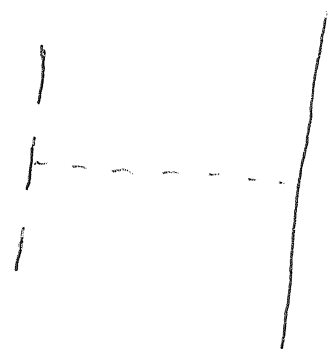


Light of wavelength 548 nm illuminates two slits separated by 0.5 mm. At what angle would one find

(1) The phase difference between the two waves to be 4 rad?

(2) The path difference to be 0.8 λ?



λ = 548 nm
d = 0.5 mm

d sin θ = m λ

(1) solution

Phase difference = m 2π rad = Δφ

Δφ / 2π rad = m

θ = sin⁻¹ (m λ / d)

$$\theta = \sin^{-1} \left(\frac{\Delta\phi \lambda}{2\pi d} \right)$$

$$= \sin^{-1} \left(\frac{4 \text{ rad } 548 \text{ E-}9 \text{ m}}{2\pi \text{ rad } 0.5 \text{ E-}3 \text{ m}} \right)$$

$$= 3.998 \text{ E-}2^\circ$$

$$\boxed{4.0 \text{ E-}2^\circ}$$

(2) solution

$$\text{path difference} = m\lambda = 0.8\lambda$$

$$\theta = \sin^{-1} \left(\frac{m\lambda}{d} \right)$$

$$= \sin^{-1} \left(\frac{0.8 \text{ } 548 \text{ E-}9 \text{ m}}{0.5 \text{ E-}3 \text{ m}} \right)$$

$$= 5.02 \text{ E-}2^\circ$$

$$\boxed{5.0 \text{ E-}2^\circ}$$