

§3. Development of LHD Data Analysis Interface Interface for LHD Remote Experimental Participation

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Toroidal confinement systems such as tokamak and helical systems have a great advantage for producing higher performance plasma and sustaining longer plasma operation. Both confinement properties are quite similar with each other, and it is important to develop a common transport modeling code for the optimization of toroidal confinement systems. A simulation code TOTAL (Toroidal Transport Analysis Linkage) is developed for this purpose, and the experimental data analysis code with an interface Fortran code PRE-TOTAL has been developed, and applied to the LHD experiments.

As a research collaboration program using Super SINET, we started developing GUI-based experimental data analysis interface, which can be easily utilized on Client PCs among LHD experimental researchers.

The TOTAL code (Fig.1) consists of a 3-dimensional equilibrium code with ohmic or bootstrap current, and a 1-dimensional transport code with neoclassical transport loss determined by ambipolar radial electric field with multiple-helicity magnetic field effects, as well as anomalous transport (empirical or drift turbulence theory). The experimental interface Fortran code called 'PRE-TOTAL' using PV-Wave application has also been used for LHD experimental data analysis. The equilibrium is iteratively solved with plasma radial profiles obtained by experimental measurements. In this case the experimental transport coefficients are obtained. Some recent analyses using TOTAL code are given in Refs.1~3.

For the arrangement of usage of this code to all LHD researchers, Linux Web servers are utilized between the main-frame SX-8 computer and the Client PCs (Fig.2). The VMEC input parameters on Web browsers (Fig.3) are used in SX-8 through SSH, and its results are transferred and saved into Linux Web server. Special arrangements are tried via Ruby on Rails for developing interactive Web applications.

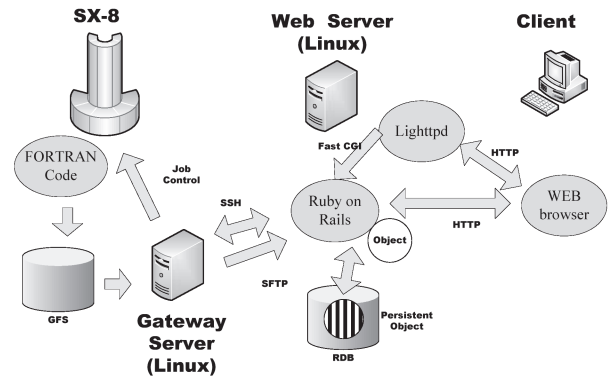


Fig. 2. System Layout of LHD Data Analysis Interface

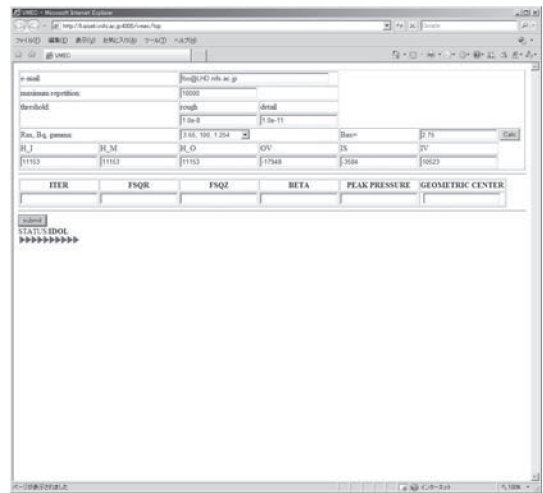


Fig. 3. User interface screen for VMEC analysis

- 1) Ohnishi, T., Yamazaki, K., Funaba, H., Arimoto, H., Shoji, T., Proceedings of ITC/ISHW2007 (15-19 October 2007, Toki, Japan)
- 2) García, J., Dies, J., Castejón, F., Yamazaki, K., Physics of Plasmas 14 (2007) 102511
- 3) Kolesnichenko, Ya I., Lutsenko, V., Marchenko, V.S., Weller, A., White, R.B., Yakovenko, Yu V., Yamazaki, K., Plasma Phys. Control. Fusion 49 No 5A (May 2007) A159-A166

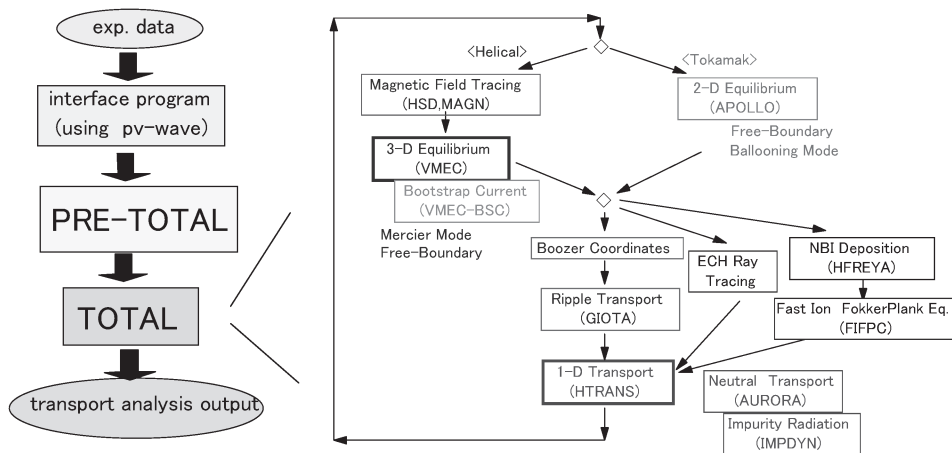


Fig.1. Flow Chart of PRE-TOTAL and TOTAL code for toroidal confinement analyses