D12FAELGRS

Diffraction on an echelette grating.
The graphs for three different values of ε.

D(θ) is the diffraction factor, I(θ) the interfference factor, and P(θ) the product.
The angle in radians of the echelle is ε.Diffraction angle θ in radians,
wavelength λ, width of openings d, and separation of openings a in mm.
N is the number of lines.
All parameters are defined globally above the graph.

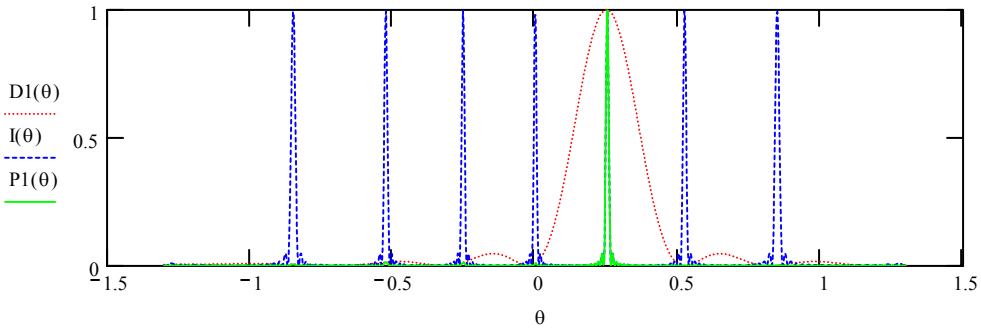
$$\theta := -1.301, -1.299 .. 1.3$$

$$D1(\theta) := \left[\frac{\sin\left[\pi \cdot \frac{d}{\lambda} \cdot (\sin(\theta + \varepsilon 1))\right]}{\left(\pi \cdot \frac{d}{\lambda} \cdot \sin(\theta + \varepsilon 1)\right)} \right]^2 \qquad I(\theta) := \left[\frac{\sin\left[\pi \cdot a \cdot (\sin(\theta)) \cdot \frac{N}{\lambda}\right]}{N \cdot \sin\left[\pi \cdot a \cdot \frac{(\sin(\theta))}{\lambda}\right]} \right]^2$$

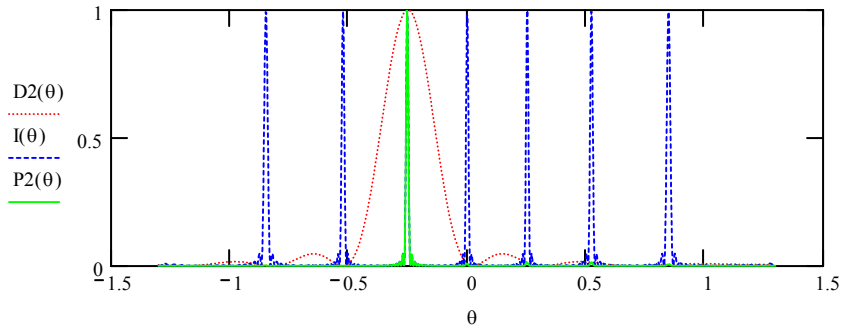
$$D2(\theta) := \left[\frac{\sin\left(\pi \cdot \frac{d}{\lambda} \cdot \sin(\theta + \varepsilon 2)\right)}{\left[\pi \cdot \frac{d}{\lambda} \cdot (\sin(\theta + \varepsilon 2))\right]} \right]^2 \qquad D3(\theta) := \left[\frac{\sin\left[\pi \cdot \frac{d}{\lambda} \cdot (\sin(\theta + \varepsilon 3))\right]}{\left(\pi \cdot \frac{d}{\lambda} \cdot \sin(\theta + \varepsilon 3)\right)} \right]^2$$

$$P1(\theta) := D1(\theta) \cdot I(\theta) \qquad P2(\theta) := D2(\theta) \cdot I(\theta) \qquad P3(\theta) := D3(\theta) \cdot I(\theta)$$

$$\varepsilon 1 \equiv -.25 \qquad d \equiv 37 \qquad \lambda \equiv 10 \qquad a \equiv 40 \qquad N \equiv 20$$



$\varepsilon 2 \equiv .25$



$\varepsilon 3 \equiv -.52$