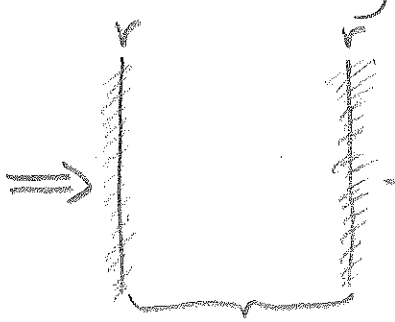
Föreläsning 9 20/04-15



$$T = \frac{1}{1 + \left[\frac{4r^2}{(1-r^2)^2}\right] \sin^2 \frac{\delta}{2}}$$

$$F = \frac{4r^2}{(1-r^2)^2}$$

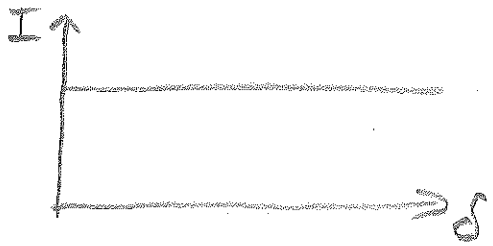
$$T = \frac{1}{1 + F \sin^2 \frac{\delta}{2}}$$

$\delta = 2kd$

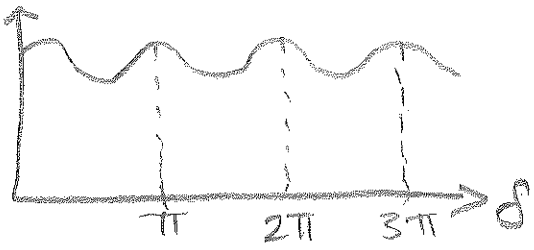
$r: 0 \to 1$

$F: 0 \to \infty$

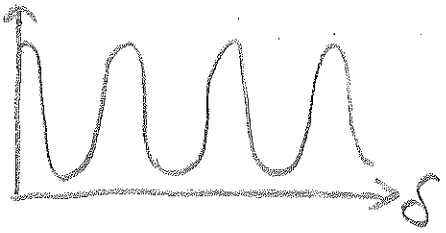
$r = 0$



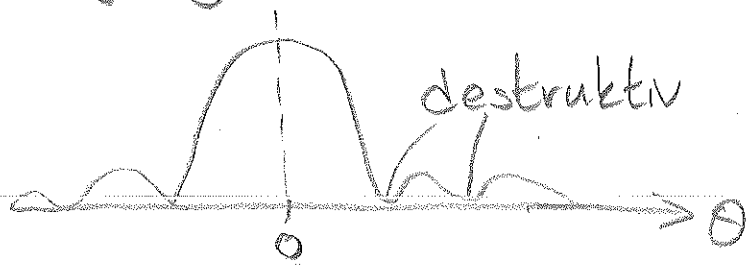
$r = 0{,}2$

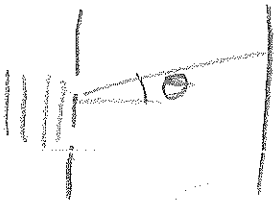


$r = 0{,}9$

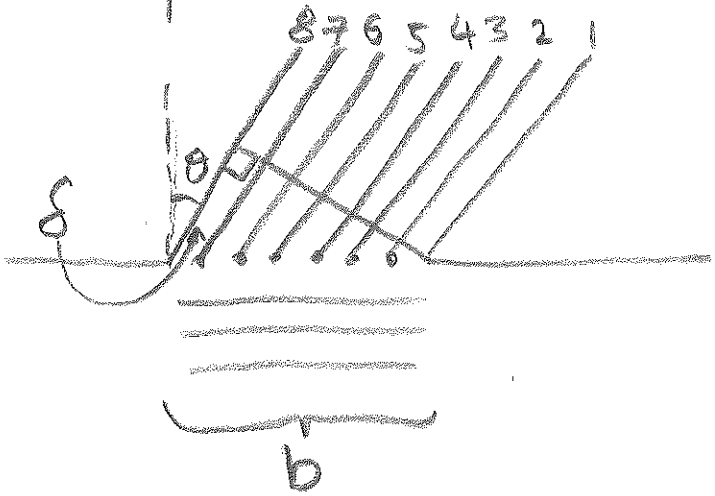


Böjningsmönster m.h.a Huygens' princip





När får vi minima?



Parvis utsläckning

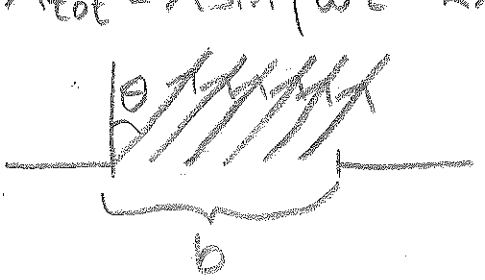
① + ④ = 0
② + ⑤ = 0
③ + ⑥ = 0

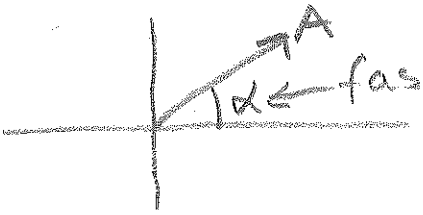
} $\frac{\lambda}{2}$

$\Rightarrow \frac{\delta}{2} = \frac{\lambda}{2} \Rightarrow \delta = m\lambda \quad m = \pm 1, \pm 2, \ldots$

$\delta = \boxed{b\sin\theta = m\lambda}$ ger min i böjning

$A_{tot} = A\sin(\omega t - kx)$

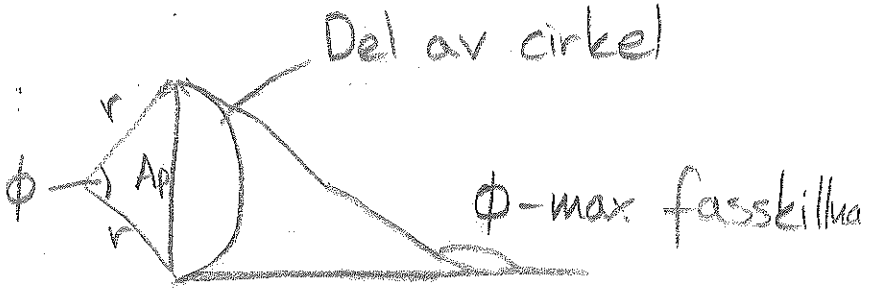




Total amplitud $A_p = \Sigma$ delampl.

Hur lång är A_p

När $N \to \infty$:



Max skillnad i sträcka

$\delta = b\sin\theta$

$\lambda : 2\pi \Rightarrow \phi = \delta\frac{2\pi}{\lambda} = \frac{2\pi}{\lambda} b\sin\theta$

$\frac{1}{2}A_p = r\sin\frac{\phi}{2}$

$\phi = \frac{N \cdot A}{r} \Rightarrow r = \frac{NA}{\phi} \Rightarrow A_p = 2\frac{NA}{\phi}\cdot\sin\frac{\phi}{2} =$

ϕ ↑ def radian.

$NA\,\frac{\sin\phi/2}{\phi/2}$

Intensitet = amplitud i kvadrat

$I = I_0\left[\frac{\sin\beta}{\beta}\right]^2$

$\beta = \frac{\phi}{2} = \frac{\pi}{\lambda} b\sin\theta$

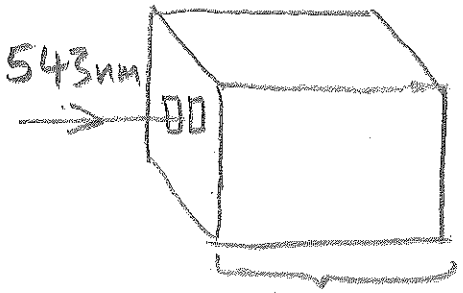
$I = 0$ då $\sin\beta = 0$ men $\beta \neq 0$

$\frac{\pi}{\lambda} b\sin\theta = m\pi \qquad \beta = m\pi$

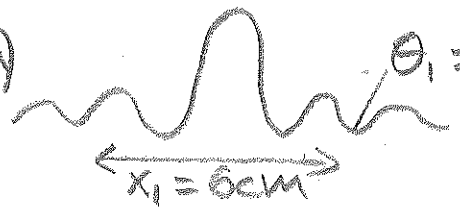
$m \in \mathbb{N}$

$\Rightarrow b\sin\theta = m\lambda$ böjnings min

Uppgift - hur fysiker passar fiskar



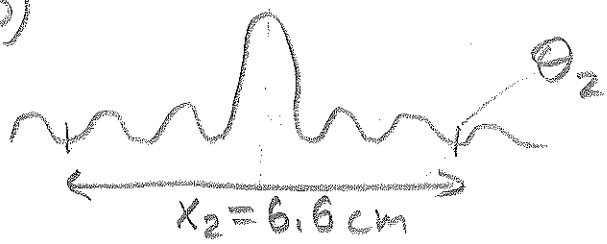
a)



$$\tan\theta_1 = \frac{x_1/2}{L} \Rightarrow \theta_1 = 4,3°$$

$$\left.\begin{array}{l} b\sin\theta = m_1\lambda \\ m_1 = 2 \end{array}\right\} \Rightarrow b = 14,5\mu m$$

b)



$$\tan\theta_2 = \frac{x_2/2}{L} \Rightarrow \theta_2 = 4,7°$$

$$\left.\begin{array}{l} b\sin\theta_2 = m_2\frac{\lambda}{n} \\ m_2 = 3 \end{array}\right\} n = \frac{m_2\lambda}{b\sin\theta_2} = 1,36$$

Cirkulär öppning, D

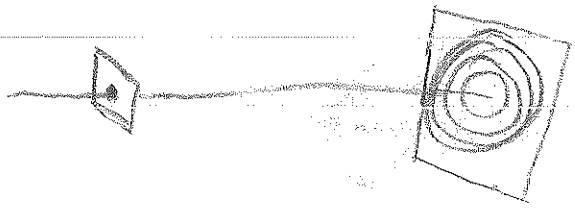
Första min $D\sin\theta = 1,22\lambda$

Andra mm $D\sin\theta = 2,23\lambda$

Högre $D\sin\theta = k\lambda$, $k = 0,25 + m$, $m \in \mathbb{Q}$

Uppgift

Diametern hos 5:te mörka ringen = 62mm



$$\tan\theta = \frac{3,1\cdot10^{-3}m}{5,00m} \quad \theta \approx 0,355°$$

$m = 5$

$k = 0,25 + 5$

$D\sin\theta \approx k\lambda$ $\Rightarrow$ $D = 536\mu m$