

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

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Tokamak and helical systems have a great advantage for producing higher performance plasma and sustaining longer burning 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 with internal transport barrier (ITB). A simulation code TOTAL (Toroidal Transport Analysis Linkage) (Fig.1) is developed [1] for this purpose, and the experimental data analysis code with an interface Fortran code PRE-TOTAL has been arranged and applied to the LHD experimental data.

As a research collaboration program using Super SINET, we are 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.1~5 and typical result of ITB is shown in Fig.2.

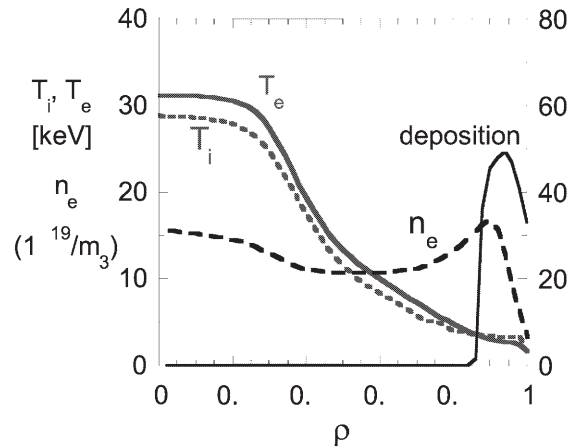


Fig. 2 Radial plasma profile of ITB operation in helical reactor HR-1.

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- 2) Ohnishi, T., Yamazaki, K., Funaba, H., Arimoto, H., Shoji, T., Plasma and Fusion Research: Regular Articles 3 (2008) S1081
- 3) Higashiyama, Y., Yamazaki, K., Garcia, J., Arimoto, H., Shoji, T., Plasma and Fusion Research: Regular Articles 3 (2008) S1048
- 4) Higashiyama, Y., Yamazaki, K., Garcia, J., Arimoto, H., Shoji, T., Journal of Physics: Conference Series 123 (2008) 012032
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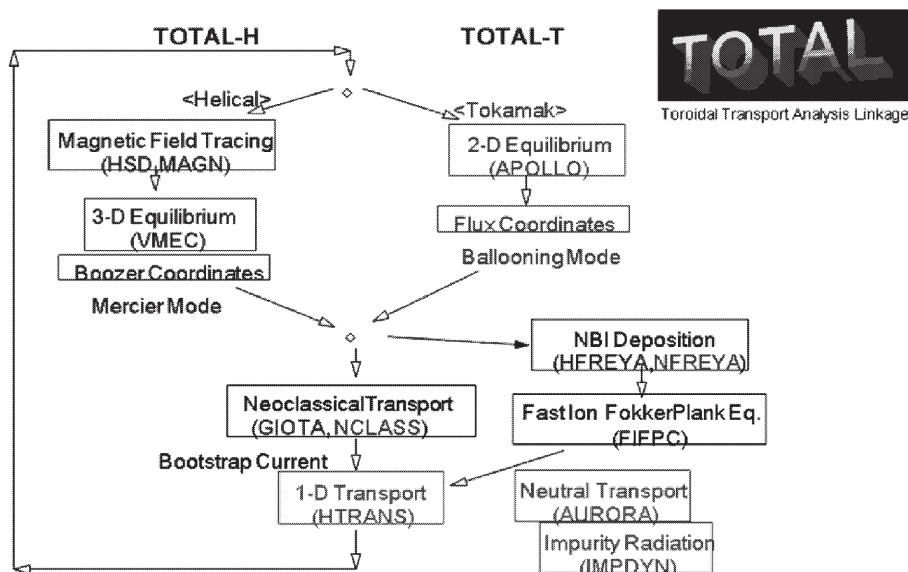


Fig.1. Flow Chart of TOTAL code for toroidal confinement analyses