

## The photometric measurement of the obliquity factor of diffraction

In vol. lxxviii of *Nature (London)* (May 21, 1908, p. 55) was published a note on 'Secondary Waves of Light,' in which I described the diffraction effects produced by an obliquely held rectangular aperture or reflecting surface, and pointed out that the observed distribution of illumination in the pattern was not in accordance with that deduced in the ordinary way. I indicated an explanation of the discrepancy, that it was due to the variation of the obliquity factor of diffraction within the limits of the pattern.

The interest of the observations lay in the fact that such an effect had never been noticed before, and that the observations enabled us actually to trace the variation of the amplitude of vibration from point to point on Huygens's secondary waves. A full description of the effect and a mathematical investigation were published in the *Philos. Mag.* for January.

The effect observed was that the intensities of illumination in corresponding bands on opposite sides of the central band in the unsymmetrical pattern were unequal. A photometric investigation of this difference in illumination has been carried out. The method was to use revolving sectors to reduce the illumination in one of the two bands to be compared, so as to make them both of equal brightness. The following table illustrates the comparisons made:

No. of expt.	Ratio of illumination according to ordinary theory	Ratio of illumination actually determined	Ratio of illumination calculated from obliquity
1	1.00	1.66	1.61
2	1.00	1.81	1.98
3	1.00	2.66	2.43
4	1.00	3.25	3.27

The obliquity law demonstrated by these measurements is that, in the hemispherical wavelets emitted by each element of a transmitting aperture or reflecting surface upon which waves are incident at any angle, the amplitude of the light vector is, at any point in the plane of incidence, proportional to the cosine of the angle made by the line joining that point and the element, with the normal to the plane of the element.

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