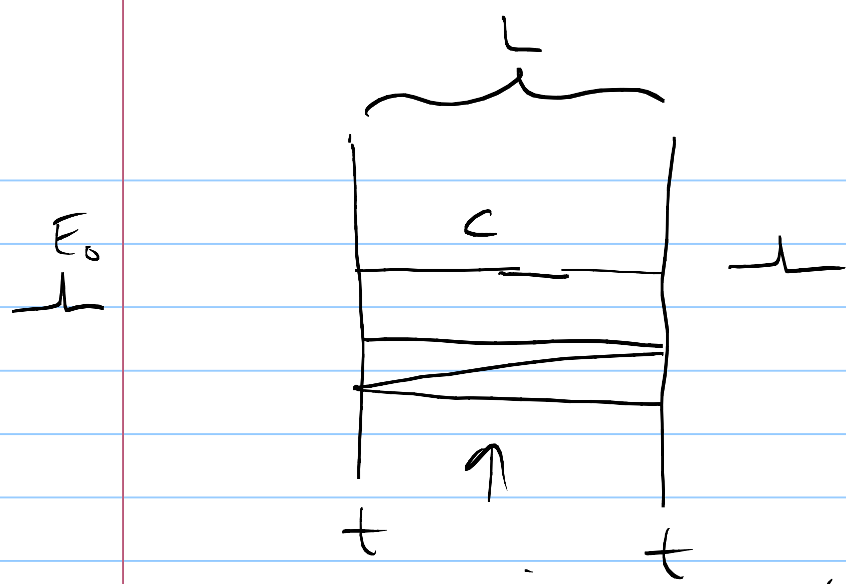
Fabry-Perot etalon

Note Title 9/13/2006

2 identical mirrors



$E_0 t^2 e^{i\omega L/c}$

$E_0 t^2 r^2 e^{i\omega 3L/c}$

$E_0 t^2 r^4 e^{i\omega 5L}$

artists conception, all rays $\perp$ mirrors

$$E_t = (E_0 t^2) e^{i\omega L/c} \left[1 + r^2 e^{i\omega 2L/c} + r^4 e^{i\omega 4L/c} + \dots \right]$$

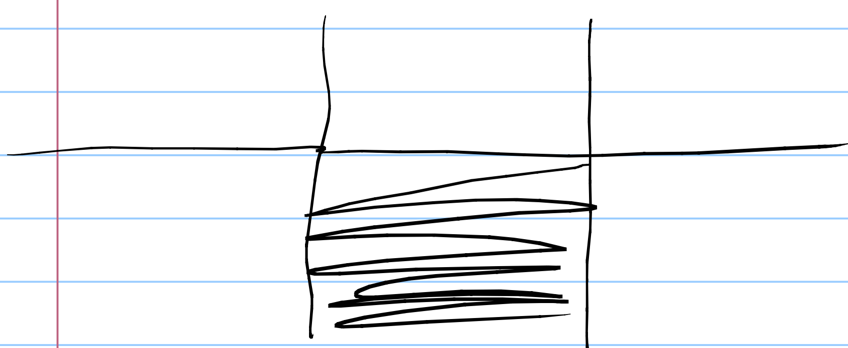
$$\underset{\text{terms}}{m} \quad = E_0 t^2 e^{i\omega L/c} \left(\frac{1 - r^{2m} e^{i\omega m L/c}}{1 - r^2 e^{i\omega 2L/c}} \right)$$

$$\lim_{m \to \infty} = \frac{E_0 t^2 e^{i\omega L/c}}{1 - r^2 e^{i\omega 2L/c}}$$

$$\frac{I_t}{I} \equiv \frac{\text{transmitted intensity}}{\text{inciden intensity}}$$

$$\boxed{\frac{I_t}{I_0} = \frac{1}{1 + K\sin^2(L\omega/c)}}$$

$$K = \frac{2\Gamma}{(1-\Gamma)^2}$$



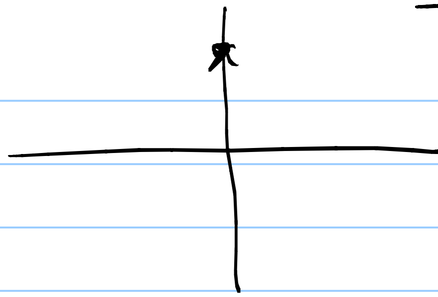
$e^{i\omega L/c}$

$e^{i\omega n L/c_0}$

CRDS

Cavity Ringdown Spectroscopy

O & PS google



$z = i \quad = 1 e^{i\pi/2}$

$z = e^{i\pi/2} = e^{i(\pi/2 + 2\pi)}$

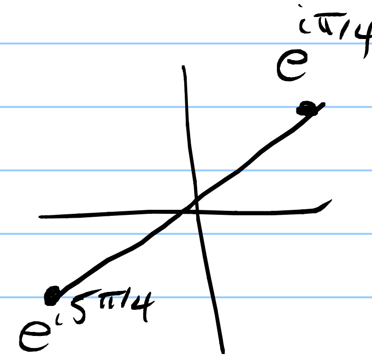
$= e^{i5\pi/2}$

$z = re^{i\theta} \qquad z^2 = r^2 e^{i2\theta}$

$z^{1/2} = \sqrt{r}\, e^{i\theta/2}$

if $z = e^{i\pi/2} \quad \sqrt{z} = e^{i\pi/4}$

$z = e^{i5\pi/2} \quad \sqrt{z} = e^{i5\pi/4}$

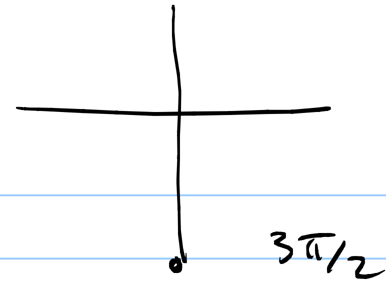


$$\sqrt[6]{-8i}$$

$$\sqrt[6]{8(-i)}$$

$$\sqrt[6]{8} = \sqrt{2}$$

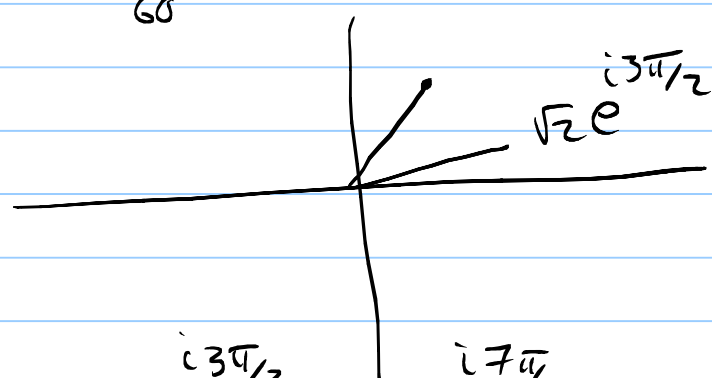
$$z = -8i$$



$$= 8e^{i3\pi/2}, \quad 8e^{i(3\pi/2 + n2\pi)}$$

Arg $\quad \frac{3\pi}{2}, \frac{7\pi}{2}, \frac{11\pi}{2}, \frac{15\pi}{2}, \frac{19\pi}{2}, \frac{23\pi}{2}$

$\sqrt[6]{\ }$ $\quad \underbrace{\frac{3\pi}{12}, \frac{7\pi}{12}}_{60^\circ}, \frac{11\pi}{12}, \frac{15\pi}{12}, \frac{19\pi}{12}, \frac{23\pi}{12}$

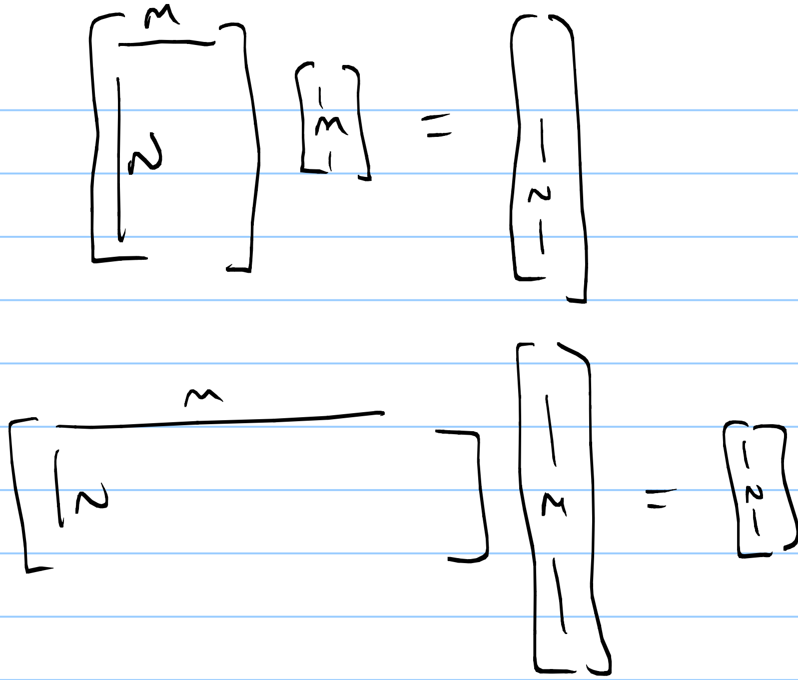


$$\sqrt[6]{-8i} = \sqrt{2}e^{i3\pi/2}, \sqrt{2}e^{i7\pi/2}, \dots \sqrt{2}e^{i23\pi/12}$$

$A \in \mathbb{R}^{N \times m}$ N rows m columns

A matrix is the representation of a Linear operator mapping from

$\mathbb{R}^M \to \mathbb{R}^N$



m
n
m
n
m
n
m
n

$$A \cdot \vec{x} \Rightarrow \quad \vec{x} \in R^{m}$$

$$(A \cdot \vec{x}) \in R^{N}$$

$$(A \cdot X)_i = \sum_{j=1}^{m} A_{ij} X_j$$

$A \cdot x$ let $\begin{bmatrix} a_i \\ \\ \end{bmatrix}$ ith column of A

$$A \cdot x = x_1 \begin{bmatrix} | \\ a_1 \\ | \end{bmatrix} + x_2 \begin{bmatrix} | \\ a_2 \\ | \end{bmatrix} + x_3 \begin{bmatrix} a_3 \end{bmatrix} + \cdots$$