Width of central maximum:

1.Angular width:

The angle subtended between 1st secondary minima on either side of central maxima is the angular width of central maxima.

Angular width of central maxima, $\theta = 2\theta_1$

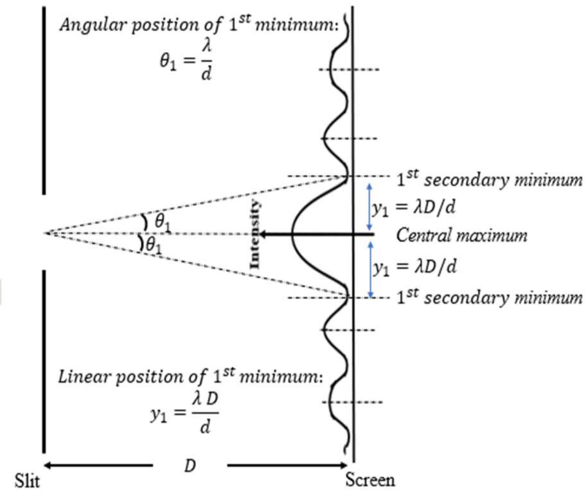
$$\boldsymbol{\theta = 2\frac{\lambda}{d}}$$

2.Linear width:

The linear distance between 1st secondary minima on either side of central maxima is the linear width of central maxima.

Linear width of central maxima, $L = 2y_1$

$$\boldsymbol{L = 2\frac{\lambda D}{d}}$$



In interference pattern:

Angular width of central maxima= $\frac{\lambda}{d}$ and Linear width of central maxima $= \frac{\lambda D}{d}$.

- ***The width of central maxima in diffraction fringe band is double of that in interference fringe band.***

Secondary minima:

Angular position: $\boldsymbol{\theta_n = \frac{n\lambda}{d}}$ $\quad \boldsymbol{n = 1, 2, 3, 4, \ldots}$

Linear position: $\boldsymbol{y_n = \frac{n\lambda D}{d}}$

Secondary maxima:

Angular position: $\boldsymbol{\theta_n = (2n+1)\frac{\lambda}{2d}}$

Linear position: $\boldsymbol{y_n = (2n+1)\frac{\lambda D}{2d}}$

- Angular width of central maximum= $\boldsymbol{2\frac{\lambda}{d}}$ (in radians)
- Linear width of central maximum= $\boldsymbol{2\frac{\lambda D}{d}}$

✓ Width of central maxima is affected due to:

i. Change in width of slit [if slit width is doubled, the width of central maxima will be halved]

ii. Change in wavelength of light [is directly proportional to wavelength]

iii. Insertion of certain transparent medium in between the slit and the screen.
[when the whole apparatus is immersed in water, the width of central maxima decreases due to decrease in wavelength of light in water.]

✓ Angular width is independent of D, while linear width depends upon D.

✓ In practice, the screen is placed at the focal plane of a converging lens placed just after the slit.

$\boldsymbol{i.e., (distance\ between\ slit\ and\ screen) D = f\ (focal\ length\ of\ convrx\ lens)).}$

1. The angular width of the central bright maximum in Fraunhofer's Diffraction pattern of a slit width $12 \times 10^{-5} cm$ when the slit is illuminated by monochromatic light of wavelength $6000 A^o$ is:
   a. 30^o b. $\mathbf{60^o}$ c. 80^o d. 90^o
2. Estimate the angular separation between first order maximum and third order minimum of the diffraction pattern due to single slit of width $1mm$, when light of wavelength 600 nm is incident normal on it. [$\boldsymbol{Ans: 9 \times 10^{-4} rad.}$]