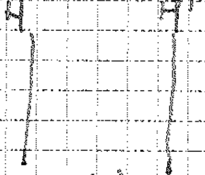
jul 03

① a) $-\frac{1}{a} + \frac{1}{a'} = \frac{1}{f'}$ $a, a', f' \rightarrow$ desde H, H', N'



$\cancel{\beta' a} \cdot \beta' = 1$

$\frac{1}{f'} =$ $\beta' = \frac{n a'}{n' a} = a'\left(\frac{1}{a'} - \frac{1}{f'}\right) = 1 - \frac{a'}{f'} = \beta$

$-\frac{n}{a} + \frac{n'}{a'} = \frac{n'}{f'} \rightarrow \frac{n'}{a'} - \frac{n}{a} = n'\left(\frac{1}{f'} - \frac{1}{a'}\right)$ $\frac{n}{n'a} = \left(\frac{1}{a'} - \frac{1}{f'}\right)$

$a = -\frac{n}{n'} \frac{1}{\left(\frac{1}{f'} - \frac{1}{a'}\right)} \rightarrow$

$\beta = 1 - \frac{a'}{f'}$ $a' = H'O'$

$a'_{H^{-1}} = H'H^{-1'}$

$-1 = 1 - \frac{a'_{H-1}}{f'} \rightarrow a'_{H-1} = 2f'$ $f' = \frac{H'H^{-1'}}{2}$

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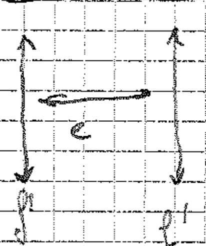
b)



$f' = 3\,cm$
$e = 2\,cm$

H, H'
-1
F, F'

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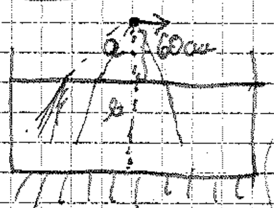
sp 2001

①



$b + a = h + 60\,cm$

$a(t), b(t) = h - 0{,}5\frac{cm}{s}t$, $a = 60\,cm + 0{,}5\frac{cm}{s}t$

$$\begin{pmatrix} h' \\ \sigma' \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}\begin{pmatrix} 1 & -b \\ 0 & 1 \end{pmatrix}\begin{pmatrix} 1 & 0 \\ 0 & \frac{1}{n} \end{pmatrix}\begin{pmatrix} 1 & -a \\ 0 & 1 \end{pmatrix}\begin{pmatrix} h \\ \sigma \end{pmatrix}$$

$$= \begin{pmatrix} 1 & -b \\ 0 & -1 \end{pmatrix}\begin{pmatrix} 1 & -a \\ 0 & \frac{1}{n} \end{pmatrix}\begin{pmatrix} h \\ \sigma \end{pmatrix} = \begin{pmatrix} 1 & -a - \frac{b}{n} \\ 0 & -\frac{1}{n} \end{pmatrix}\begin{pmatrix} h \\ \sigma \end{pmatrix} = \begin{pmatrix} h - \sigma\left(a + \frac{b}{n}\right) \\ -\frac{\sigma}{n} \end{pmatrix}$$

NO

$-\frac{n}{a} + \frac{n'}{a'} = \frac{n'}{f'} \rightarrow -\frac{1}{a} + \frac{n}{a'} = 0 \rightarrow \frac{n}{a'} = +\frac{1}{a}$ $a, b < 0$

$\rightarrow a' = +\frac{a}{n}$ $a_2 = b + a'$

$-\frac{n}{a_2} + \frac{(-n)}{a_2'} = \frac{(-n)}{\infty} \rightarrow -\frac{n}{a_2} - \frac{n}{a_2'} = 0$ $a_2' = -a_2 = -(a' + b) = \left(\frac{a}{n} + b\right)$

$a_2' = -\left(\cancel{0{,}5t} \frac{60 + 0{,}5t}{n} + h + 0{,}5t\right) = \frac{60 + 0{,}5t}{n} + h - 0{,}5t$

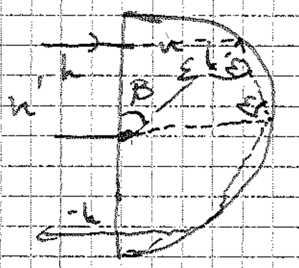
C. directo:

final: $0{,}5t = h \rightarrow \frac{60 + h}{n}$

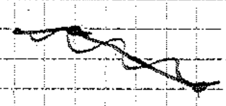
$4 + \ \rightarrow \cancel{4 \cdot 60 + 0{,}5t\ (+0{,}5t)}$

set 06

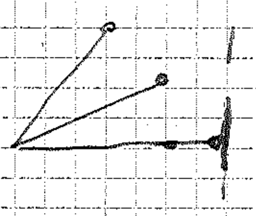
$n = 1{,}52$ 5 refl. internas

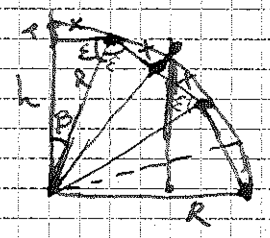


$\sin\varepsilon = \frac{h}{R}$



$R\cos\varepsilon = x$





$\beta = \frac{\pi}{2} - \varepsilon$

$5\beta = \frac{\pi}{2} \rightarrow \beta = \frac{\pi}{10} \rightarrow \varepsilon = \frac{\pi}{2} - \frac{\pi}{10} = \frac{4\pi}{10} = \frac{2\pi}{5}$

$h = R \sin \frac{2\pi}{5}$

$\varepsilon = 2\pi/5 \geq \varepsilon_e$ $\qquad \varepsilon = \frac{2\pi}{p}$

$n \sin 2\pi/5 = n' \sin \pi/2$

$n' \leq 1{,}4456$

$|r_{\parallel}|, |r_{\perp}| = 1$

e. polarización $\rightarrow$ $\begin{matrix} A_{\parallel} \\ A_{\perp} \end{matrix} \rightarrow A \begin{pmatrix} 1 \\ 1 \end{pmatrix}_{Aleat} \rightarrow \begin{matrix} t_{\parallel} \\ t_{\perp} \end{matrix} \rightarrow 5 \quad \begin{matrix} t_{\parallel}' \\ t_{\perp}' \end{matrix}$

$\Delta = 5 \tan \frac{\delta}{2} =$ $\qquad t = \frac{2n}{n+n'}$

$\rightarrow t \cdot t' A \left(\cancel{\ } \right)_{Aleat}$ $\qquad t' = \frac{2n'}{n+n'}$

$= \frac{4nn'}{(n+n')^2} \cdot A \cdot \left(\quad \right)_{Aleat} \cdot = K \cdot ($

ene 05

①

$\rightarrow S|\alpha\rangle = p_L \begin{pmatrix} 1 \\ e^{i\alpha} \end{pmatrix} |p_L \alpha\rangle$; $\begin{pmatrix} 1 \\ ie^{i\alpha} \end{pmatrix}$ $\begin{pmatrix} 1 \\ -ie^{-i\alpha} \end{pmatrix}$

$S|R\rangle = p_R \cdot e^{-i\alpha} |R\rangle$;

$\hookrightarrow p_R \begin{pmatrix} 1 \\ i \end{pmatrix} (1 \;\; -i) \cdot e^{-i\alpha} + p_L \cdot e^{i\alpha} \begin{pmatrix} 1 \\ -i \end{pmatrix} (1 \;\; i)$; $p_L \begin{pmatrix} 1 \\ e^{+i\alpha - i\pi/2} \end{pmatrix}$

$= p_R e^{-i\alpha} \begin{pmatrix} 1 & -i \\ i & 1 \end{pmatrix} + p_L \cdot e^{i\alpha} \begin{pmatrix} 1 & i \\ -i & 1 \end{pmatrix}$

$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 1 \\ i \end{pmatrix} = p_R \cdot \begin{pmatrix} 1 \\ i \cdot e^{-i\alpha} \end{pmatrix} = \begin{pmatrix} a + ib \\ c + id \end{pmatrix}$ $\qquad p_R = a + ib$

$i p_R \cdot e^{-i\alpha} = c + id$

$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 1 \\ -i \end{pmatrix} = p_L \cdot \begin{pmatrix} 1 \\ -i \cdot e^{i\alpha} \end{pmatrix}$ $\quad p_L = a - bi$ $\quad p_L + p_R = 2a \rightarrow a = \frac{p_L + p_R}{2}$

$-p_L \, i e^{i\alpha} = c - di$ $\quad i p_R e^{-i\alpha} - i p_L e^{i\alpha} = 2c$

$$\begin{pmatrix} \cdots & \cdots \\ \frac{i}{2}(p_R \cdot e^{-i\alpha} - p_L e^{i\alpha}) & \frac{p_L e^{i\alpha} + p_R \cdot e^{-i\alpha}}{2} \end{pmatrix} = \frac{1}{2}\begin{pmatrix} \cdots & \cdots \\ i(p_R e^{-i\alpha} - p_L e^{i\alpha}) & i(p_R e^{-i\alpha} + p_L e^{i\alpha}) \end{pmatrix}$$

$$\longrightarrow \begin{pmatrix} 1 \\ i \end{pmatrix} \longrightarrow \frac{1}{2}\begin{pmatrix} p_R + p_L + p_R - p_L \\ \frac{i}{2}(-) + \frac{i}{2}(+) \end{pmatrix} = \frac{1}{2}\begin{pmatrix} 2 p_R \\ 2i\, p_R e^{-i\alpha} \end{pmatrix}$$

$$= p_R \begin{pmatrix} 1 \\ i \cdot e^{-i\alpha} \end{pmatrix} \checkmark \quad \cong \begin{pmatrix} 1 \\ -i \end{pmatrix} \checkmark$$

$\rightarrow \lambda_s$

$$\begin{vmatrix} (p_R + p_L) - \lambda & i(p_L - p_R) \\ i(p_R e^{-i\alpha} - p_L e^{i\alpha}) & i(p_R e^{-i\alpha} + p_L e^{i\alpha}) - \lambda \end{vmatrix} = (a-\lambda)(b-\lambda) + (p_L - p_R)(-)$$

$$= ab + \lambda^2 - \lambda b - \lambda a + ( )( ) = i(p_R + p_L)(r+l) + \lambda^2 - \lambda i (r+l)$$

$$- \lambda(p_R + p_L) + (p_L - p_R)(r - l)$$

$$= \lambda^2 - \lambda((p_R + p_L) + i(r+l)) + (p_L - p_R)(r-l) + i(p_R + p_L)(r+l) = 0$$

$$= \lambda^2 + (p_R + p_L)(i(r+l) - \lambda)$$

<u>exc 03</u>

$$P|\psi_1\rangle = p_1 |\psi_1\rangle \qquad p_1 \to 1 \qquad |\psi_1\rangle = \begin{pmatrix} \cos\alpha \\ \sin\alpha \end{pmatrix} \quad \psi_1 \angle T_\alpha$$

$$P|\psi_2\rangle = p_2 |\psi_2\rangle \qquad p_2 \to 0 \qquad |\psi_2\rangle = \begin{pmatrix} -\sin\alpha \\ \cos\alpha \end{pmatrix}$$

$$M = p_1 \begin{pmatrix} c\alpha \\ s\alpha \end{pmatrix}(c\alpha \ \ s\alpha) + p_2 \begin{pmatrix} -s\alpha \\ c\alpha \end{pmatrix}(-s\alpha \ \ c\alpha)$$

$$= p_1 \begin{pmatrix} c^2 & sc \\ sc & s^2 \end{pmatrix} + p_2 \begin{pmatrix} s^2\alpha & -sc \\ -sc & c^2 \end{pmatrix}$$

$$= \begin{pmatrix} c^2(p_1 + p_2) & sc(p_1 - p_2) \\ sc(p_1 - p_2) & s^2(p_1 + p_2) \end{pmatrix}$$

ex 07

(1) $\varepsilon_1 = \begin{pmatrix} \cos\alpha \\ i\sin\alpha \end{pmatrix}$

$\langle \varepsilon_2 | \varepsilon_1 \rangle = 0 = \varepsilon_2^{+} \varepsilon_1^{*} = (a^* \ b^*) \begin{pmatrix} \cos\alpha \\ i\sin\alpha \end{pmatrix} = 0$

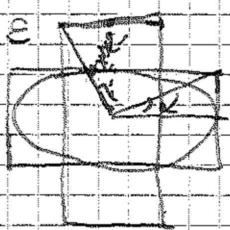
$a^* \cos\alpha + i b^* \sin\alpha = 0 = \cos\alpha' \cos\alpha + \frac{i}{i} \sin\alpha' \sin\alpha = 0$

$\angle$ d. entrada $\rightarrow \alpha' = \alpha + \pi/2$

$\left.\begin{array}{l} \cos\alpha' = -\sin\alpha \\ \sin\alpha' = \cos\alpha \end{array}\right\} \checkmark$

$\begin{pmatrix} \cos\alpha \\ i\sin\alpha \end{pmatrix} \leftrightarrow \begin{pmatrix} -\sin\alpha \\ i\cos\alpha \end{pmatrix} \sim \begin{pmatrix} \cos(\alpha+\pi/2) \\ i\sin(\alpha+\pi/2) \end{pmatrix}$

$\alpha = \varepsilon$



$\angle$ e. G $\alpha + \pi/2$

b) $\begin{pmatrix} i & 0 \\ 0 & 1 \end{pmatrix} (+) \begin{pmatrix} \cos^2\varepsilon & s\varepsilon c\varepsilon \\ s\varepsilon c\varepsilon & \sin^2\varepsilon \end{pmatrix} \begin{pmatrix} i & 0 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} i c^2\varepsilon & s\varepsilon c\varepsilon \\ i s\varepsilon c\varepsilon & s^2\varepsilon \end{pmatrix}$

$\begin{pmatrix} i c^2\varepsilon & s\varepsilon c\varepsilon \\ i s\varepsilon c\varepsilon & s^2\varepsilon \end{pmatrix} \begin{pmatrix} c\varepsilon \\ i s\varepsilon \end{pmatrix} = \begin{pmatrix} i c^3\varepsilon + i s^2 c\varepsilon \\ i c^2 s\varepsilon + i s^3\varepsilon \end{pmatrix} = i \begin{pmatrix} c\varepsilon(c^2+s^2) \\ s\varepsilon(c^2+s^2) \end{pmatrix}$

$= i \begin{pmatrix} \cos\varepsilon \\ \sin\varepsilon \end{pmatrix}$ $\quad \begin{pmatrix} i & 0 \\ 0 & 1 \end{pmatrix} \varepsilon_1 \rightarrow P_\varepsilon = I$

$\begin{pmatrix} i\cos\varepsilon \\ i\sin\varepsilon \end{pmatrix} \sim i \begin{pmatrix} \cos\varepsilon \\ \sin\varepsilon \end{pmatrix}$

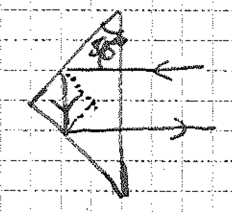
$(\ ) \begin{pmatrix} i & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} -\sin\varepsilon \\ i\cos\varepsilon \end{pmatrix} = (\ ) \begin{pmatrix} -i\sin\varepsilon \\ i\cos\varepsilon \end{pmatrix} = -i (\ ) \begin{pmatrix} \sin\varepsilon \\ -\cos\varepsilon \end{pmatrix}$

$= -i \begin{pmatrix} c^2\varepsilon s & -sc^2 \\ s^2 c & -s^2 c \end{pmatrix} = 0 \checkmark$ $\quad P_{\varepsilon+\pi/2} \leftarrow \begin{array}{l} P_\varepsilon \\ \varphi = \pi \end{array}$

$D\varepsilon = A \cdot D\varepsilon_1 = A \cdot P_\varepsilon$

c) $\varepsilon \rightarrow \varepsilon + \alpha \Rightarrow$ Similar $P_{\varepsilon+\alpha}$

② $n = 1{,}3$ $\quad \varepsilon_c = 50{,}28$



$$\begin{pmatrix} t'_{\parallel} r'^{2}_{\parallel} t_{\parallel} \Delta_{\parallel} \\ t'_{\perp} r'^{2}_{\perp} t_{\perp} \Delta_{\perp} \end{pmatrix} \nearrow \begin{array}{l} t_{\parallel} = t_{\perp} = t \\ t'_{\parallel} = t'_{\perp} = t \end{array} \quad \text{ça que } i = 45°$$

$$= tt' \begin{pmatrix} r'^{2}_{\parallel} \\ r'^{2}_{\perp} \end{pmatrix} \rightarrow tt' \begin{pmatrix} r''^2 & 0 \\ 0 & r_{\perp}^2 \end{pmatrix}$$

$$r_{\parallel} = \frac{n\cos i - n\cos r}{\cos i + n\cos r} \Rightarrow \qquad \Delta_{\parallel} = \Delta_{\perp} = \Delta$$

$$\varepsilon' = A t t' \begin{pmatrix} r_{\parallel}^2 \\ r_{\perp}^2 \end{pmatrix}$$

$$r_{\perp} = \frac{n\cos i - \cos r}{n\cos i + \cos r}$$

$$t = \frac{2}{1+n} \qquad \varepsilon' = \Delta \cdot \underbrace{\frac{4n}{1+n^2}}_{\sqrt{T_{\parallel} T_{\perp}}} \begin{pmatrix} R_{\parallel} \\ R_{\perp} \end{pmatrix}$$

$$t' = \frac{2n}{1+n}$$

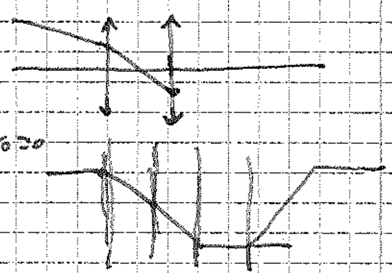
$$T_{\parallel} = t_{\parallel}^2 \cdot \frac{n'^2}{n^2} \qquad 1{,}3 \cdot \sin 45 = 1 \cdot \sin r$$

$$r = 66{,}8$$

$$r_{\parallel} = 0{,}160 \quad , \quad r_{\parallel}^2 = 0{,}0256708$$

$$r_{\perp} = 0{,}4 \qquad r_{\perp}^2 = 0{,}160221093$$

$$\frac{I}{I_0} = \frac{\Delta^2 t^2 t'^2 (r''^4 + r_{\perp}^4)}{\Delta^2 2} = 0{,}049194848$$



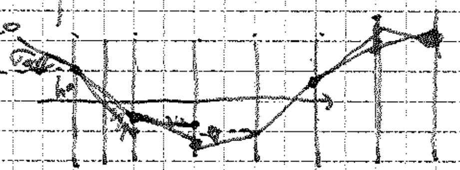
Exo 06

② $M = \begin{pmatrix} 1 & 0 \\ \varphi' & 1 \end{pmatrix} \qquad \varphi' = (n-1)\left(\frac{1}{r_1} - \frac{1}{r_2}\right)$

$$\sigma_0 = 0$$

$$\begin{pmatrix} 1 & 0 \\ \varphi' & 1 \end{pmatrix} \begin{pmatrix} h_0 \\ \sigma_0 \end{pmatrix} = \begin{pmatrix} h' \\ \sigma' \end{pmatrix} = \begin{pmatrix} h_0 \\ \varphi' h + \sigma_0 \end{pmatrix} \rightarrow \begin{pmatrix} 1 & -\frac{1}{\varphi'} \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ \varphi' & 1 \end{pmatrix} = \begin{pmatrix} 0 & -\frac{1}{\varphi'} \\ \varphi' & 1 \end{pmatrix}$$

$$\begin{pmatrix} -\frac{\sigma_0}{\varphi'} \\ \varphi' h_0 + \sigma_0 \end{pmatrix} \rightarrow = \begin{pmatrix} -\frac{h_0}{\varphi'} \\ -\sigma_0 + \varphi' h_0 + \sigma_0 \end{pmatrix} = \begin{pmatrix} -\frac{\sigma_0}{\varphi'} \\ \varphi' h_0 \end{pmatrix}$$



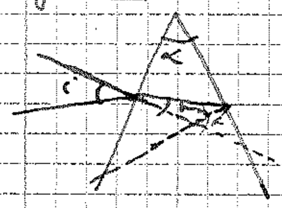
$$\begin{pmatrix} 1 & -\frac{1}{\varphi'} \\ 0 & 1 \end{pmatrix} \underset{\begin{pmatrix} 1 & 0 \\ \varphi' & 1 \end{pmatrix}}{\rightarrow} \begin{pmatrix} -\frac{\sigma_0}{\varphi'} - h_0 \\ \varphi' h_0 \end{pmatrix} \rightarrow \begin{pmatrix} -\frac{\sigma_0}{\varphi'} - h_0 \\ -\sigma_0 \end{pmatrix} \rightarrow \begin{pmatrix} -h_0 \\ -\sigma_0 \end{pmatrix}$$

$$\begin{pmatrix} h_0 \\ \sigma_0 \end{pmatrix} \xrightarrow{L_1} \begin{pmatrix} h_0 \\ \varphi' h_0 + \sigma_0 \end{pmatrix} \xrightarrow{T_1} \begin{pmatrix} -\frac{\sigma_0}{\varphi'} \\ \varphi' h_0 + \sigma_0 \end{pmatrix} \xrightarrow{L_2} \begin{pmatrix} -\frac{\sigma_0}{\varphi'} \\ \varphi' h_0 \end{pmatrix} \xrightarrow{T_2} \begin{pmatrix} -\frac{\sigma_0}{\varphi'} - h_0 \\ \varphi' h_0 \end{pmatrix} \xrightarrow{L_3} \begin{pmatrix} -\frac{\sigma_0}{\varphi'} - h_0 \\ -\sigma_0 \end{pmatrix} \xrightarrow{T_3} \begin{pmatrix} -h_0 \\ -\sigma_0 \end{pmatrix}$$

$$T_3 L_3 T_2 L_2 T_1 L_1 \begin{pmatrix} h_0 \\ \sigma_0 \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} h_0 \\ \sigma_0 \end{pmatrix} \rightarrow T L_6 T L_5 T L_4 (\,) = -I(-I) = I$$

feb-09

①



$n, \alpha \ / \ i_2 = r$

$i_2 + r + \pi - \alpha = \pi$

$i_2 + r = \alpha$

$2r = \alpha$

$r = \frac{\alpha}{2}$

$\sin r = \sin\frac{\alpha}{2}$

$\underbrace{n' \sin r}_{n \sin \varepsilon_B} = n' \sin\frac{\alpha}{2}$

$$\varepsilon_B + \varepsilon_B' = \frac{\pi}{2} = i + r = i + \frac{\alpha}{2} = \operatorname{atan}(n') + \frac{\alpha}{2}$$

$$2\operatorname{atan}(n') + \alpha = \pi \rightarrow n' = \tan\frac{\pi - \alpha}{2}$$

$$= \frac{\cos \alpha/2}{-\sin \alpha/2} = +\operatorname{cotg}(\alpha/2)$$

$$\hookrightarrow \operatorname{tg}\frac{\alpha}{2} = \frac{1}{n'}$$

$$\begin{pmatrix} A_{\parallel} \\ A_{\perp} \end{pmatrix} \rightarrow \begin{pmatrix} t_{\parallel} A_{\parallel} \\ t_{\perp} A_{\perp} \end{pmatrix} \rightarrow \left\{ t_{\parallel} = \frac{2\cos i}{\cos r + n\cos i} \right.$$

$i + r = \pi/2$ $\quad \sin i = \sin(\pi/2 - r) = \cos r$

$\cos i = \cos(\pi/2 - r) = \sin r$

$\cos(i+r) = 0$

$\cos i \cos r - \sin i \sin r = 0$

$$t_{\perp} = \frac{2\cos i}{\cos i + n\cos r}$$

$\operatorname{tg} i = \operatorname{tg} r =$

$\sin(i+r) = \pi/2$

$\sin i \cos r + \cos i \sin r = 1$

$$\frac{\sin i}{\cos i} = n' = \frac{\sin i \cdot n}{\sin r} \rightarrow \sin r = \cos i$$

$$= \frac{n' \sin r}{\cos i}$$

$1 - \sin^2 r = 1 - \cos^2 i$

$\cos r = \sin i$

$$\frac{I_{\parallel t}}{I_{\perp t}} = \frac{n'/n}{n'/n}\left(\frac{A_{\parallel}}{A_{\perp}}\right)^2 \cdot \frac{t_{\parallel}^2}{t_{\perp}^2} \Rightarrow \frac{t_{\parallel}}{t_{\perp}} = \frac{2\cos i}{\cos r + n\cos i} \cdot \frac{\cos i + n\cos r}{2\cos i}$$

$$= \frac{\cos i + n\cos r}{n\cos i + \cos r} = \frac{\sin r + n\cos r}{n\sin r + \cos r} = \frac{\cos r(\tan r + n)}{\cos r(1 + n\tan r)} = \frac{\frac{1}{n} + n}{1 + 1} = \frac{\frac{1}{n} + n}{2}$$

$$= \frac{1 + n^2}{2n} = \frac{(n+1)^2}{2n} - 1$$

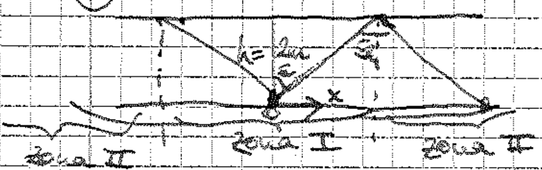
$$\hookrightarrow \frac{I''_t}{I_{\perp t}} = \frac{(1+n^2)^2}{4n^2}$$

set 08

$I \equiv \rho_{\varepsilon}$ $\quad I = \int \rho \cdot dx$ ó $\int \rho_{\varepsilon} d\varepsilon$

$\varepsilon > \varepsilon_c \rightarrow I = I_0$

②



$\tan \varepsilon_c = \frac{x_I/2}{h}$

$|x_I| = 2h\tan\varepsilon_c = 4\tan\varepsilon_c$

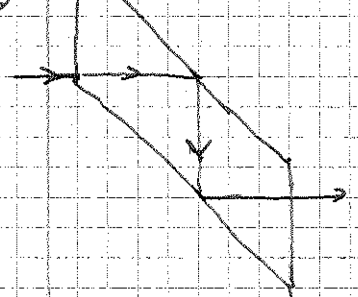
$x_{II} \rightarrow > x_I$ $\quad r_{\parallel\perp}(\varepsilon) \rightarrow \tan\varepsilon = \frac{x/2}{h}$

$x = 2h\tan\varepsilon$

$$\begin{pmatrix} A_{\parallel} \\ A_{\perp} \end{pmatrix} = \begin{pmatrix} r_{\parallel} A_{\parallel} \\ r_{\perp} A_{\perp} \end{pmatrix} \rightarrow I(x_I) = r_{\parallel}^2(x) \cdot A_{\parallel}^2 + r_{\perp}^2(x) A_{\perp}^2$$

$\rightarrow A_{\parallel} = A_{\perp} = A$

$$= A^2 (r_{\parallel}^2 + r_{\perp}^2) = A^2 \left(\frac{\tan^2(\varepsilon - \varepsilon')}{\tan^2(\varepsilon + \varepsilon')} + \frac{\sin^2(\varepsilon - \varepsilon')}{\sin^2(\varepsilon + \varepsilon')} \right)$$



$$\begin{pmatrix} A_\parallel \\ A_\perp \end{pmatrix} \rightarrow \begin{pmatrix} t_\parallel & A_\parallel \\ t_\perp & A_\perp \end{pmatrix} \rightarrow \begin{matrix} r_\parallel' \\ r_\perp' \end{matrix} \rightarrow \begin{matrix} r_\parallel' \\ r_\perp' \end{matrix} \rightarrow \begin{matrix} t_\parallel' \\ t_\perp' \end{matrix}$$

$$t_\parallel = t_\perp = t$$
$$t_\parallel' = t_\perp' = t'$$

$$\longrightarrow \quad |r_\parallel| = 1$$
$$|r_\perp| = 1$$

$$\rightarrow \; t \cdot t' \cdot \begin{pmatrix} r_\parallel'^2 \cdot A_\parallel \\ r_\perp'^2 \quad A_\perp \end{pmatrix} = t \cdot t' \begin{pmatrix} e^{i2\varphi_x} & A_\parallel \\ e^{i2\varphi_y} & A_\perp \end{pmatrix}$$

$$= t \cdot t' \, e^{i2\varphi_x} \begin{pmatrix} A_\parallel \\ e^{i2\delta_0} A_\perp \end{pmatrix} \qquad 2\delta_0 = \delta$$

$$\tan \frac{\delta}{2} = \tan \delta_0 = \ldots$$

↳ Lámina $\lambda/4$ $\quad \begin{pmatrix} 1 & 0 \\ 0 & e^{i\pi/2} \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & i \end{pmatrix}$

↳ $2\delta_0 = \frac{\pi}{2} \rightarrow \delta_0 = \pi$ $\qquad \theta_i = \pi/2$ X $\quad \alpha = 0$ X

↳ $\tan \pi = 0 =$ ↳ $\sin^2 i = \left(\frac{n_t}{n_i}\right)^2 = \frac{1}{n^2} = \sin^2(\pi/2 - \alpha)$

↳ $\frac{1}{n} = \pm \sin\left(\frac{\pi}{2} - \alpha\right) = \pm \cos \alpha$

$$\alpha_+ = \arccos \frac{1}{n} = 48{,}9^\circ$$

$$\left(\alpha_- = \arccos \frac{1}{n} - \pi = -131{,}1^\circ\right)$$

<u>jun 08</u>

① $0^\circ \rightarrow 60^\circ$

$30^\circ \rightarrow 150^\circ$

a) $G|P_0\rangle = |P_{60}\rangle$ ↗ no vectores propios

$G|P_{30}\rangle = |P_{150}\rangle$

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} \cos 0 \\ \sin 0 \end{pmatrix} = \begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 1 \\ 0 \end{pmatrix} = \begin{pmatrix} \cos 60 \\ \sin 60 \end{pmatrix}$$

$$a = \cos 60^\circ$$
$$c = \sin 60$$

$$\begin{pmatrix} \cancel{\cos 60} & b \\ \cancel{\sin 60} & d \end{pmatrix} \begin{pmatrix} 0 \\ 1 \end{pmatrix} = \begin{pmatrix} \cos 150^\circ \\ \sin 150^\circ \end{pmatrix}$$

$$b = \cos 150^\circ = -\cos(+30) = -\sin 60$$
$$d = \sin 150^\circ = -\sin(-30) = \sin 30 = \cos 60$$

$$G = \begin{pmatrix} \cos 60 & -\sin 60 \\ \sin 60 & \cos 60 \end{pmatrix}$$