Experimental Study of Transient Perfpemance Response for The High Pressure Common Rail Direct Injection Diesel Engine

林辰、張一屏

E-mail: 386810@mail.dyu.edu.tw

ABSTRACT

The purpose of this study is to explore the fuel consumption and exhaust emission response and the cylinder combustion pressure, fuel injection signal correlation for a high-pressure Common Rail Direct Injection (CRDI) diesel engine during transient operating conditions. Engine and dynamometer control and data acquisition system were used to observe the engine output performance parameter variation during the transient torque and speed changed operating conditions. Combustion analyzer was used to measure the corresponding engine combustion fuel injection signals and the cylinder pressure for these different transient conditions. The engine output performance parameters correlations with the combustion fuel control signal and corresponding cylinder pressure data can be used for further reference. Three different transient testing modes were set for this study, these modes are Constant Speed Varied Torque (CSVT) Mode, Constant Torque Varied Speed (CTVS) Mode, and Varied Speed Varied Torque (VSVT) Mode. Experiment data acquisition system with LabVIEW software was used to record the CRDI diesel engine output torque, speed, fuel consumption and the exhaust emissions. The combustion analyzer was used to record the cylinder pressure and fuel injection signals corresponding to the three different transient testing modes. The measured data can be used for future CRDI diesel engine dynamic simulation model prediction for fuel consumption and emission validation under these three different transient operating conditions. The database established can also future CRDI diesel engine management system control strategy and control parameter optimization reference.

Keywords : High-Pressure Common Rail Direct Injection (CRDI) Diesel Engine、Engine Transient Response Measurement 、Transient Diesel Engine Fuel Consumption and Emission

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