Laboratory-work

This chapter presents the dSpace laboratory available at Aalborg University (Institute of Energy Technology). In order to be able to implement the simulated control schemes presented in the previous chapters, it is necessary to get familiar with the configuration involved in the cited laboratory. Therefore, a brief introduction to the dSpace system is presented in the following lines.

8.1 The Flexible Drive System Laboratory (FDSL)

The FDSL consists of three identical drive systems controlled by mixed RISC/DSP digital controllers (dSpace DS1103 PPC plugged in host PC). The set up configuration of the system is shown if the figure below.

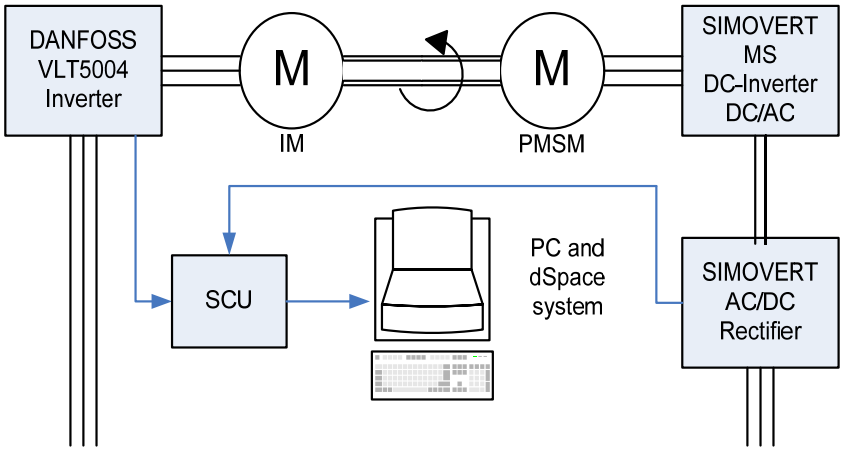

Figure 8.1: *Laboratory setup configuration*

Figure 8.1 consists of an induction motor (IM) used as plant, (which should be replaced in the implementation of the present project by the Surface Mounted PMSM), and a brushless DC motor used as load.
The IM is supplied through an AC inverter (VLT5004), and the load motor through a DC inverter (Simovert MS).
Signals from the set up are used to feed a Signal Conditioning Unit (SCU), which is used to ensure the galvanic isolation between the PC and the dSpace hardware.

8.2 Basic data processing principle

The Flexible Drive System supports (or is supported by) the C code extension and Matlab files.

Models crated in Simulink are transformed in to C code and used as program to control the setup. Visualization and controlling parameters accessibility are available on a dSpace control desk where layouts that fit specific requirements are developed.

8.3 Simulink models

The simulink model of the laboratory setup consists of:

- A data acquisition block (that gives measured signal to all other blocks)

- A signal conditioning block

- Protection blocks

- The control block (accessible block for new implementation)

-And output to PWM blocks.

This lay out is depicted in the figure below. For more information about the overall FDSL, see reference.

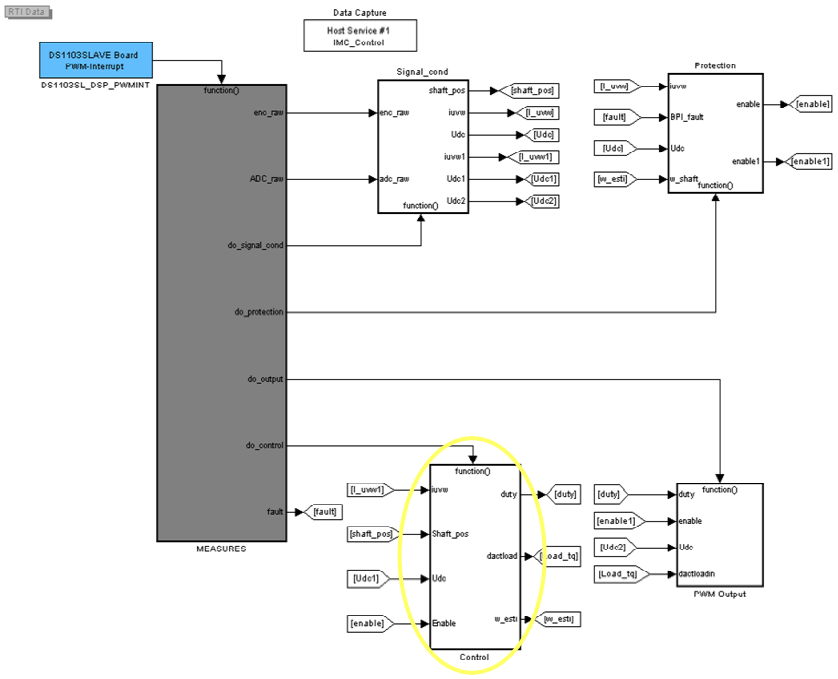

Figure 8.2: *Layout of the laboratory simulink model*

8.4 Project implementation

In the previous chapter, the adaptive observer combined with the high frequency signal injection was found to be the most effective approach, intended to be implemented in the dSpace laboratory.
Previously in chapter three, the closed loop control (FOC) was presented as the reference model (destined to be used to validate the precision of the estimation algorithms).
In another term, the laboratory work would require the implementation of the closed loop Field Oriented Controller first and the addition of the selected estimation scheme afterwards.
However, due to the space limitation, only the implementation of the closed loop controller was done in dSpace laboratory. No implementation result is shown in this report for the reason that the closed loop FOC was not the main goal of the thesis, taught it stands in this report as the floorboard of the thesis.

Bibliography

[1] Michael M. Bech & Remus Teodorescu, Control of Induction Motor Drives-in theory and in practice. October, 2002. IET, Aalborg University.