

Novel Brushless Motor Driver and the Application of Electric Motorcycles

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ABSTRACT

This thesis is mainly concerned with the development of a DSP-based control system for a brushless motor driver and the application of electric motorcycles. The famous and important space vector pulse-width-modulation (SVPWM) technique will be used in the brushless motor driver. An application about the control of electric motorcycles will also be discussed. In addition to use traditional PI controller, a modified variable structure control (VSC) is used in controlling of the motor control system. This modified VSC can guarantee the existence of the sliding mode by using output feedback only. By using the linear matrix inequalities (LMI), we give a new invariance condition guaranteeing the existence of a linear switching surface such that the system in the sliding mode is not only stable but also completely invariant to mismatched uncertainties under certain conditions. The hardware and software of the SVPWM driver and new VSC controller are implemented by the DSP-based system. We design all the circuits and write all the program of the system. The high efficiency of responses of motor control system can be successful obtained. On the other hand, by using our hardware and software, the application of electric motorcycle is also established with high performance.

Keywords : space vector pulse-width-modulation ; electric motorcycle ; variable structure systems ; linear matrix inequality ; Digital signal processor

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