

§28. Development of High-Resolution Spectrometer in VUV Wavelength Region

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A high-resolution VUV spectrometer was developed for Doppler ion temperature measurement of Fe XXIV spectral line at  $255.29 \text{ \AA}$ . To realize a high-resolution measurement, newly developed techniques and optical mounting are adopted in this spectrometer. A cylindrical grating with varied groove spacing is used for astigmatism- and coma-free imaging. The wavelength scanning is achieved by translational motion of the grating and the position of entrance and exit slits is fixed.

The performance of this spectrometer has been tested by using a hollow cathode discharge tube. The resultant instrumental width (FWHM) is measured to be  $0.3 \text{ \AA}$ . Compared with the originally designed value of the resolution :  $0.1 \text{ \AA}$ , measured resolution shows poor properties.

To investigate a cause of the deterioration in wavelength resolution, a preciseness of the grating motion has been inspected by Heterodyne interference methods with Zeeman laser. The preciseness of the translational motion for the grating has been measured in two directions : parallel direction along the translational motion

and normal direction of the grating associated with the translation. A fairly good linearity between the actual translation and the indication of the dial for translational motion has been found at  $\pm 15 \mu\text{m}$  in 1 mm movement. This result is shown in Fig. 1. However, the motion in normal direction has been found to be  $\sim 480 \mu\text{m}$  in the translation of 24 mm.

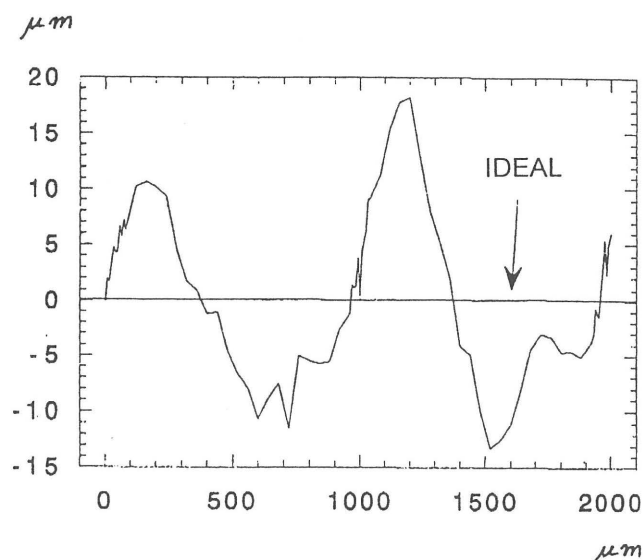


Fig. 1 Deviation of translational motion from the counter reading. The axis of abscissas shows the counter reading.