Forschungspraxis/Research internships

Hardware and software design for a resolver demodulation

In most electrical drive systems, rotor position/speed is measured by an encoder or a resolver. Encoder is a simple coding device and it outputs pulse signals according to rotor position/speed without any excitation signals except a single power supply. But for a resolver, which has more precise accuracy, it needs specific excitation sine signals (special voltage and frequency) and it outputs also sine & cosine signals. These sine & cosine signals need a special device or program to decode, and then we can get the related rotor position/speed information. The aim of this project is to design a PCB circuit for this decoding device (AD2S1210) and meanwhile implement its basic control software design in FPGA.

The detailed information of the AD2S1210 can be found through the link below.
You can find the recommended PCB circuit for this device. The control information of AD2S1210 is also important for the software design in a FPGA. Please pay more attention.

The FPGA is a typical Cyclone 3 and it is a core part of our Pentium system, which is a universal controller for machines and power electronic devices. VHDL codes are adopted in the FPGA to implement the basic control purpose. After demodulation, FPGA will transfer these rotor position/speed data to CPU, which implements the rest algorithms.

Requirements:
- Literature review on datasheet of AD2S1210
- PCB design for resolver decoding circuit based on AD2S1210
- Software design in FPGA to obtain the real rotor position/speed information

Prerequisites:
- Knowledge of control and electrical drive systems
- Basic knowledge of PCB design
- Knowledge of FPGA and VHDL

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