§28. Laser Beam Position Monitor System of YAG Thomson Scattering on CHS

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Improvment in YAG Thomson system on CHS [1] was continued. One improvement in this fiscal year is that the laser beam position monitor system set on the Thomson system. The laser beam path was misaligned because of thermal expansion and contraction of beam transfer components. This aberration affected a calibration factor for an absolute density value. The position monitor is necessary for the correct alignment.

The beam position monitor system consists of a beam splitter and a position sensitive detector (PSD). The PSD can measure simultaneously the beam position in x and y direction. The beam splitter was set in front of the entrance window of the vacuum vessel. The length between the PSD and the beam splitter is about 3 m. This length coincides with the length between the beam splitter and the plasma center. We use two sets of this system, so that the complete beam path can be obtained.

Figure 1 shows a typical example of two PSD signals during plasma discharge which is plotted in x-y plane. All data acquired in the discharge are plotted in the same graph. The positions are almost constant in the discharge.

The positions of about 750 shots on CHS are plotted in Figure 2. These shots correspond to the experiments of 10 days. The position slightly moved in almost all days. But in 10/11 and 10/16, the position moved larger than other days. In 9/22 and 10/3, only y position largely moved. The reason why the beam move largely in these days is not clear. It is suggested that the temperature of the atmosphere changed largely in the days.

We have a plan to construct an auto alignment system of the beam transfer optics with feed back control using this position monitor signal.

References

1) Narihara,K, et al., Rev.Sci.Instrum., 66(9) 1995, pp.4607-4612 (1995)

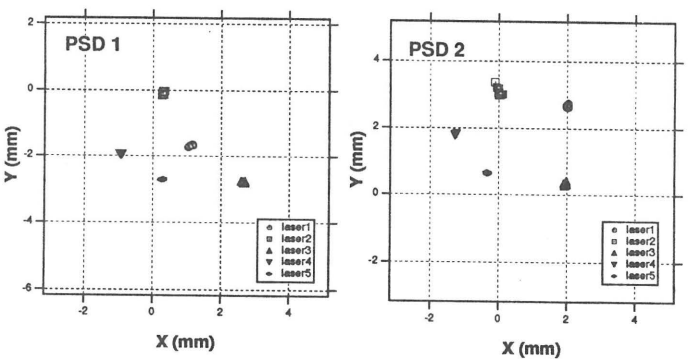

Fig. 1. Typical example of two PSD signals during plasma discharge.

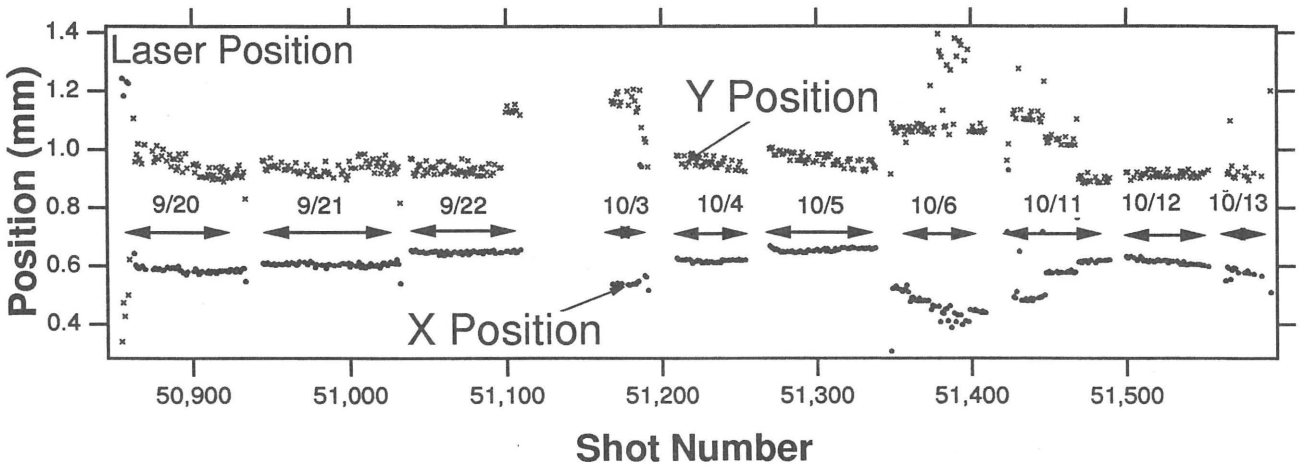

Fig. 2. Laser beam positions of about 750 shots are plotted. These experiments were executed for 10 days.