# §28. LiBP Imaging Using CCD Camera

Narihiro, Z. (Dep. Energy Eng. Sci., Nagoya Univ.)
Nakamura, K., Iguchi, H.

In our present LiBP system, the emisson of a neutral lithium beam (LiI/670.8nm) has been detected by eight channel APD detectors combined with optical fibers and interference filters. The emission intensity profiles can be obtained at intervals of about 8mm along the beam. Two-dimensional measurements are performed by changing the beam injection angle shot by shot.

Recently, a CCD camera has been installed on CHS to see the beam emission as a two-dimentional picture. Therefore, the observation points can be taken densely in observing the full emission intensity profile along the beam. In addition, the system can be extended to imaging measurements using a sheet beam in future.

In order to observe plasma area from inside of the last closed flux surface to the separatrix region, view of the CCD camera is set to be 150mm × 200mm at the position R=1200mm, where the beam is injected vertically. Then, the focal length of the optical lens attached to the CCD camera is selected to be 24mm with the lens diameter of 50mm, and the distance from the lens to the observation region is about 770mm. Moreover, the interference filter is designed in consideration of the angle of light incidence onto the filter so that the CCD camera can detect LiI emission selectively. The center wavelength and the bandwidth are 669.86nm and 4.58nm, respectively.

Figure 1 shows a schematic drawing of the CCD camera arrangement. The angle between O-port and the tangential port to which the CCD camera is attached is 40 degrees. Figure 2 shows the total CCD camera observation system installed on CHS. The CCD camera is operated remotely from the control room through the personal computer(PC) in the laboratory room. Image data of CCD camera is stored in the PC and is processed by the use of the software, Image-Pro Plus.

Figure 3 shows an initial sample data of the beam emission measured by the CCD camera in the low field ECH plasma experiment (2.45GHz and 18kW). The beam injection angle is –5 degree. The bright vertical line in the picture is emission of the lithium beam. In this case, it is considered that the emission is due to excitation by collisions with the neutral hydrogen gas which is introduced by gas puffing just before the ECH pulse (200 ms duration) to produce a plasma. External trigger system to determine the timing of the data acquisition with respect to the plasma discharge is being prepared.

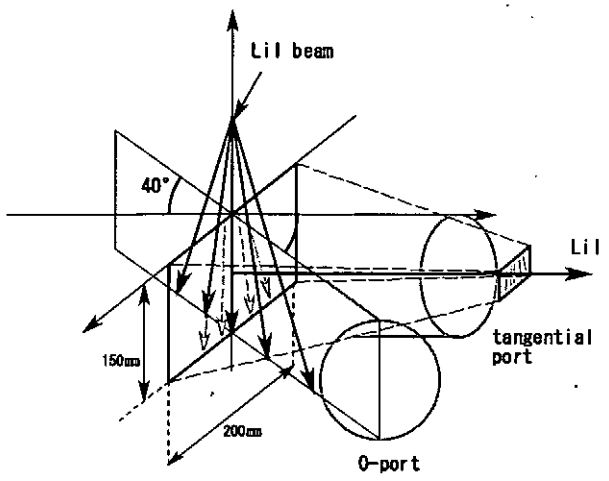


Fig.1. Schematic drawing of the CCD camera arrangement on the CHS diagnostic port.

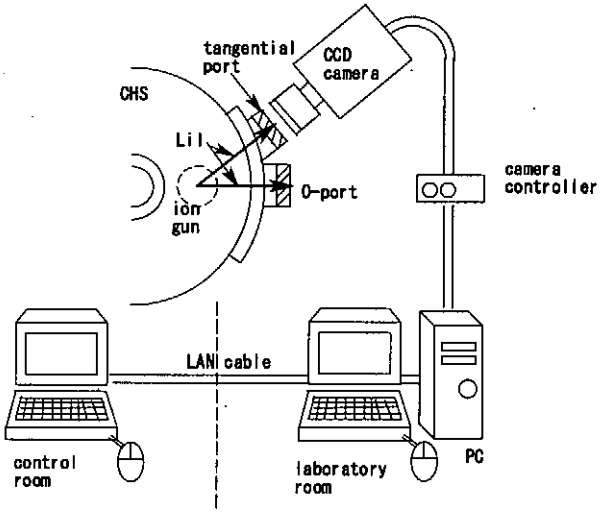


Fig.2. The CCD camera observation and control system installed on CHS.

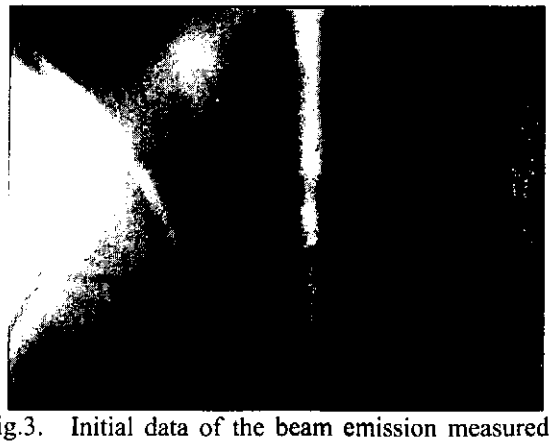

Fig.3. Initial data of the beam emission measured by the CCD camera.