Diffraction and Interferance

Intensity when Diffraction

$$I = I_0 \left(\frac{\sin \beta}{\beta} \right)^2 \quad \text{with} \quad \beta = \frac{\pi}{\lambda} b \sin \theta$$

Diffraction minimun of slit

$$b \sin \theta = m\lambda \quad \text{where} \quad m = \pm 1, \pm 2, \pm 3, ...$$

Diffraction minimum of round opening

$$D \sin \theta = k\lambda$$

$$\text{where} k = 1,22 \quad 2,23 \quad 3,24 \quad 4,25 \quad 5,25...$$

Rayleigh's Resolution Criterion

Central top for the first point over the first min for the second point

Interference if Diffraction is neglected

$$I = I_0 \left(\frac{\sin N\gamma}{\sin \gamma} \right) \quad \text{där} \quad \gamma = \frac{\pi}{\lambda} d \sin \theta$$

Interference gives main max if

$$d \sin \theta = m\lambda \quad \text{där} \quad m = \pm 1, \pm 2, \pm 3, ...$$

Visibility

$$V = \frac{I_{max} - I_{min}}{I_{max} + I_{min}}$$

Grating, transmission or reflection

$$d(\sin \alpha_2 + \sin \alpha_1) = m\lambda$$
$$d(\sin \alpha_2 - \sin \alpha_1) = m\lambda$$

Max or min in case of interference in thin layers

$$2n_2 d \cos \alpha_2 = m\lambda \quad \text{där} \quad m = 0, \pm 1, \pm 2, ...$$

Finesse in Fabry-Perot interferometer

$$F = \frac{\Delta f}{\delta f} \quad \text{where} \quad \Delta f = \frac{c}{2d}$$

Airy Function

$$T = \frac{1}{1 + \left[\frac{4r^2}{(1-r^2)^2} \right] \sin^2 \left(\frac{\delta}{2} \right)}$$