

# 並聯式複合電動重型機車之鋰電池管理技術與電控系統研製

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## 摘要

複合動力車輛(HEV)在石油短缺的現代日益重要，因為HEV不只可以節省燃料，同時也可以減少環境污染。但是目前HEV有許多的關鍵技術仍有待加強與突破。本論文主要研究的對象是複合動力的重型機車，主要研究的主題是整個電控系統的關鍵技術開發，其中包括：(1)車用即時充電系統：可隨發電機輸出的變動電壓，配合整車之狀況，即時的調整充電電壓與電流，可有效的回收電能與增加續航力；(2)鋰電池管理系統：結合系統管理匯流排(SMBus)，可即時監控鋰電池的各項參數，提高鋰電池安全性；(3)整車電控系統控制單元：利用數位信號處理器(DSP)為基礎來整合各項電控系統關鍵技術的運作。此DSP電控系統控制單元實現了複合動力重型機車的能量管理流程、發電機系統和馬達系統的溝通與控制。在馬達控制部份，使用可變結構系統中的Totally invariant variable structure system理論和線性矩陣不等式(LMI)理論，推導出一個新型非匹配不確定輸出回授控制器，能保證馬達控制系統穩定且有良好的控制性能。

關鍵詞：複合電動重型機車；即時充電系統；鋰電池管理系統；系統管理匯流排；馬達控制；數位信號處理器；可變結構系統

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