§45. Implementation of Coordinate Mapping System to Heliotron J for Enhancing Experimental Analysis

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In the Large Helical Device (LHD), the coordinate mapping system, so called TSMAP [1], has been routinely available. It automatically maps the measure thr electron temperature (Te) profile (as a function of the major radious, R) to that of the function of the effective minor radius (reff). Here, the precalculated VMEC (three-dimensional) equilibrium database is prepared, and the reasonable equikibrium is picked up based on the peak and in-out symetry of measured Te profile. TSMAP has contributed a lot to provide unified mapping among many reseachers.

It has become possible to meausre Te profile in Heliotron J device by means of installed Nd:YAG Thomson sacttering system [2,3]. Based on this situation, this collaborative research was formulated to implement TSMAP system onto Heliotron J to provide common and easy-to-evaluate mapping, and then to facilitate the physics analysis of Heliotron J plasmas.

As the first year of our collaboration, the PC dedicated for this activity was installed, and the several meetings at both sides were held to increase mutual understandings on TSMAP system, as follows.

- installation of the dedicated PC,
- Problems definition for creating VMEC database for Heliotron J; convergence, range of

configuration parameters, how to treat corrugated flux surfaces near the plasma boundary etc,

- Computer environement and software-related issues (cf., Fig. 1 for TSMAP in LHD),
- Identification of points to be modified to be suitable to Heliotron J, work-sharing (cf., Fig. 1 for TSMAP in LHD),
- line-of-sight database for Nd:YAG Thomson scattering system
- measured Te data registration to be compatibel with "eg" format in LHD Data Kaiseki Server [4].

Based on these information exchanges, now, the sample VMEC database has been prepared, and the modifications of related software and computer environment have been on-going. The trial operation should be anticipated in early 2016 fiscal year after the continuation of this collaborative work. In the meantime, broadening of VMEC database should be done for more routine operation of TSMAP system in Heliotron J.

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- C.Suzuki et al., Plasma Phys. Control. Fusion 55 (2013) 014016.
- 2) T. Minami et al., Rev. Sci. Instrum. 81 (2010) 10D532.
- N. Kenmochi et al., Plasma and Fusion Research, 8 (2013) 2402117.
- 4) M.Emoto et al., Fusion Eng. Des. 81 (2006) 2019.



Fig.1: Coordinate mapping systems (TSMAP) in LHD (cited from Dr. C.Suzuki's presentation material)