

"Mathcad_waves_lecture_2.mcd"

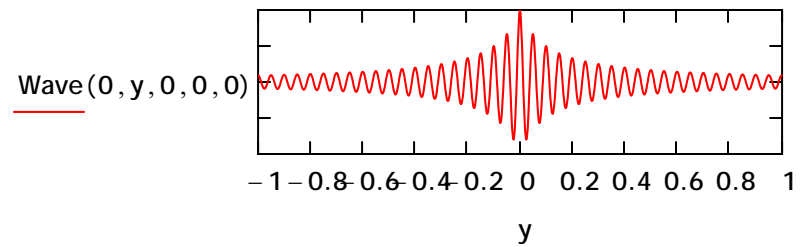
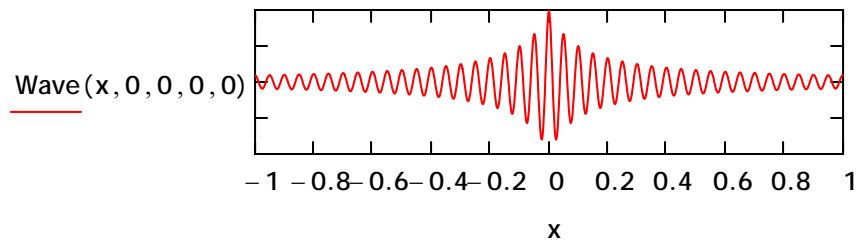
$\lambda := 5\text{cm}$

$\omega := 2\pi \cdot \text{Hz}$

Make a circular wave: $R(x, y, x_0, y_0) := \sqrt{(x - x_0)^2 + (y - y_0)^2}$

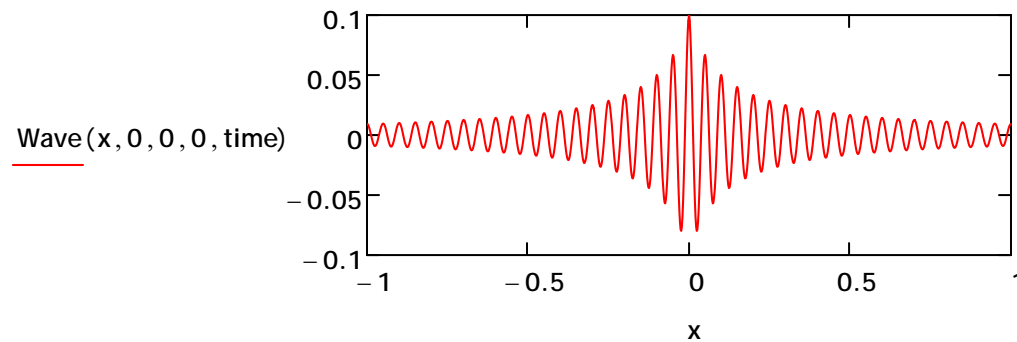
$$\text{Wave}(x, y, x_0, y_0, t) := \frac{\cos\left(\frac{2\pi}{\lambda} R(x, y, x_0, y_0) - \omega \cdot t\right)}{\frac{R(x, y, x_0, y_0)}{\text{cm}} + 10}$$

Show it behaves properly along X, Y axes:



Animating this with time := 0.1 · FRAME · sec

Using Microsoft Video 1 codec

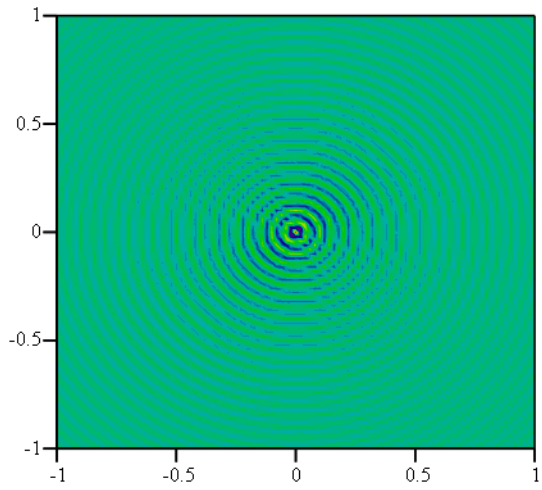


3D version of single point source::

Animating this with FRAME = 0 to 100

time := 0.1 · FRAME · sec

Wave₁(x, y) := Wave(x, y, 0, 0, time)



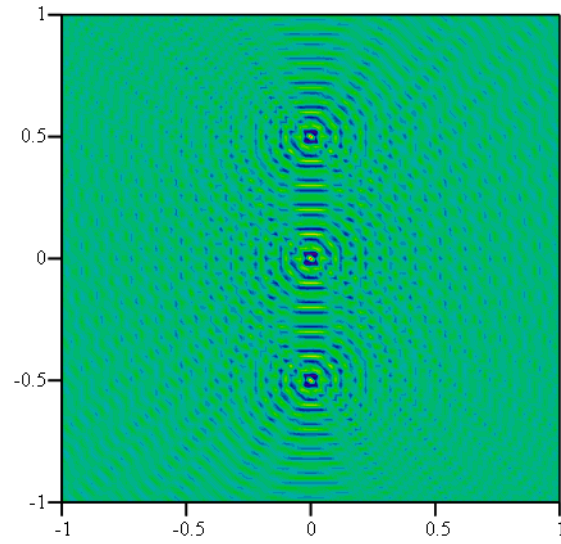
Wave₁

Three point sources in a row:

Animating this with FRAME = 0 to 100

$$\text{time} := 0.1 \cdot \text{FRAME} \cdot \text{sec}$$

$$\text{Wave}_3(x, y) := \text{Wave}(x, y, 0, -50 \cdot \text{cm}, \text{time}) + \text{Wave}(x, y, 0, 0, \text{time}) + \text{Wave}(x, y, 0, 50 \cdot \text{cm}, \text{time})$$



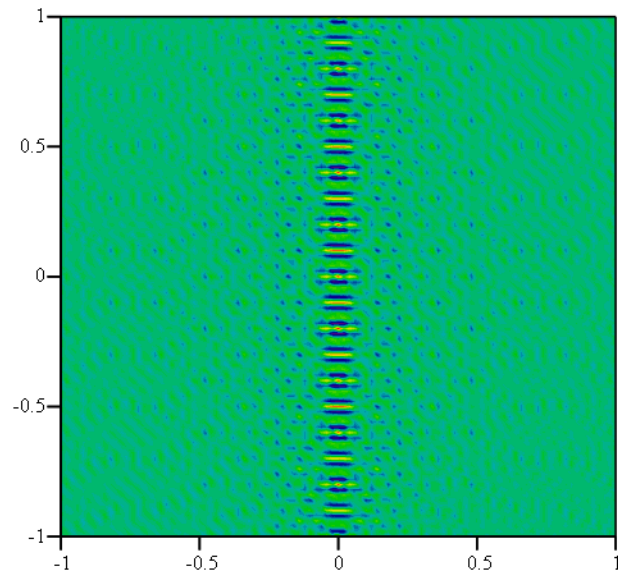
Wave₃

11 point sources in a row:

Animating this with FRAME = 0 to 100

$$\text{time} := 0.1 \cdot \text{FRAME} \cdot \text{sec}$$

$$\text{Wave}_{11}(x, y) := \sum_{y_0 = -5}^5 \text{Wave}(x, y, 0, y_0 \cdot 20\text{cm}, \text{time})$$



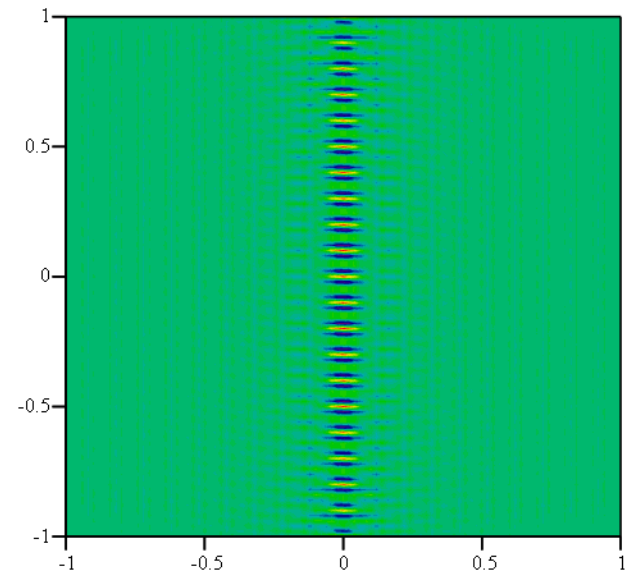
Wave₁₁

41 point sources in a row:

Animating this with FRAME = 0 to 100

$$\text{time} := 0.1 \cdot \text{FRAME} \cdot \text{sec}$$

$$\text{Wave}_{41}(x, y) := \sum_{y_0 = -20}^{20} \text{Wave}(x, y, 0, y_0 \cdot 5\text{cm}, \text{time})$$



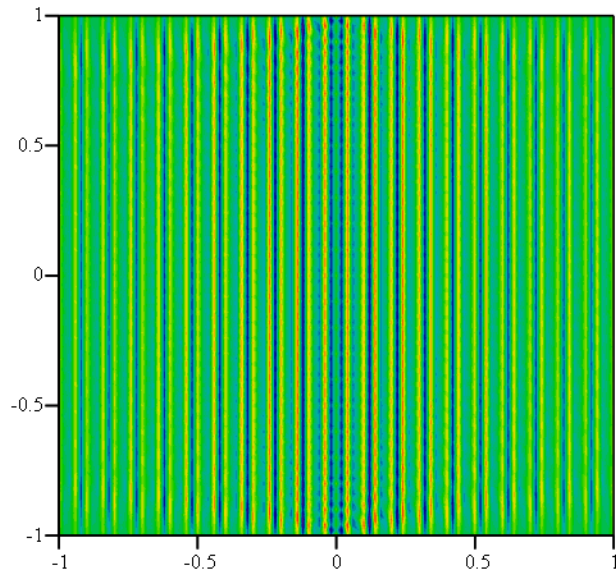
Wave₄₁

81 point sources in a row:

Animating this with FRAME = 0 to 100

$$\text{time} := 0.1 \cdot \text{FRAME} \cdot \text{sec}$$

$$\text{Wave}_{81}(x, y) := \sum_{y_0 = -40}^{40} \text{Wave}(x, y, 0, y_0 \cdot 2.5\text{cm}, \text{time})$$



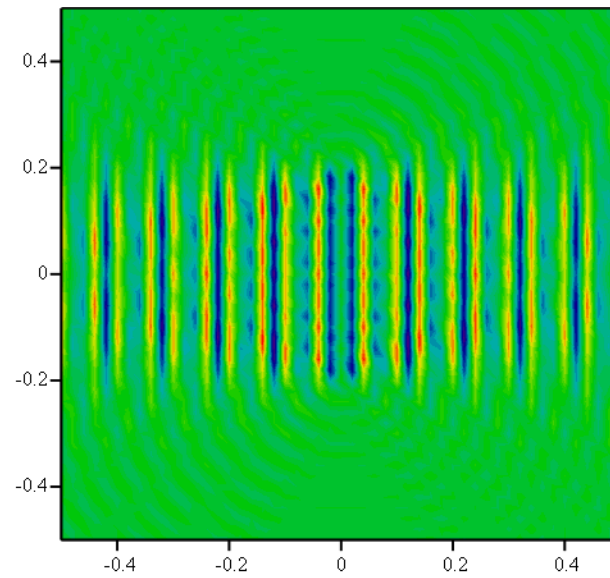
Wave₈₁

81 point sources, zoomed, with shrinking row :

Animating this with FRAME = 0 to 100

$$\text{time} := 0.1 \cdot \text{FRAME} \cdot \text{sec} \quad d := 0.005\text{cm} \cdot (100 - \text{FRAME})$$

$$\text{Wave}_{81_shrinking}(x, y) := \sum_{y_0 = -40}^{40} \text{Wave}(x, y, 0, y_0 \cdot d, \text{time})$$



Wave_{81_shrinking}