RESULTS OF LASER BEAM SCATTERING STUDY IN THE ATMOSPHERE

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ABSTRACT

I

In the first part of the report data on the laser beam scattering in the ground layer of the atmosphere are presented.

I. Results concerning interrelation between scattering on the located volume and extinction are given for measurements performed with optical quantum generators such as helium-neon (632.8 nm), argon working on several wavelengths in the green region of the spectrum, ruby (694.3 nm) and with usual searchlight with interference filters.

Measurements were taken in several places for maritime climate, semi-desert climate, for town haze conditions and in the Mountain Observatory. It has been shown that extinction and backward scattering interrelation is non-linear and can be well approximated with the power law with positive exponent varing from 0.55 to I.70.

2. Scattering indicatrixes of the helium-neon laser (632.8 nm) are given for the ground layer of the atmosphere and for angular range 2° - I78°.

To find out potentialities of multifrequency laser sounding of the atmosphere it has been studied spectral dependence of extinction and that of backward scattering for several types of climates in visual and partially in ultraviolet regions of the spectrum (300 - 700 nm). Spectral dependence of backward scattering does not agree with that for extinction. This can be explained by different responce of scattering on located volume and extinction

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The work was done by: Ist part - doctor Toropova T. P., Tokarev O. D., Ten A. P.; 2nd part - doctor Tem E. L.

to different particle fractions contained in the volume under investigation. This fact must be taken into consideration when sounding of the atmosphere methods are worked out.

II

In the second part data on background brightness of the atmosphere are given. These are based on scattering radiation measurements for different climates and for spectral range 405 - 700 nm. Background brightness of the day-time sky was found in absolute units.

Optical thicknesses and transparence coefficients were found.

Using brightness indicatrixes measurements in angular range 2° - 160° it has been found aerosol scattering indicatrixes and backward scattering coefficients.