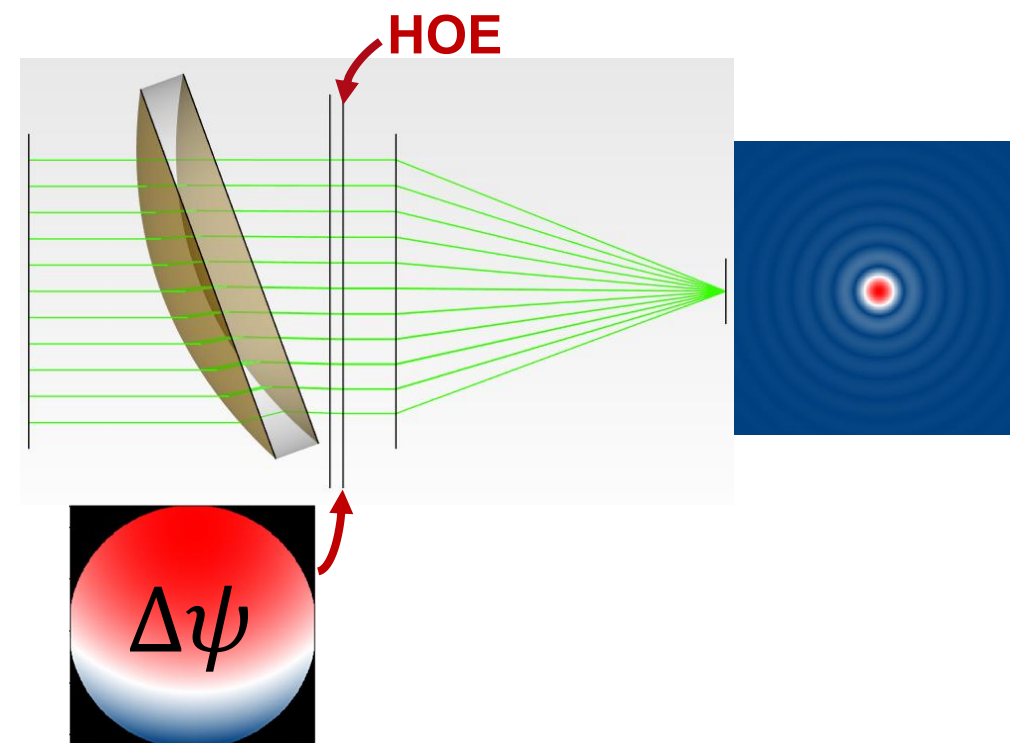


Two-Step Design – Part 2: Structural Transfer to HOE – Rocket Window Application

via Wavefront Phase Modifier (WPM) Twin

Doc. ID:	FD-HOE-ROCKET
Doc. Version:	1.1
Date:	September, 02, 2026
Author	LightTrans International GmbH
SW Package:	VirtualLab Fusion Platform
SW Version:	2026.2 (Build 3.30)



Scenario

Goal

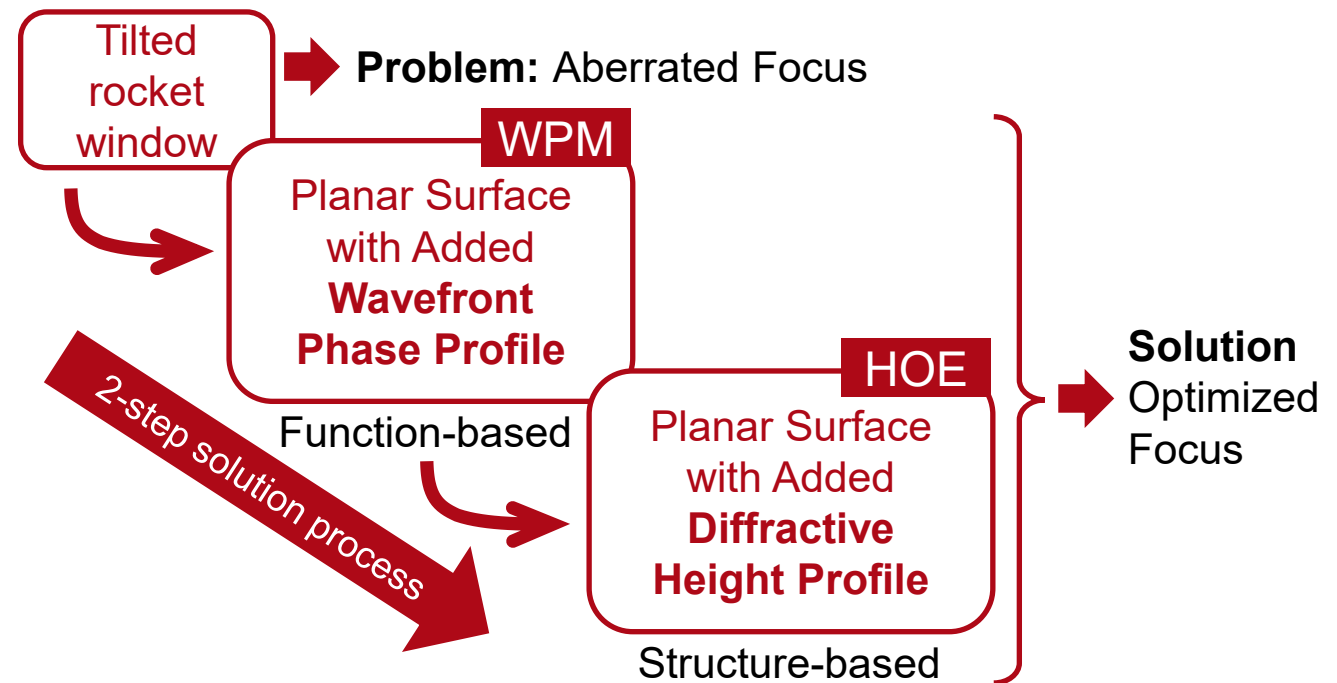
The Setup: A 20 mm plane wave passes through a 20°-tilted, aspherical fused-silica rocket window.

The Challenge: Heavy wavefront distortions and severe aberrations.

The Solution: A planar HOE perfectly compensates for distortions, enabling flawless camera lens focusing at 25 mm.

Two-Step Solution

- 1. Identify & Model:** Wavefront correction is determined and applied using a function-based Wavefront Phase Modifier (WPM) twin.(*)
- 2. Implement & Realize:** The obtained correction is applied to a structure-based HOE twin – (demonstrated in this feature demo).



Starting Point

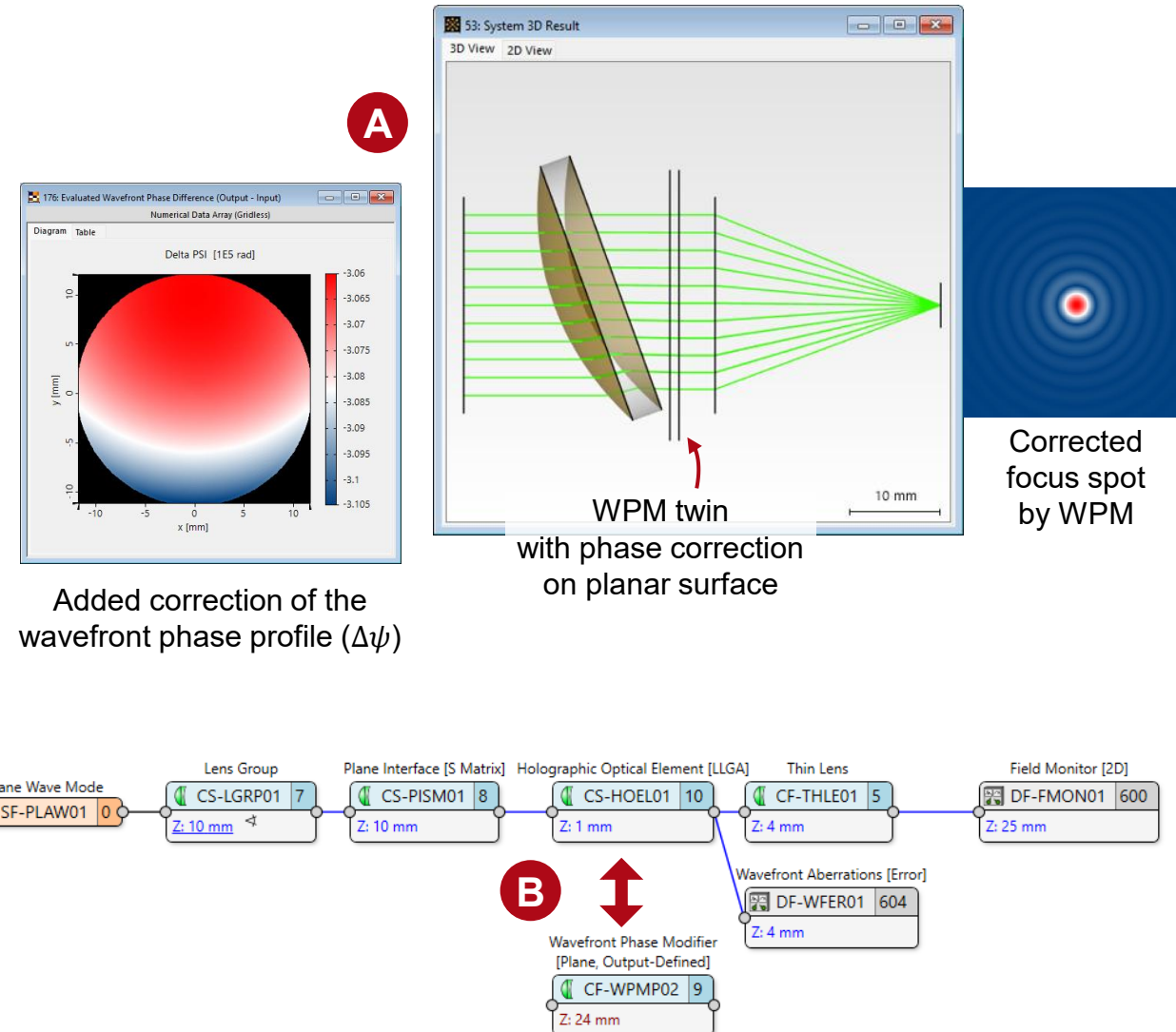
Known Required Wavefront Phase Determined and Provided by a WPM Twin

- A) Using the *Wavefront Phase Modifier [Plane, Output-Defined]* twin, the required wavefront difference was calculated, which eliminates the aberrations and ensures an optimal focal spot.

$$\Delta\psi = \psi_{\text{desired out}} - \psi_{\text{in}}$$

This is a solution at the functional level.

- B) Now let's use the determined data for the holographic optical element (HOE) and simulate it using its structural description.

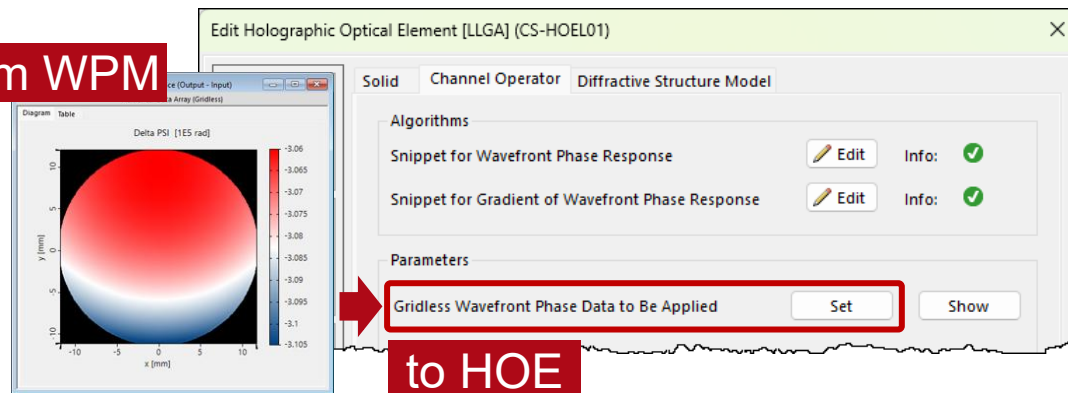


Simulation Results after Transferring WPM Data to HOE

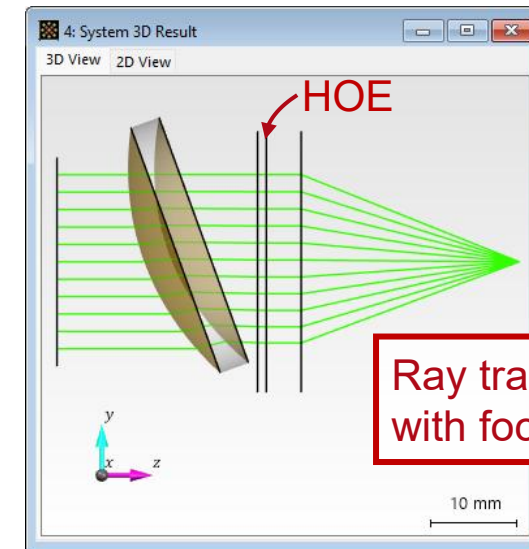
Easy Transfer and Quick Simulation

- The required wavefront phase profile obtained by the simulation with the WPM can be inserted directly into the prepared HOE twin.
- The HOE now represents the diffractive wavefront-phase-correcting surface.

from WPM

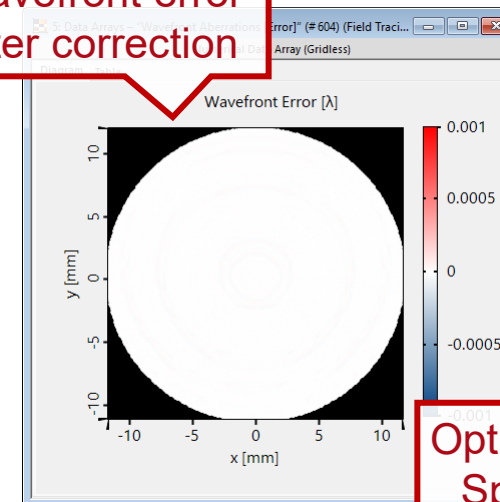


to HOE

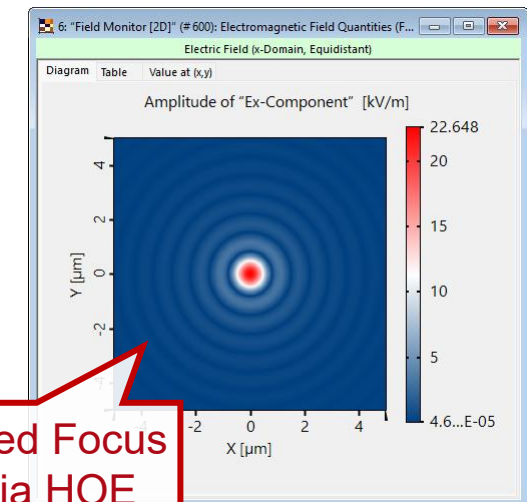


Ray tracing result
with focusing by HOE

Wavefront error
after correction



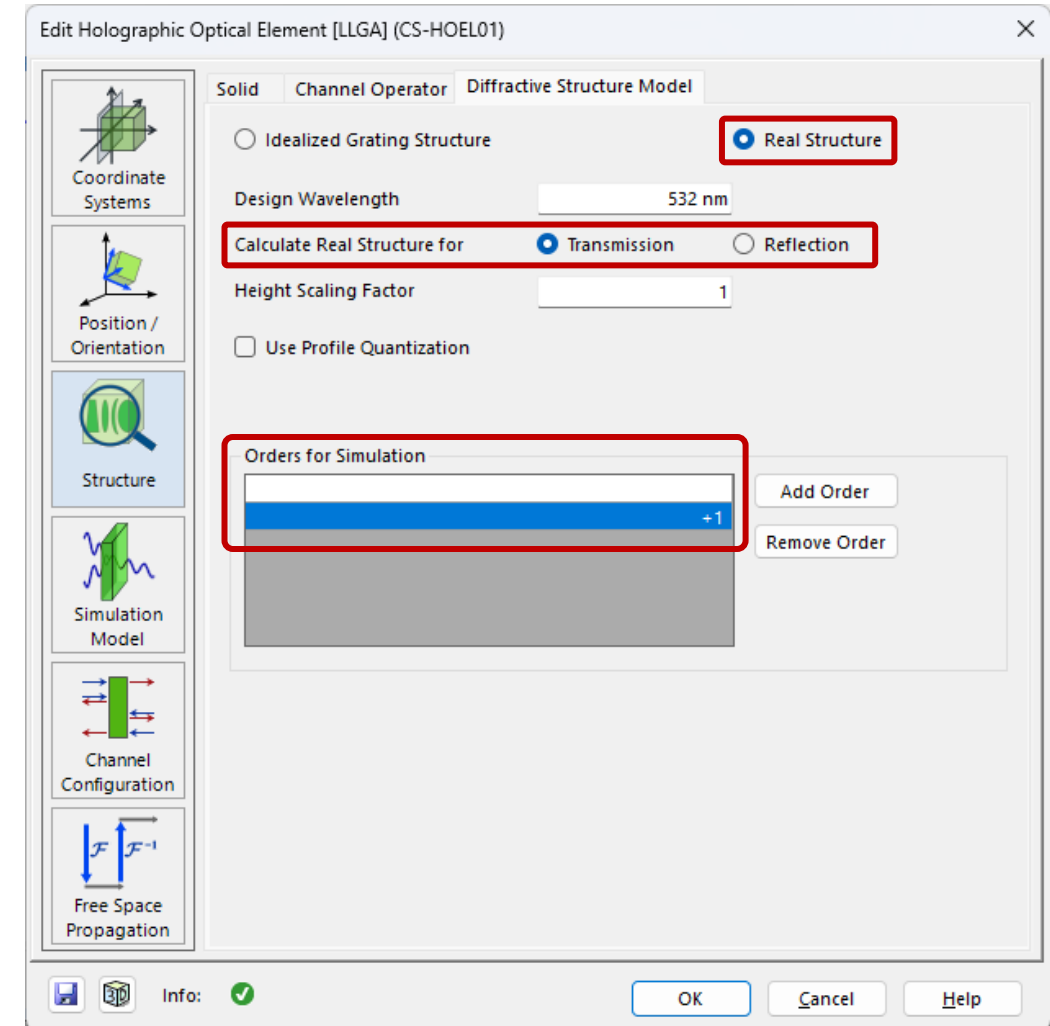
Optimized Focus
Spot via HOE



Workflow

What the User Does

1. Take the correcting wavefront phase profile data from the system simulation with the WPM.
2. Exchange the WPM twin for the given HOE twin. The code inside this HOE is meant to take the wavefront data from a WPM as input.
3. Make sure that the HOE is correctly configured (including the planar surface, the material, real-structure mode for transmission, and working order +1)
4. Run the simulation and inspect the corrected focal spot.



Related Resources

Use Cases and Feature Demos

- [Two-Step Design - Part 1: WPM Phase Synthesis - Rocket Window Application](#)
- [Wavefront Error Detector](#)
- [Aberration Control via Metalens](#)
- [Wavefront Phase Modifier Twins \(Collimation\)](#)
- [Transfer Wavefront Phase Profile to a Metalens](#)

White Papers

- [Wavefront Phase Modifiers](#)

Marketing Picture

