HW#5 Solution 4/5/'21

$$E_T = E_0 e^{i\omega t}\left(tt' + tt'r'^2 e^{-i\delta} + tt'r'^4 e^{-i4\delta} + tt'r'^6 e^{-i6\delta} + \cdots \right) e^{-i\delta}$$

$$= E_0 e^{i\omega t} e^{-i\delta}\, tt'\left(1 + x + x^2 + x^3 + \cdots\right), \quad x = r'^2 e^{-i\delta}, \quad \delta = 2n_f t \cos\theta_t$$

$$= E_0 e^{i\omega t} e^{-i\delta}\, tt' \left(\frac{1}{1-x} \right)$$

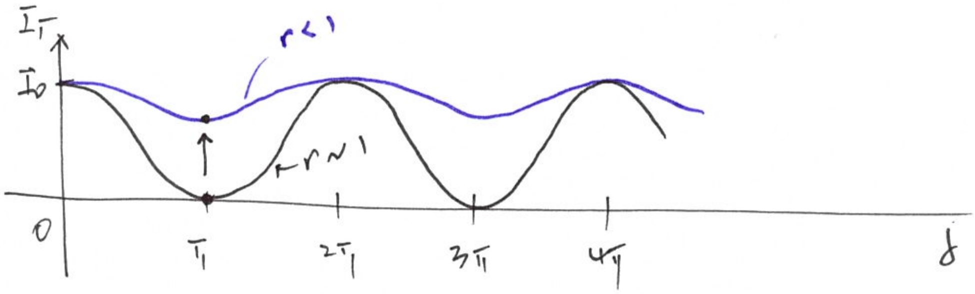
$$= E_0 e^{i\omega t} e^{-i\delta} \frac{1-r^2}{1-r^2 e^{-i\delta}}$$

$$I_T = E_T E_T^* = I_0 \frac{(1-r^2)^2}{1+r^4 - r^2\left(e^{i\delta} + e^{-i\delta}\right)} = \frac{(1-r^2)^2}{1+r^4-2r^2\cos\delta}$$

For $\delta = 0$, $I_T = I_0$, regardless of r.

~~$\delta = \frac{\pi}{2}$, if $r \sim 1$, $I_T = 0$; if $r \sim 0$, $I_T \sim I_0$~~

$\delta = \pi$, $I_T = \dfrac{(1-r^2)^2}{(1+r^2)^2} I_0$, if $r \sim 1$, $I_T = 0$; if $r \sim 0$, $I_T = I_0$



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Hw#5
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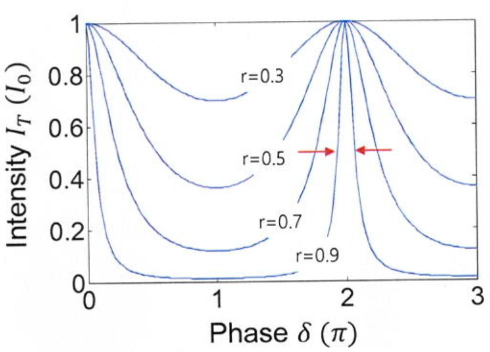
Prof. Ham

[Fabry-Perot Transmitted light]




```
%hw#5 2021.04.05
clear all
hold on
dx=pi/48;
pi3=3*pi;
x=[0:dx:pi3];%path-length induced phase difference
r=.3;%reflectance coefficient
I=(1-r^2).^2./(1+r^4-2*r^2.*cos(x));
xx=x/pi;
plot(xx,I)
```