engine. To present this work, the thesis is organized as follows:

Chapter 1 is entitled as “Introduction”. First of all, a review of previous works on the development of DISI engines, impinging spray and fuel adhesion formation as well as its relative experimental methods were presented in this chapter.

Chapter 2 is entitled as “Experimental apparatus and measurement methods”. It introduced the experimental apparatus implemented in this study, such as constant high-pressure chamber, impingement system and the observation techniques applied in this investigation.

Chapter 3 is entitled as “Fuel adheison formation under non-evaporation conditions”. The spray characteristics and fuel adhesion evolution were experimentally investigated under non-evaporation conditions in this chapter. The effect of pressure, roughness of the

wall surface, impingement distances were tested in this chapter.

Chapter 4 is entitled as “Fuel adheison formation under evaporation conditions”. The effects of ambient temperatures and hole diameters on the spray impingement and fuel adhesion formation were studied. Furthermore, the different mechanisms in fuel adhesion formation were discussed in this chapter.

Chapter 5 is entitled as “Microscopic behaviors of impinging spray”. To correlate the spray behaviors with the fuel adhesion, it illuminated the microscopic characteristics of impinging spray under different conditions, then, the droplets diameter and velocity were reported before and after impingement. Finally, the relationships between droplets and fuel adhesion were summarized and compared with the single droplets behavior in this chapter.

Chapter 6 is entitled “Conclusions”. The main findings of this study and general conclusions on the evolution of imping spray and fuel adheison formation for gasoline engine were summarized, ans some recommendations of future work in this theme were conducted as well in this chapter.

以上，審査の結果，本論文の著者は博士（工学）の学位を授与される十分な資格があるものと認められる。

備考：審査の要旨は，1,500 字以内とする。