

LEOK-3-26 Build a Grating Monochromator

- Complete set
- Cost effective solution
- Detailed instructional manual
- Easy alignment

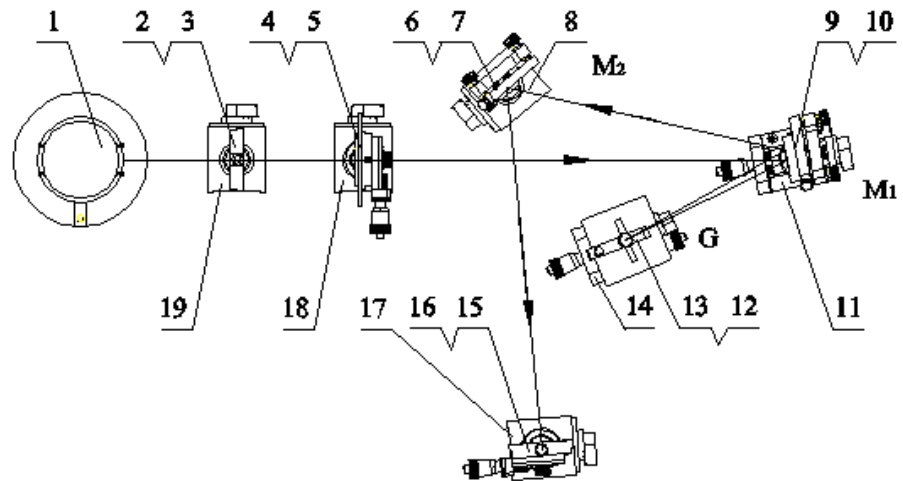


Figure 26-1 Schematic of experiment setup

- | | |
|--------------------------------|--|
| 1: Mercury Lamp (LLE-1) | 7,10: Kinematic Holder (SZ-07) |
| 2: Lens L_1 ($f' = 50$ mm) | 8,11,14,17,18,19: Magnetic Base (SZ-04) |
| 3,15: Lens Holder (SZ-08) | 9: Spherical Mirror M_1 ($f' = 300$ mm) |
| 4,16: Adjustable Slit (SZ-27B) | 14,17: Two-Axis Stage (SZ-02) |
| 5: Rotary Lens Holder (SZ-06A) | 12: Grating Table (SZ-10) |
| 6: Flat Mirror M_2 | 13: Flare grating G (1200 lines/mm) |

Theory

Using the characteristics of a blazed grating, we can get the spectral lines of a light source. The principle of a blazed grating is almost the same as the last experiment, as shown in Figure 26-2.

The blazed wavelength of the k_{th} order is given by:

$$2d \sin \theta_b = k\lambda_{kb} \quad k=1, 2, 3... \quad (26-1)$$

The structure of a grating monochromator is shown below in Figure 26-3.

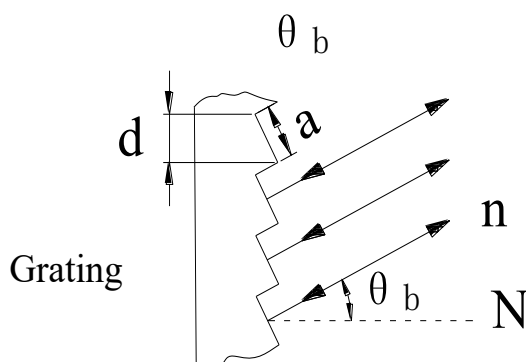


Figure 26-2 Schematic of blazed grating diffraction

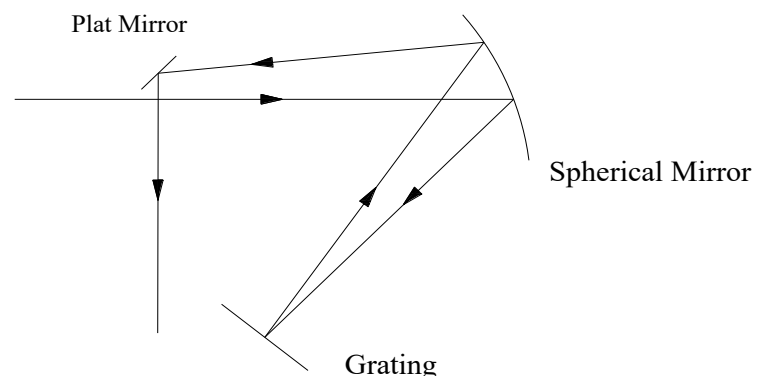


Figure 26-3 Schematic of grating monochromator

Experiment Procedures

Note: This experiment is recommended to be carried out in dark environment.

1. Refer to Figure 26-1, align all component in same height and let the primary plane of the system parallel to the table;
2. Focus the light source on the adjustable slit (slit width > 0.5 mm) using lens L_1 ;
3. Set each component according to Figure 26-1, check the light field on M_2 , M_1 and G , make sure no part of the light path is blocked and the central portions of these components are illuminated; set the distance between the grating and the spherical mirror to be about 200 mm.
4. Let the incident beam on M_1 and the output beam from M_1 have a minimum intersection angle (approximately Littrow-style);
5. Use a white paper to find the optimal focusing position of the output spectrum, then replace the white paper with an adjustable slit at about 0.05 mm width;
6. Rotate the grating, spectral lines of the Mercury lamp will exit from the slit sequentially.