

DA1FAGRSTEP1S

Diffraction on an step grating with width d, center to center distance of steps a, height H, wavelength λ , distance from grating to screen X and coordinate on Screen Y. All distances and wavelength in mm, number of lines N .Normal incidence.
All parameters are globally defined above the graph.

D(θ) is the diffraction factor, I(θ) is the interference factor, normalized to 1.

II(θ) is the interference factor of the gratings with respect to the two planes.

P(A) is the product of interference and diffraction factors.

The intensity of the zeroth order and of the first orders change depending on the heighth H.

If H is a multiple of λ , all light is in the zero order, if H is a multiple of $\lambda/2$, all light is in the first order.

$$D(\theta) := \left[\frac{\sin\left(\pi \cdot \frac{d}{\lambda} \cdot \sin(\theta)\right)}{\left(\pi \cdot \frac{d}{\lambda} \cdot \sin(\theta)\right)} \right]^2 \quad I(\theta) := \left(\frac{\sin\left(\pi \cdot \frac{a}{\lambda} \cdot \sin(\theta) \cdot N\right)}{N \cdot \sin\left(\pi \cdot \frac{a}{\lambda} \cdot \sin(\theta)\right)} \right)^2 \quad \theta := -.5001, -.4999.. .5$$

$$a \equiv .002 \quad N \equiv 6 \quad d \equiv .001$$

$$II1(\theta) := \cos\left[\left[\frac{\pi}{\lambda} \cdot (d \cdot \sin(\theta) + H1)\right]\right]^2$$

$$II2(\theta) := \cos\left[\left[\frac{\pi}{\lambda} \cdot (d \cdot \sin(\theta) + H2)\right]\right]^2$$

$$P1(\theta) := D(\theta) \cdot I(\theta) \cdot II1(\theta)$$

$$P2(\theta) := D(\theta) \cdot I(\theta) \cdot II2(\theta)$$

$$n2 \equiv 10 \quad H2 \equiv n2 \cdot \lambda \quad n1 \equiv 10.25 \quad H1 \equiv n1 \cdot \lambda$$

$$II3(\theta) := \cos\left[\left[\frac{\pi}{\lambda} \cdot (d \cdot \sin(\theta) + H3)\right]\right]^2$$

$$P3(\theta) := D(\theta) \cdot I(\theta) \cdot II3(\theta)$$

$$P4(\theta) := D(\theta) \cdot I(\theta) \cdot II4(\theta)$$

$$II4(\theta) := \cos\left[\left[\frac{\pi}{\lambda} \cdot (d \cdot \sin(\theta) + H4)\right]\right]^2$$

$$n4 \equiv 10.5 \quad H4 \equiv n4 \cdot \lambda \quad n3 \equiv 10.37 \quad H3 \equiv n3 \cdot \lambda$$



