Single Slit Diffraction

Monochromatic Coherent Light

\[ \tan \theta = \frac{y}{L} \]
\[ \tan \theta \approx \sin \theta \approx \theta = \frac{y}{L} \]

\[ m = \pm 1, \pm 2, \text{ etc} \]

Condition for minimum
\[ D \sin \theta = m\lambda, \quad m = \pm 1, \pm 2, \text{ etc} \]
\[ y \approx \frac{m\lambda L}{D} \]

Note: \( y = \frac{m\lambda L}{D} \), \( m = \pm 1, \pm 2, \text{ etc} \) locates the dark fringes

Double Slit Interference

Monochromatic Coherent Light

Assumption of infinite source distance gives plane wave at slit so that all amplitude elements are in phase.

\[ \tan \theta = \frac{y}{L} \]
\[ \tan \theta \approx \sin \theta \approx \theta = \frac{y}{L} \]

Condition for maximum
\[ \frac{d \sin \theta}{\lambda} = m \]
\[ y = \frac{m\lambda L}{d} \]
\[ m = 0, \pm 1, \pm 2, \text{ etc} \]

Note: \( y = \frac{m\lambda L}{d}, \quad m = 0, \pm 1, \pm 2, \text{ etc} \) locates the bright fringes