Abstract

This thesis contains the description of an inverter controler designed to drive a 3-phase motor, implemented on a *Xilinx Spartan-3E* FPGA. First it aims to provide an overview of AC motors, their control and the power converters used to drive them, while examining the most frequent problems one has to face during the application of these units. After this, the mathematical toolbox used in space vector control is explained. The subsequent chapter uses these aforementioned elements to overview a general space vector based closed-loop control circuit. Last it implements the output module of one such circuit with the aforementioned FPGA, providing a hierarchical and functional description of the submodules, while examining the problems, which emerged during the implementation.

Although such control systems for this tasks are already extensively implemented on microcontroler based systems, due to the spread and availability of FPGA-s its justifiable to assess the feasibility of the system on this platform. The reason for this lies partially in the more deterministic operation of FPGA-s (thus better reliabilty), and partially in the aim to reduce the load of the microcontroler in the control-loop (thus allowing tighter real-time code).

Furthermore by assessing the implementation on FPGA, it provides an overview for a later ASIC based implementation, both in feasibility and resource estimation, and by providing an early HDL based description.