§1. Present Status and Prospect of Plasma Control System and Data Acquisition System on QUEST

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One of significant missions on QUEST (Q-shu University Experiment with Steady-State Spherical Tokamak) is to achieve the current drive control, particle control, wall temperature control, and so on for the steady-state operation. For the achievement of these missions, many parsons such as researchers, technical staff members, and students are involved with the QUEST experiments. Thus, the plasma control system (PCS) and the data acquisition system (DAS) have to be robust and user-friendly systems. Here, the present status and prospect of the PCS and DAS are introduced.

Figure 1 shows the overall configuration of PCS. The workstation (WS) acquires and sends data to the peripheral systems such as coil power supply system, RF control system, and gas fueling system. The subsystem (SS) mainly acquires magnetic signals and transfers them to the WS via an optical fiber of reflective memory (RFM). The WS and SS are the PXI systems with multi-core CPU, and several tasks such as main calculation and hardware control are executed in parallel. For the control of plasma position and its shape, the real-time equilibrium calculation code with field-programmable gate array (FPGA) is now under development, and various sensors and actuators such as flow meters will be installed for the integrated control of plasma.

The editor of the control parameters are provided by another WEB server, and this server communicates with the WS and SS. The interface of the editor is shown in Fig. 2. The wave forms such as coil currents, gas fueling, and RF powers can be typed in number on the text box of WEB pages, and they can be checked through the graph easily. The acquired data and analyzed data are also provided by this server with the graph.

Experimental data are also acquired by the PXI systems developed on NIFS, and are stored on NIFS's remote data server with the help of SINET. With these systems, fundamental data such as plasma current, coil currents, visible signals are acquired with 24ch of 1MS/s. Almost all flux loop signals and RF power monitor signals are acquired with 64ch of 1MS/s and 64ch of 250kS/s, respectively. Hard x-ray signals with PHA are also acquired with 5modules of 2ch. These acquired data can be browsed via graph data on WEB pages, and users can download them in numerical data via SINET.
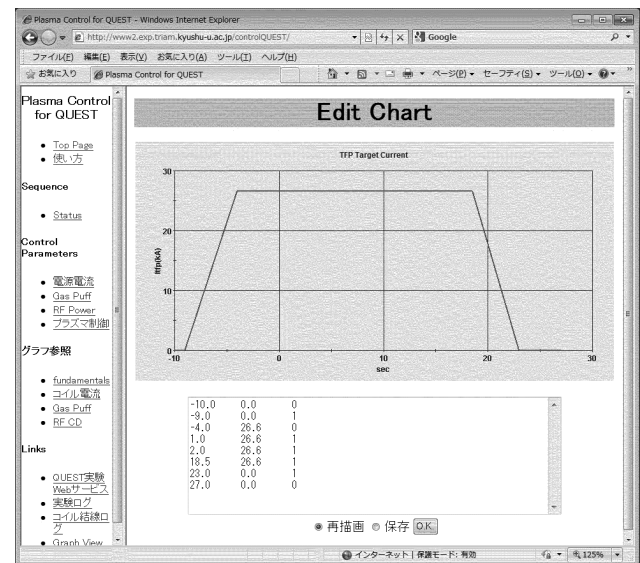

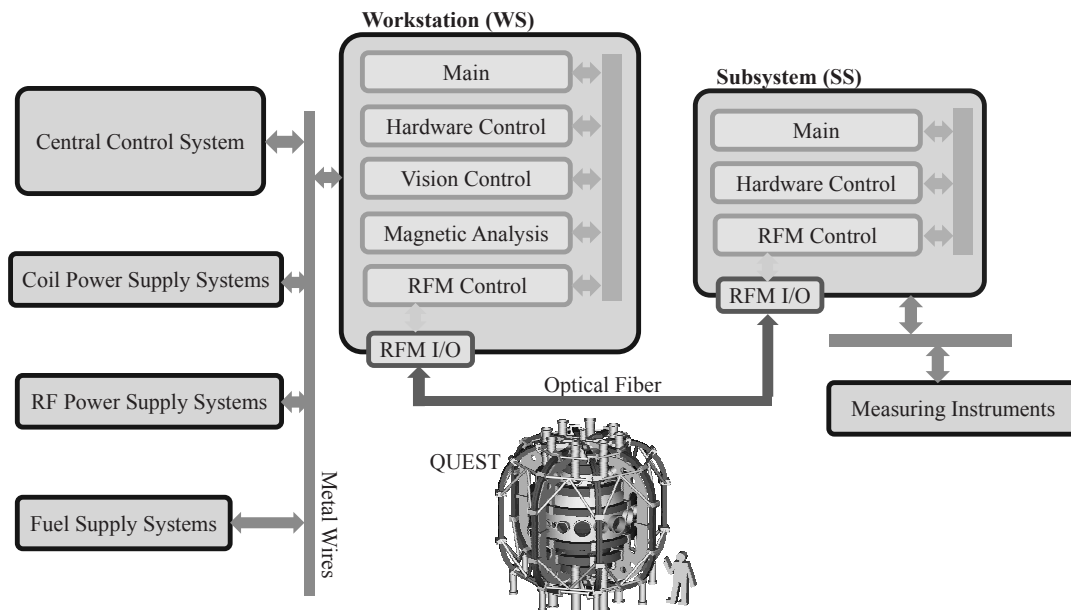Fig. 2 Interface of wave form editor on QUEST

Fig. 1 Overall configuration of plasma control system on QUEST