

## §14. Preliminary Experiment of Imaging Spectroscopy Measurement

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For a spectroscopic measurement of non axi-symmetrical plasma like LHD-plasma, the spatial resolution becomes important. For such a measurement, an image detector should be used in the spectroscopy system. Several years ago, an imaging spectroscopy system was developed using a CCD camera and an image memory of a personal computer.<sup>1)</sup> It was successfully used as a powerful tool to study a plasma-gas interaction phenomena.<sup>2)</sup> In which system, however, an ordinary CCD was used, so a high sensitive measurement was impossible because of the dark current noise of CCD. To reduce the dark current, CCD should be cooled. Such cooled CCD is now becoming popular in the field of astronomy to take a picture of heavenly bodies.

We began to try to apply such a cooled CCD for plasma spectroscopy. For the first step we exercised the handling of image data of it. The cooled CCD used in this experiment is ST-6 manufactured at SBIG (Santa Barbara Instrument Group). It is produced mainly for amateur astronomist's use. The ST-6 system consists of a CCD head, CPU box, and a power supply. The signal output from the CCD head is sent to a personal computer through RS232C cable. The detecting area of the CCD is 8.6mm × 6.5mm, and the pixel number is 375 × 242. The system has a 16bit AD converter and a thermoelectric (Peltier) cooling system.

A test experiment was made in a system shown in Fig.1. A camera lens was attached to the CCD head. A test pattern was drawn on a paper and the image of it was taken by the cooled CCD using a computer program attached to the system. The image data was transferred to a personal computer(FC9801B). The structure of the created image data was analyzed. A preliminary computer program was built to read the image data and to plot it. Figure 2 shows an example of the bird's eye view plot of the test-pattern image.

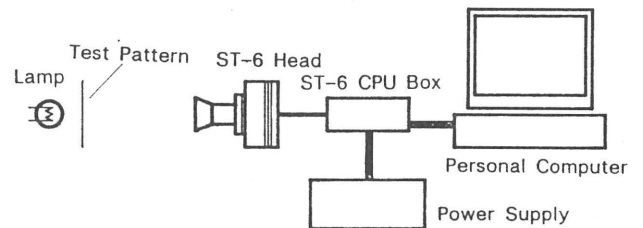


Fig.1 Set-up of testing the ST-6 Cooled CCD system. A test-pattern image was taken by the system

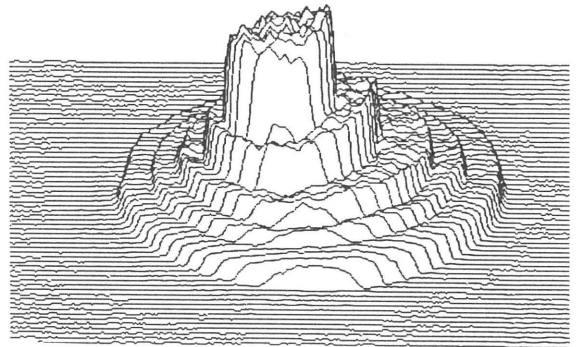


Fig.2. A bird's eye view plot of the test-pattern image.

### References

- 1)Mimura,M.and Sato,K., Trans. IEICE. E73(1990)1361.
- 2)Mimura,M.and Sato,K., XX Int.Conf. Pheno.Ion.Gas.3(1991)831.