Fentes d'Young

1) $T(x,y) = 1$ si $-\frac{e}{2} - \frac{a}{2} \leq x \leq -\frac{e}{2} + \frac{a}{2}$ OU $\frac{e}{2} - \frac{a}{2} \leq x \leq \frac{e}{2} + \frac{a}{2}$

ET $-b/2 \leq y \leq +b/2$

$= 0$ sinon

2) $\underline{\psi}(u,v) = \psi_0 \iint T(x,y)\, e^{-i2\pi(ux+vy)}\, dx\,dy$

$$= \left\{ \int_{-e/2-a/2}^{-e/2+a/2} e^{-i2\pi ux}\, dx + \int_{e/2-a/2}^{e/2+a/2} e^{-i2\pi ux}\, dx \right\} \int_{-b/2}^{+b/2} e^{-i2\pi vy}\, dy$$

$$= \psi_0\, 2ab\, \mathrm{sinc}(ua)\, \mathrm{sinc}(vb) \cos(\pi ue)$$

$$I(u,v) = 4I_0\, \mathrm{sinc}^2(ua)\, \mathrm{sinc}^2(vb) \cos^2(\pi ue)$$

$$\left(= 4I_0\, \mathrm{sinc}^2\left(\frac{aX}{d\rho}\right) \mathrm{sinc}^2\left(\frac{bY}{d\rho}\right) \cos^2\left(\frac{\pi e X}{d\rho}\right) \right)$$

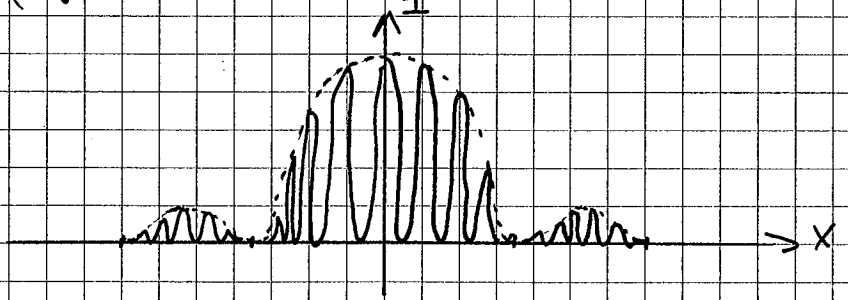
3) $a \ll b$ et $b \gg \lambda$ $\quad i_x = \frac{d\rho}{a} \gg i_y = \frac{d\rho}{b}$ $\Rightarrow$ figure comprimée suivant les Y $\Rightarrow \delta(v)$

4) $I(u,v) = 4I_0\, \delta(v) \left[\frac{\sin(\pi ua)}{(\pi ua)}\right]^2 \cos^2(\pi ue)$

5) $i_x = \frac{d\rho}{a}$ $\quad \Delta x_i = \frac{d\rho}{e}$ $\quad \frac{e}{3,5} = a \Rightarrow i_x = 3,5\, \Delta x_i$

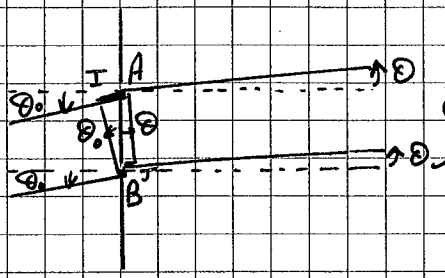
$\mathrm{sinc}^2\left(\frac{aX}{d\rho}\right) = 0$ $\quad \cos^2\left(\frac{\pi eX}{d\rho}\right) = 1$

$\mathrm{cad}\left(\frac{\pi aX}{d\rho}\right) = k\pi$ $\quad k \neq 0$ $\quad \mathrm{cad}\left(\frac{\pi eX}{d\rho}\right) = k'\pi$



Réseau par transmission

1/



$\Delta\phi = \frac{2\pi}{\lambda}\delta$ avec $\delta = \overline{IA} - \overline{BJ}$

$= a(\sin\theta_0 - \sin\theta)$

max : $\Delta\phi = k 2\pi$ k entier $\Rightarrow a(\sin\theta_0 - \sin\theta) = k\lambda$

$\theta_0 = 0$ incidence normale $\Rightarrow \sin\theta_0 = 0 \Rightarrow +a\sin\theta = k\lambda$

$\sin\theta = \frac{k\lambda}{a}$

$= n\lambda k$

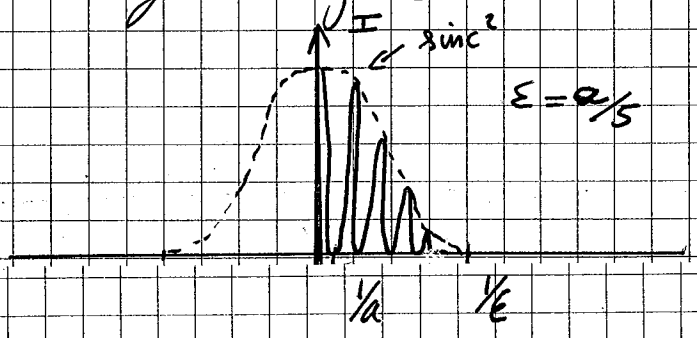
avec $n = 500\,10^{-6}$ (mm^{-1})

$k = 1$ $\sin\theta_1 = 0,3164$ $\Rightarrow$ 3 faisceaux ou 3 ordres $k = 1 \dots 3$

soit $\begin{cases} \theta_1 = 18,45° & k=1 \text{ ordre} \\ \theta_2 = 39,86° & k=2 \\ \theta_3 = 71,66° & k=3 \end{cases}$

2/ $I(u) = N^2\varepsilon^2 \left[\frac{\sin(\pi u \varepsilon)}{\pi u \varepsilon}\right]^2 \left[\frac{\sin(N\pi u a)}{N\sin(\pi u a)}\right]^2$

diffraction par une fente de largeur ε — fct réseau (forme interférentiel)



3/ $\Delta X_{1/2} = \frac{\lambda f}{\varepsilon}$