Answer on Question #60468-Physics-Optics

The inclined faces of a glass biprism (μ = 1.5) make an angle of 1° with its base. The biprism is illuminated by a sodium lamp (λ = 589 nm) and the eye piece is at a distance of 1 m from the slit. A convex lens inserted between the biprism and the eye piece gives clear images of coherent sources in the focal plane of the eye piece. If the images are 0.4 cm apart in one case and 0.16 cm apart in the second case, calculate the width of interference fringes observed on the screen.

Solution

The fringe width is given by

$$\beta = \frac{\lambda D}{d}$$

where $d = \sqrt{d_1 d_2}$.

Here $d_1 = 0.004\ m, d_2 = 0.0016\ m, D = 1.0\ m, \lambda = 589\ nm$.

Hence

$$d = \sqrt{(0.004\ m)(0.0016\ m)} = 2.53 \cdot 10^{-3}\ m$$

So,

$$\beta = \frac{(589 \cdot 10^{-9}\ m)(1.0\ m)}{2.53 \cdot 10^{-3}\ m} = 2.33 \cdot 10^{-4}\ m$$