$\frac{g + 2(g + \sqrt{g^2 - 1})\, v \cos\vartheta}{4v^2 + g^2}$ [1]), if ϑ is not too small, so that h_{II} may be neglected by the side of h_I. In this case $\frac{g\cos\vartheta}{v} = \frac{\sin^2\vartheta}{g}$ may be put for the second expression, as v is pretty large compared with g. The angle ϑ, for which the intensity of the outer and middle components is the same, is given by

$$2\sin^2\vartheta = 1 + \cos^2\vartheta, \text{ which gives } \vartheta = 54°,$$

whereas the equality of the components was observed at about 67.°5; at 45° the middle component was clearly fainter than the outer ones.

If the observation is made with a nicol which transmits the horizontal vibrations, the outer components will only have the intensity

$$\frac{\cos^2\vartheta}{1+\cos^2\vartheta} \times \frac{1+\cos^2\vartheta}{2g} = \frac{\cos^2\vartheta}{2g}.$$

The angle ϑ for equal intensity is then given by $\cos^2\vartheta = 2\sin^2\vartheta$, which yields $\vartheta = 35°$, whereas in this case equal intensity was observed at 27°; at 35° the middle component was already stronger than the outer ones. The observed differences are undoubtedly in connection with the fact that with purely transversal observation ($\vartheta = 90°$) the ratio of the intensities of the middle and the outer components amounts only to about 1.32, instead of 2; with observation by means of a nicol the components were namely seen with equal intensity when the direction of the transmitted vibrations made an angle of 49° with the horizontal direction. In another respect, too, the examined chrome line is not perfectly normal: the middle component is distinctly broader than the original line, so that it is possibly, double.

Physics. — "*Diffraction of a single pulse wave through a slit according to* KIRCHHOFF's *theory.*" By Prof. C. H. WIND.

1. Some years ago Prof. HAGA in conjunction with the author of this paper studied experimentally the image which is formed of a slit lighted by Röntgen-rays on a photographic plate placed behind it. [2]) By comparison [3]) of the obtained photographs with the known diffraction images which we get when lighting the slit with homo-

[1]) H. A. LORENTZ loc. cit.
[2]) H. HAGA and C. H. WIND, These Proc. I, p. 420, 1899, and V, p. 247, 1902.
[3]) Id. Ibid., I, p. 423, 1899; cf. also Physik. Zschr. 2, p. 265, 1900.

geneous light of different wave-lengths, it was possible, by approximation to find the region of wave-lengths, inside which the R-rays considered as a mixture of rays of different wave-lengths, but homogeneous in themselves, possess their greatest energy.

Such a conception of the nature of the R-rays was not inconsistent with the supposition advanced then already on different sides, that these rays would owe their origin to impulsive disturbances of the equilibrium of the ether, following each other irregularly. For also a radiation arising from such "single pulse waves" may be conceived as a mixture of homogeneous rays, though it be of an infinite number of wave-lengths [1]). This was elucidated by me at the "Deutsche Naturforscherversammlung" at Aix-la-Chapelle (1900) and afterwards more fully in the Physik. Zeitschr. [2]). It was then also pointed out, what connection there exists between what on this latter supposition may be called the "length" [3]) of the single pulse waves, viz. the distance between the first and the last wave-front in one of them and what we had found, starting from the experiments, as "*wavelength of maximum energy*" in the mixture of homogeneous radiations.

The latter conception renders it possible to reduce the problem of diffraction of R-rays through a slit to the problem already fully worked out by KIRCHHOFF of diffraction of homogeneous light through a slit. [4]) But it is, also possible to derive the diffraction of a single pulse wave through a slit *directly* from HUYGENS-KIRCHHOFF's principle. [5]) This will be done in the following pages. Where the problem of the diffraction of the R-rays is still actual even now, [6]) this new treatment cannot be considered as superfluous. It may serve at the same time as an introduction to a reply to the objections brought forward by WALTER and POHL [7]) to HAGA and WIND's conclusions from their experiments. It is true that about simultaneously with these investigations SOMMERFELD has devoted an extensive study to

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[1]) G. JOHNSTONE STONEY, Phil. Mag. (5) 45, p. 532, and 46, p. 253, 1898.

[2]) C. H. WIND, Physik. Zschr. l.c. and 2, p. 189, 1900, p. 292, 1901.

[3]) It seems more in harmony with the denomination "wavelength" for periodic disturbances, to call the distance between front and rear wave-front "*length* of the single pulse wave", than to speak of its "breadth" ("Breite des Impulses") with SOMMERFELD) (Physik. Zschr. 1, p. 105, 1899, and 2, p. 55, 1900).

[4]) G. KIRCHHOFF, Vorlesungen üb. math. Physik, II, 7te Vorl., p. 129, 1891.

[5]) G. KIRCHHOFF, Ibid, 2te Vorl., p. 22, 1891.

[6]) Comp. i. a. E. MARX, "Zweite Durchführung der Geschwindigkeitsmessung der R.-strahlen" (Abh. math. phys. Kl. k. sächs. Ges. d. Wiss. 32, N°. 2, p. 156, 1910).

[7]) B. WALTER u. R. POHL, Ann. d. Physik 25, p. 715, 1908, and 29, p. 331, 1909.

the same subject [1]). But he took a different course, by the side of which it may once more be shewn that the original way indicated by KIRCHHOFF leads just as well to the purpose. Further I have been enabled, thanks to the collaboration of our fellow-member W. KAPTEYN [2]), for which I am greatly indebted to him, to carry out the numerical calculation of the intensity of radiation for every point of our special diffraction image, and so to get to know the distribution of this intensity over the image in all the details required. This is of importance on account of the doubt which has again risen [1]) [3]) with respect to the interpretation of our experiments of diffraction.

2. According to KIRCHHOFF [4]) in any point O behind an opaque screen, which is provided with one or more apertures, but which for the rest extends into infinity (fig. 2), and receives on its front side a radiation determined by a function φ, which outside the sources of radiation satisfies the equation

$$\Delta \varphi - \frac{1}{c^2}\frac{\partial^2 \varphi}{\partial t^2} = 0 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

the value of this function at any time t may be expressed by:

$$\varphi_{O,t} = \frac{1}{4\pi}\int_S dS \left\{ \frac{\partial r_0}{\partial N}\frac{\partial}{\partial r_0}\frac{\bar{\varphi}_{t-\frac{r_0}{c}}}{r_0} - \frac{\left(\frac{\partial \bar{\varphi}}{\partial N}\right)_{t-\frac{r_0}{c}}}{r_0} \right\} \quad . \quad . \quad . \quad (2)$$

In this expression the integral is to be taken over a surface S consisting of as many parts as there are apertures in the screen and bounded by the edges of these apertures, while in every point of this "slit plane" N denotes the normal to it directed backward, r_0 the distance to the point O, and $\bar{\varphi}$ the value which the function φ would have in the point in the case of presence of the same sources of radiation, but absence of the screen.

In the case of a single pulse wave emitted by an electrical point charge during a change in its state of movement, we are free to take for φ either the electromagnetic potential ϕ or the electromagnetic vector potential $\mathfrak{A}$ [5]), or e. g. the electric or magnetic force.

[1]) A. SOMMERFELD, Zschr. f. Math. u. Physik. 46, p. 11, 1901.

[2]) See the following communication in these proceedings p. 405.

[3]) See note 6 and 7 p. 395.

[4]) G. KIRCHHOFF, l.c. 2e Vorl..

[5]) M. ABRAHAM, Elektromagn. Th. d. Strahlung, § 6, Leipzig, 1905.

3. If the disturbance in the source is accomplished from the moment t' to the moment t'', then $\bar{\varphi}$ in the point P of the slit-plane, at a distance r_1 from the point L, differs from zero only from $t = t' + \frac{r_1}{c}$ to $t = t'' + \frac{r_1}{c}$. If the greatest absolute value which this function reaches there during this period be $\frac{K}{r_1}$ and the flux of energy may be put proportional to the square of the function φ, K may

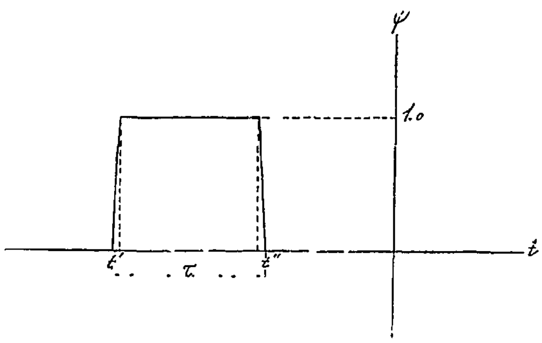


Fig 1.

evidently be considered as dependent on the source but not on the place of the point P in the slit plane.

Then if we put:

$$\bar{\varphi}(t) = \frac{K}{r_1} \psi\left(t - \frac{r_1}{c}\right), \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

ψ is a function, of which for all the points of the slit-plane (cf. fig. 1, in which for a reason which will become clear later on t' has been taken negative and $t'' - t'$ is indicated by τ) we know already, that

$$\left.\begin{array}{lll} \text{for} & t \leq t' & \psi(t) = 0, \\ \text{,,} & t' < t < t'' & 0 < |\psi(t)| < 1, \\ \text{,,} & t \leq t'' & \psi(t) = 0. \end{array}\right\} \quad . \quad . \quad (4)$$

Further we have:

$$\left(\frac{\partial \bar{\varphi}}{dN}\right)_t = - K \cos \theta_1 \left[\frac{\psi\left(t - \frac{r_1}{c}\right)}{r_1^{\,2}} + \frac{\psi'\left(t - \frac{r_1}{c}\right)}{r_1 c}\right],$$

$$\frac{\partial r_0}{\partial N} \frac{\partial}{\partial r_0} \frac{\bar{\varphi}_{t - \frac{r_0}{c}}}{r_0} = - K \cos \theta_0 \frac{\partial}{\partial r_0} \frac{\psi\left(t - \frac{r_0 + r_1}{c}\right)}{r_0 r_1},$$

if θ_0 and θ_1 denote the angles which resp. the radius vector r_0 from P to O and the continuation of the radius vector r_1 from L to P form with the normal N (fig. 2),

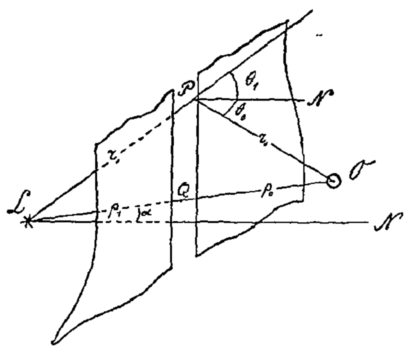


Fig. 2.

and equation (1) is changed into:

$$\varphi_{O,t} = \frac{K}{4\pi} \int\limits_S dS \left\{ \left(\frac{\cos\theta_0}{r_0} + \frac{\cos\theta_1}{r_1} \right) \frac{\psi\left(t - \frac{r_0 + r_1}{c}\right)}{r_0 r_1} + \right.$$

$$\left. + (\cos\theta_0 + \cos\theta_1) \frac{\psi'\left(t - \frac{r_0 + r_1}{c}\right)}{c\, r_0 r_1} \right\} \quad (5)$$

4. For every point of the slit-plane the length of path $r_0 + r_1$ from L to T over P has a definite length. It is shortest for the pole Q of the point O, the point of intersection of the slit-plane with the line LO; for this point it is $\varrho_0 + \varrho_1$ (c.f. notation indicated in fig. 2). We put:

$$\varrho_0 + \varrho_1 = R$$

and term

$$\zeta = r_0 + r_1 - R$$

the difference of path for the point P of the slit.

We now consider in the slit-plane those lines which are loci of points with definite values of this difference of path ζ, and term these lines ζ-curves. Two such curves (fig. 3), belonging to values of ζ which differ from each other an infinitely small amount $d\zeta$, inclose an infinitely small region of the slit-plane, the whole of which, bounded as it is by the limits of the slit-plane, and often consisting of as many separate pieces as there are apertures in the screen. we call a $d\zeta$-zone. The area of such a $d\zeta$-zone we may denote by $l d\zeta$, in which l is a function of ζ.

We now introduce such a $d\zeta$-zone as surface-element dS into the integral of (5), noticing that under the integral sign in the denominators

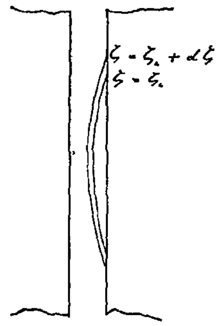


Fig. 3.

we may substitute the constant distances ϱ_0 and ϱ_1 for the distances r_0 and r_1, varying from point to point in the slit plane, and likewise the constant *cos α* for *cos* θ_0 and *cos* θ_1, behaving in the same way, provided we consider the radiation only in such points O, for which the values r_0 and r_1 are very large compared with the dimensions of the slit plane, in other words at great distances from the slit.

By these substitutions and simplifications (5) becomes:

$$\varphi_{O,t} = \frac{K}{2\pi} \frac{\cos\alpha}{\varrho R} \int_0^\infty \left\{ \frac{2}{\varrho} \psi\left(t - \frac{R+\zeta}{c}\right) + \frac{2}{c} \psi'\left(t - \frac{R+\zeta}{c}\right) \right\} l d\zeta, \quad . \quad . \quad (6)$$

if be put:

$$\frac{1}{\varrho_0} + \frac{1}{\varrho_1} = \frac{2}{\varrho},$$

and therefore

$$\varrho_0 \varrho_1 = \tfrac{1}{2} \varrho R$$

5. To get a better understanding of the quantity l we imagine the confocal revolution ellipsoids, which may be described with the ascending values of $R+\zeta$ as lengths of the major axis, round L and O as foci, and which meet the slit plane in the ζ-curves.

Excluding cases in which the angle α comes very near 90° we may for those values of ζ which are of importance for us consider the projection of the ζ-curve on the plane, brought $\perp LO$ through Q, to be an arc of the circle along which this plane is intersected by the same ellipsoid which meets the slit plane in the ζ-curve. If we call the radius of this circle ξ and the extent of that arc, in radians, β, then, whith a sufficient degree of approximation,

$$\zeta = \frac{\xi^2}{\varrho} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (7)$$

Considering finally the area of the projection of the $d\zeta$-zone on the plane mentioned we have

$$\cos\alpha \,.\, l\, d\xi = \beta\xi \,.\, d\xi = \tfrac{1}{2}\,\beta d\xi^2 = \tfrac{1}{2}\,\beta\varrho d\zeta,$$

from which follows

$$l = \frac{\varrho}{2\cos\alpha}\,\beta$$

By substitution of this value (6) passes into:

$$\varphi_{O,t} = \frac{K}{2\pi R}\int_0^\infty \frac{1}{\varrho}\,\psi\left(t - \frac{R+\zeta}{c}\right)\beta d\zeta + \frac{K}{2\pi R}\int_0^\infty \frac{1}{c}\,\psi'\left(t - \frac{R+\zeta}{c}\right)\beta d\zeta. \quad (8)$$

6. As $\psi\left(t - \frac{R+\zeta}{c}\right)$ at every definite moment differs from zero only between two values of ζ lying $c\,(t''-t')$ from each other, and as it is then $\overline{\overline{<}}\, 1$ at the utmost, whereas β cannot exceed 2π, it is clear that

$$\frac{K}{R}\,\frac{c\,(t''-t')}{\varrho} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (9)$$

is an upmost limit whieh connot be exceeded in any case by the value of the first term of (6). Hence so long as

$$\frac{c\,(t''-t')}{\varrho}$$

is a very small value [1]), that term may be neglected by the side of a term of the order of magnitude of $\frac{K}{R}$, and it is allowed to write for (8):

$$\varphi_{O,t} = \frac{K}{2\pi R}\int_{\zeta=\infty}^{\zeta=0} \beta\, d\psi\left(t - \frac{R+\zeta}{c}\right). \quad . \quad . \quad . \quad . \quad (10)^2)$$

[1]) For Röntgen rays $c\,(t'-t'')$ is of the order of magnitude of 10^{-10}, and in the diffraction experiments ρ is of the order of 10^2 cm.

[2]) That it appears to be allowed to neglect the first integral in the second member of (8) is of much interest in connection with the application of HUYGENS' principle in its more primitive form to the problem of diffraction. it proves that if one forms a conception of the propagation of radiation aggreeing with this principle, one must bear in mind that the (secondary) emission of elements of disturbance in either which one then imagines to issue from every element of the slit plane, does not depend on the amplitude which the disturbance itself possesses in the considered element, but only on the *rapidity of change of this amplitude* at that place.

We assume — to take a special case — that $\psi(t)$ increases within a very short time from zero to its value 1 (fig. 1), then preserves this value unchanged, and afterwards decreases again as rapidly to zero, and that in such a way that it is allowed for the values of ζ corresponding to the periods of change of ψ, to take no value for β but that corresponding to the beginning or end of these periods. Then (10) becomes simply:

$$\varphi_{0,t} = \frac{K}{2\pi R}(\beta'-\beta''), \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (11)$$

when we put for:

$$\left.\begin{array}{ll} \zeta = \zeta' \equiv c(t-t') - R & \beta = \beta' \\ \text{and for} \quad \zeta = \zeta'' \equiv c(t-t'') - R & \beta = \beta''. \end{array}\right\} \quad . \quad . \quad . \quad (12)$$

7. Now if the slit is bounded by parallel edges, if the distance from the point Q to the nearest edge be denoted by n, to the furthest by m, n being taken as negative when Q falls outside the slit, then

$$\left.\begin{array}{lll} \beta = 2\left(arcsin\frac{m}{\xi} + arcsin\frac{n}{\xi}\right), & \text{for} & \zeta\varrho > m^2, \\ \beta = 2\left(\frac{\pi}{2} + arcsin\frac{n}{\xi}\right), & ,, & m^2 > \zeta\varrho > n^2, \\ \beta = 2\left(\frac{\pi}{2} + \frac{\pi}{2}\right), & ,, & n^2 > \zeta\varrho > 0,\ n > 0, \\ \beta = 2\left(\frac{\pi}{2} - \frac{\pi}{2}\right). & ,, & ,, \ ,, \ ,, \ ,, \ ,, \ n < 0. \end{array}\right\} , \quad . \quad . \quad (13)$$

All these expressions for β, holding in the different cases, may be united to a single one, if we consider that in general

for $a^2 > 1$ and $a > 0$, $arc\ sin\ a = \frac{1}{2}\pi i\, l_{nat}(a + \sqrt{a^2-1})$,

,, ,, ,, ,, ,, $a < 0$, $arc\ sin\ a = -\frac{1}{2}\pi - i\, l_{nat}(-a - \sqrt{a^2-1})$

and ,, $a^2 < 1$, $arc\ sin\ a =$ real.

Then we may write in each of the 4 cases considered:

$$\beta = 2\Re:\left(arc\ sin\frac{m}{\xi} + arc\ sin\frac{n}{\xi}\right). \quad . \quad . \quad . \quad . \quad . \quad (14)$$

Even for moments for which (1) yields a negative value of ζ, this

Therefore, if a single pulse wave of the type represented in fig. 1, traverses the element, *two* periods of secondary emission of radiation are to be ascribed to the element, one during the "*immersion*" of the element in the single pulse wave, the other during the "*emersion*" (cf. footnote 1 p. 403).

expression accurately indicates the value of β, which then of course is zero. Indeed ζ being negative, ξ (according to (7)) and also $\frac{m}{\xi}$ and $\frac{n}{\xi}$ will be purely imaginary, while, generally, for imaginary values of a

$$arc\,sin\,a = -i\,l_{nat}\,(ia + \sqrt{1-a^2})$$

and hence

$$\Re\,arc\,sin\,a = 0.$$

If we now take (14) as the general expression for β and substitute $\sqrt{\varrho\zeta}$ for ξ (cf. (7)), we get:

$$\beta = 2\Re\left(arcsin\frac{m}{\sqrt{\varrho\zeta}} + arcsin\frac{n}{\sqrt{\varrho\zeta}}\right). \quad . \quad . \quad . \quad . \quad (15)$$

and so, according to (11) and (12)

$$\varphi_{O,t} = \frac{K}{2\pi R} \cdot 2\,\Re\left(arcsin\frac{m}{\sqrt{\varrho\zeta'}} - arcsin\frac{m}{\sqrt{\varrho\zeta''}} + \right.$$

$$\left. + arcsin\frac{n}{\sqrt{\varrho\zeta'}} - arcsin\frac{n}{\sqrt{\varrho\zeta''}}\right) \quad . \quad . \quad . \quad . \quad . \quad (16)$$

or, introducing the values of ζ' and ζ'' indicated in (12):

$$\varphi_{O,t} = \frac{K}{\pi R}\,\Re\left(arc\,sin\frac{m}{\sqrt{\varrho c(t-t')-\varrho R}} - arc\,sin\frac{m}{\sqrt{\varrho c(t-t'')-\varrho R}} + \right.$$

$$\left. + arc\,sin\frac{n}{\sqrt{\varrho c(t-t')-\varrho R}} - arc\,sin\frac{n}{\sqrt{\varrho c(t-t'')-\varrho R}}\right) \quad . \quad . \quad (17)$$

If in this formula we put

$$t' = -\frac{R}{c}, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (18)$$

which means that time is reckonned from the moment at which, in the absence of the diffracting screen, the beginning of the disturbance would reach the point O; if further we put

$$t'' - t' = \tau, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (19)$$

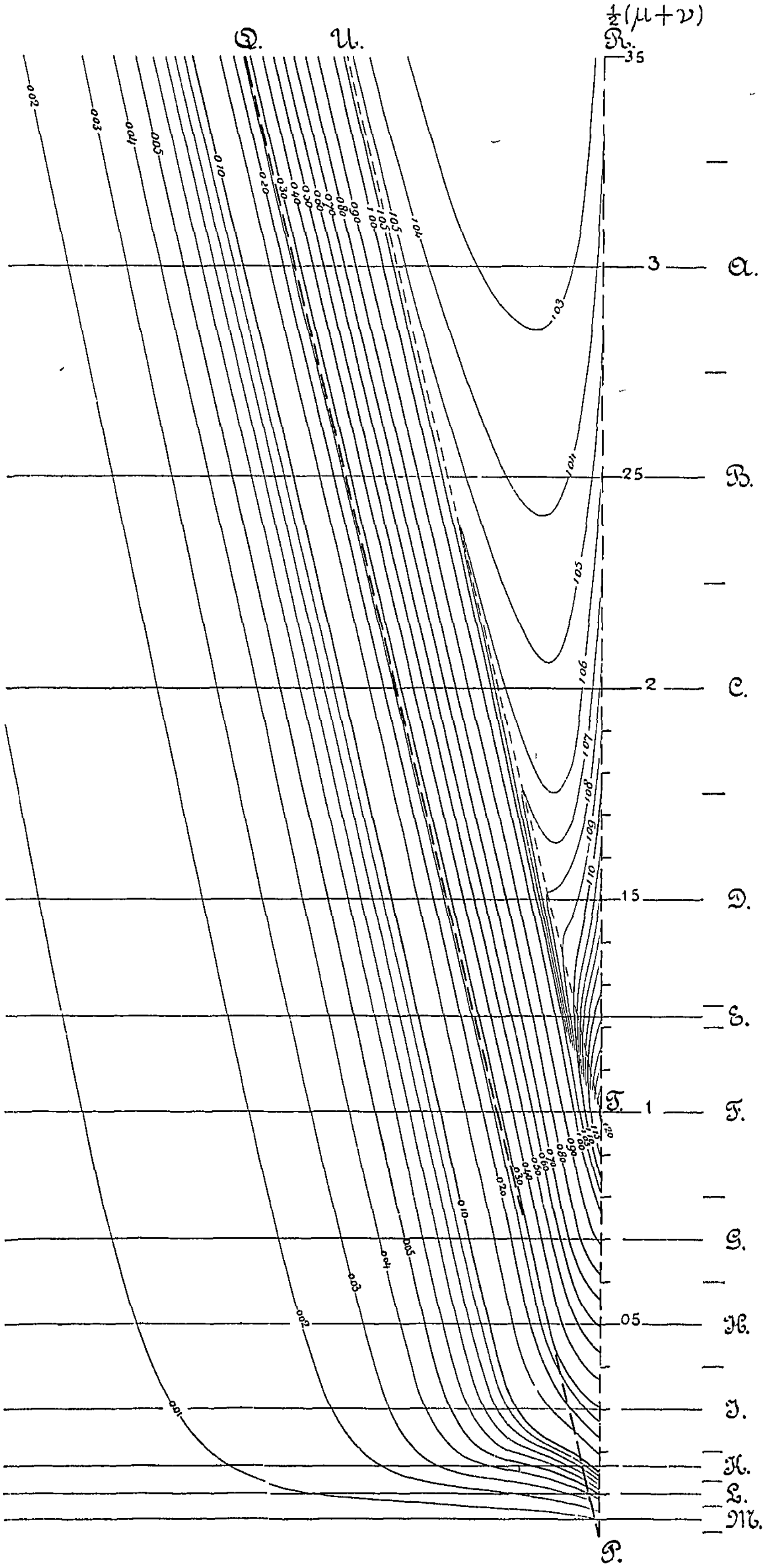
$$c\tau = \lambda, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (20)$$

indicating by τ and λ the duration and the "length" of the single pulse wave, and finally:

$$\frac{m}{\sqrt{\varrho\lambda}} = \mu\,, \; \frac{n}{\sqrt{\varrho\lambda}} = \nu, \quad . \quad . \quad . \quad . \quad (21), (22)$$

we get:

C. H. WIND. "Diffraction of a single pulse wave through a slit according to KIRCHHOFF's theory." Fig. 4.



$$\varphi_{O,t} = \frac{K}{\pi R} \Re e \left(arc\,sin \frac{\mu}{\sqrt{t/\tau}} - arc\,sin \frac{\mu}{\sqrt{t/\tau - 1}} + \right.$$

$$\left. + arc\,sin \frac{\nu}{\sqrt{t/\tau}} - arc\,sin \frac{\nu}{\sqrt{t/\tau - 1}} \right). \quad . \quad . \quad . \quad (23)\ ^{1)}$$

The phenomenon observable in O, by which we may judge of the intensity of the radiation produced by the single pulse wave, may be of different kinds, e. g. photographic action on a sensitive plate, or generation of heat in case of absorption by matter, or ionisation of a gas and the resulting discharge of a charged body. With phenomena of this kind it is usual, and to a certain extent justifiable, to put the intensity of the action produced during a definite lapse of time proportional to the quantity of energy which, with the wave, and per unit of area, traverses a surface element placed in the point of observation normal to the direction of radiation. Per unit of time this quantity may be put proportional to $\varphi^2_{O,t}$, whence for the whole duration of the disturbance in O it will be adequately represented by:

$$J = \int_{-\infty}^{+\infty} \varphi^2_{O,t}\, dt.$$

This becomes, by introducing (23) and putting

$$\frac{t}{\tau} = x, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (24)$$

$$J = \left(\frac{K\tau}{\pi R}\right)^2 I, \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (25)$$

in which:

$$J = \int_{-\infty}^{+\infty} \left[\Re e \left(arc\,sin \frac{\mu}{\sqrt{x}} - arc\,sin \frac{\mu}{\sqrt{x-1}} + arc\,sin \frac{\nu}{\sqrt{x}} - arc\,sin \frac{\nu}{\sqrt{x-1}} \right) \right]^2 dx.$$

This expression essentially agrees with that which SOMMERFELD arrived at in his lastly mentioned paper and which has also been there numerically evaluated. These calculations, however, have been confined — at least as far as is seen from the paper — to values in points situated along certain special curves, and, moreover, have

[1]) In connection with footnote 2 p. 400 we may point out that in the expression (23) the first and the third term between parentheses jointly correspond to the "immersion" of elements of the slit plane into the single pulse wave, the second and the fourth term jointly to the "emersion" from it.

not been pushed to a very high degree of accuracy. For the purpose, pursued by Mr. SOMMERFELD at the time, of course they were quite sufficient.

The present author in the contrary, having grown auxious to learn further particulars on the distribution of intensity, found himself in the necessity of approximating the expression with some accuracy, and that not only along curves, along which the integration of the expression can be obtained in finite form, but also in a great number of points arbitrarily chosen. By the series expansions deduced by Prof. W. KAPTEYN [1]) this was rendered possible, though it remained a laborious business.

The result, being a nearly complete survey of the way in which the energy of radiation of the single pulse wave in a definite point depends on μ and ν, or any other couple of parameters equivalent to these, is graphically represented in fig. 4. In this diagram every section normal to the axis PR indicates the distribution of the energy in the horizontal section of the diffraction image of a parallel edged slit, for a definite value of $\frac{1}{2}(\mu+\nu)$. For some of the sections the value of this quantity, viz.

$$\frac{1}{2}(\mu+\nu)=\frac{1}{2}\frac{m+n}{\sqrt{\varrho\lambda}}=\frac{1}{2}\frac{\textit{breadth of the slit}}{\sqrt{\varrho\lambda}}$$

is indicated by the numbers put along the axis PR.

The points of equal intensity in the successive sections are connected by curves, and this enables us at once to form an idea also of the distribution of intensity which may be expected in the diffractionimage of a slit with edges not parallel, but slowly converging towards the base [2]). When using the diagram in this way for single pulse waves of very small length, we must, bear in mind that in the direction normal to PR it is represented at a much larger scale than in the direction of PR itself.

What the diagram, looked upon from this point of view, represents is the distribution of intensity over one half of the slit image, the broken line PQ indicating in it the projection of one edge of the slit from the point L on the plane of observation.

This distribution of intensity presents a number of noteworthy particulars. To some of these I hope to draw your attention on a following occasion.

1) See the following communication in these proceedings.

2) In the slits, used by HAGA and WIND in their experiments, the angle formed by the edges never amounted to more than 0°.03.