REFRACTION PHENOMENON AND ITS DIFFERENT APPEARANCES

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ABSTRACT

Information about the phenomenon of refraction, its types, the dependence of light refraction on the refraction of light and the processes by which the phenomenon of refraction can be observed.

Key words: *refraction phenomenon; refraction of light; fracture types; vertical refraction; horizontal refraction; astronomical refraction; refraction of radio waves.*

ANNOTATSIYA

Refraksiya hodisasi, uning turlari, yorug‘lik refraksiyasi yorug‘likning sinishiga bog‘liqligi va qanday jarayonlar tufayli refraksiya hodisasi kuzatilishi mumkinligi haqida ma’lumotlar berib o‘tilgan.

Kalit so’zlar: *refraksiya hodisasi; yorug’likning sinishi; sinish turlari; vertikal refraksiya; gorizantal refraksiya; asronomik refraksiya; radioto‘lqinlar refraksiyasi.*

АННОТАЦИЯ

Информация о явлении преломления, его видах, зависимости преломления света от преломления света и процессах, с помощью которых можно наблюдать явление преломления.

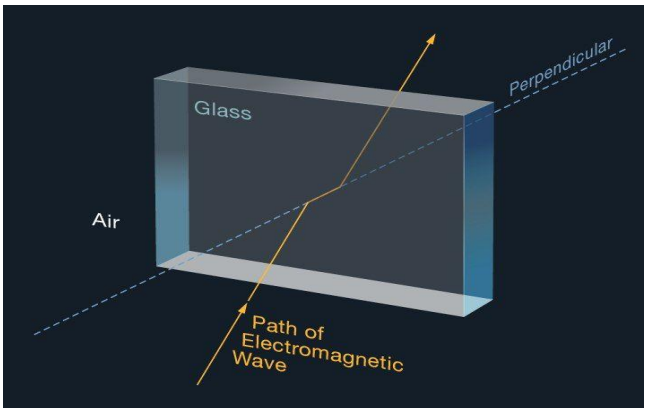
Ключевые слова: *явление рефракции; преломление света; виды переломов; вертикальная рефракция; горизонтальное преломление; астрономическая рефракция; преломление радиоволн.*

INTRODUCTION

Various optical phenomena are observed when sunlight passes through the layers of the atmosphere. These phenomena are associated with refraction and scattering of solar rays through the layers of the atmosphere in aerosol particles. Atmospheric phenomena like rainbows and various other phenomena, include mirages, blue sky, reddening of the horizon in the morning and evening. Let's talk about the phenomenon of refraction from such phenomena. We all know that the sun's rays pass through the layers of the atmosphere until they reach the upper layer of the Earth, and in this process there is a spatial change in the physical parameters of light, that is, due to the phenomenon of refraction, spatial homogeneity is violated, causing certain deviations in the propagation of light in a straight line. As a result, the

phenomenon of refraction causes a curvature of the trajectories of light rays in an inhomogeneous atmosphere.

Refraction (lat. refractus - refracted) - the phenomenon of curvature of light or electromagnetic waves when passing through different layers of the atmosphere, passing through its certain parameters (density, temperature, humidity, pressure, refractive index and other properties) in each layer . As a result From our research so far we know that light rays pass through different layers of the atmosphere and propagate along a curve. Therefore, the results of our observations show that we see the object we observe not in the direction of its actual position, but along the line of sight at the point of observation. What mathematical expressions and experiments can be used to calculate the phenomenon of refraction?



1 - picture. Deviation of an electromagnetic wave from the direction of propagation due to refraction.

2.Experience and Methods

The phenomenon of refraction is a concept directly related to the refraction of light, and the basic laws of light refraction are studied using transverse models of the path of light radiation in lenses, prismatic and round bodies.

According to W. Snell (1580-1626), the change in the direction of light rays can be expressed by the following relationship:

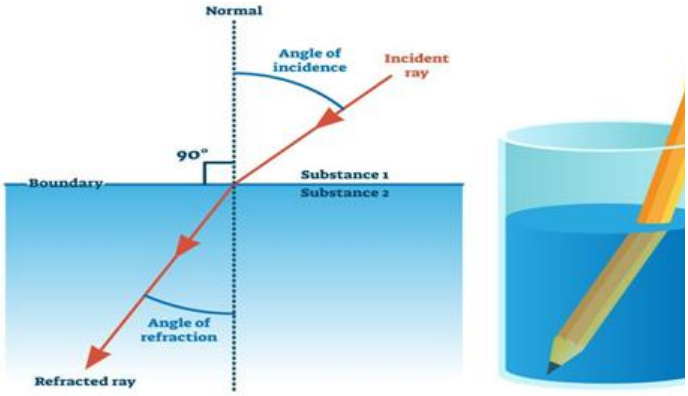
$$\frac{\sin\alpha}{\sin\beta} = \frac{n_2}{n_1}$$

α – angle of incidence; β – angle of refraction.

$?_1$- the refractive index of the first medium;

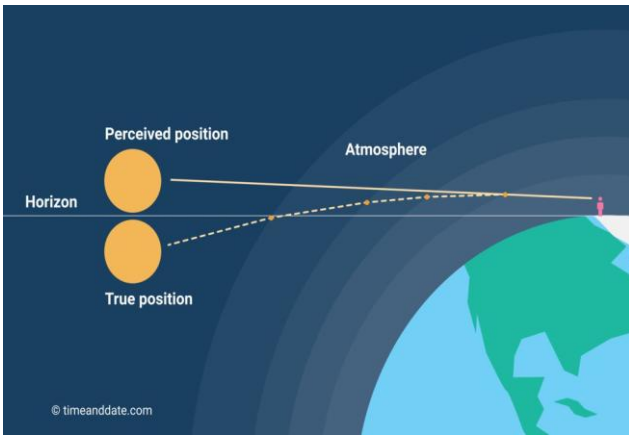
$?_2$- the refraction of the second medium is the refractive index.

Experiments by W. Snell show that light is reflected from (smooth) surfaces. At the same time, light also passes through the surface into another medium. Passing from one (homogeneous) medium to another, it changes the direction of propagation. This phenomenon is called refraction of light.



2 - picture. Changing the angle of refraction of light.

In Timofeev's book "Theoretical Foundations of Atmospheric Physics", refraction is explained in connection with refraction in the atmosphere, and there are several types of atmospheric refraction, and it classifies them as follows:



3- picture. Astronomical refraction

- astronomical refraction is the phenomenon of changing the apparent position of extraterrestrial light sources relative to their actual position on the celestial sphere. Astronomical refraction causes all extraterrestrial light sources - the Sun, planets, stars - to appear high above the horizon at some angle. The maximum angles of astronomical refraction are reached at the moments of rising and setting of light rays and at small negative elevation angles;
- Earth (atmospheric) refraction - phenomena associated with a change in the visible state of a light source (or object) in the atmosphere when observed from the surface of the Earth or from another point in the atmosphere. Light rays from objects on Earth also follow curved paths. The Earth's refraction angle is the angle between the directions of the apparent and actual position of an object. The values of this angle depend on the distance to the observed object and the thermal stratification of the surface air layer;
- cosmic refraction is the effect of changing the position of light sources when viewed from space through the Earth's atmosphere. The development of

space methods for measuring atmospheric parameters is relevant for taking into account refraction phenomena when observing extraterrestrial sources through the atmosphere from space. An important effect of cosmic refraction is the refractive expansion of the beam element. The lengthening of refraction at low altitudes of radiation propagation in the atmosphere can reach 5-15%.

Finding in the literature the definitions of regular (normal) and random refraction:

- regular refraction is associated with a smooth change in the parameters of the atmosphere and, accordingly, with a smooth change in the refractive index;
- random refraction depends on relatively small-scale spatial variations in atmospheric parameters and refractive indices.

Method: verification of the phenomenon of refraction by the refraction of light when light passes through media, for which glass and air media were used.

3.Results

When calculating the result, it is calculated using the deviation of its direction from a straight line as a result of the passage of light through the medium, for this, the angle of incidence and the angle of refraction of the glass are used as a result of the passage of white light from the transition from air to glass, the indicator is determined. To conduct an experiment used a light stick. The cylinder and optical disc are placed together, the optical disc must be graduated, since the refractive index of light passing from one medium to another is determined on the optical disc in degrees. The refractive index of air is n_1= 1. Using the Snell formula:

$$\frac{\sin\alpha}{\sin\beta} = \frac{n_2}{n_1}$$

α – angle of incidence; β – angle of refraction.

The results of the experiment are as follows:

A	10	20	30
B	6.7	13.2	19.8
$\sin\alpha$	0.17	0.34	0.50
$\sin\beta$	0.12	0.22	0.30
$\frac{\sin\alpha}{\sin\beta}$	1.5	1.5	1.5

CONCLUSION

As a result of our research, it is still known that light rays pass through different layers of the atmosphere and propagate along a curve. Therefore, the results of our observations show that we see the object we observe not in the direction of its actual position, but along the line of sight to the line of sight at the point of observation.

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