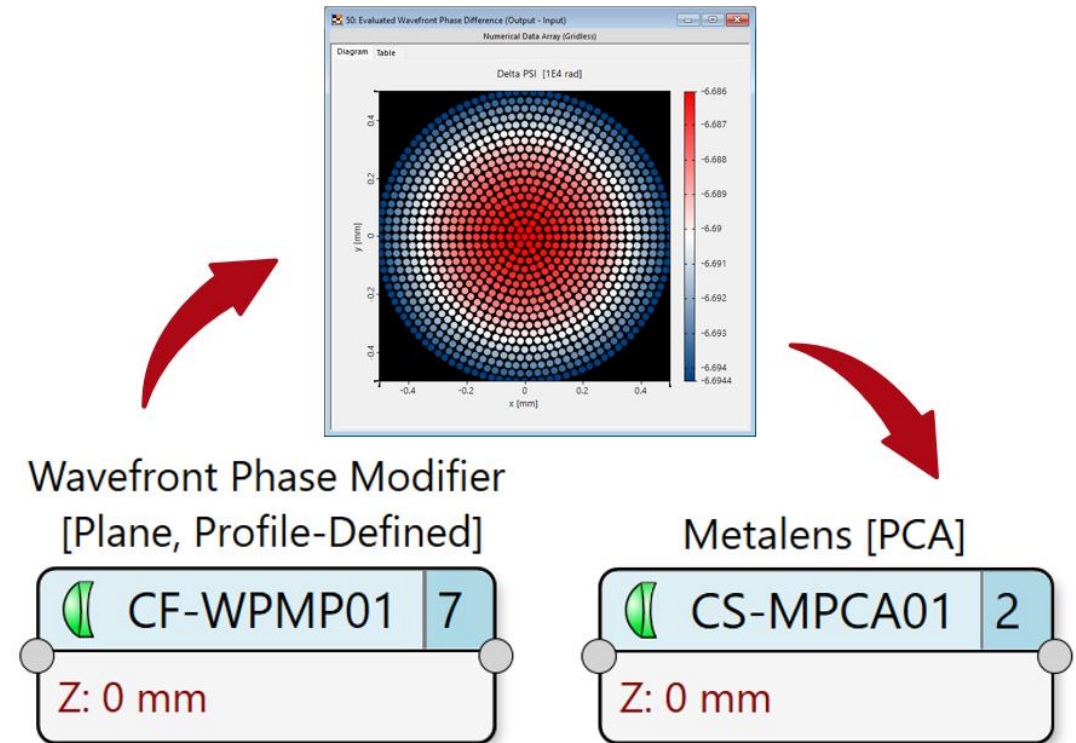


Transfer Wavefront Phase Profile to a Metalens Twin

Document ID:	FD-META-TRANSFER
Version:	1.0
Date:	August 12, 2026
Author:	LightTrans International GmbH
Version:	2026.2
Package:	Flat Lens Package



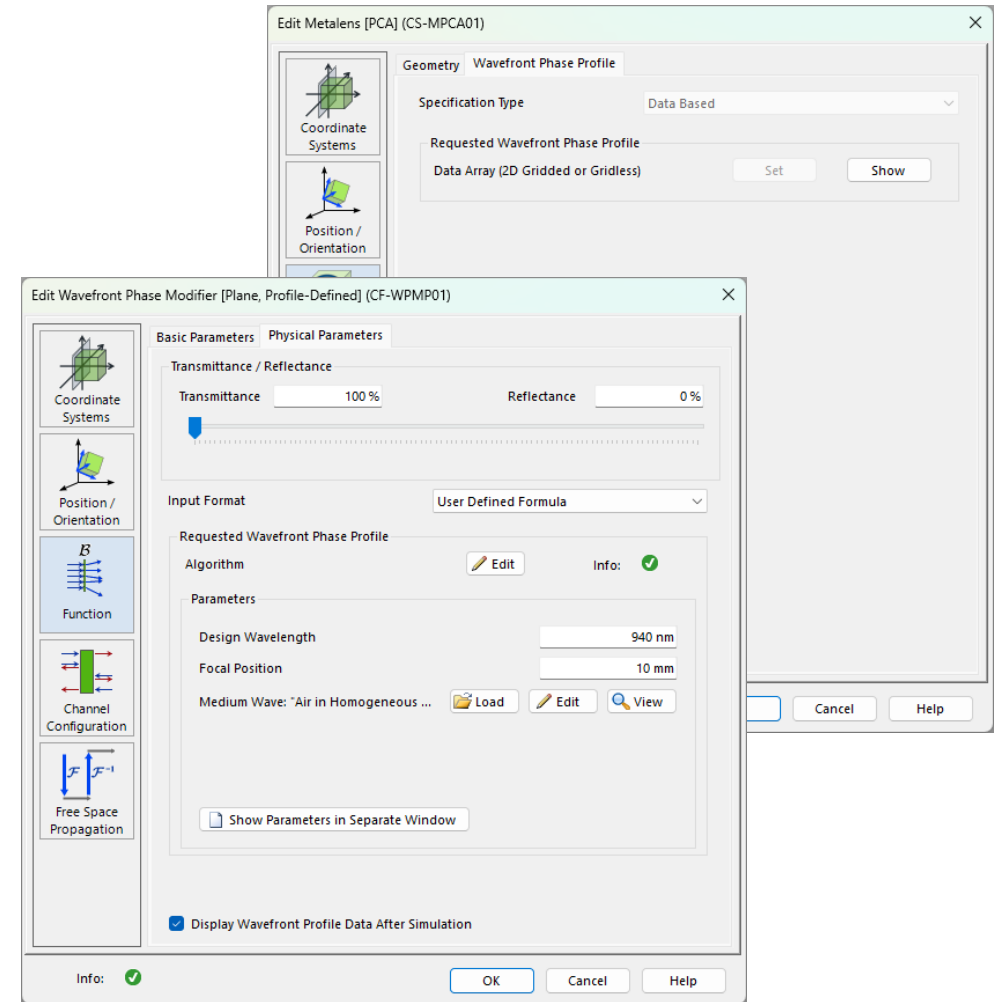
What Can It Be Used For?

💡 From Ideal Phase to Real Structure

- A *Wavefront Phase Modifier* applies a defined phase function directly to the incoming wavefront.
- A *Metalens* component uses a specified wavefront phase profile to automatically design a meta-surface structure.
- The new workflow connects both steps: first define and test the desired phase response, then reuse the same phase profile for the metalens design.

For a deep dive into our Wavefront Phase Modifier twins, see:

[Wavefront Phase Modifier](#)



Demonstration Example



Demonstrated

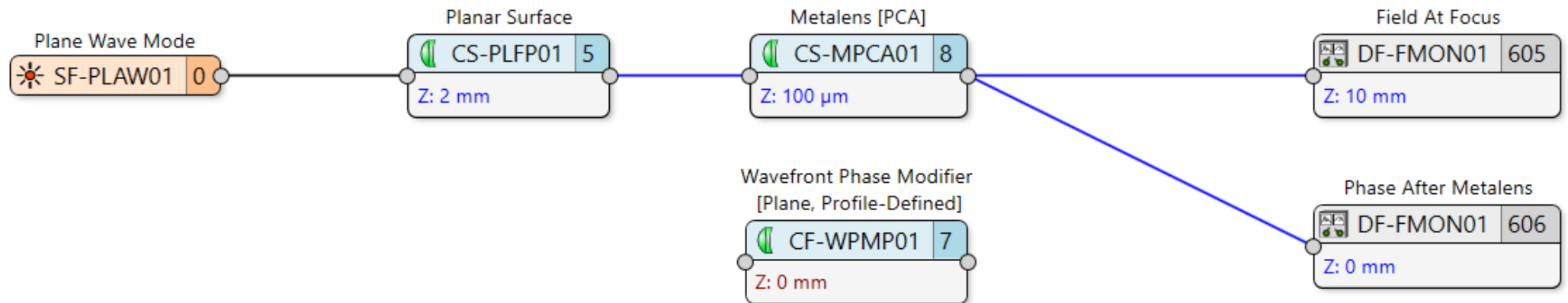
Optical

Setup

Component	Specification
Source	Plane wave, 940 nm, 2 mm size
Metalens-Type	Nanopillars
Metalens-Function	Focussing Lens (10 mm focal length)
Detector behind Metalens	Phase of the field
Detector in Focus	EM-field

Please find the surrogate model in the corresponding files as:

- *Example_WavefrontPhaseModifier.os* (With the Wavefront Phase Modifier active.)
- *Example_Metalens.os* (With the Metalens [PCA] active.)



Comparison Between two Twins

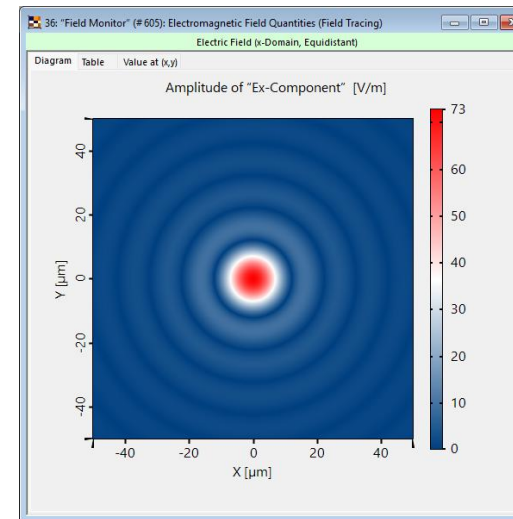
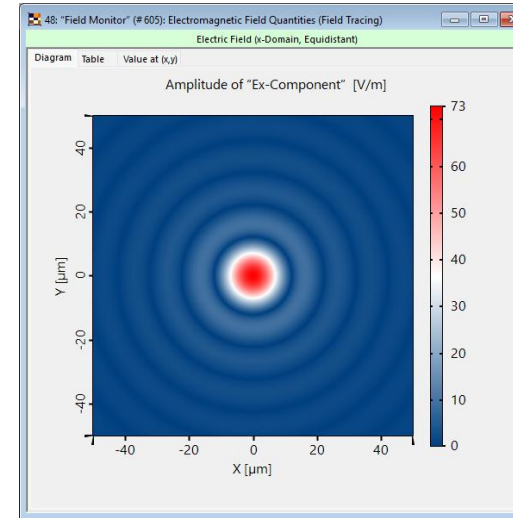
💡 Main Observation

- The ideal wavefront phase modifier and the generated metalens produce the same focusing behavior.
- The focal positions and focal shapes agree well in the comparison.
- Directly behind the real metalens, additional structured phase effects caused by the quantized metalens structure are visible.

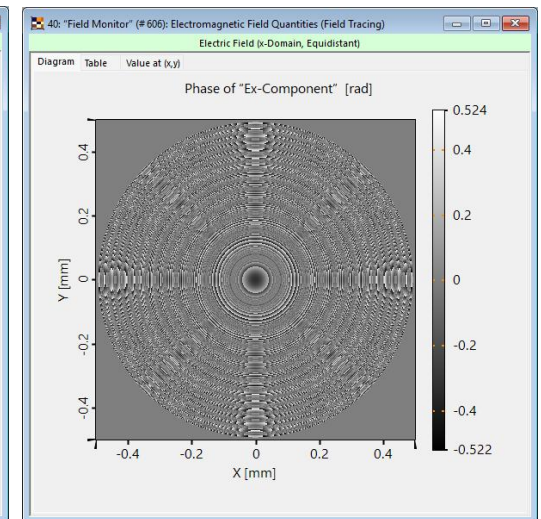
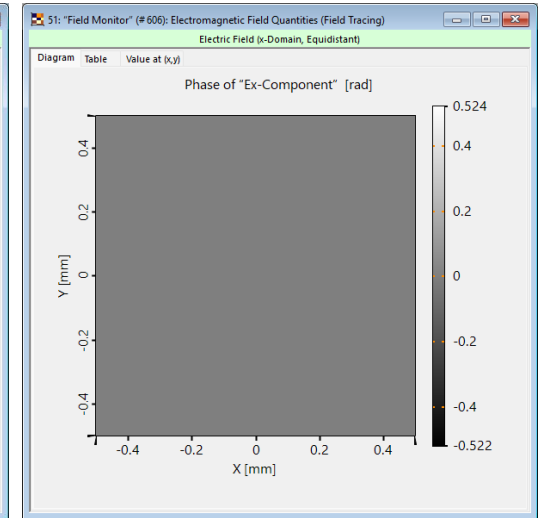
For a detailed discussion of the field effects introduced by the quantized metalens, see:

Collimation with a Metalens Based on Nanopillars

Focal Spot



Residual Phase after lens



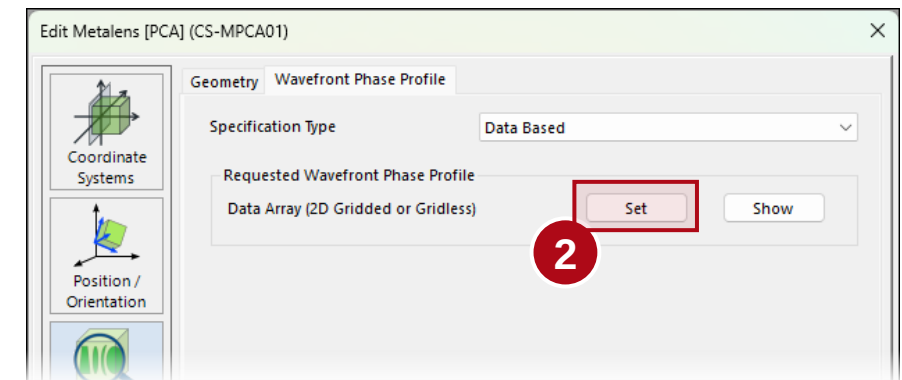
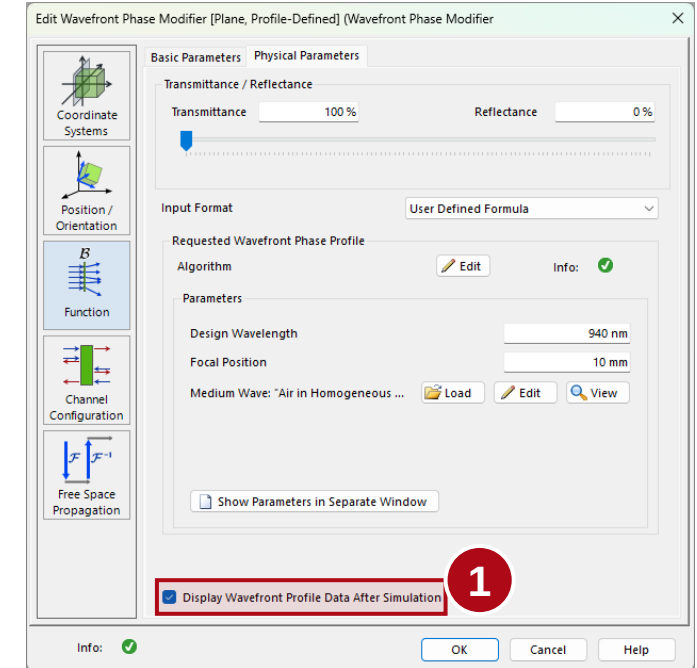
Wavefront Phase
Modifier component

Metalens [PCA]
component

Workflow

1 2 3 What the User Does

1. Define the desired wavefront phase response in the *Wavefront Phase Modifier*.
2. Activate *Display Wavefront Profile Data After Simulation*.
3. Start the simulation. You will receive a wavefront phase profile.
4. Load the phase profile into the *Metalens* component using *Data Based* input format.
5. Run the simulation again with the generated metasurface structure.
6. Compare the ideal phase-function result with the metalens result



Related Documents

White Papers

- [WP-META-SURROGATE — Surrogate Modeling: Enabling Practical Metalens Design and Simulation](#)
- [WP-META-PHASE — Designing and Analyzing the Phase Response of Metasurfaces](#)

Use Cases and Feature Demos

- [Collimation with a Metalens Based on Nanopillars](#)
- [Aberration Control via Metalens](#)
- [Wavefront Phase Modifier Twins](#)
- [Forward Queries](#)

Tutorials

- [Wavefront Phase Modifier](#)
- [Designing a Metalens in VirtualLab Fusion](#)

Working with Wavefront Phase Modifier Twins in VirtualLab Fusion

Overview

This tutorial introduces the **Wavefront Phase Modifier** twins available in VirtualLab Fusion and explains how to select the appropriate component and define its wavefront.

Wavefront Phase Modifier twins are **Functional Digital Twins** that modify the wavefront of an incoming optical field. They are especially useful during early-stage optical design, when the intended function of a component is already known but its physical structure has not yet been designed.

For example, a Wavefront Modifier can be used as a precursor to a metalens component. It allows you to define and evaluate the required lens function before mapping that function to a realizable nanostructure.

With VirtualLab Fusion 2026.2, four Wavefront Modifier twins are available: