378.147:535.4

Methodological Notes

A LUMMER-GEHRCKE PLATE FOR INSTRUCTIONAL PURPOSES

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At present there is practically no use of many-ray interference spectroscopes in instructional physics laboratories, although the theory of the construction of these devices is treated in physics courses. It has been found in practice that a Lummer-Gehrcke device can be hand-made. In the physics equipment group of Tomsk University we have used for this purpose the plane-parallel glass plate from an OSK-3 optical bench, which is used for autocollimation. It was tested for plane-parallel quality by the well known method of observing fringes of equal inclination. The light source was a PRK-5 mercury-vapor lamp fed from an induction coil. The test showed that along the majority of the diameters the deviation from plane-parallel character is 2 to 3 rings, but there is a diameter with one practically perfect radius; along the second radius there was a shift of half a ring, that is, the thickness varied by $\frac{1}{2}(\lambda/2n) = \lambda/6$. The only modification required in constructing the interferometer was that the mounting of the plate was shifted from the vertical to the horizontal position and was attached to two supports. A reinforcing ring is placed under the glass, which is raised slightly above the mounting. The entire system remains on its original base plate with three screws (Fig. 1).

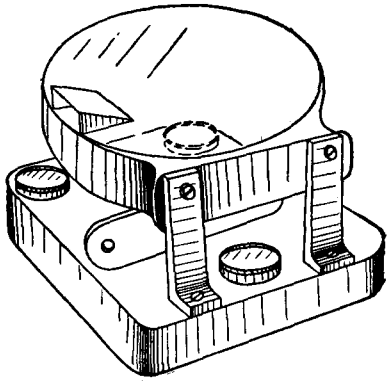

FIG. 1

A right-angle prism with acute angle 24° is attached with a very thin layer of glycerin at the edge of the plate. The bundle of rays directed into the prism comes from a home-made collimator, which has a wide slit cut in cardboard and illuminated with a PRK lamp fed from a circuit. Beyond the Lummer Gehrcke plate is placed a school-demonstration type direct-vision prism and a viewing telescope focused on infinity. With this arrangement a large number of interference fringes are seen, running across the wide slit image in monochromatic light. A photograph of the pattern observed in the light of the yellow and green mercury lines is shown in Fig. 2. The photograph was made with a TAIR telescopic lens with F = 300 mm. The glass we used, 100 mm in diameter and 20 mm thick, is not the optimal one, because a 150 mm plate fits the OSK-2 bench. The large thickness of the glass is a disadvantage, since it leads to a small angular dispersion—close spacing of the maxima.

We note that with this apparatus one can observe the normal Zeeman effect of the singlet yellow line of mercury.

Translated by W. H. Furry

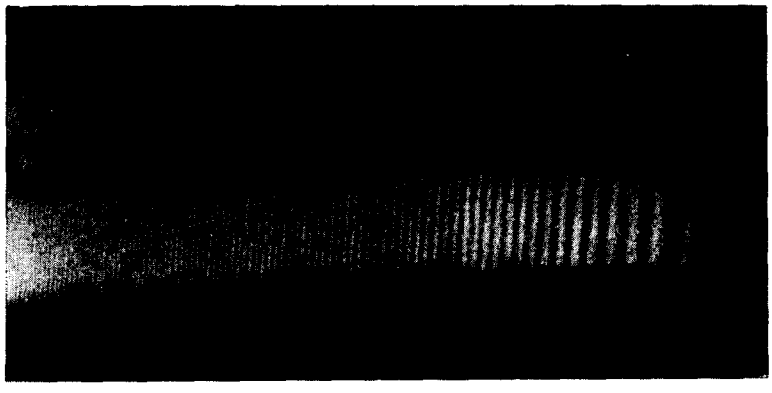

FIG. 2