

Development of electrical control system and performance analysis for a new ParallelHybrid electric heavy motorcycle

莊佳豪、蔡耀文

E-mail: 9607547@mail.dyu.edu.tw

ABSTRACT

With growing concerns over environmental protection and energy conservation, the hybrid electric vehicle (HEV) has taken center stage. The electric vehicle is a transportation implement of zero emission; however, its performance and driving distance are not acceptable in most cases. Thus the electric vehicle is not accepted extensively. On the other hand, the hybrid electric vehicle (HEV) not only achieves minimum fuel consumption and minimum emissions but also reduce pollution. The hybrid electric heavy motorcycle would have the merits of energy-saving. In this study investigates a new parallel hybrid electric heavy motorcycle, the aim of research is integral performance analysis and electrical control system. Its includes : (1) The simulation and performance analysis of integral systems: to simulate and analyze situations which the vehicle operate under variations of vehicle load ; (2) Electrical control system: the major controller of the systems used by Digital Signal Processor (DSP) and control the vehicle under variations of driving pattern. In order to achieves minimum fuel consumption and minimum emissions, the internal combustion engine always operates at the sweet spot. The linear matrix inequality (LMI) method is applied in the design of dynamic output feedback controller for mismatched uncertain variable structure system (VSS). Using this new LMI theory based output feedback variable structure control (VSC), the mismatched variable structure systems is asymptotically stable with better performance. The electric control system and major controller of the hybrid electric vehicle have been achieved on the experimental platform. The prototype of hybrid vehicle is also established. The performances of the new hybrid electric vehicle are proved by experiment and operate actuality.

Keywords : Hybrid electric heavy motorcycle (HEV) ; Sliding mode ; Variable Structure Control (VSC)

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