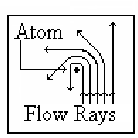
SECTION 7

Analysis of the Amount of Deflection

> The *Propagated Outward Flow* concentration produced by an atom of the slit edge falls off inversely as the square of distance from it.
>
> The Cauchy-Lorentz Distribution is an inverse square function that can represent the diffraction pattern envelope. The envelope of the pattern is the relative amounts of the underlying *Propagated Outward Flow* carrying the light.
>
> The relative amounts of the incoming *Propagated Outward Flow* that are deflected in any specific direction can thus be calculated with the Cauchy-Lorentz distribution.

THE AMOUNT OF DEFLECTION

The manner of the deflection is curving of the path of rays of gravitational Flow as they pass close to atoms of the deflector with the direction to which curved depending on the relative positions of the ray and an atom and the amount of the curving depending on how close the ray passes to the atom. Because of the range of those variables and their various combinations the "deflection" is essentially a "scattering" in various amounts in various directions, all scattering being away from the perfectly vertical upward which the deflector is designed to solely deflect. The "scattering" is illustrated two-dimensionally in the figure below visualized as that figure viewed from the top and rotated through a full circle.



Single Atom Deflection of Rays of Gravitational Flow

A two-dimensional physical example of the "scattering" is the diffraction pattern of light diffracted by a slit. Figure 7-1, below, presents the diffraction pattern produced by a slit that is $5.4 \cdot 10^{-6}$ *meter* wide with incoming light of wavelength $4.13 \cdot 10^{-7}$ *meter*. The peaks and valleys of the pattern, the interference pattern, are a phenomenon of the light imprint on the *Flow* that carries it. <u>The envelope of the pattern is the relative amounts of the underlying *Flow* carrying the light</u>.

For that reason, while the interference pattern varies according to the slit width and the wavelength of the light involved, <u>the form of the envelope of that pattern is always the same</u>.

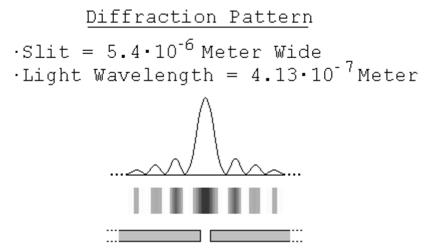


Figure 7-1 - A Slit Light Diffraction Pattern

The *Flow* concentration produced by the two slit edges falls off with distance from the slit edge inversely as the square of distance from its atoms. The Cauchy-Lorentz Distribution is an inverse square function of its variable. Its Density Function can represent the relative *Flow* intensity pattern produced by the diffraction process by representing the envelope of the diffraction pattern. In Figure 7-2, below, the Cauchy-Lorentz distribution is fitted to the diffraction pattern by the appropriate choice of value of its distribution parameter γ [Greek *gamma*].

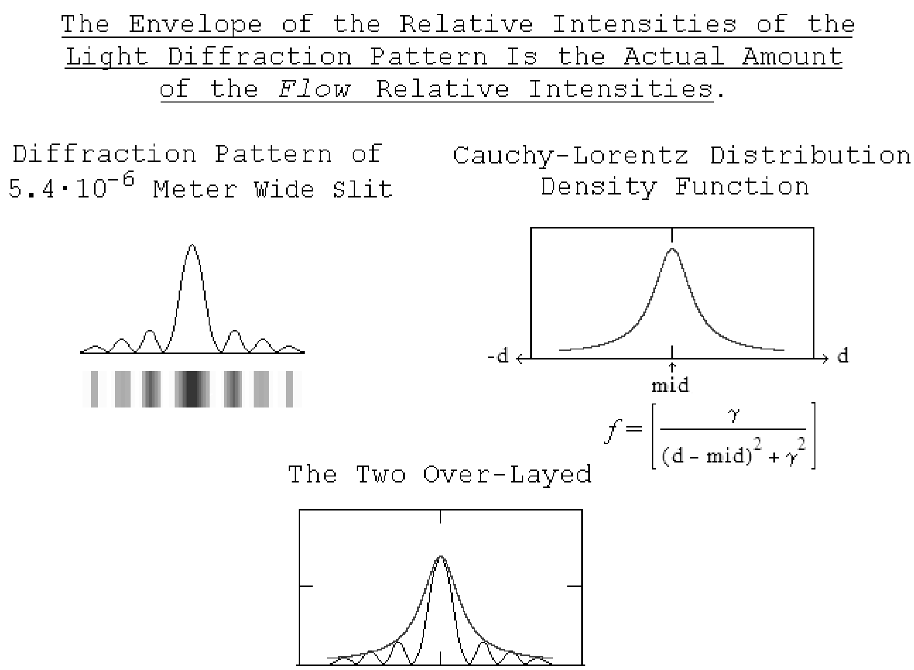


Figure 7-2 – The Cauchy-Lorentz Distribution Diffraction Pattern Envelope

The deflection angle, *Φ [Greek Phi]*, is the angle of deflection of the rays to any particular point on the diffraction pattern. That is *Φ* is the angle of deflection of the rays directed to that particular point and of intensity per the Cauchy-Lorentz Distribution at that point.

The interest here is not in the location of the light interference maxima and minima, but in the deflection angles the diffraction imposes on the *Flow*. However, calculation of the deflection angles to the minima provides a good indication of the amount of *Flow* deflection obtained over the overall diffraction pattern. The table below presents that data for the $5.4 \cdot 10^{-6}$ *meter* wide slit with incoming light of wavelength $4.13 \cdot 10^{-7}$ *meter*. [The minimums are counted outward from the center peak of the diffraction interference pattern].

Minimum #	Φ°		Minimum #	Φ°
1	4.39		8	37.72
2	8.80		9	43.50
3	13.26		10	49.89
4	17.81		11	57.28
5	22.48		12	66.60
6	27.36		13	83.86
7	32.37		14	$Sin(\Phi) > 1.0$

$$Sin(\Phi) = n \cdot [\ ^{\text{light wavelength}} / _{\text{slit width}}\ ],\ n = 1, 2, \ldots$$

Figure 7-3 – Table of Diffraction Minimums Deflection Angles

Again, while we are not interested in the diffraction minimums and not in the diffraction interference patterns at all, the envelope of the diffraction pattern depicts the distribution of the deflection of the *Propagated Outward Flow* that carried the light in the diffraction pattern.

The above table demonstrates that the deflection of the *Flow* is at least in amounts up to $90°$. That deflection may well extend to angles beyond $90°$, perhaps to as much as $180°$, a complete reversal of direction. There is no way of determining that from the diffraction pattern, however, because the light of the diffraction pattern cannot be deflected beyond $90°$ because the light cannot penetrate the material containing the slit.

But, the *Flow* readily penetrates and permeates all of material reality.

The tilt of the cubic crystal structure divides the slit into a large number of sub regions the first and last of which are at the slit's edge and produce the maximum deflection. The tilt also arranges that ultimately all of the vertical components of the incoming vertical Flow must pass through one of those "at the edge of the slit" regions, *i.e.* must experience maximum deflection.

The overall average effect is equivalent to every ray's vertical component curving at least 90^o because the crystal tilt causes every ray to pass extremely close to an atom at some point in the crystal, as shown for the extreme rays in the figure below.

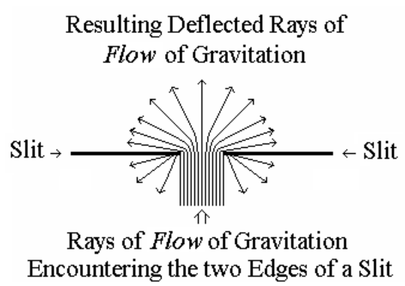


Figure 7-4 – Single Slit Gravitation Deflection

PROPAGATED OUTWARD FLOW DEFLECTION CAUSED BY ITS FLOW SLOWING

The bending of *Propagated Outward Flows*' paths results from differential slowing, that is the systematic slowing of the *Propagated Outward Flow* wave front in different amounts along that front. The slowing takes place in accordance with equation *(5-2)*. Figure 7-5, below, depicts the differential slowing-caused process.

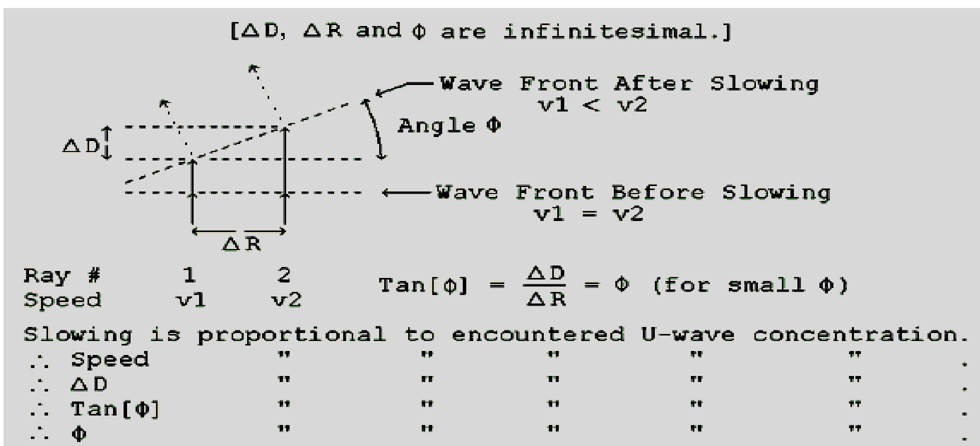


Figure 7-5 – Propagated Outward Flow Deflection

The figure indicates the differential slowing of the upward-directed [as for gravitation] *Propagated Outward Flow* flux that results in deflection of the *Propagated Outward Flows*' paths. The slowing is directly proportional to the encountered concentration of the *Propagated Outward Flow* flux, and, therefore the angle of deflection, Φ, is proportional to that concentration.

QUANTIFYING THE PROPAGATED OUTWARD FLOW DEFLECTION IN LIGHT

The diffraction pattern is a projection on a screen or piece of photographic film of the diffracted light as it spreads out due to the diffracting action. The physical size, the linear dimension of the pattern becomes larger as the distance from the diffracting slit to the screen or film on which the pattern appears increases. But the angles, as measured from the center of the slit to any point on the diffraction pattern [relative to the 0° angle from the center of the slit to the center of the pattern], are the same regardless of the distance from the slit to the screen or film.

Therefore, to analyze and evaluate the pattern requires attending to those angles, not linear distances on the pattern. Since the linear distances on the pattern are irrelevant, any convenient distance from the slit to the screen or film may be chosen. In the following analysis that distance will be taken as equal to the slit width, $5.4 \cdot 10^{-6}$ *meter* in this case.

The data of interest here, which is a measure of the amount of *Propagated Outward Flow* bending contained in the diffraction pattern, is the portion of the total light incident on the slit appearing in any specified portion of the diffraction pattern. That portion can be defined in terms of the angles just described and that portion is an otherwise dimensionless number, again independent of the physical or linear size of the diffraction pattern.

The Cauchy-Lorentz Distribution for this application is as follows.

(7-1) The Cauchy-Lorentz Distribution Density Function

[a] In General

$$f(x;x_0,\gamma) = \frac{1}{\pi}\cdot\left[\frac{\gamma}{(x-x_0)^2+\gamma^2}\right]$$

[b] As Used Here

$$f(d;mid,\gamma) = \left[\frac{\gamma}{(d-mid)^2+\gamma^2}\right]$$

mid = half-way point between slit edges
d = distance from mid
γ = half-width at half-maximum

From the above Figure 7-2, the half-width of the Cauchy-Lorentz Distribution at its half-maximum is *74.0%* of the distance from the mid-point to the first minimum in the interference pattern. That is γ is *74.0%* of the displacement from the centerline to the first intensity minimum outward from the centerline. Calculating the deflection angle to that minimum the angle is found to be $4.39°$.

The corresponding displacement along the d-axis [for screen distance = slit width] of Figure 7-3 is the value of γ in the Cauchy-Lorentz distribution.

(7-2)
$$\begin{aligned}\gamma &= [74\%\ \text{of}]\big[[\text{slit width}]\cdot \text{Tan}[4.39°]\big] \\ &= [0.74]\cdot[5.4\cdot 10^{-6}\ \text{meter}]\cdot[0.077] \\ &= 3.1\cdot 10^{-7}\ \text{meter}\end{aligned}$$

The deflection angle, Φ, for any particular point on the diffraction pattern is the angle between [a] a reference line that runs from the center of the slit perpendicular to the barrier containing the slit toward the projected diffraction pattern and [b] a line running from the center of the slit to the location of the particular point on the diffraction pattern. That is the angle of deflection of the rays directed to that point and of intensity per the Cauchy-Lorentz Distribution at that point.

In these diffraction patterns so long as the ratio of the wavelength of the incident light to the width of the slit is constant, then each deflection angle, Φ, is independent of the distance from the slit to the screen where the diffraction pattern is projected.

The Cauchy-Lorentz Distribution's Cumulative Distribution Function is the integral of the Density Function, that is the area under the Density Function curve, the cumulative density. That function is given in equation *(7-3)*, below.

(7-3) The Cauchy-Lorentz Distribution Cumulative Distribution Function

[a] In General

$$f_{cum}(x;x_0,\gamma) = \frac{1}{\pi}\cdot\arctan\left[\frac{x - x_0}{\gamma}\right] + \frac{1}{2}$$

[b] As Used Here

$$f_{cum}(d;mid,\gamma) = \frac{1}{\pi}\cdot\arctan\left[\frac{d - mid}{\gamma}\right] + \frac{1}{2}$$

With $mid = 0$, when $d = -\infty$ [a deflection of $90°$ to the left in Figure 7-3], then $f_{Cum} = 0$. Likewise at $d = +\infty$ then $f_{Cum} = 1$, the total amount. To find the fraction, F, of the total amount of the incident light entering the slit that is deflected through some chosen angle, Φ, or more to the left of mid the procedure is as follows, taking $\Phi = -45°$ as an example and using $\gamma = 3.1\cdot10^{-7}$ meter per equation *(7-2)*. Because that light exists only on the *Propagated Outward Flow*s carrying it the portion, F, is the fraction of the total amount of *Propagated Outward Flow*s entering the slit that is deflected through angle Φ or more.

1 – Calculate the displacement, d, of Figure 7-3.

(7-4)
$$\begin{aligned} d &= \mathrm{Tan}[\Theta] \times [\text{slit width}] \\ &= \mathrm{Tan}[-45°] \times [5.4\cdot10^{-6}] \\ &= -5.4\cdot10^{-6} \quad [\text{for this example of } \Theta = -45°] \end{aligned}$$

2 – Calculate $F = f_{cum}(d;mid,\gamma)$ from equation *(7-3)*.

(7-5)
$$\begin{aligned} F = f_{cum}(d;mid,\gamma) &= \frac{1}{\pi}\cdot\arctan\left[\frac{d - mid}{\gamma}\right] + \frac{1}{2} \\ &= \frac{1}{\pi}\cdot\arctan\left[\frac{(-5.4\cdot10^{-6}) - (0)}{3.1\cdot10^{-7}}\right] + \frac{1}{2} \\ &= 0.018 \end{aligned}$$

Then P, the percentage deflected through angle Φ or more of the total *Propagated Outward Flow*s incident on the slit is:

$F \div f_{cum}(d = +\infty) = F \div 1 = F.$

P = 1.8% of total incident light entering the slit on each side [for this example].

In this example calculation the portion of the total *Propagated Outward Flow* flux that is deflected by $\Phi = 45°$ *or more* is $P_{45} = 1.8 + 1.8 = 3.6\%$.

Table 7-6, below, presents the portion of the total amount of the incoming gravitational *Propagated Outward Flow* flux that is deflected through some chosen angle, Φ or more, using the above $45°$ example type of calculations for each of the deflection angles cited in Table 7-3, above.

Φ°	% Deflected	Φ°	% Deflected
4.39	40.9	37.72	4.7
8.80	22.6	43.50	3.8
13.26	15.2	49.89	3.1
17.81	11.3	57.28	2.3
22.48	8.8	66.60	1.6
27.36	7.1	83.86	0.4
32.37	5.7		

Table 7-6
Percent of Total Propagated Outward Flow that is Deflected By Various Angles of Deflection, Φ, or More

USING THESE SLIT DIFFRACTION RESULTS FOR A GRAVITATION DEFLECTOR

The above table and example indicate that significant *Propagated Outward Flow* ray deflection does take place in the case of the atoms along the edge of the $5.4 \cdot 10^{-6}$ meter wide slit, but the amount of deflection is not very much – about only 3.6% deflected 45° or more, in the example.

On the other hand, looking at 100% of the rays of *Propagated Outward Flow* flux that arrive, uniformly spaced, at the $5.4 \cdot 10^{-6}$ meter wide slit, 3.6% of them arrived at that slit near enough to the atoms of one of the edges so as to be deflected 45° or more. All of the rays of that 3.6% achieved that much deflection because they passed their deflecting atom much more closely than the rest of the rays.

The 1.8% on each side of the Cauchy-Lorentz Distribution passed its deflecting atom within a distance of 1.8% of the slit width $[0.018 \times (5.4 \cdot 10^{-6}) = 9.7 \cdot 10^{-8}$ meter]. If it could be arranged that all of the vertically upward *Propagated Outward Flow* gravitational flux were to pass that closely to atom then 100% of the gravitational flux would be deflected by 45° or more.

However, these deflection calculations are for a *Propagated Outward Flow* flux of the density or concentration of the *Propagated Outward Flow* carrying the beam of light to the diffracting slit. The vertically upward *Propagated Outward Flow* flux of the Earth's gravitational field is immensely more dense and concentrated.

The following Section 8 addresses that aspect.