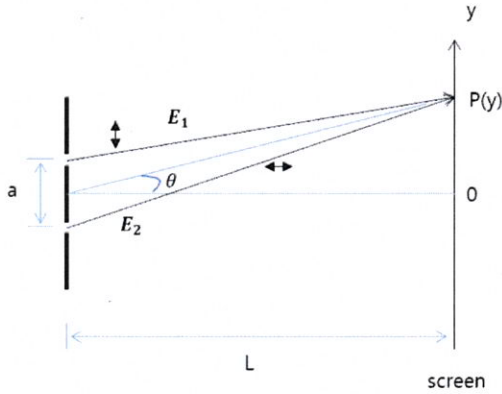


For young's double-slit experiments with orthogonally polarized lights E_1 and E_2 ,

1. Calculate the output intensity $I(y)$ at an arbitrary point $P(y)$ on the screen as a function of y . Both electric fields E_1 and E_2 have the same phase at the double slits. $L \gg a$. Hint: use the basis notation for inner product. $\hat{i} \cdot \hat{j} = 0$.
2. At $y=0$, calculate intensity $I(0)$ as a function of rotation φ of the E_2 field's polarization for the fixed E_1 polarization.



Sol.) $\vec{E}_1 = E_0 \hat{i} \quad ; \quad \vec{E}_2 = E_0 \hat{j} \cos \varphi$

$\vec{E} = \vec{E}_1 + \vec{E}_2 = E_0 (\hat{i} + \cos \varphi \hat{j})$

$I = |\vec{E}| |\vec{E}|^* = I_0 (\hat{i} + \cos \varphi \hat{j}) (\hat{i} + \cos \varphi \hat{j})$

$= I_0 (\hat{i}\hat{i} + \cos^2 \varphi \hat{j}\hat{j}) = \underline{I_0 (1 + \cos^2 \varphi)}$

