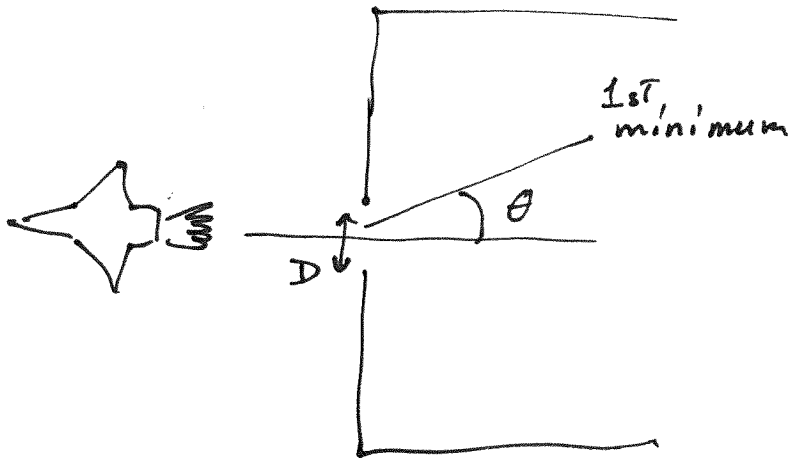
Ch.4 Prob.29

$f = 600\ Hz$

$D = 0.800\ m$

$v = 340\ m/s$



Find the angle of the first minimum.

First find the wavelength

$$v = \lambda \cdot f \rightarrow \lambda = \frac{v}{f} = \frac{340\ m/s}{600\ Hz} = \underline{0.567_m}$$

Now use the single-slit formula to find the minimum

$$D \sin\theta = m\lambda \quad \text{where } m = 1$$

$$\sin\theta = \frac{\lambda}{D}$$

$$\theta = \sin^{-1}\left(\frac{\lambda}{D}\right) = \sin^{-1}\left(\frac{0.576_m}{0.800\ m}\right)$$

$$= \boxed{45.1^\circ}$$