柴油引擎操作參數對黑煙排放影響之研究

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摘 要

本文主要是以一具MITSUBISHI 4M40-2AT1 2835 c.c. 間接噴射式渦輪增壓附中間冷卻器四行程水冷式引擎為研究對象，運用田口實驗計劃法探討引擎操作參數對柴油引擎黑煙及NOx污染排放的影響效應，並尋找最佳的操作參數組合來改善柴油引擎的廢氣排放。 本研究主要分為兩個部份，首先是使用靜態特性的田口實驗計劃進行各操作參數間交互作用之實驗規劃，來探討引擎操作參數對柴油引擎黑煙及NOx污染排放的影響效應及最佳化；另一方面則是增加噴射正時為動態特性的田口實驗規劃，探討柴油引擎噴射正時與黑煙及NOx污染排放間之關係。其污染物的量測方法，將分別於引擎動力計上以瞬態測試程序(美國FTP, Transient Cycle 測試型態)及穩態測試程序(我國柴油車排煙測試程序)進行測試。 研究結果顯示當柴油引擎以美國FTP, Transient Cycle 測試型態為量測方法時，柴油含硫量及進氣溫度對柴油引擎黑煙及NOx污染排放是有顯著的影響，最佳化的黑煙平均改善率為28.9％(靜態)及30.0％(動態)；而在柴油車排煙測試程序方面，排氣背壓及噴油量反而才是主要的影響參數，其黑煙的平均改善率為43.8％，對於量測方法間黑煙污染物相關性不佳的問題，其測試型態不同產生不同的操作參數影響效應，應該是造成相關性不佳的主要原因。

關鍵詞 : 柴油引擎，黑煙，田口實驗計劃法，最佳化，相關性

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