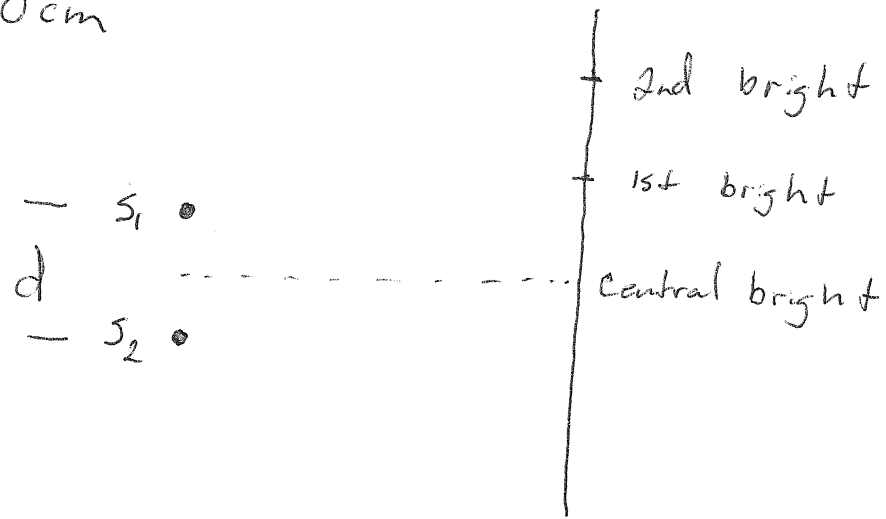


Two line sources transmit microwaves of wavelength 3.0 cm in phase. How far apart should they be to produce a 10° angular separation between the first and second bright fringes on one side of the central maximum?

$\lambda = 3.0 \text{ cm}$



$d \sin \theta_m = m \lambda$

$\theta_2 - \theta_1 = 10^\circ$

$L \tan \theta_m = y_m$

Use $\sin \theta \sim \theta$ for small angle approximation

(2)

$$d \sin \theta_m = m \lambda \quad \Rightarrow \quad d \theta_m = m \lambda$$

$$\theta_2 - \theta_1 = 10^\circ = 0.1745 \text{ rad}$$

$$\frac{2\lambda}{d} - \frac{\lambda}{d} = 0.1745 \text{ rad}$$

$$\frac{\lambda}{d} = 0.1745 \text{ rad}$$

$$d = \frac{3.0 \text{ E-}2 \text{ m}}{0.1745 \text{ rad}}$$

$$= 1.72 \text{ E-}1 \text{ m}$$

17.2 cm