TOPIC: C - Plasma Engineering and Control

A Matlab based framework for the real-time environment at FTU (P2-C-396)

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The Feedback Control System running at FTU has been recently ported from a commercial platform (O.S. LynxOS) to an open-source GNU/Linux-RTAI platform, obtaining significant performance and cost improvements. Thanks to the new platform, more user friendly tools can be developed in order to help the designer with new control laws. A relevant goal within this new framework is to provide a high level environment where new control algorithms can be created then simulated and finally released without minding the code implementation issues. The ideal situation would be to have a dedicated framework which provides all the necessary phases from the design to the commissioning of the new software. This framework should simulate the real-time context and make transparent to the user on the one hand all the issues related to the simulation (e.g. experimental data retrieving) and on the other hand all the aspects (platform, operating system, programming language, network, hardware...) related to the actual environment where the new algorithm will be run.

In this paper we report on recent developments, based on The MathWorks' Simulink and Real Time Workshop (RTW) packages, aimed at obtaining the above mentioned environment where a new control law can be easily modelled, simulated with the real time constraints and then translated in the appropriate executable format. Using this tool, the control designer only needs to specify the control law in the Simulink graphical environment. The arising model is then automatically translated in C code, integrated with control system code and simulated in real-time using the data from the FTU data base archive.

All the necessary steps to adapt the RTW scripts and the control system code to the new simulation/validation environment will be illustrated in this paper. Moreover we will report on some experimental tests where the actual experiment is compared with the simulations provided by the proposed environment.