Forschungspraxis/Research internships

SVPWM implementation based on FPGA

Pulse Width Modulation (PWM) technology is widely adopted in machine control system based on Voltage Source Inverters (VSI). Among these varied PWM technologies, there are two popular types, which are Sinusoidal PWM (SPWM) and Space Vector PWM (SVPWM). SPWM is a most used technology, which utilizes the comparison of a sinusoidal modulation signal and a triangle carrier signal to generate PWM. It is simple to implement and easy to realize. But it only uses 78.55% of the DC link voltage and needs other special compensation methods to improve this ratio.

Compared to SPWM, SVPWM is a promising alternative technology. It can reach 90.7% efficiency of DC link voltage and meanwhile reduce voltage and current harmonics obviously by using a symmetrical waveform of PWM. Nevertheless, the implementation of SVPWM will become complicated compared to SPWM. Fortunately, there are so many literatures related to how to design an algorithm to realize this SVPWM.

This project aims to design software to realize SVPWM based on a FPGA and a CPU. It is flexible to choose the work distribution for these two controllers. This project is a part of a (Permanent Magnet Synchronous Machine) PMSM control system, which has been implemented based on SPWM technology.

Requirements:

- Literature review on SVPWM
- Software design in FPGA to generate PWM signals
- Software design in CPU to adapt SVPWM generation

Prerequisites:

- Knowledge of control and electrical drive systems
- Basic knowledge of C code
- Knowledge of FPGA and VHDL

Main References:


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