雙動力驅動車輛之鋰鐵電池動態充電系統研製

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摘 要

近年來傳統燃油車輛越來越多，使得地球上石油的存量越來越少，加上環境污染日益嚴重，節能減碳技術變成全世界最重要的研究課題。為了解決前述問題，電動車輛與複合電動車輛的開發是必要的，而發電機控制及電池管理技術，在電動車輛與複合電動車輛領域扮演著關鍵的角色。有鑑於此，本文研究雙動力驅動車輛之發電機控制及電池管理技術，基於高效能動力需求，本研究選用磷酸鋰鐵電池，此種電池具有高放電功率，可快速充電且循環壽命長之優良特性，是目前產業界認為符合環保、安全和高性能要求的動力電池。本文發展一個雙動力驅動車輛的鋰鐵電池動態充電系統，考慮電動車輛的充電電源會因為行車動態而不斷改變其電量大小，本文發展之新式動態充電系統，可以因應此種充電電量之不斷變化，對電池作最佳化的充電調配，使得此充電系統具有高充電效能、維護電池安全以及電量平衡充電三大優點。為了驗證本論文之正確性，我們也建構了一組雙動力驅動車輛平台，經實測之結果證明此動態充電系統的效能。

關鍵詞 : 複合電動車輛，磷酸鋰鐵電池，動態充電系統，發電機，數位訊號處理器

目錄

参考文献

[1] Te-Sheng Su, “ Development of High Power 20kW Brushless DC Motor Driver and Application of Novel Parallel Hybrid Electric Vehicle ”, Department of Mechanical and Automation Engineering College of Engineering Dayeh university, 2008.

[2] Chen. Chiang. Lin, Pao. Chung. shih, “ Hybrid Electric Vehicle, ” Chwa book company, 2002.

[3] The Auto Channel, 2009-03-11, “ Toyota and Lexus Hybrids Top One Million Sales in the U.S. ”, Retrieved on 2009-03-28 [4] Padlhi A K, Nanjundaswamy K S, Goodenough J B. J. Electrochem. Soc.,1997, 144 (4): 1188-1194.

[5] LiFePO4.HK, “ About LiFePO4, ” retrieved from http://www.lifepo4.hk/, 2009.

[6] L.Legers, “ Meridian International Research, ” 29, May, 2008 [7] Jia-Hao Jhuang, “ Development of Electrical Control System and Performance Analysis for a New Parallel Hybrid Electric Heavy Motorcycle ”, Department of Mechanical and Automation Engineering College of

Engineering Dayeh university, 2007.
[8] Hybrid Synergy Drive, “ TOYOTA HYBRID SYSTEM THSII ”, Toyota Motor Corporation, 15 Jun. 2007.
[9] Texas Instruments “ TMS320LF2407A-EP DSP CONTROLLERS ” Texas Instruments Inc., 2002.
[10] R. W. Erickson and D. Maksimovic, “ Fundamentals of power electronics, ” Kluwer Academic Publishers, 2nd, pp. 57-59, 2001.
[11] Ruei-Hong Dai, “ DSP Based 20kW Generator/Lithium Battery Management System and Application of Parallel Hybrid Electric Vehicles ”, Department of Mechanical and Automation Engineering College of Engineering Dayeh university, 2008.
[12]R. W. Erickson, Fundamentals of Power Electronics. New York: Chapman &Hall, 1997.
[13]B. Pevec, D. Voncina,D. Miljavec, and J. Nastran, “ Extending the Low-Speed peration Range of PM Generator in Automotive Applications Using Novel AC – DC Converter Control ”, IEEE Transactions on Industrial Electronics, vol.52, no. 2, Apr. 2005.
[14] S. Rees and U. Ammann, “ New gate control unit for automotive synchronous rectifiers, ” in Proc. PCIM Europe ’ 03, Nuremberg, Germany, 2003, pp. 95 – 101.
[15] Ming-Che Su, “ DSP-Based Energy Management System of New Parallel Hybrid Electric Heavy Motorcycle, ” Graduate Institute of Electro-Mechanical Automation Engineering July, 2007.
[16] Yimin Gao and Mehrdad Ehsani, “ A Torque Speed Coupling Hybrid Drivetrain Architecture, Control, and Simulation ”, IEEE Fellow, vol. 21, no. 3, May.2006.
[17] V. Johnson, “ Battery Performance Models in ADVISOR, ” Journal of Power Sources, Vol.110, pp321~329, 2002.