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Preliminary design of real-time plasma control system for CFETR

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China Fusion Engineering Experimental Reactor (CFETR), an important step to realize the dream of fusion energy, has entered the stage of engineering design and research. The preliminary design of real-time plasma control system (PCS) for CFETR is promoted synchronously. The design of CFETR PCS is composed of real-time control framework, control algorithms integration, and two assistant tools PCS-SDP (Software Development Platform) and PCS-VP (Verification Platform) for algorithm development and verification.
For the control framework hardware design, the distributed cluster structure will be adopted and the operating system will be customized for real-time performance. The software of real-time control framework, referred to ITER RTF (Real Time Framework), is divided into three layers following the layered and modular design principles. PCS-SDP, a visual algorithm development platform, has completed its preliminary design. And a prototype is built to validate the design and technical feasibility with the control algorithm development for EAST. The validation process and results will be reported in this paper. PCS-VP is under preliminary design taking ITER PCSSP (Plasma Simulation Platform) design as reference. The PCSSP has successfully been adapted to EAST and the plasma current and position controller is integrated and tested with GSevolve plasma response model, which accumulates experience for the development of CFETR PCS-VP.

Keywords: real-time plasma control system; Control framework; PCS software development platform; PCS verification platform

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