DSP Based 20kW Generator/Lithium Battery Management System and Application of Parallel Hybrid Electric Vehicles

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ABSTRACT

The generator and lithium battery management system plays an important role in many electromechanical devices. In a hybrid electric vehicles (HEV), the generator and lithium battery management system is not only the core unit of high performance but also the decisive unit of energy-conservation and reduce carbons. In this thesis, we develop an adaptive battery charge system and energy management strategy for HEV. They both cooperate with each other and turn into key unit of energy-conservation and reduce carbons. The adaptability battery charge system can immediately regulate optimum charge for lithium battery according to energy of power source. Based on this method, we design many suitable automation charge mode. It is able to charge the lithium battery on the condition of ultra-low energy source. Hence, it reaches these functions of improving the storing efficiency and reducing energy losses. Moreover, it can also equilibrium charge at the same time to lengthen the battery life. We will apply this adaptability battery charge system in the HEV platform. Because the power of generator and lithium battery is possible more than 10 kW, the circuit design and stability operation of this system are not an easy task. We consider power of generator modulation, charging and discharging reacting of lithium battery and safety norm to accomplish the adaptability battery charge system of HEV. Besides, we also achieved the construction of the prototype vehicle to real application and test in this research. Through the real experiments, we have proved the exactitude of theory and the practicability of the novel method. The adaptability battery charge system can not limits the application to the kind of particular battery and vehicle system, it can also apply to any kind of real-time electricity generation system of the frequently change energy.

Keywords : Integrated motor/generator (IMG) ; Lithium battery ; Battery charge system ; Charge equalization ; Hybrid electric vehicle (HEV)

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