

Dispersion of light

Dispersion (of light) is what we call phenomena that arise as a result of the dependence of the refractive index on the wavelength, i.e. phenomena in which white light is split into individual colors during the passage of light through a substance. The cause of dispersion is the dependence of the phase velocity of the light wave propagation on its wavelength ($v = f(\lambda)$) when passing through a material environment.

Dispersion of light is the breakdown of electromagnetic radiation into components at different wavelengths.

$$c = \frac{1}{\sqrt{\epsilon_0 \cdot \mu_0}}$$

c = phase velocity in vacuum, ϵ = permittivity of vacuum, μ = vacuum magnetic permeability

This relationship shows that the speed of light in a vacuum is the **same** for all wavelengths, and light dispersion **does not occur** in a vacuum.

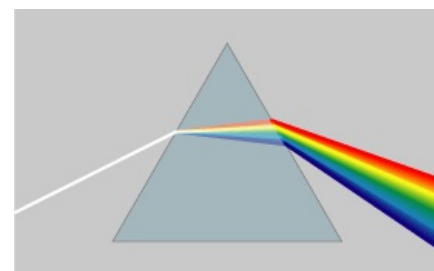
Dispersion of substances – quantity determining the rate of change of the refractive index ($n = c / v$) depending on the wavelength (derivative of the refractive index according to the wavelength). In transparent media, the refractive index increases with decreasing λ . If this quantity is < 0 = *normal dispersion*, > 0 = *abnormal dispersion*.

Division

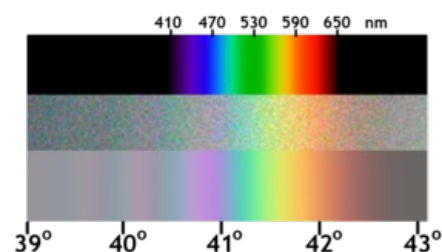
- normal dispersion,
- chromatic dispersion,
- anomalous dispersion.

The most common dispersion is a **rainbow**. Sunlight falls on a falling raindrop, the ray is refracted into the drop, and some of the light reflects off the inner surface of the drop and then refracts outward. The first refraction causes **the light to split into a spectrum**. The second refraction **enlarges**. Light is refracted in large numbers. Red comes from drops above and purple below. If the Sun is higher above the horizon, the rainbow cannot be seen.

A 2nd order rainbow has an angle of 53° and the color order is reversed.



Dispersion of light on an optical prism



The colors of the rainbow compared to the color spectrum

Links

Related articles

- Refraction index

External links

- Disperze světla (encyklopedie fyziky) (<http://fyzika.jreichl.com/main.article/view/441-disperze-rozklad-svetla%7C>)

Sources

- KUBATOVA, Senta. *Biofot* [online]. [cit. 2011-01-31]. <<https://uloz.to/!CM6zAi6z/biofot-doc>>.