

高壓共軌直噴柴油引擎暫態性能響應之實驗研究

林辰、張一屏

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

摘要

本研究之主旨為探討高壓共軌柴油引擎之暫態油耗及排放響應特性與引擎噴油訊號與燃燒壓力之關係。研究將運用引擎控制與輸出性能參數即時顯示之軟硬體，觀測引擎輸出性能參數對應暫態扭力、轉速變化時，輸出性能之間的響應，並使用燃燒分析儀紀錄分析不同暫態轉速與扭力變化操作狀態下之燃燒壓力與噴油控制訊號對應暫態排放廢氣與油耗之關係。研究設定三種不同暫態測試模式，包括定轉速變扭力暫態測試、定扭力變轉速暫態測試、與變轉速變扭力暫態測試。實驗以LabVIEW資料擷取系統紀錄高壓共軌柴油引擎輸出扭力、轉速、油耗，配合廢氣分析儀與煙度計上之數值，並運用燃燒分析儀記錄暫態變化時間中之平均燃燒壓力與噴油訊號，對三種暫態測試模式進行探討其油耗、廢氣排放、燃燒壓力對應不同暫態響應時間之關係。本研究量測之數據，未來可供建立定轉速變扭力暫態測試、定扭力變轉速暫態測試與變轉速變扭力三種暫態測試模式之模擬動態模型進行不同暫態負荷改變之行駛油耗及排放廢氣輸出性能分析驗證之用。此外亦可提供建立高壓共軌柴油引擎噴油系統暫態最佳化控制策略與排放污染特性之研究參考數據資料庫，配合相關控制軟體構建之暫態資料擷取系統，預測油耗、廢氣與燃燒壓力之模型參數調校與控制參數最佳化比較，不同污染氣體測得之延遲時間可供研究與分析改善柴油高壓共軌引擎暫態響應性能。

關鍵詞：高壓直噴共軌柴油引擎、引擎暫態響應量測、柴油引擎暫態油耗與排放

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