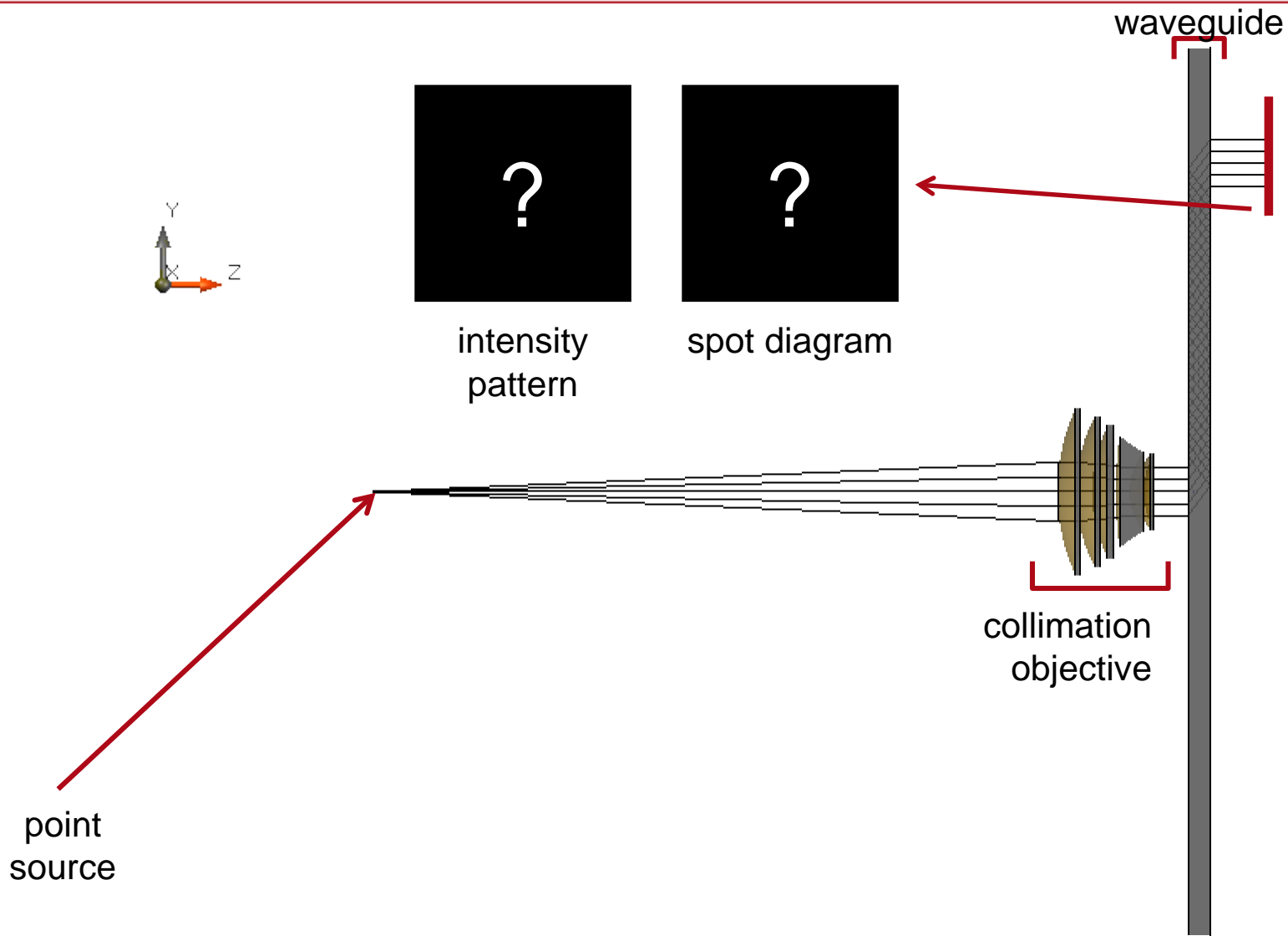


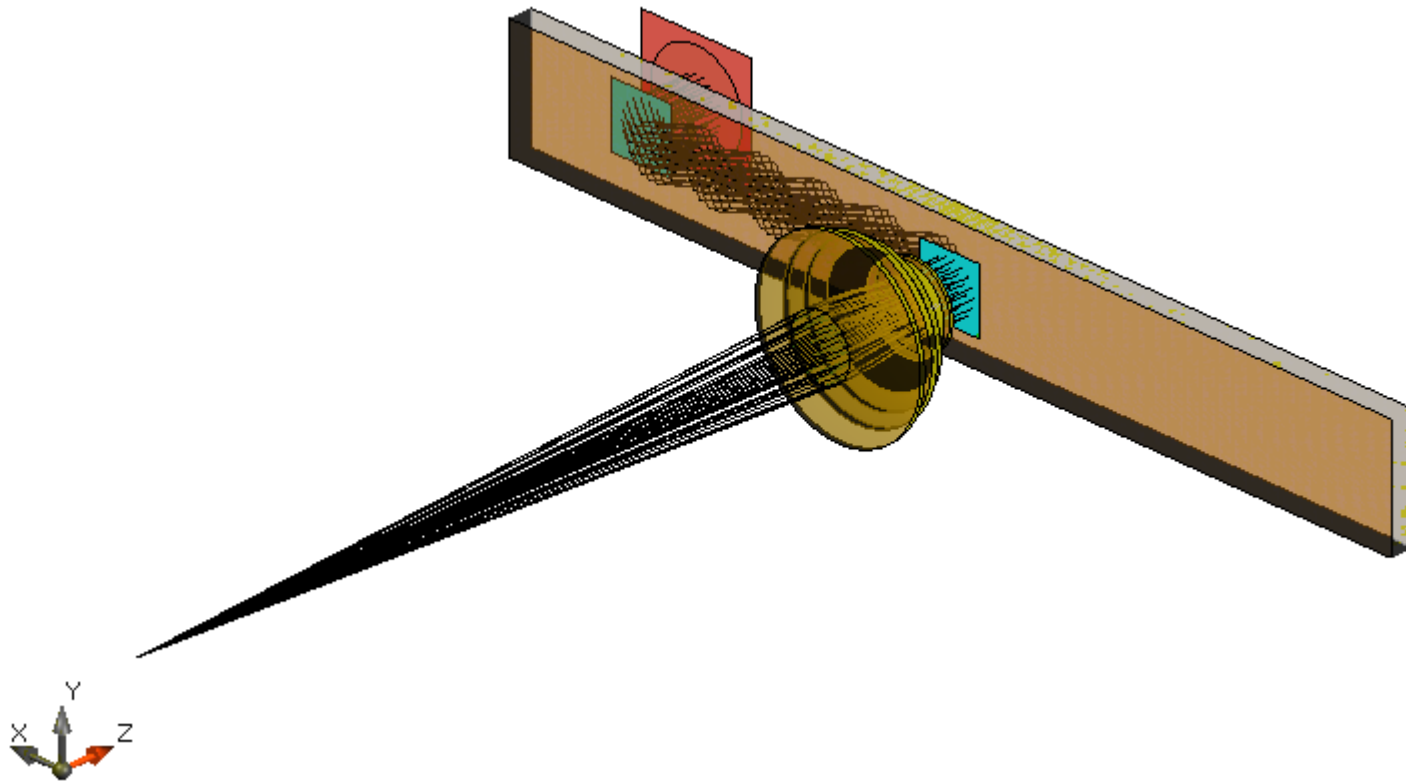
Virtual and Mixed Reality > Near-Eye-Displays

Analysis of Folded Imaging System and Multiple Apertures

Task/System Illustration

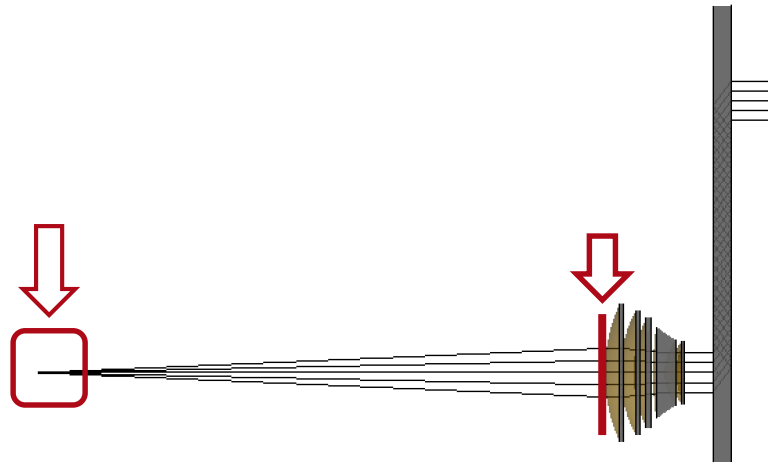


Highlights



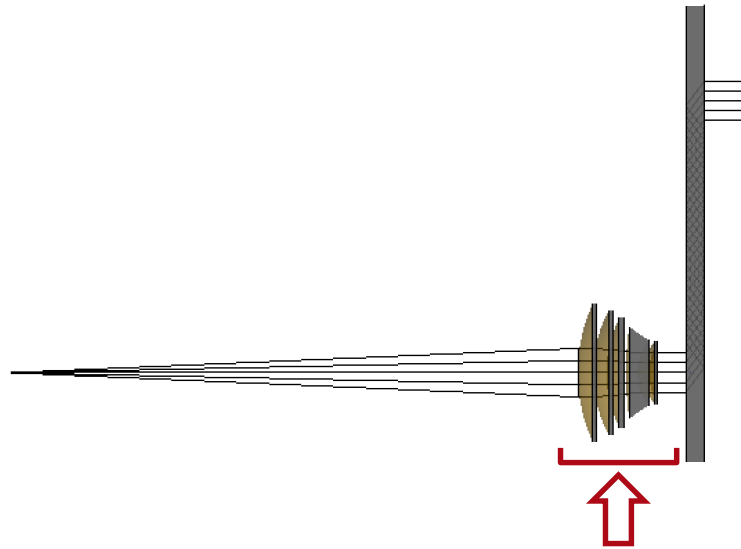
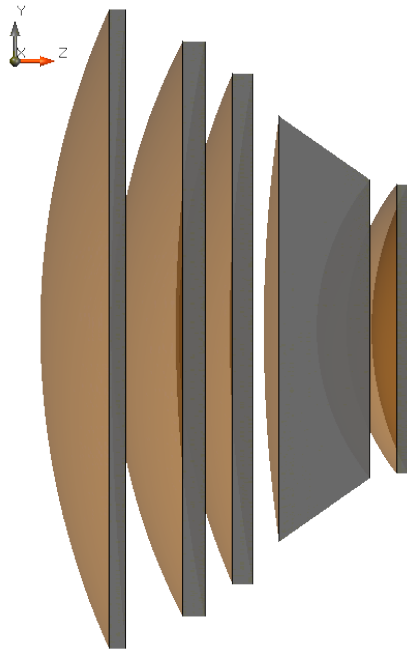
- non-sequential analysis of propagation in the waveguide
- full automatic handling of multiple apertures within the system

Specification: Light Source



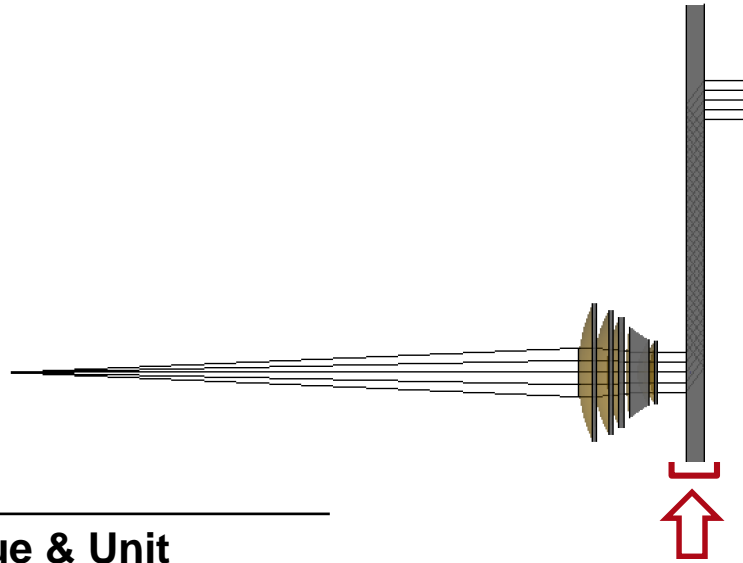
Parameter	Description / Value & Unit
type/number	spherical wave (point source)
wavelength	532nm
polarization	linear in x-direction (0°)
lateral offset	0
distance to next surface	30.955mm
aperutre at next surface	2.5mm×2.5mm

Specifications: Collimating Lens

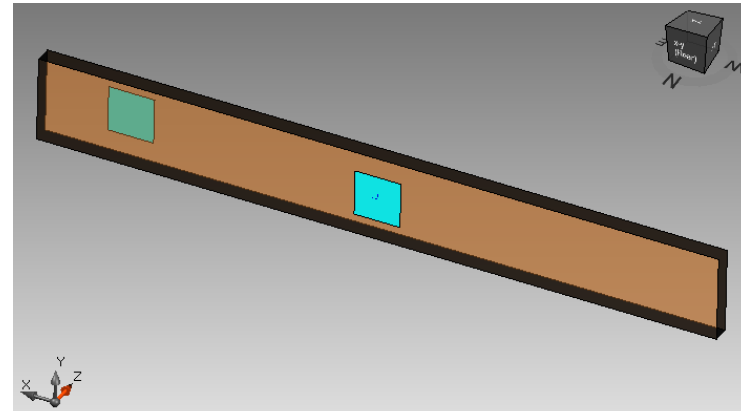


Parameter	Value & Unit
types of lens surfaces	5 lenses with 10 spherical surfaces
numerical aperture (NA)	0.15

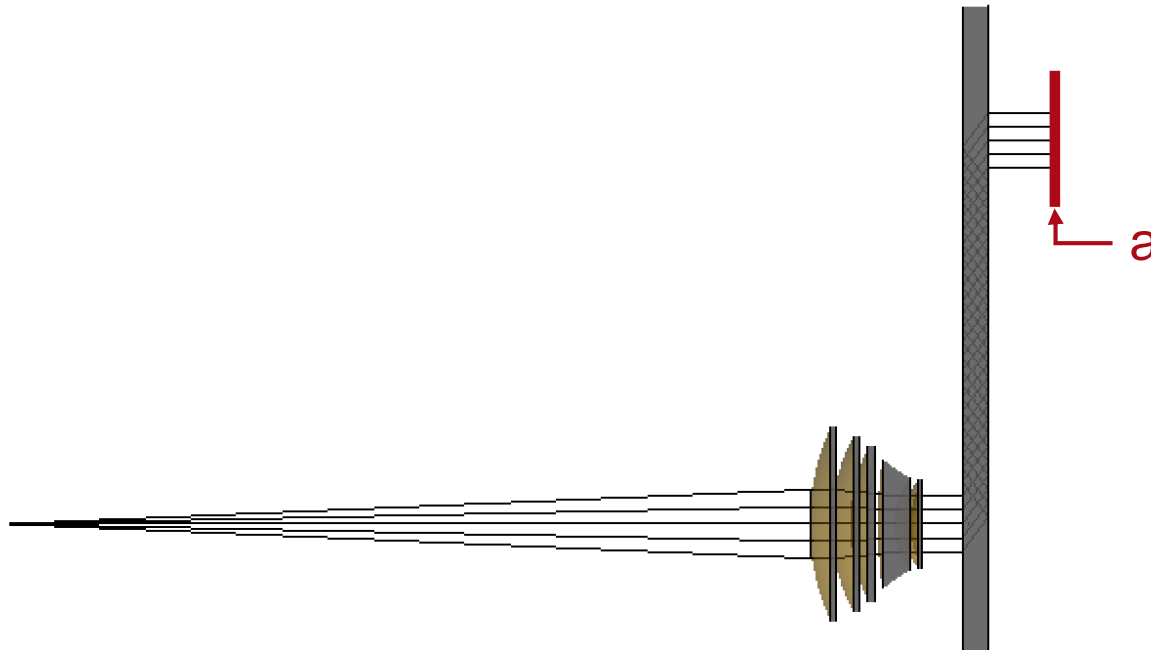
Specification: Waveguide



Parameter	Value & Unit
type	parallel planes
thickness	1 mm
material	fused silica
input region size	2.7 mm×2.7 mm
input region position	0 mm×0 mm
output region size	2.7 mm×2.7 mm
output region position	15 mm×0 mm

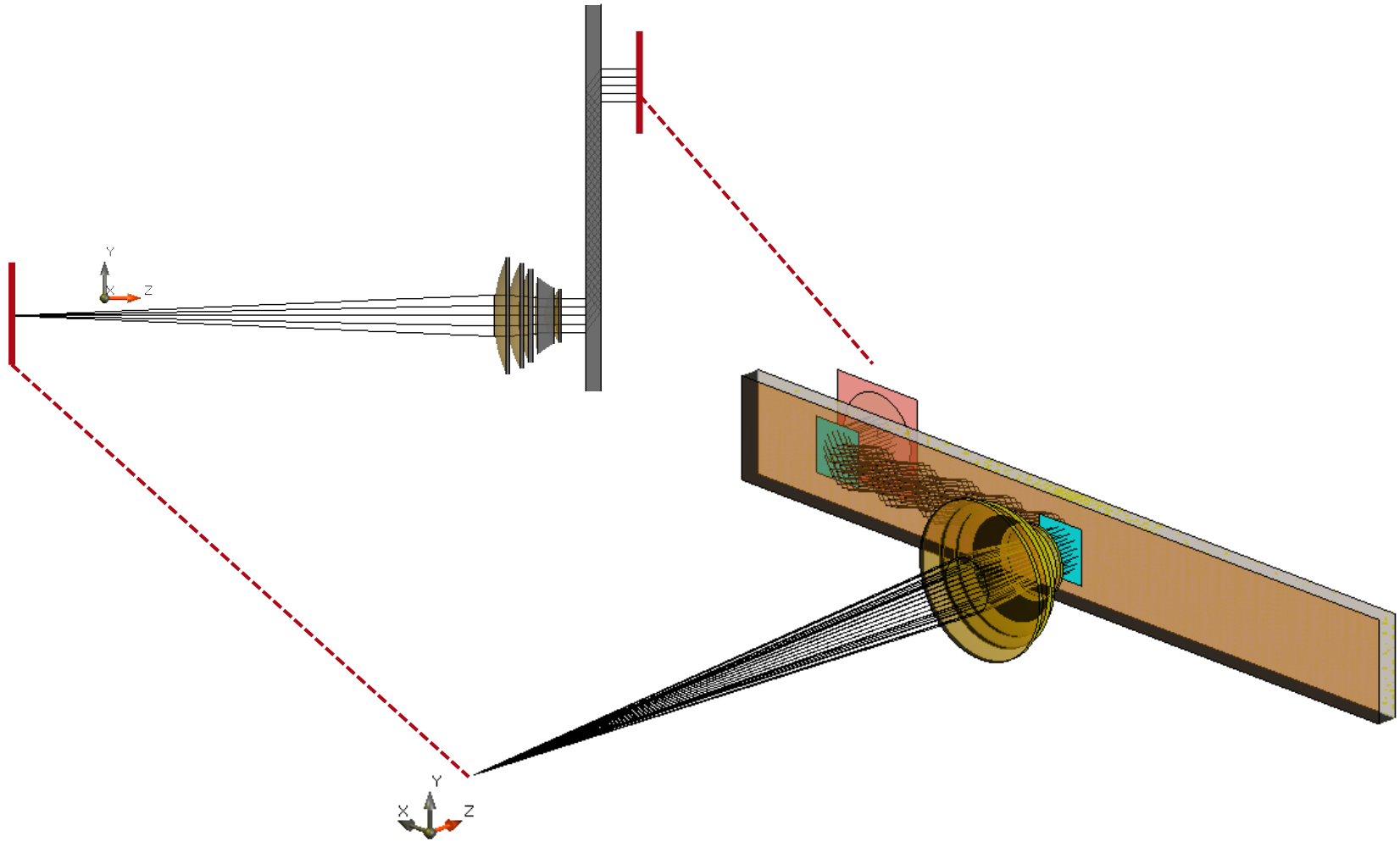


Specification: Detectors

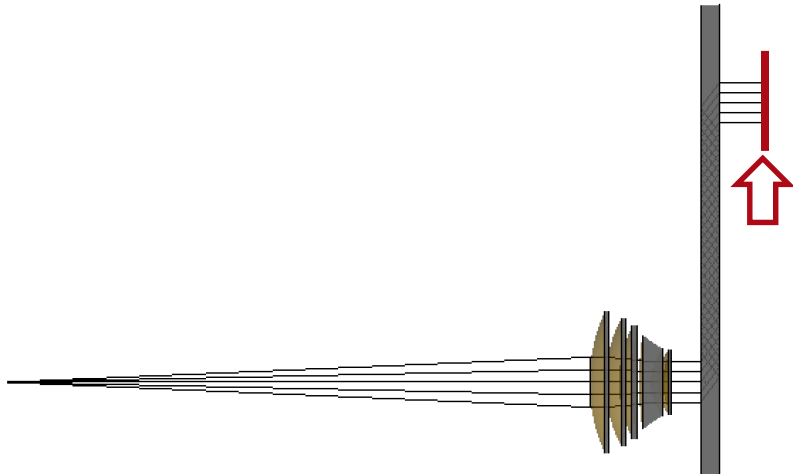


Position	Modeling Technique	Detector/Analyzer
full system	3D ray tracing	3D ray tracing system visualization
a	field tracing	evaluation of 2D PSF and MTF

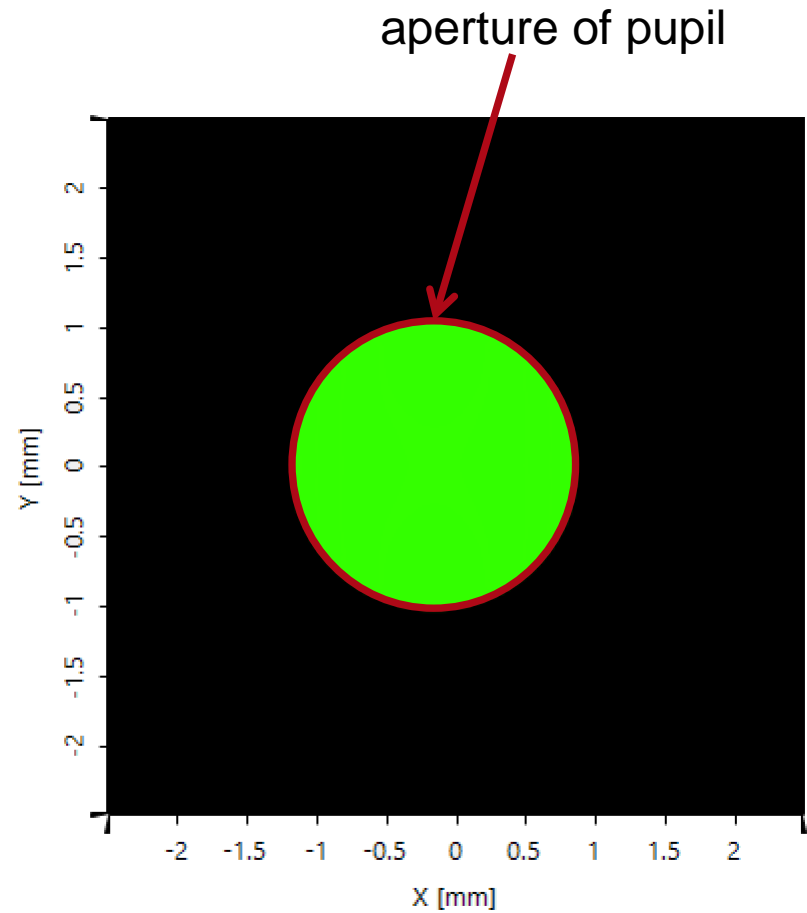
Result: 3D Ray Tracing



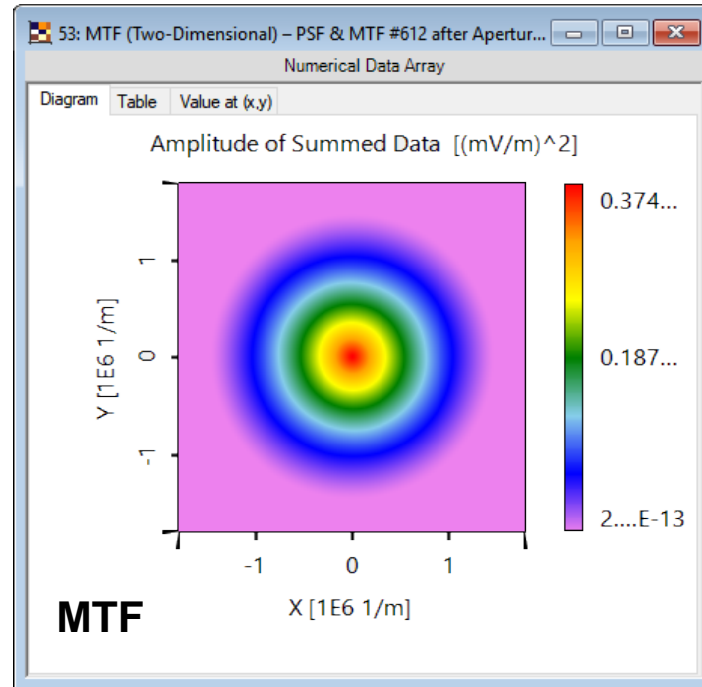
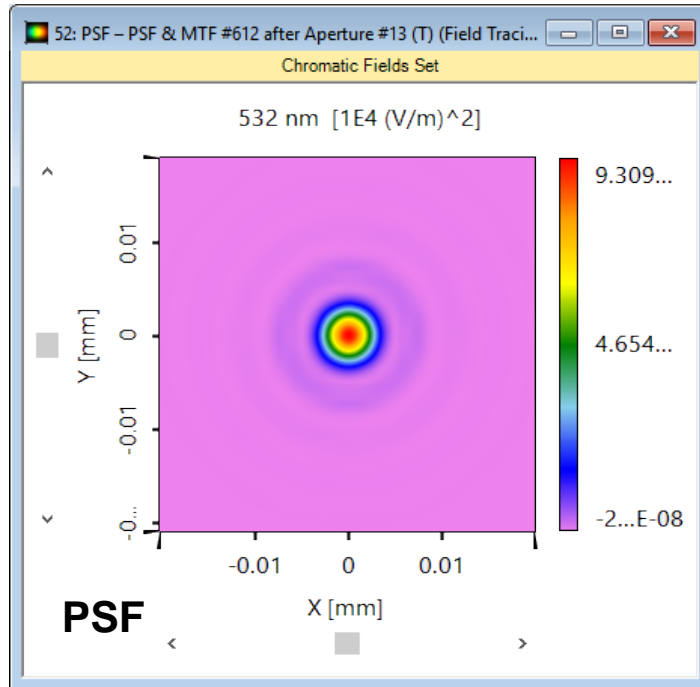
Result: Intensity Behind Aperture



pupil aperture is filled **completely**
(no clipping at system aperture)



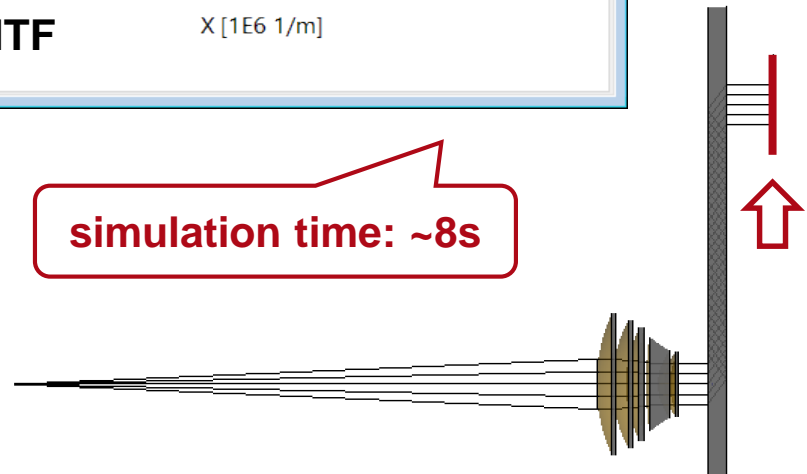
Result: 2D PSF & 2D MTF



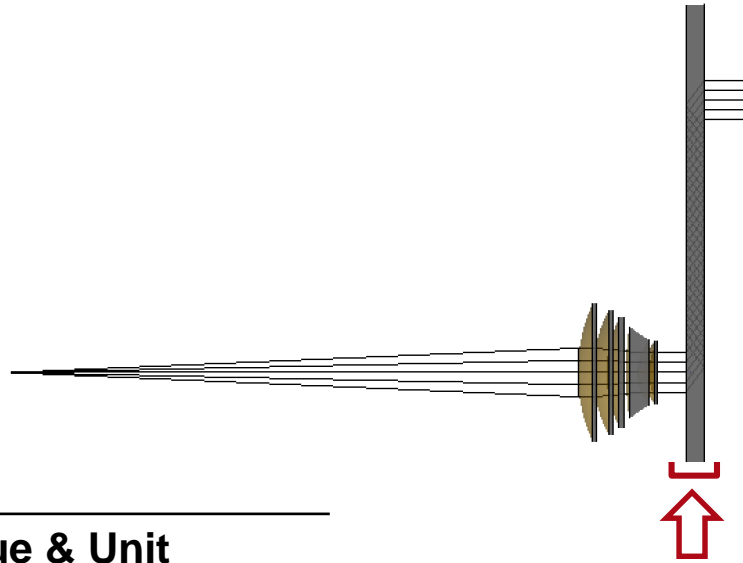
Highlights

- non-sequential analysis of propagation in the waveguide
- full automatic handling of multiple apertures within the system

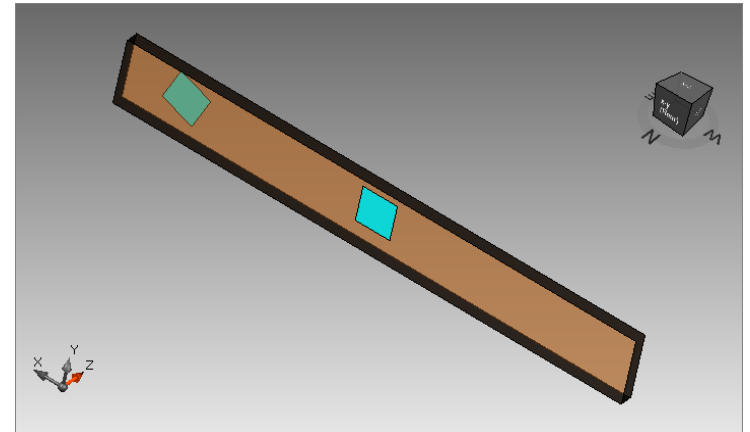
simulation time: ~8s



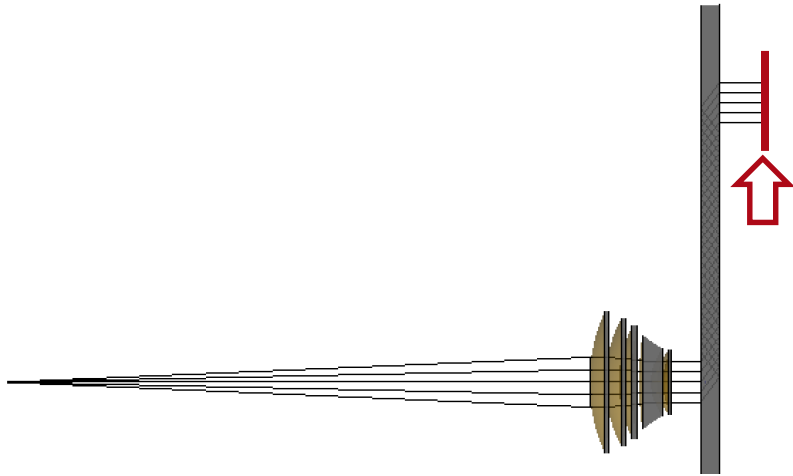
Specs: Waveguide (Apertures)



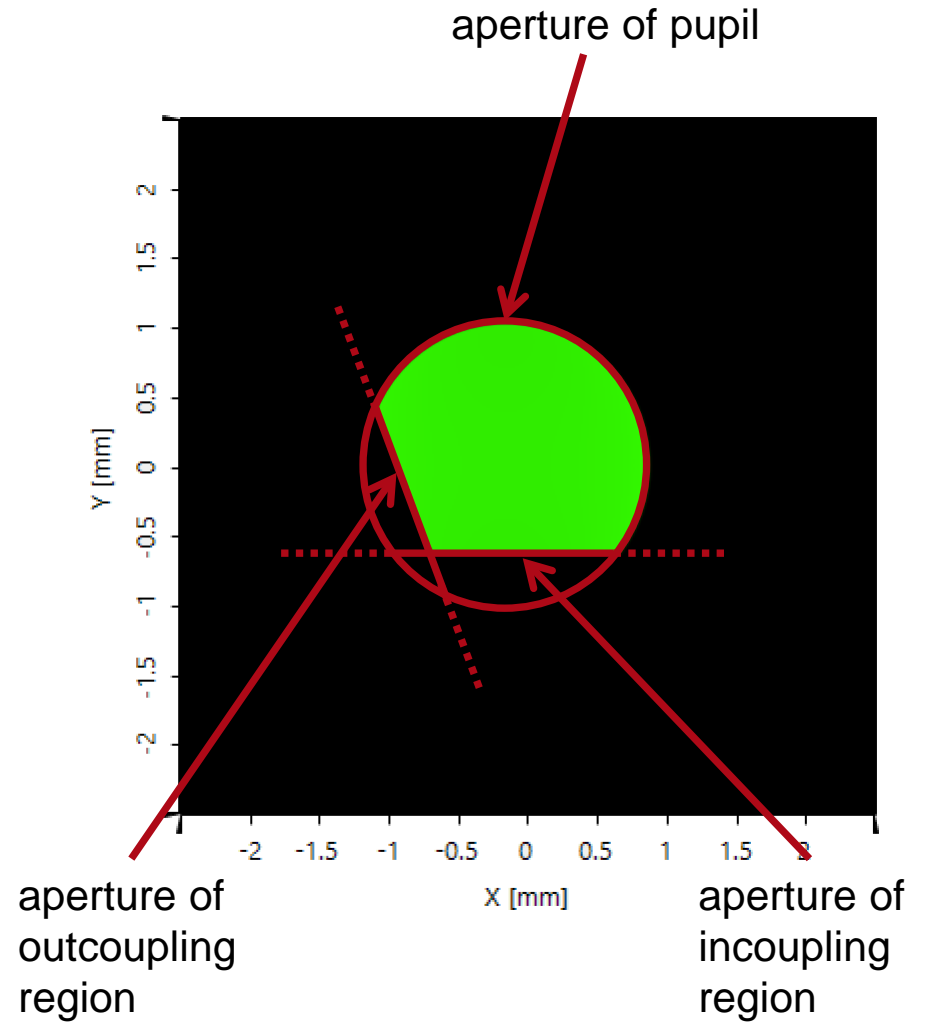
Parameter	Value & Unit
type	parallel planes
thickness	1 mm
material	fused silica
input region size	2.7 mm×2.7 mm
input region position	0 mm× 0.7 mm
output region size	2.7 mm×2.7 mm
output region position	15.5 mm ×0 mm
output region rotation	20°



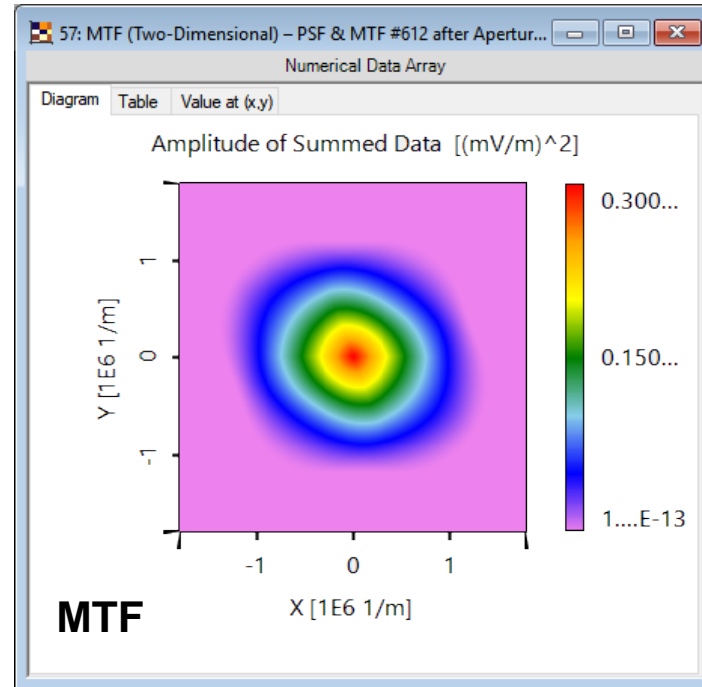
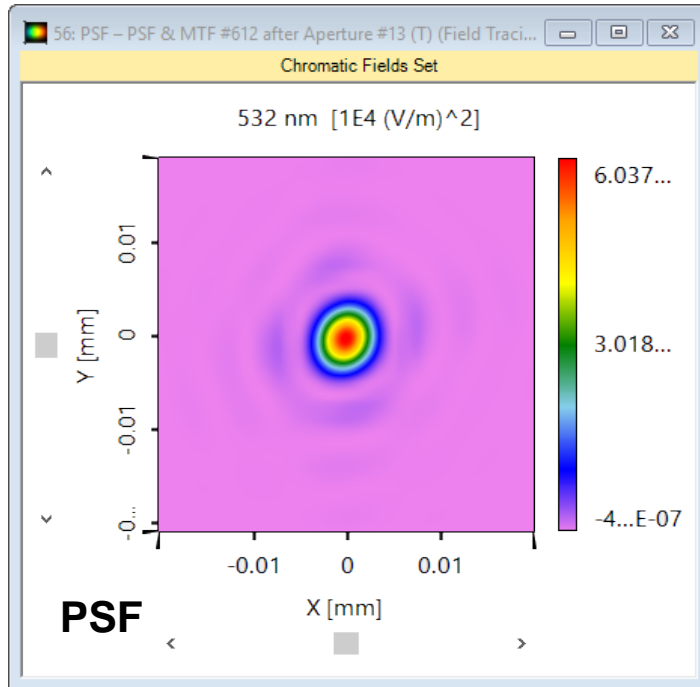
Result: Intensity Behind Aperture



pupil aperture only **filled partially**
(cut by in- and outcoupling region)



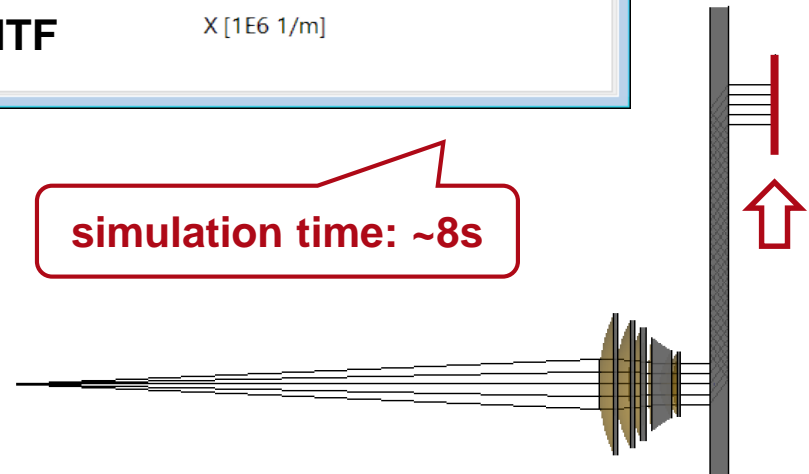
Result: 2D PSF & 2D MTF



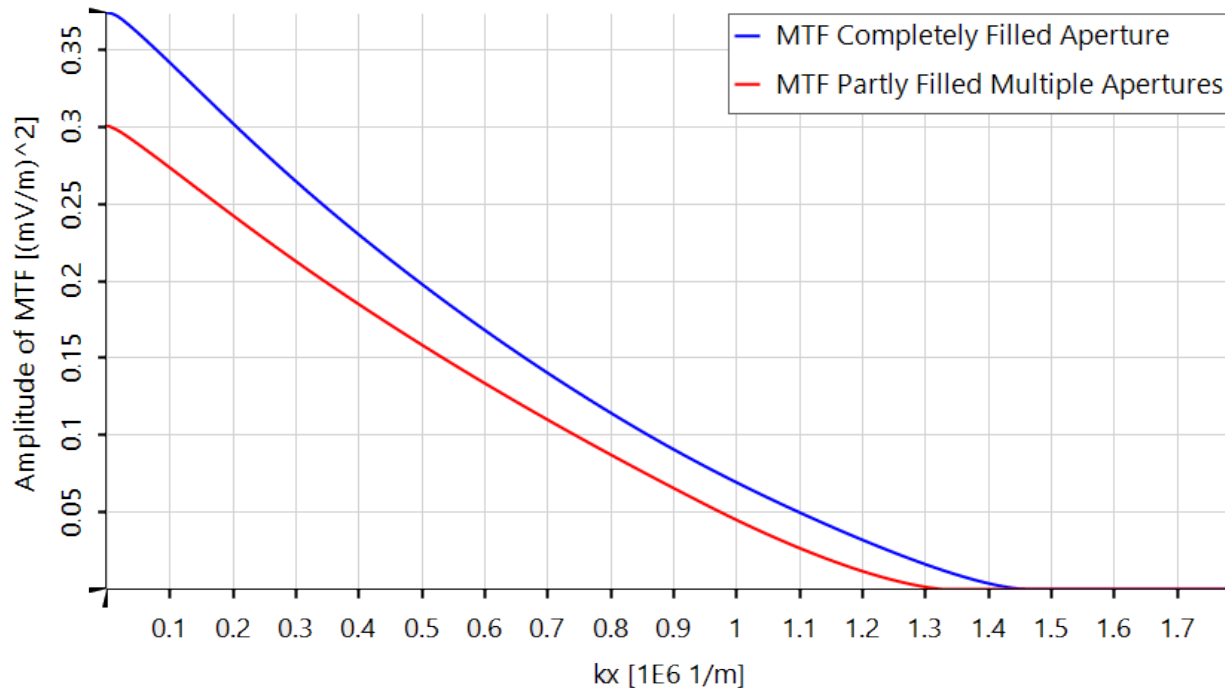
Highlights

- non-sequential analysis of propagation in the waveguide
- full automatic handling of multiple apertures within the system

simulation time: ~8s

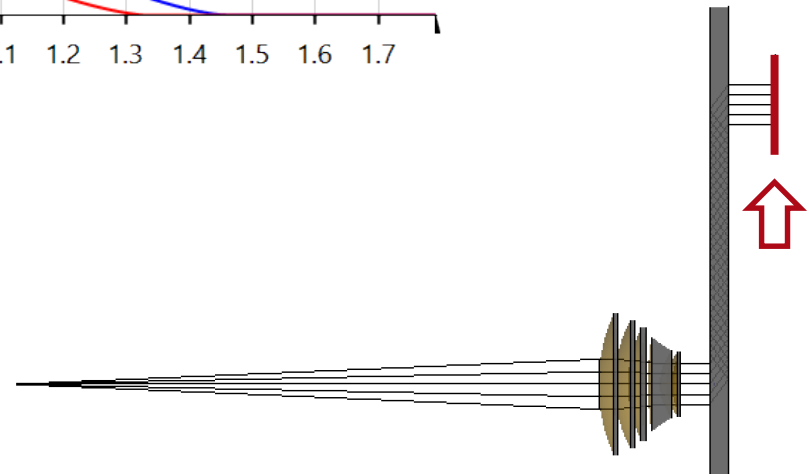


Result: 1D Filled vs. Partially Filled Aperture



Highlights

- non-sequential analysis of propagation in the waveguide
- full automatic handling of multiple apertures within the system



Document & Technical Info

code	NED.0009
version of document	1.0
title	Folded Imaging System Analysis
category	Virtual & Mixed Reality > Analysis of Folded Imaging System and Multiple Apertures
created by	Christian Hellmann
used VL version	7.0.0.29

Specifications of PC Used for Simulation

Processor	i7-6650 CPU (4 CPU cores)
RAM	16 GB
Operating System	Windows 10