Mask Diffraction Patterns - Finite Pentagon

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Establish mask geometry:

$$R := 2 \qquad m := 1 .. A \qquad \Theta_m := \frac{2\cdot\pi\cdot m}{A} \qquad x_m := R\cdot\sin\left(\Theta_m\right) \qquad y_m := R\cdot\cos\left(\Theta_m\right)$$

Fourier transform of position wave function (mask geometry) into the momentum representation:

$$\Phi\left(p_x, p_y\right) := \frac{1}{2\cdot\pi\cdot d\cdot\sqrt{A}}\cdot\left[\sum_{m=1}^{A}\left(\int_{x_m-\frac{d}{2}}^{x_m+\frac{d}{2}}\exp\left(-i\cdot p_x\cdot x\right)dx\cdot\int_{y_m-\frac{d}{2}}^{y_m+\frac{d}{2}}\exp\left(-i\cdot p_y\cdot y\right)dy\right)\right]$$

Display mask geometry and diffraction pattern: $A \equiv 5$ $d \equiv .3$

$$N := 100 \qquad \Delta p := 10 \qquad j := 0 .. N \qquad k := 0 .. N \qquad p_{x_j} := -\Delta p + \frac{2\cdot\Delta p\cdot j}{N} \qquad p_{y_k} := -\Delta p + \frac{2\cdot\Delta p\cdot k}{N}$$

$$\text{DiffractionPattern}_{j,k} := \left(\left|\Phi\left(p_{x_j}, p_{y_k}\right)\right|\right)^2$$