M. I. Gvozdev, N. I. Dimov, N. L. Zhernokleev, V. S. Zuev, P. D. Kalachev, Yu. L. Kokurin, T. I. Marchenko, E. P. Orlov, and V. A. Sautkin. Large Multielement Optical Telescope With Controllable Mirror Shape. It is impossible to solve a number of astrophysical problems or to improve the accuracy of laser sounding of the moon without using a telescope having a large receiving area and at the same time a satisfactory resolution.

While examining the possibility of increasing the diameter of the main mirror, we turned to the idea of a controllable composite mirror, made up of a large number of mirrors of 0.5 – 1.0 m diameter, forming together a surface close enough to a paraboloid of revolution.

The optical system of the composite telescope is shown in Fig. 1. The mirrors making up the surface of the principal mirror are hexagonal blocks with actuating mechanisms. The mirror surface is a part of a paraboloid. The required shape of each mirror is obtained by additional working (aspherization) of a spherical surface that is closest to the paraboloid. Possible methods of aspherization are considered.

The composite-mirror deformations due to inclination and to temperature are compensated with the aid of a control system, the diagram of which is shown in Fig. 2.

The operating principle of the system consists of successive illumination of a part of each mirror by means of a light source located at the focus of the telescope. After reflection, the light beam is turned 180° by a corner reflector and is incident on a section of the neighboring mirror. Thus, the light is gathered at the initial point if there is no focal mismatch relative to the mirror chosen as the base.

The analyzer of the control system determines the required magnitude and direction of rotation of the mirror whose focus does not coincide with the focus of the base mirror.

The actuating mechanism for the adjustment of the mirror, with a pitch of ~ 0.1 μ over a length of ~ 2 mm, make it possible to use for the composite mirror a mount subject to less stringent rigidity requirement than the customarily employed mounts.

The weight of the composite mirror together with the actuating mechanism, which determines in the main the weight of the remaining elements of the telescope, is

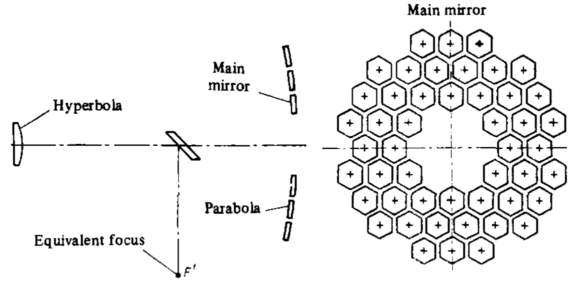

FIG. 1

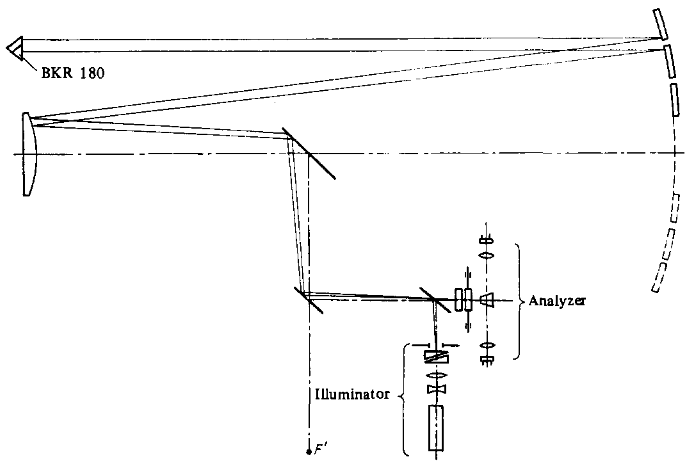

FIG. 2

greatly reduced. Thus, for example, the BTA mirror weighs 42 tons, while the equivalent composite mirror weighs 6.5 tons.

By way of example, a telescope design is considered with a principal mirror consisting of 48 mirrors of 0.5 m diameter. The circle of confusion is 0.6″ and is close to optimal for observations from the earth's surface.

Thus, the development of a telescope with a diameter larger than 10 m on the basis of the proposed multielement composite telescope system seems desirable.

G. V. Galutva and A. I. Ryazantsev, Inventor's Certificate No. 295491, dated April 24, 1969. J. B. Schroeder, H. D. Dieselman, J. W. Douglass, Appl. Opt. 10, 295 (1971). A. B. Meinel, R. R. Shannon, F. L. Whipple, F. J. Low, Opt. Eng. 11, 33 (1972).

I. A. Viktorov. Ultrasonic and Hypersonic Surface Waves. Elastic surface waves were discovered by Rayleigh in 1886. They were first used only to register earthquakes. In the 1950's they started to be extensively used at ultrasonic frequencies, for comprehensive non-destructive control of the surface layers of solids. Finally, at the present time Rayleigh waves at ultrasonic and hypersonic frequencies are widely used also in systems for the processing of electric signals and in physical experiments.

The paper deals with ultrasonic and hypersonic Rayleigh waves and with other types of elastic surface waves. The peculiarities and the conditions for the existence of each type of wave are analyzed.

Excitation methods, the physical properties, and the characteristics of the surface waves are described, including their interaction with electrons in semiconducting crystals. Related to this problem are the following: electronic amplification and damping of waves in piezoelectric crystals at ultrasonic frequencies, the influence of surface states of a semiconductor on the interaction of hypersonic surface waves with electrons, waveguide propagation of surface waves, electronic and elastic nonlinearity, and other problems. Numerous applications of elastic surface waves are described.

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I. A. Viktorov and A. A. Talashev, Akust. Zh. 18, 197 (1972) [Sov. Phys.-Acoustics 18, 165 (1972)]. I. Yu. Solodov, Candidate's Dissertation, Moscow State University, 1972.

Translated by J. G. Adashko

ERRATA

In the article by G. B. Zhdanov, "Search for Transuranium Elements," Vol. 16, No. 5, in the caption to Fig. 5, p. 645, read: "$R_a = 5000\ \mu$," and the call-outs of Fig. 16, p. 650, should read: "$L_t = V_tT$ and $L_g = V_gT$."