Thus the following relation between the reflection angle α_2 and the incidence angle α_1 is the relativistic generalization of the law of reflection:

$$\frac{\cos\alpha_1-\beta}{1-\beta\cos\alpha_1}=\frac{\cos\alpha_2+\beta}{1+\beta\cos\alpha_2} \tag{29}$$

or after simple rearrangement

$$\frac{\sin\alpha_1}{\cos\alpha_1-\beta}=\frac{\sin\alpha_2}{\cos\alpha_2+\beta}. \tag{30}$$

Relations (20) and (25) are the solution of the stated problem; they determine the optical properties of a moving refraction boundary.

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New Developments in Optics

The most precise measurements have been offered by optics for a long time. The invention of laser and the growing use of the computer technique have increased the measuring precision by some orders of magnitude. The greatest progress has been noted recently in measurements of time. Now, the times of order of picoseconds are easily measured. With two lasers and a microwave generator, stabilized by a molecular generator, it is possible now to determine frequencies up to $6\cdot10^{13}$ Hz. Carrying out the independent measurements of frequency and of the wave-lenth allows us to determine the velocity of light with a precision unattainable so far.

One of the fundamental sources of information is photography. The simple photogram contains more than 10^4 bits of information. The aerial fotographs of great areas taken by a modern camera contain much more information. Two years ago, in the newspapers published in the USA there appeared a photograph taken from the height of about 13.5 km; on which two golf balls were distinctly seen. It is quite evident that the abundance of information in the photograms of great areas is due to the fact that there are not two identical surfaces that are emitting or reflecting light in the same way. The cameras for long-range photography are usually linked with a programmed computer, memorizing millions of bits. The immense multitude of information contained in such a photogram can be analyzed in a proper way by a computer only. A photograph taken by the long-range camera can contain more information than an encyclopaedia written on 500 pages.

In recent years a new method for optical investigations has been developed in Mahrburg [4, 5, 6]. It is believed that the method will have great influence on further progress in the field of pure as well as applied optics. The above method suggested by Blodgett and Langmuir as early as in 1931 [3], has been applied only recently in optics of monomolecular layers. They are formed from some organic, asymmetric compounds; their shape is commet alike and there is attached a long chain to the ball. The monomolecular layers are usually formed from the following substances: arachide acid, palm acid, the complex compound of europium or some pigments, e.g. cyanin. Especially durable layers are formed from salt of arachide acid CdC_{20}. The monomo-

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lecular layers are formed very easily. Some drops of the solution in benzol of cadmium salt of arachide acid are placed on water surface, after some time the benzol vaporizes and on the water surface remains the monomolecular layer. If a clean microscopic glass is plunged in the water then it will be covered on both sides with monomolecular layer. When repeatedly plunged and carefully taken out, the glass will be covered with the next and next layer. In this way, there can be some 500 layers formed, one upon another, and thus a "layer crystal" with parallel and equidistant planes may be composed. The distance between the planes is about 26.5 Å when using CdC_{20}.

If a surface of a well reflecting mirror is covered with monomolecular layers forming steps and then on the steps is deposited another monomolecular layer, e. g. fluorizing pigment, then we get arrangement in which the pigment molecules will be placed at known distances from the mirror, at distances that are the multiple of dimensions of molecules forming the steps, in this case the multiple of 26.5 Å.

Since the intensity of fluorescence is proportional to the square of the vector of light of the stimulated wave and since the molecules of fluorizing pigment can be deposited on steps formed by CdC_{20} at distances smaller than wave-length, it is possible to investigate the intensity of light vector at points remote from one another less than the wave-length. Using the weak solution of the pigment makes it possible to deposit the single fluorizing molecule on the top of the steps and thus to observe emission or absorption of light by a single molecule. So far, there is not another method known that would allow us to carry out such measurements.

The above method gives the possibility to observe the standing light wave in a much more refined way than in the famous experiments performed in 1890 by Wiener. The method allows us as well to repeat, with better resolution, the experiments carried out by Goos and Handchen in 1947, in which the effect of light wave shift in the total internal reflection was shown. The above method is also more precise than any other method in application to quantum yield of fluorescence and to measurements of fluorescence relaxation time.

Taking into account what was said above, it seems that the method of monomolecular layers has broken a technological barrier on the way to full understanding of "white noise" usually called the visible light.

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Optical Constants Determination in Thin Films with the Help of a Photometric Method

1. Introduction

Modern design of thin films coatings with the help of computers requires an exact knowledge of the refractive indices and absorption constants of the layers in the respective spectral range. These parameters depend to certain extent upon both the quality of the materials used for film production and the technological process applied. Therefore, independently the numerous data published in the literature here we deter-

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