SoPC Based Motor Controller Design Using New Optimal Output Feedback Variable Structure Control Theory

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ABSTRACT

The system design on a programmable chip (SoPC) based on variable structure control (VSC) has already finished in this research. A new design technique of the optimal switching surface for variable structure systems is proposed. The optimal switching surface design technique guarantees that the system behavior in the sliding mode has asymptotical stability and good performance. A modified output feedback variable structure controller is given to assure the existence of the sliding mode. The state is not all available and no estimated state is required. We use the Complex Programmable Logic Device (CPLD) to realize these new variable structure controllers. Because of the mature development and easy acquirability of CPLD, we digitize this controller and develop it the Altera CPLD platform. The peripheral circuit and the controller is established in our new system on a programmable chip. It can shortens the time for manufacturing electronic circuits, and can also achieves the goal of a fast prototype. The variable structure controller will be realized by using this new SoPC defined control program. This VSC will be applied to the control of the motor. The controllers have low cost and good performance. In additional, it can also reduce complex of the system.

Keywords : System on a programmable chip, Optimal switching surface, Variable structure systems, Complex programmable logic device

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