

論文審査の要旨

博士の専攻分野の名称	博 士 (工 学)	氏名	金 焯
学位授与の要件	学位規則第4条第1・2項該当		
論 文 題 目			
Characterization of Diesel Spray and Mixture Formation Processes under Small Injection Amount Condition (微小噴射量条件下のディーゼル噴霧と混合気形成過程の特性に関する研究)			
論文審査担当者			
主 査	教 授	西田 恵哉	印
審査委員	教 授	難波 慎一	印
審査委員	教 授	三好 明	印
審査委員	准教授	尾形 陽一	印
〔論文審査の要旨〕			
<p>An experimental study was conducted on Diesel spray and mixture formation in a constant volume chamber for investigating the effects of small injection amount under evaporating and non-evaporating conditions. Tracer laser absorption and scattering (LAS) technique and diffused background illumination (DBI) were employed to qualitatively and quantitatively characterize the spray development and mixture formation process. Tracer fuel with n-tridecane of 97.5 vol% and of 1-methylnaphthalene (α-MN) 2.5 vol% was adopted in LAS experiment to reveal the liquid and vapor phases distribution under the evaporating conditions. Microscopic observation was performed to obtain the different on the near-field spray behavior between transient and quasi-steady states under non-evaporating conditions. In addition, numerical simulation of nozzle internal flow was conducted to illustrate the effect of nozzle flow on spray characteristics. The detailed arrangement of this dissertation is summarized as following.</p> <p>Chapter 1 is entitled as “Introduction”. First of all, a review of previous works on the development of diesel common rail systems, nozzle internal flow, spray and mixture formation as well as experimental method were presented.</p> <p>Chapter 2 is entitled as “Experimental apparatus, procedure and numerical method”. The experimental apparatus, optical measurement and numerical methods employed in this study are introduced in this chapter.</p> <p>Chapter 3 is entitled as “Spray results of single-hole and multi-hole injectors under same rail pressure condition”. The effects of injection amounts for single-hole or multi-hole injectors were studied in this chapter under both evaporating and</p>			

non-evaporating conditions.

Chapter 4 is entitled as “Spray results of single-hole and multi-hole injectors under similar injection rate profile”. The effects of spray velocity and structure on mixture formation were studied under similar injection rate condition by comparing the single- and multi-hole injectors.

Chapter 5 is entitled as “Nozzle internal flow and near-field spray simulation”. The numerical research was conducted to illuminate and analyze the spray and mixture behaviors found in Chapters 3 and 4.

Chapter 6 is entitled as “Characteristics of spray development and mixture formation under split injection condition”. The effects of small injection amount on split injection was discussed. The phenomenon presented in split injection was analyzed by combining the results under different injection amount conditions.

Chapter 7 is entitled as “Closure”. The main findings of this study were summarized in this chapter. In addition, the view and proposition on the future work has been advanced.

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。