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P2.030 The WEST plasma control system: Integration commissioning and operation on the first experimental campaigns

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The WEST tokamak is aiming at testing ITER like divertor component. This requires to address new control challenges like X-point configuration magnetic control or heat loads control in metallic environment and event handling challenges to sustain long duration H-mode that are in line with ITER needs.

To address these requirements, a new Plasma Control System (PCS) has been built using a generic version of the DCS (Discharge Control System) Real-Time (RT) framework that is currently used on ASDEX-Upgrade and offers enough flexibility to be adapted to any tokamak. Based on a segmented approach of the plasma discharge, DCS is now the central part of the WEST plasma control system, managing the different actuators and reading the RT data from a large set of diagnostics. In order to reach this goal, several modules have been developed for the synchronization and the communication between DCS and the WEST CODAC infrastructure. The WEST controllers' layout has been built using Matlab Simulink while the RT source code has been generated with the Simulink coder toolbox. This approach allows asserting the controllers' performance by coupling them to a tokamak simulator prior to the commissioning phase.

This contribution will start by summarizing the different concepts used to build the WEST Plasma Control System. The details of the modules developed to integrate DCS into the global WEST CODAC infrastructure will be discussed. An overview of the different plasma controllers will be also presented. The last part of the paper will focus on the results obtained so far highlighting the performance of the system and on the analysis tools used during operation. We will also discuss the ability of the WEST PCS concepts to deal with the machine protection issues.

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