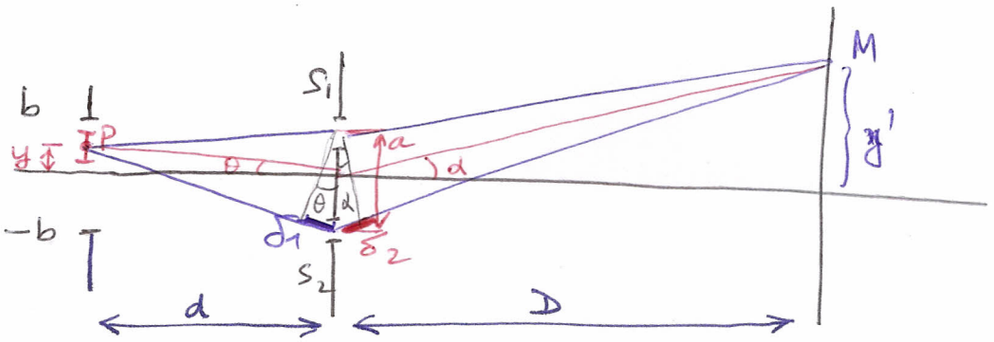
Ex2 (2021) Q.8 fente fine de largeur 2b :



$\sin\theta \simeq \theta \simeq \frac{y}{d} \simeq \frac{\delta}{a}$

$$\delta_{P(M)} = \delta_1 + \delta_2 = \frac{ay}{d} + \frac{ay'}{D} = a\left(\frac{y}{d} + \frac{y'}{D}\right).$$

S : incohérence. Soit un élément de longueur dy centré autour de P :

$$d\mathcal{I}_P(M) = 2\frac{I_0}{(2b)}\left(1 + \cos\left(\frac{2\pi}{\lambda}\delta\right)\right)dy$$

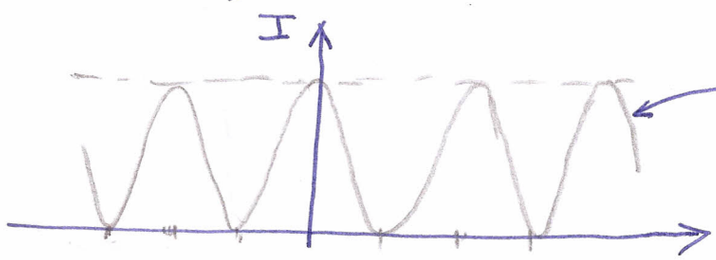
On pose
$u = \frac{2\pi a}{\lambda}\left(\frac{y}{d} + \frac{y'}{D}\right)$
$dy = \frac{1}{\frac{2\pi a}{\lambda d}} \cdot du$

$$\mathcal{I}(M) = I_0\left(\int_{-b}^{+b} dy + \int_{-b}^{+b} \cos\frac{2\pi}{\lambda}\left(\frac{y}{d} + \frac{y'}{D}\right)dy\right)$$

$$= 2I_0 + \frac{I_0}{\frac{2\pi ab}{\lambda d}}\left[\sin\left(\frac{2\pi a}{\lambda}\left(\frac{b}{d} + \frac{y'}{D}\right)\right) - \sin\left(\frac{2\pi a}{\lambda}\left(\frac{-b}{d} + \frac{y'}{D}\right)\right)\right]$$

$$= 2I_0 + \frac{I_0}{\frac{2\pi ab}{\lambda d}}\left[2 \cdot \sin\left(\frac{2\pi a}{\lambda 2}\left[\frac{2b}{d}\right]\right) \times \cos\left(\frac{2\pi a}{\lambda 2}\left[\frac{2y'}{D}\right]\right)\right]$$

$$\Rightarrow \mathcal{I}(M) = 2I_0\left[1 + \text{sinc}\left(\frac{2\pi ab}{\lambda d}\right) \times \cos\left(\frac{2\pi a}{\lambda D}y'\right)\right]$$



↳ pour b donné
sinc(… b) = cte
b ↘ : I_{Max} ↗