B.Sc - II 22/1/22

Special cases →

(1) when the thickness of the plate is such that the phase difference introduced by it in O & E components is integral multiple of 2π

i.e $\delta = n_, 2\pi$, $n = 0, 1, 2$ ---

than $\cos\delta = 1$ & $\sin\delta = 0$

So eqn (12) becomes

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} - \frac{2xy}{ab} = 0$$

$$\left(\frac{x}{a} - \frac{y}{b}\right)^2 = 0 \Rightarrow \frac{x}{a} - \frac{y}{b} = 0 \Rightarrow \frac{x}{a} = \frac{y}{b} \Rightarrow y = \left(\frac{b}{a}\right)x$$

$$\boxed{y = (\tan\theta)x}$$

It is equation of straight line passing through origin.

(2) when the thickness of the plate is such that the phase difference introduced by it in O & E components is odd multiple of $\pi/2$.

i.e $\delta = (2n+1)\pi/2$, $n = 0, 1, 2$ ---

then $\cos\delta = 0$ & $\sin\delta = 1$

So eqn (12) becomes

$$\boxed{\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1}$$

case (i)

when $b = a$

$$\frac{x^2}{a^2} + \frac{y^2}{a^2} = 1$$

$$\boxed{x^2 + y^2 = a^2}$$

which is equation of circle. The emergent light will be circularly polarized.

case (ii)

when $b \neq a$

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

which is equation of ellipse & emergent light is elliptically polarized.

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