

D16FAGRRANS

One dimensional periodic and random arrangement for interference and diffraction

Diffraction on an amplitude grating with width of openings d , center to center distance of strips a , 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.

$D(\theta)$ is the diffraction factor

$I(\theta)$ is the interference factor, normalized to 1.

$P1(\theta)$ is the product of interference and diffraction factor.

$P2(\theta)$ is for the case that the lines are not periodic and the interference factor averages to a constant.

$$\theta := -1.001, -0.9999.. 1.001$$

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

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

$$P2(\theta) := D(\theta) \cdot C$$

$$C := .5$$

$$d \equiv .002 \quad \lambda \equiv .0005 \quad a \equiv .008 \quad N \equiv 20$$

