DSP-Based Energy Management System of New Parallel Hybrid Electric Heavy Motorcycle

蘇明哲、蔡耀文

E-mail: 9608234@mail.dyu.edu.tw

ABSTRACT

Transform of the conventional mini- or medium-size motorcycles into hybrid electric vehicles is very difficult, because their physical space is very limited and the cost of the hybrid power system is very high. Combine the advantages of internal combustion engine and electric motor, the parallel hybrid electric motorcycle systems have proved they can reduce emission, save energy and raise mileage. By using adaptable control strategy and complex electromechanical systems, a high performance and high efficiency hybrid electric vehicle with very low emission and very low energy consumption can be established. In this thesis, by using the energy management strategy, we have established and improved the performance of the driver and controller. Based on a digital signal processor (DSP), we have developed the energy management system for the new parallel hybrid electric system. The Li-ion battery management system has also developed in this thesis. On the other hand, under a real platform test, we verify and modify the performances of the energy management system. In addition, the energy management system controller adequately adjust the switch of battery and power unit to achieve the purpose of effectively manage the electric control system and make the internal combustion engine run at its sweet spot in most cases. Moreover, it also can robustly protect Li-ion battery no matter what operation modes are. The hybrid electric heavy motorcycle would have the merits of energy-saving. In addition, we also have installed a prototype of the hybrid electric heavy-duty motorcycle.

Keywords : parallel hybrid electric motorcycle ; heavy-duty motorcycle ; digital signal processor(DSP) ; energy management system ; Li-ion battery management system ; optimal sweet spot

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