

Advanced Simulation of Microlens Array with VirtualLab Fusion

Abstract



Amplitude of Ex in space domain (near field)

Energy density at detector plane (far field)

Microlens arrays are getting more and more attention in various optical applications, such as digital projectors, optical diffusers, and 3D imaging. VirtualLab Fusion applies an advanced field tracing algorithm to simulate this multi-channel situation. In this use case, the configuration method and usage of the Microlens Array component are introduced.

Structure Configuration of the Microlens Array

The Microlens Array component is intended as a tool to provide the Edit Stack Block possibility to define a microlens array (and other more general periodic height profiles). se Ba Edit Micro Lens Array Component X Edit Micro Lens Array Component Index z-Distance z-Position Subsequent Medium Surface Com Solid Surface Add-Ons Surface Add-Ons Solid 1 0 mm 0 mm Conical Surface Fused Silica in Homoc Enter your commer Component Surface Stack Plane Surface Coordinate Default Microlens Array Stack Coordinate Systems Systems **BD** View 🥖 Edit 🔍 View 🚰 Load R Q Domain: Size and Shape Position / Position / Validity: Add Insert Delete Shape Rectangular Elliptic Orientation Orientation Periodicity & Aperture Size 20 mm 20 mm The periodic surface profile is Homogeneous Medium Behind Surface + Stack Period is Dependent from the Period of Surface with Index Structure Fused Silica in Homogeneous Medium Structure defined by a stack (where the Stack Period 🥖 Edit Q View 250 um × 250 um 对 Load stack period determines the Nm 2 m Effect on Field Outside of Domain 🛐 🛃 Tools 縃 🗸 Cancel OK Help Solver Solver period used in the simulation). $\overrightarrow{}$ ↑₩ ₩↓ ⇔ Channel Channel Configuration Configuration $\mathcal{F} = \mathcal{F}^{-1}$ \mathcal{F} \mathcal{F}^{-1} Fourier Fourier Transforms Transforms P Validity: 🕜 OK Cancel Help Validity: OK Cancel Help

Sub-Channel Decomposition

- In the Microlens Array component, we enable the option to perform a lateral channel decomposition.
- The height profile per channel is modeled using the Local Plane Interface Approximation (LPIA).

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If the Surface Related Sub- Channel Scheme is activated, the ncident light will be decomposed into sub-channels in the x domain, with the output field of each sub-channel processed individually through the subsequent system.	Region Boundary Management Channel Mode Management Master Channels Sub-Channels: X-Domain Sub-Channels: K-Domain Sub-Channel Scheme None Sub-Channel Mask Data Sub-Channel Mask Data Programmable 716 15 14 13 30 36 17 16 15 14 13 30 37 18 5 4 3 12 29 38 19 6 1 2 11 28 39 20 7 8 9 10 27 40 21 22 23 24 25 26 41 42 43 44 45	Coordinate Systems Position / Orientation	Coordinate Systems Position / Orientation	Master Channels Sub-Channels: X-Domain Sub-Channels: K-Domain Region Boundary Management Channel Mode Management Channel Mode Management Options All Channel Modes Image: Selected Channel Mode 1 the between [1 6561] Image: Im	
			Structure	The Channel Mode Mana allows the user to select in sub-channel regions fo simulation. More option for channel management we added future version	gement dividual r the or the vill be
	t alidity: C QK Cancel Help		Configuration	OK Cancel Help	

Region Boundary Management



- For handling the soft edge per channel several option are available on the tab page Region Boundary Management in the channel section of the edit dialog of the Microlens Array component
- The user can select between specification of the Inner, Outer or Shared soft edge. In addition, the width of the soft edge is to be specified.





Microlens Array Scenario



Results of Ray Tracing (Far Field)



Results of Field Tracing (Near Field)



Results of Field Tracing (Far Field)



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