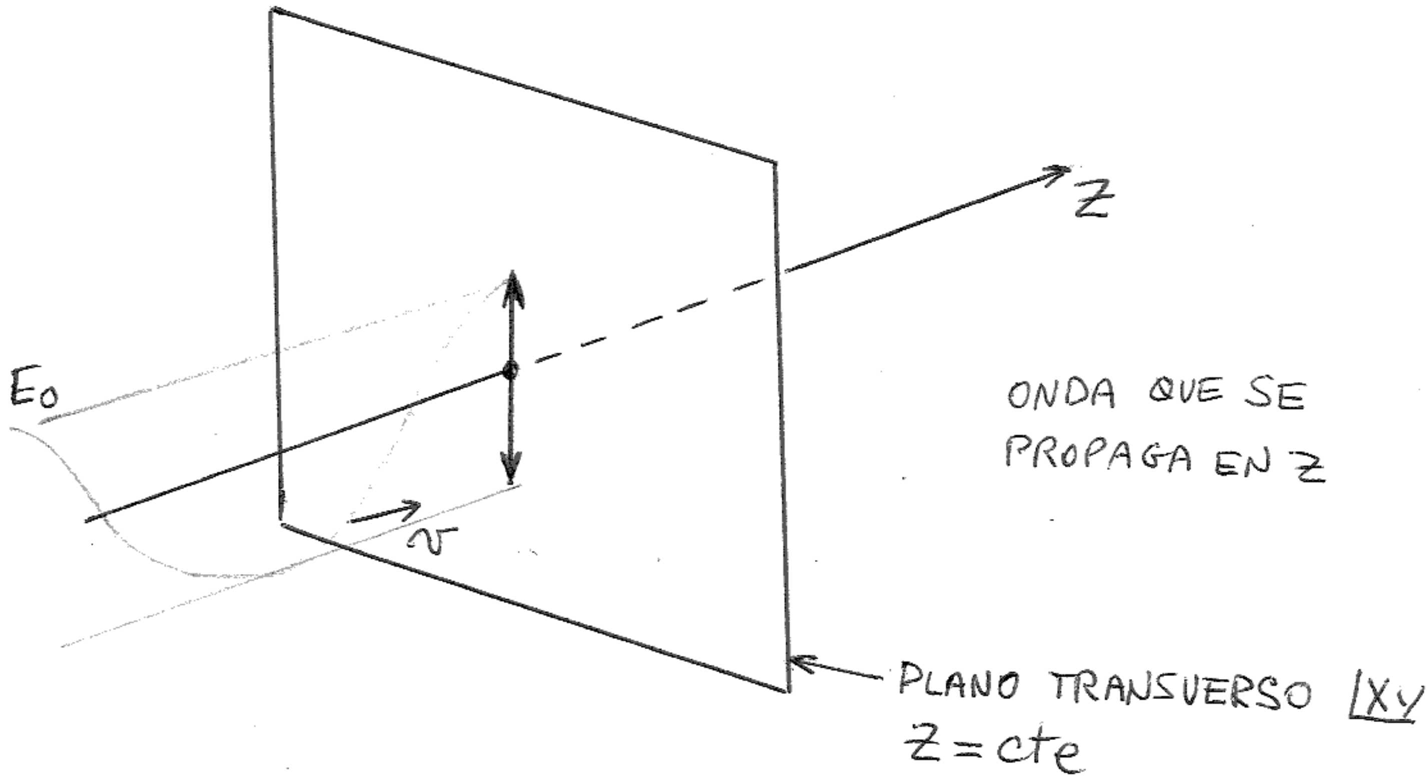
POLARIZACION:

LA POLARIZACION ES LA DIRECCION DEL VECTOR CAMPO ELECTRICO $\vec{E}$ DE UNA ONDA QUE SE PROPAGA EN EL ESPACIO.



$$\vec{E} = \hat{i}\, E_x$$

$$\vec{E} = \hat{i}\, E_{01} \cos(\omega t - \beta z)$$

POLARIZACION HORIZONTAL

$$\vec{E} = \hat{j}\, E_y$$

$$\vec{E} = \hat{j}\, E_{02} \cos(\omega t - \beta z)$$

POLARIZACION VERTICAL.

EN $z=0$

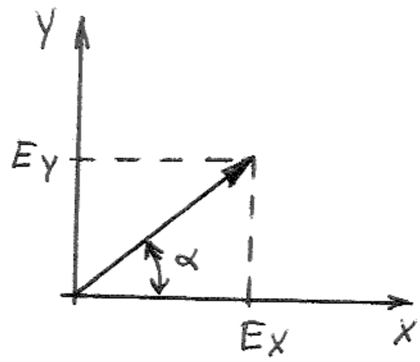
$\vec{E} = \hat{\imath}\, E_{01} \cos\omega t$ POL. HOR

$\vec{E} = \hat{\jmath}\, E_{02} \cos\omega t$ POL. VERT.

POLARIZACION OBLICUA

$\vec{E} = \hat{\imath}\, E_x + \hat{\jmath}\, E_y$

$\vec{E} = \hat{\imath}\, E_{01} \cos\omega t + \hat{\jmath}\, E_{02} \cos(\omega t + \delta)$



α: ANGULO DE POLARIZACION LINEAL

$\underline{\delta = 0}$

$\vec{E} = \hat{\imath}\, E_{01} \cos\omega t + \hat{\jmath}\, E_{02} \cos\omega t$

$\alpha = \operatorname{arctg} \frac{E_y}{E_x} = \operatorname{arctg} \frac{E_{02}}{E_{01}}$

$0 \leq \alpha \leq \pi/2$

$\underline{\delta = \pi}$

$\vec{E} = \hat{\imath}\, E_{01} \cos\omega t + \hat{\jmath}\, E_{02} (\cos\, \omega t + \pi)$

$\vec{E} = \hat{\imath}\, E_{01} \cos\omega t - \hat{\jmath}\, E_{02} \cos\omega t$

$0 \leq \alpha \leq \pi/2$

POLARIZACION ELÍPTICA

SI $\delta \neq 0$ LA ONDA ESTARA ELÍPTICAMENTE POLARIZADA

$$\vec{E} = \hat{\imath}\, E_{01} \cos(\omega t - \beta z) + \hat{\jmath}\, E_{02} \cos(\omega t - \beta z + \delta)$$

$\underline{z = 0}$

$$E_x = E_{01} \cos \omega t$$

$$E_y = E_{02} \cos(\omega t + \delta) = E_{02} (\cos \omega t \cos \delta - \operatorname{sen} \omega t \operatorname{sen} \delta)$$

como $\cos \omega t = \dfrac{E_x}{E_{01}}$

$$E_y = E_{02} \left(\frac{E_x}{E_{01}} \cos \delta - \operatorname{sen} \omega t \operatorname{sen} \delta \right)$$

$$\operatorname{sen} \omega t \operatorname{sen} \delta = \frac{E_x}{E_{01}} \cos \delta - \frac{E_y}{E_{02}}$$

ELEVANDO AL CUADRADO SE OBTIENE

$$\operatorname{sen}^2 \omega t \operatorname{sen}^2 \delta = \left(\frac{E_x}{E_{01}}\right)^2 \cos^2 \delta - 2 \frac{E_x}{E_{01}} \cos \delta + \left(\frac{E_y}{E_{02}}\right)^2$$

COMO:

$$\operatorname{sen}^2 \omega t = 1 - \cos^2 \omega t = 1 - \left(\frac{E_x}{E_{01}}\right)^2$$

$$\left(1 - \left(\frac{E_x}{E_{01}}\right)^2\right) \cdot \operatorname{sen}^2 \delta = \left(\frac{E_x}{E_{01}}\right)^2 \cos^2 \delta - 2 \frac{E_x}{E_{01}} \cos \delta + \left(\frac{E_y}{E_{02}}\right)^2$$

$$sen^2\delta = \left(\frac{Ex}{E01}\right)^2 \underbrace{\left(\cos^2\delta + sen^2\delta\right)}_{=1} - \frac{2Ex}{E01}\cos\delta + \left(\frac{Ey}{E02}\right)^2$$

$$\boxed{sen^2\delta = \left(\frac{Ex}{E01}\right)^2 - 2\left(\frac{Ex}{E01}\right)\cos\delta + \left(\frac{Ey}{E02}\right)^2}$$

ESTA ES LA EC. DE UNA ELIPSE

ECUACION GRAL DE UNA ELIPSE

$$A.X^2 - BXY + CY^2 = 1$$

Ejemplo

$E02 = \frac{E01}{2}$ $\qquad \delta = \frac{\pi}{2}$

$$Ex = E01 \cos wt$$

$$Ey = E02 \cos\left(wt + \frac{\pi}{2}\right) = \frac{E01}{2} \cdot \cos\left(wt + \frac{\pi}{2}\right)$$

$$\vec{E} = \hat{\imath}\, E01 \cos wt + \hat{\jmath}\, \frac{E01}{2} \cos\left(wt + \frac{\pi}{2}\right)$$

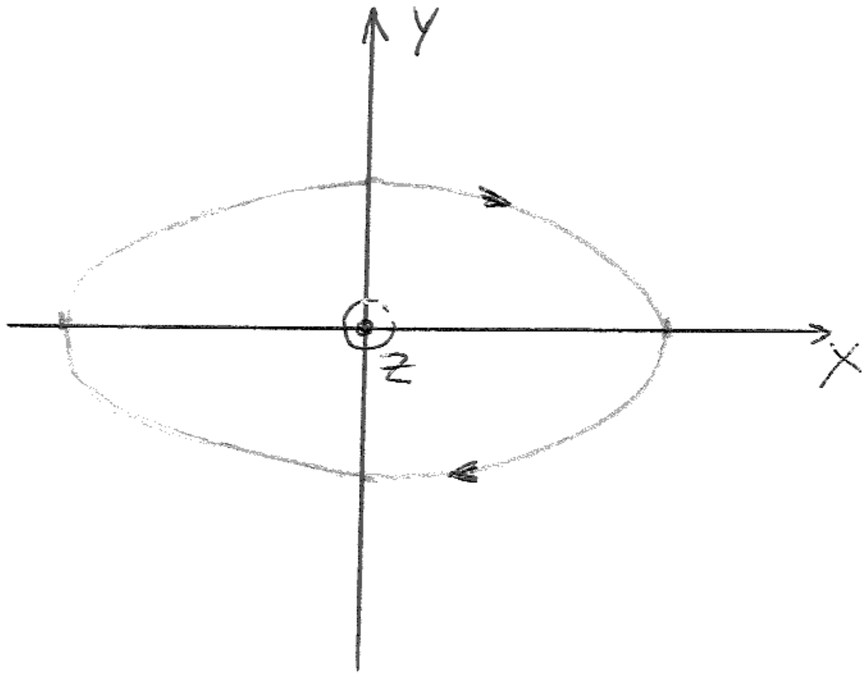
$$\vec{E} = \hat{\imath}\, E01 \cos wt + \hat{\jmath}\, \frac{E01}{2}(-sen\, wt)$$

$$\frac{|\vec{E}|}{E01} = \sqrt{\cos^2 wt + \frac{1}{4} sen^2 wt}$$

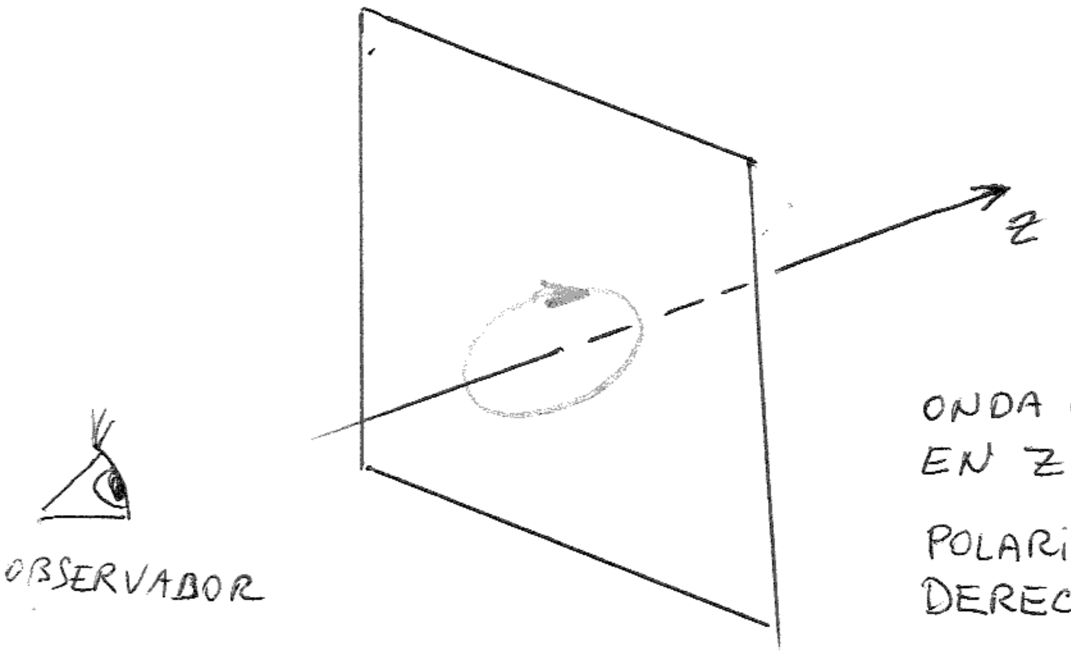
ADEMAS :

$$1 = \left(\frac{E_X}{E_{01}}\right)^2 + \left(\frac{E_Y}{E_{02}}\right)^2$$

$$1 = \frac{E_X^2}{E_{01}^2} + \frac{E_X^2}{\left(\frac{E_{01}}{2}\right)^2}$$



NORMA IEEE



ONDA QUE SE PROPAGA EN Z

POLARIZACION DERECHA

POLARIZACION CIRCULAR

$E_{01} = E_{02}$

$\delta = \pm \frac{\pi}{2}$

LA ECUACION DE LA ELIPSE QUEDA

$\cos \delta = 0$

$\operatorname{sen} \delta = \pm 1$

$$1 = \left(\frac{E_x}{E_{01}}\right)^2 + \left(\frac{E_y}{E_{01}}\right)^2$$

$$\boxed{E_{01}^2 = E_x^2 + E_y^2}$$

ES LA EC. DE UNA CIRCUNFERENCIA

Si $\delta = +\frac{\pi}{2}$ POLARIZACION CIRCULAR IZQUIERDA

$\delta = -\frac{\pi}{2}$ POLARIZACION CIRCULAR DERECHA.

SE HA VISTO QUE

$$\vec{E} = \hat{\imath}\, E_x + \hat{\jmath}\, E_y$$

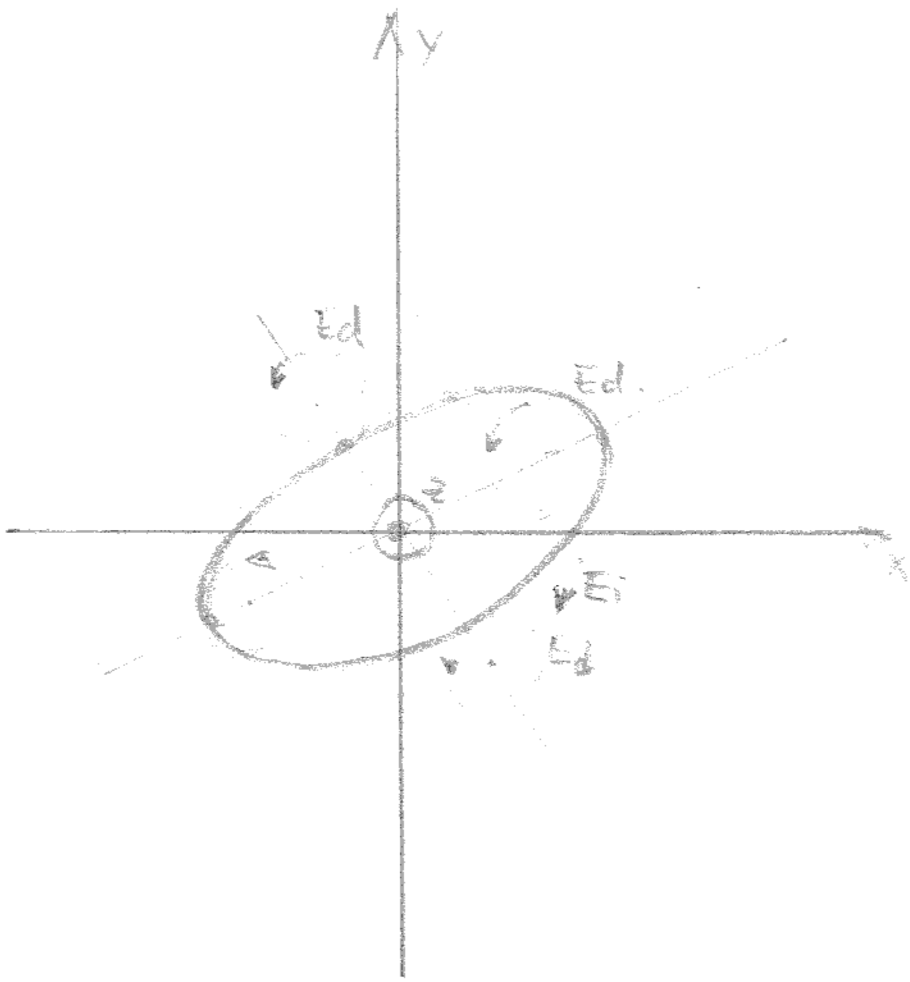
TAMBIEN SE PUEDE EXPRESAR

$$\vec{E} = \vec{E}_i(t) + \vec{E}_d(t)$$

$$\vec{E} = E_{oi}\left[\hat{\imath}\cos(\omega t+\psi) - \hat{\jmath}\,\mathrm{sen}\,(\omega t+\psi)\right] + E_{od}\left[\hat{\imath}\cos(\omega t+\psi+\delta') + \hat{\jmath}\,\mathrm{sen}\,(\omega t+\psi+\delta')\right]$$

$$|E_{MAX}| = |E_{oi} + E_{od}|$$

$$|E_{MIN}| = |E_{oi} - E_{od}|.$$



RELACION AXIAL (R.A.)

$$R = \frac{E_{oi} + E_{od}}{E_{od} - E_{oi}}$$

$$R = \pm \frac{\text{LONGITUD EJE MAYOR}}{\text{LONGITUD EJE MENOR}}$$

$$R(dB) = 20 \log |R|$$

R

\+ POL. DER

− POL. NEG.

$$1 \leq |R| < \infty$$

RELACION DE POLARIZACION CIRCULAR

$$\rho_c = \frac{E_{od}}{E_{oi}}$$

$$0 < \rho_c < \infty$$

$$\rho_c(dB) = 20 \log \frac{E_d}{E_i}$$

$$R = \frac{E_{oi} + E_{od}}{E_{od} - E_{oi}} = \frac{1 + \frac{E_{od}}{E_{oi}}}{\frac{E_{od}}{E_{oi}} - 1} = \frac{1 + \rho_c}{\rho_c - 1}.$$

RELACION ENTRE R Y ρ_c.

RELACION DE POLARIZAÇON LINEAL.

$$\rho_L = \frac{E_{o2}}{E_{o1}}$$