

Question:

A Michelson stellar interferometer is used to determine the apparent diameter of a star. The fringe pattern disappears when the adjustable mirrors are at a separation of 5 m. What is the angular diameter of the star?

Solution:

We can use the next equation:

$$\theta = \frac{1.22\lambda}{d}$$

A value of λ is 5×10^{-4} mm and $d = 5\text{m}$ or 5×10^3 mm. Now we can use this:

$$\theta = \frac{1.22 \times 5 \times 10^{-4}}{5 \times 10^3} = 1.22 \times 10^{-7} \text{ rad}$$

$$\theta = 1.22 \times 10^{-7} \text{ rad}$$

$$\theta = 0.025 \text{ arc sec}$$

Answer: $\theta = 0.025 \text{ arc sec.}$