# §33. Impurity Transport in the CHS Plasma with Internal Transport Barrier

Ogawa, H., Kawashima, H. (JAERI, Naka)
Suzuki, C., Ida, K.

In CHS studies of the Internal Thermal Barrier (ITB) in the helical system has been performed by using the heavy ion beam probe diagnostics and the Thomson scattering diagnostics. In recent, the new ITB scheme with the improvement the ion confinement propertiy was successfully demonstrated. In order to estimate impurity concentration in the plasma, it was necessary to analyze the impurity transport within/out ITB layer. In previous work, the impurity transport was analyzed by the soft x-ray emission profiles and impurity transport code simulation. It was necessary for detailed analysis to estimate impurity ion density profiles which were determined by the spectral line emission profiles of lower to higher ionized ions. These line emissions mainly distributed in VUV wavelength region (1 to 200 nm).

In order to measure these impurity ion lines, two VUV spectrometers were prepared under the collaboration between NIFS and JAERI. One was prepared and installed on CHS whose wavelength range was 10 to 110 nm, and the other was used in JFT-2M at JAERI whose wavelength range was 1 to 50 nm. Both spectrometers are the flat-field grazing incident spectrometer with multi-channel detectors. The time resolution was almost 10 ms. Figure 1 shows examples of observed spectra. Figure 1 (a) shows the spectral from the CHS plasma heated by ECH. From this the wavelength resolution was about 0.5 nm. Figure 1(b) shows that from the JFT-2M plasma heated by NB. The wavelength resolution was less than 0.1 nm and higher ionized oxgen and carbon ion lines such as O VIII, O VII, C VI, C V were observed in this spectral range.

In order to measure the radial profiles of impurity line emissions, we have plan to use these two spectrometer as follows; one is installed to fixed viewing chode passing plasma center and the other changed viewing chode shot by shot. For these installation of two spectrometer the reproducebility of target plasma can be checked in every shot and the reliability of the obtained data can be increased more and more. For this purpose, design work of new VUV diagnostic system was performed in this year. Figure 2 shows a schematic drawing of arrangement of experimental setup. The sightline of the spectrometer canbe changed +/- 9 degrees in order to measure whole cross-section of CHS plasma. The extension tube and flange was made in this year.

After the operation of the JFT-2M tokamak was finished the spectrometer, vacuum vessel and pumping system will be transported to NIFS and new support system with a driving system will be constructed in next FY. New VUV system will be operated at middle of next FY.

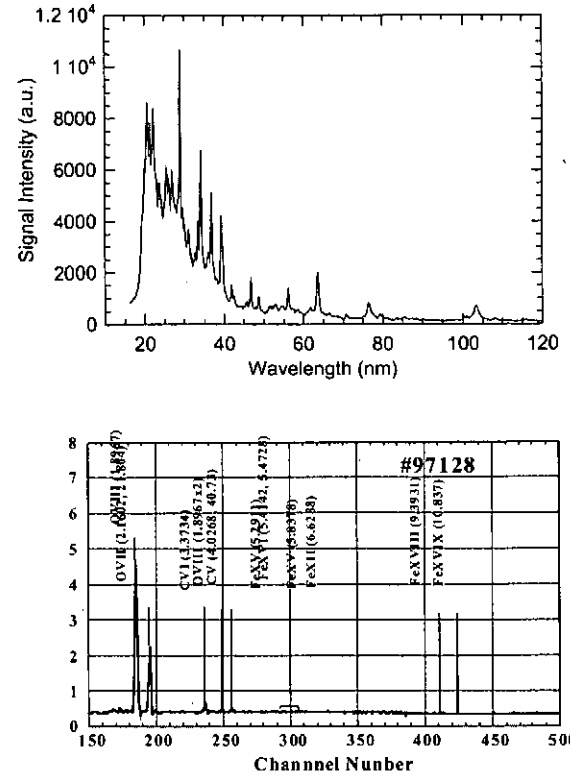


Fig. 1. Measured spectral in both spectrometer: (a) shows the spectral of CHS plasma and (b) shows that of the JFT-2M plasma

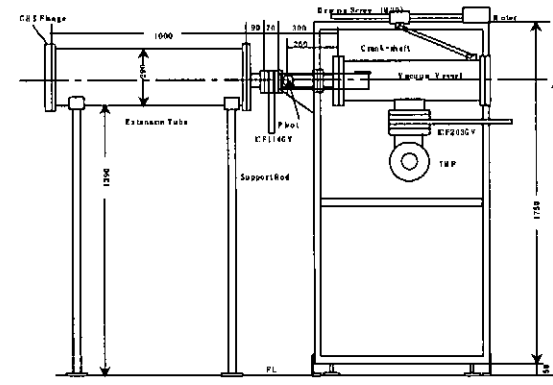

Fig. 2 Schematic Drawing of Experimental Setup