



Programming a Multiple-Slit Transmission Function

Abstract

Source Code Editor

Source Code Global Parameters Snippet Help Advanced Settings

Main Function

```
1 double realPart = 1.0;
2 double imaginaryPart = 0.0;
3
4 if (Math.Abs(x) <= (NumberOfSlits * SlitDistance + SlitWidth / 2))
5     double xInPeriod = (x - Math.Floor(x / SlitDistance)) * SlitDistance;
6     new VectorD(xInPeriod, 0);
7
8 // Ensure symmetry
9
10 if (MathFunction == "Gaussian")
11     if (Math.Abs(x) <= SlitWidth / 2)
12         return 1.0;
13     else {
14         if (Math.Abs(x) <= SlitWidth)
15             return 0.5;
16         else {
17             if (Math.Abs(x) <= SlitWidth * 1.5)
18                 return 0.0;
19             else {
20                 if (Math.Abs(x) <= SlitWidth * 2.0)
21                     return 0.0;
22                 else {
23                     return 0;
24                 }
25             }
26         }
27     }
28
29
30 }
```

Wavelength [double]
RefractiveIndex [Complex]
x [double]
y [double]
NumberOfSlits [double]
SlitWidth [double]

7: Raw Data Detector #600 after Multiple Slit #1...

Light View Data View

Globally Polarized Harmonic Field Amplitude Zoom: 4.209 (21; 67)

VirtualLab Fusion provides full flexibility in the definition of transmission functions. Using the Programmable Function, we show an example which defines an arbitrary number of equidistantly separated slits, with user-defined width and distance. The resulting function is invariant in y-direction. Parameters of the multiple-slits, e.g. the number of slits, slit width and distance, are all customizable for the user.

Task Description & Sample Code

7: Raw Data Detector #600 after Multiple Slit #1...

Light View Data View

Task:
Use Programmable Function to define an arbitrary number of equidistant slits with an arbitrary width and distance.



Global Parameters (User Defined)

Variable	Value	Allowed range
double NumberOfSlits	4	1 - 1000
double SlitWidth	50 μm	1 nm - 1 m
double SlitDistance	100 μm	2 nm - 1 m

Globally Polarized Harmonic Field Amplitude Zoom: 4.209 (21; 6)

Main Function

```
double realPart = 1.0;
double imaginaryPart = 0.0;

if (Math.Abs(x) <= (NumberOfSlits * SlitDistance +
SlitWidth) / 2) {
    double xInPeriod =
CoordinateTransformations.CoordinateWithinPeriod(ne
w VectorD(x, 0),
    new VectorD(SlitDistance, 0)).X;
    if
(MathFunctions.IsEven(MathFunctions.RoundToInt(Numb
erOfSlits))) {
        if (Math.Abs(xInPeriod) > (SlitDistance -
SlitWidth) / 2) {
            return 1;  }  }
        else {
            if (Math.Abs(xInPeriod) < SlitWidth / 2) {
                return 1  }  }
    }
}

return 0;
```

3

Document Information

title	Programming a Multiple-Slit Transmission Function
document code	CZT.0059
version	1.0
toolbox(es)	Starter Toolbox
VL version used for simulations	7.4.0.49
category	Feature Use Case
further reading	<ul style="list-style-type: none">- <u>How to Work with the Programmable Function in VirtualLab Fusion + Example: Cylindrical Lens</u>- <u>Programming a Double Slit Function</u>