

LightPipes for Mathcad Help

Content

S

LPCircAperture,
LPCircScreen,
LPRectAperture,
LPRectScreen,
LPGaussAperture,
LPGaussScreen.

☒ LP Units

m \equiv 1 km \equiv 10^3 m cm \equiv 10^{-2} m mm \equiv 10^{-3} m μ m \equiv 10^{-6} m nm \equiv 10^{-9} m

☒ LP Units

size \equiv 10·mm [gridsize](#)

N \equiv 64 [grid dimension must be even and larger than 8.](#)

λ \equiv 500·nm [Wavelength](#)

LPCircAperture,

LPCircScreen

Apertures and screens with a circular aperture and screening with a circular screen:

Definition of a Field with [LPBegin](#):

Field := LPBegin(size, λ , N)

$R \equiv 2.5 \cdot \text{mm}$ Radius

$x_s \equiv 1 \cdot \text{mm}$ shift in x-direction

$y_s \equiv -1 \cdot \text{mm}$ shift in y-direction

Field := LPCircAperture($R, x_s, y_s, \text{Field}$)

Field := LPCircScreen($R \cdot 0.25, x_s, y_s, \text{Field}$)

Calculation of the Intensity of the beam with LPIntensity and plot (Insert, Picture):

Intensity := LPIntensity(2, Field)



Intensity

LPRectAperture,

LPRectAperture

Aperturing the Field with a rectangular aperture and screening:

Definition of a Field with LPBegin:

Field := LPBegin(size, , N)

$w_x \equiv 2 \cdot \text{mm}$ width in x-direction

$w_y \equiv 3.5 \cdot \text{mm}$ width in y-direction

$x_s \equiv 1 \cdot \text{mm}$ shift in x-direction

$y_s \equiv -1.5 \cdot \text{mm}$ shift in y-direction
 $\equiv -20 \cdot \text{rad}$ rotation

Field := LPRectAperture($w_x, w_y, x_s, y_s, \quad$, Field)

Field := LPRectScreen($w_x, w_y \cdot 0.5, 0, 0, \quad$, Field)

Calculation of the Intensity of the beam with LPIntensity and plot (Insert, Picture):

Intensity := LPIntensity(2, Field)



Intensity

LPGaussApertur

e
Aperturing the Field with a Gaussian aperture:

Definition of a Field with LPBegin:

Field := LPBegin(size, \quad , N)

$R \equiv 2.5 \cdot \text{mm}$ 1/e (Intensity) radius
 $x_s \equiv 1 \cdot \text{mm}$ shift in x-direction
 $y_s \equiv -1 \cdot \text{mm}$ shift in y-direction
 $T \equiv 80 \cdot \%$ centre transmission

Field := LPGaussAperture($R, x_s, y_s, T, \text{Field}$)

Calculation of the Intensity of the beam with **LPIntensity** and plot (Insert, Picture):

Intensity := LPIntensity(2,Field)



Intensity

LPGaussScree

n
Screening the Field with a Gaussian aperture:

Definition of a Field with **LPBegin**:

Field := LPBegin(size, ,N)

$R \equiv 2.5 \cdot \text{mm}$ 1/e (Intensity) radius

$x_s \equiv 1 \cdot \text{mm}$ shift in x-direction

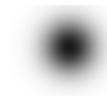
$y_s \equiv -1 \cdot \text{mm}$ shift in y-direction

$T \equiv 10 \cdot \%$ centre transmission

Field := LPGaussScreen($R, x_s, y_s, T, \text{Field}$)

Calculation of the Intensity of the beam with **LPIntensity** and plot (Insert, Picture):

Intensity := LPIntensity(2,Field)



Intensity

Example of screens and apertures:

Definition of the beam with LPBegin:

Field := LPBegin(0.01, 10^{-6} , 64)

Aperturing and screening the Field:

Field := LPGaussAperture(0.004, 0, 0, 1, Field)

Field := LPRectScreen(0.001, 0.001, -0.0015, -0.002, 0, Field)

Field := LPCircScreen(0.0007, 0.001, 0.0015, Field)

Field := LPRectScreen(0.001, 0.0035, -0.002, 0.0025, 30, Field)

Calculation of the Intensity of the beam with LPIntensity and plot (Insert, Picture):

Intensity := LPIntensity(2, Field)



Intensity

m