Master Thesis

Digital Interface and Sensorless Control Software Development for FPGA-Based SRM Controller

Switched reluctance machines (SRMs) have drawn great attention from industry and academia recently because of their several advantages such as a simple structure, low cost, rotor robustness, and possible operation in high temperatures or high rotational speeds. Since the price of rare-earth material has been increased greatly over the last several years, SRMs are becoming a popular alternative of permanent magnet synchronous machines (PMSMs) for electrical vehicle (EV) at present.

Position sensors are normally necessary for SRM drives. However, the position sensors decrease the reliability of the SRM drive system and restrict the application of SRMs in some harsh environment. Therefore, sensorless control for SRMs is desirable.

Nowadays, FPGAs are becoming attractive and competitive as the drive control platform. Firstly, soft and/or hard processors can be integrated inside FPGA chip, so FPGAs can be seen as system-on-chip platforms. Secondly, parallel processing can shorten the computational time to a large extent, which makes FPGA based controllers as quasi-analog systems.

This Master thesis work focuses on digital interface and sensorless control algorithm development for an FPGA based controller.

Prerequisites:

- Fundamental knowledge of electrical drives
- Fundamental knowledge of FPGAs and digital circuits.
- Experience in Matlab/Simulink programming and C programming
- Experience in VHDL or Verilog HDL programming is desirable but not necessary

Start time:

- As soon as possible

Location:

- Zibo-Hanhai-Technologiepark München

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