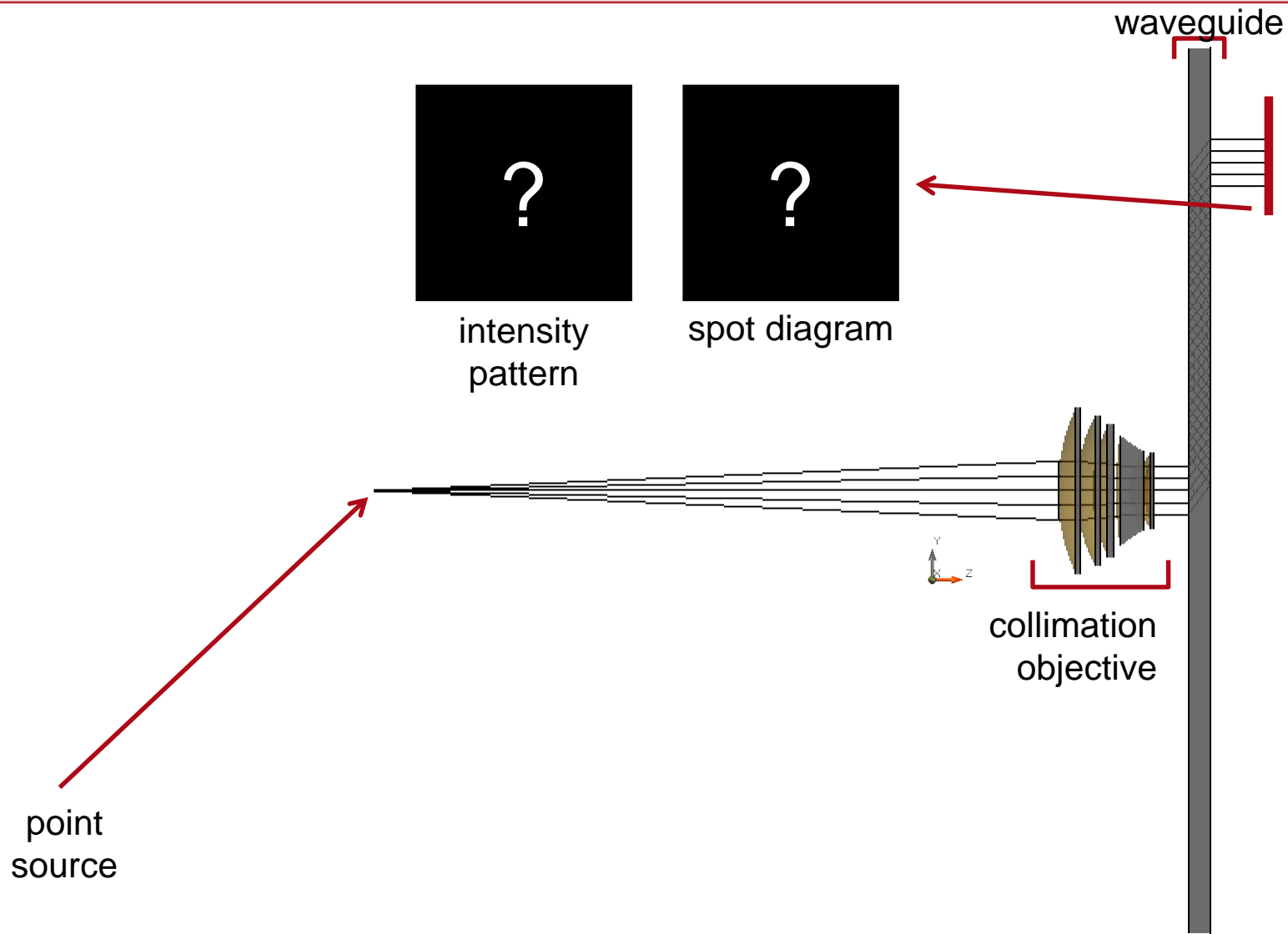


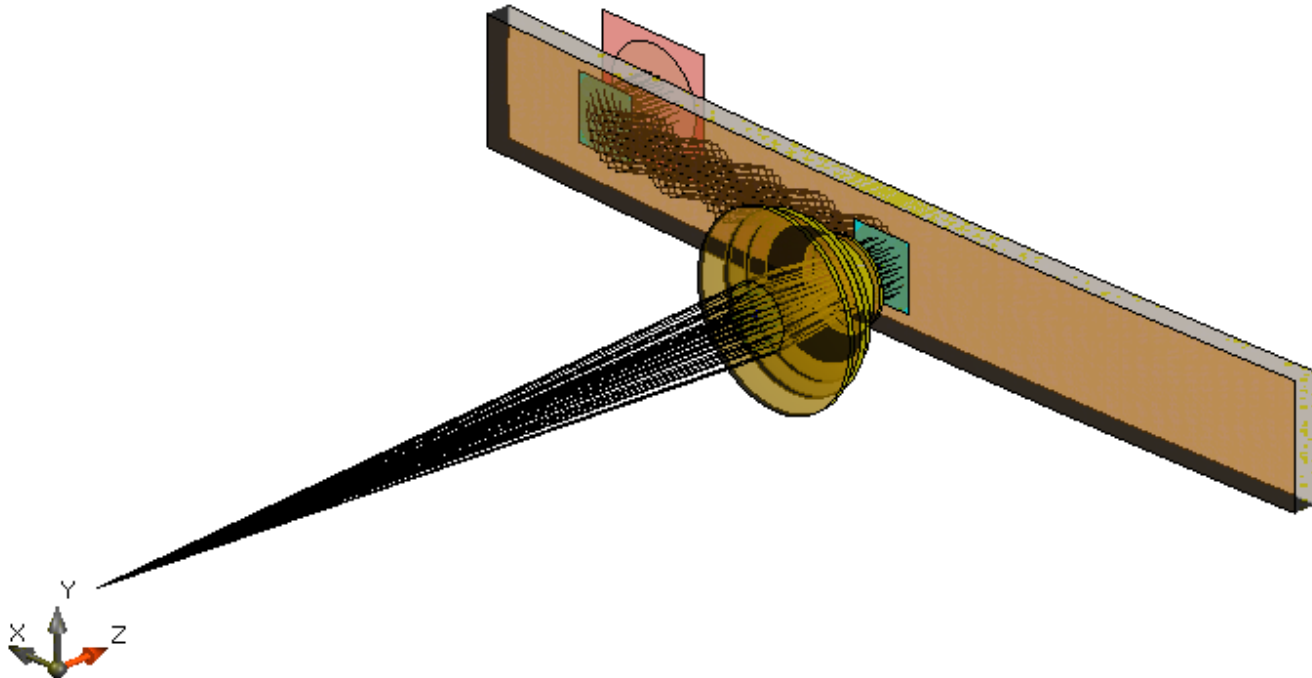
Virtual and Mixed Reality > Near-Eye-Displays

Analysis of Folded Imaging Systems

Task/System Illustration

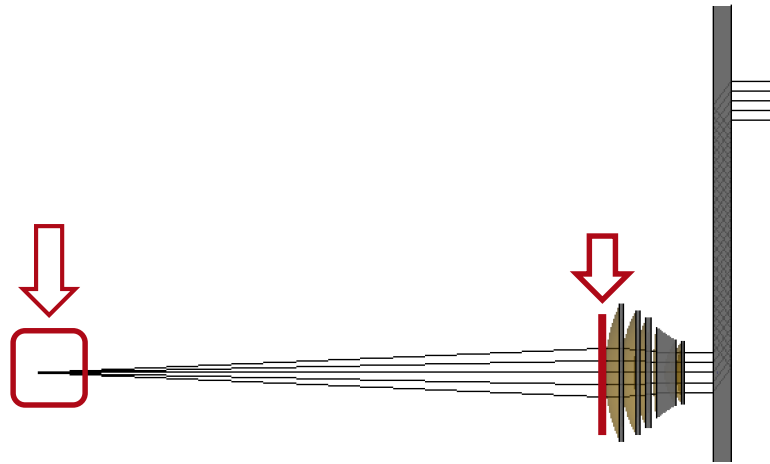


Highlights



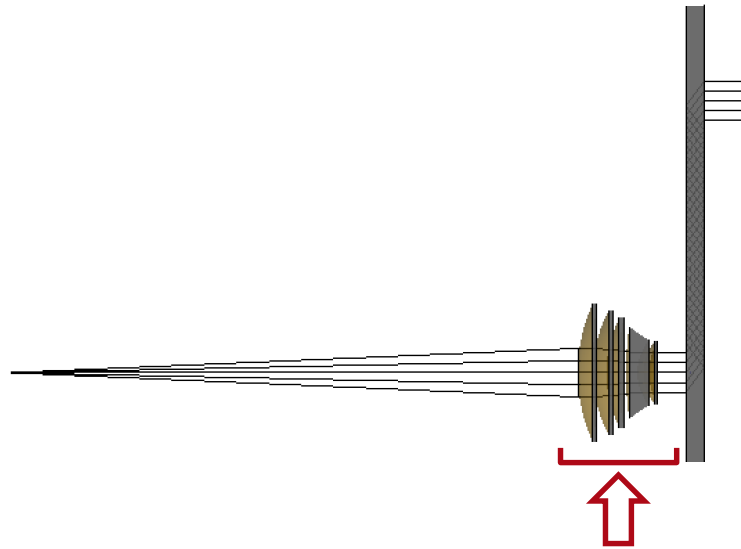
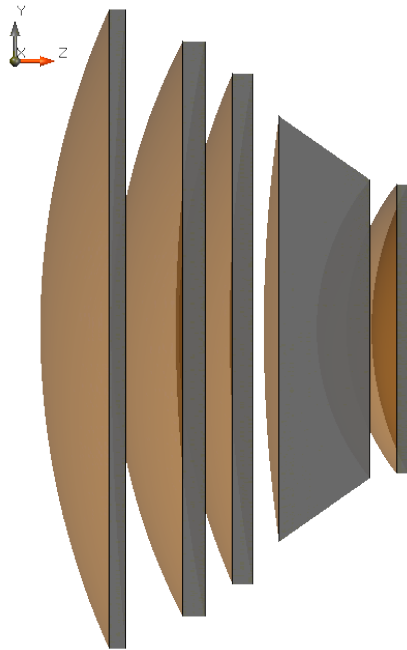
- non-sequential analysis of propagation in the waveguide
- regard of wavefront aberrations for PSF and MTF calculation

Specification: Light Source



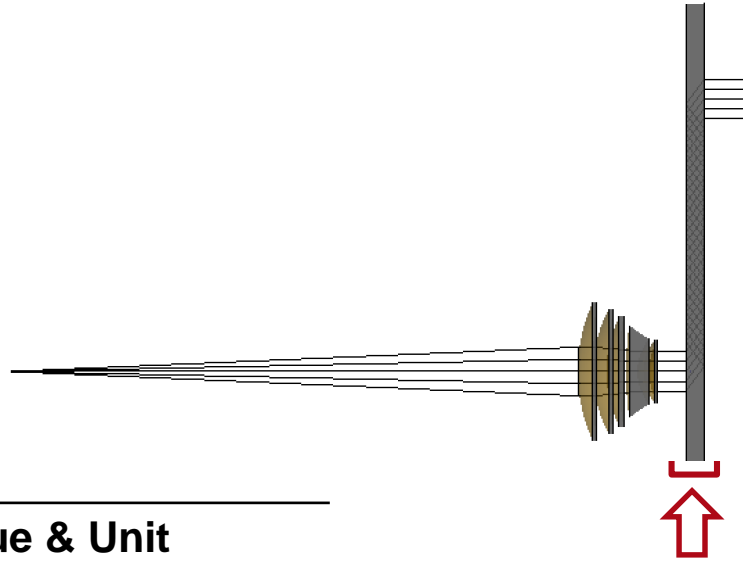
Parameter	Description / Value & Unit
type/number	spherical wave (point source)
wavelength	532nm
polarization	linear in x-direction (0°)
lateral offset	0
distance to next surface	30.955mm
aperutre at next surface	2.5mm×2.5mm

Specifications: Collimating Lens

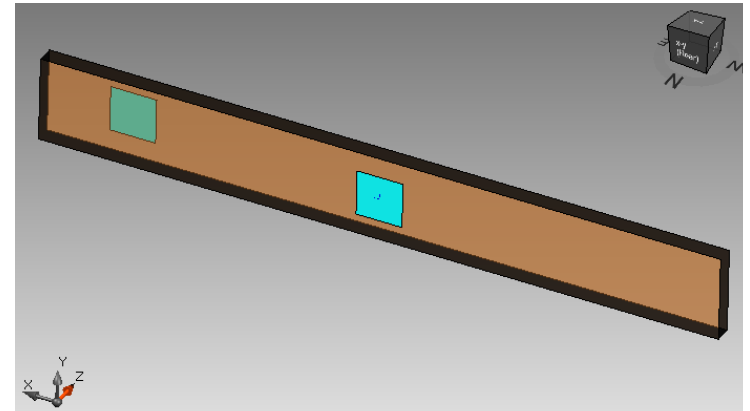


Parameter	Value & Unit
types of lens surfaces	5 lenses with 10 spherical surfaces
numerical aperture (NA)	0.15

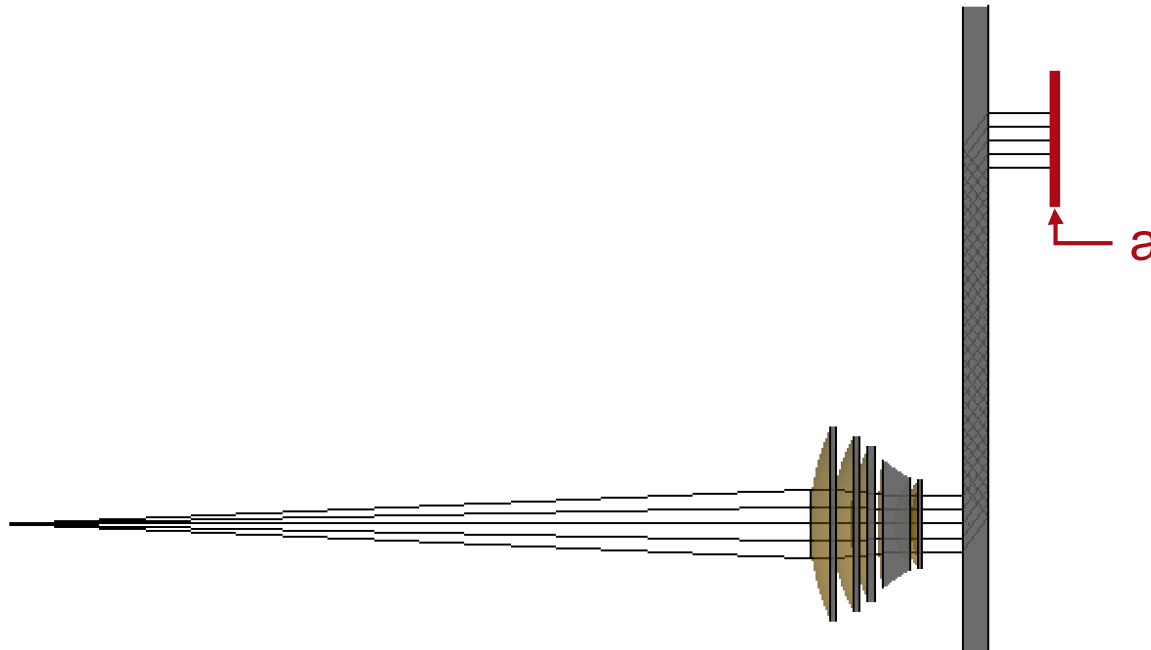
Specification: Waveguide



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

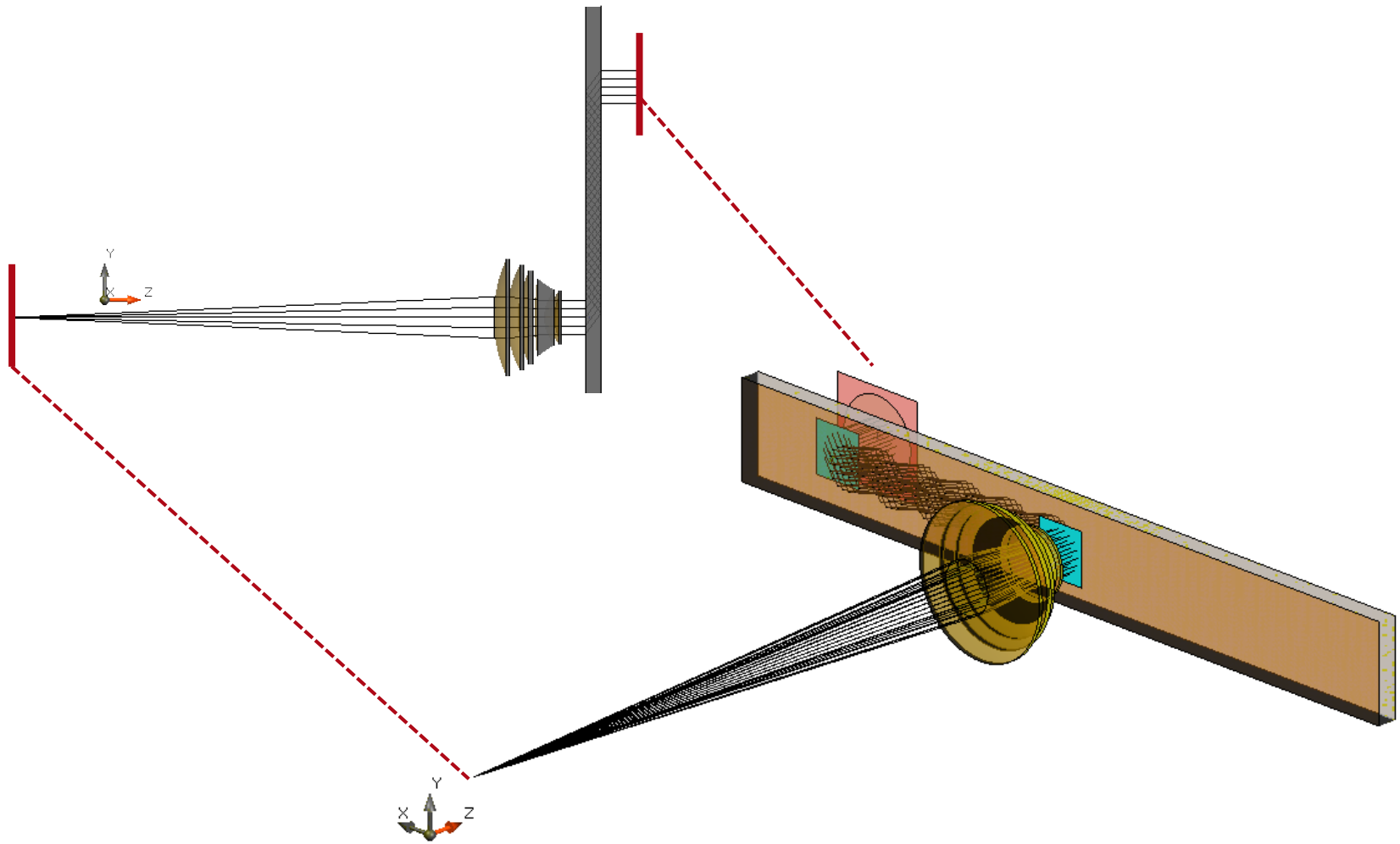


Specification: Detectors

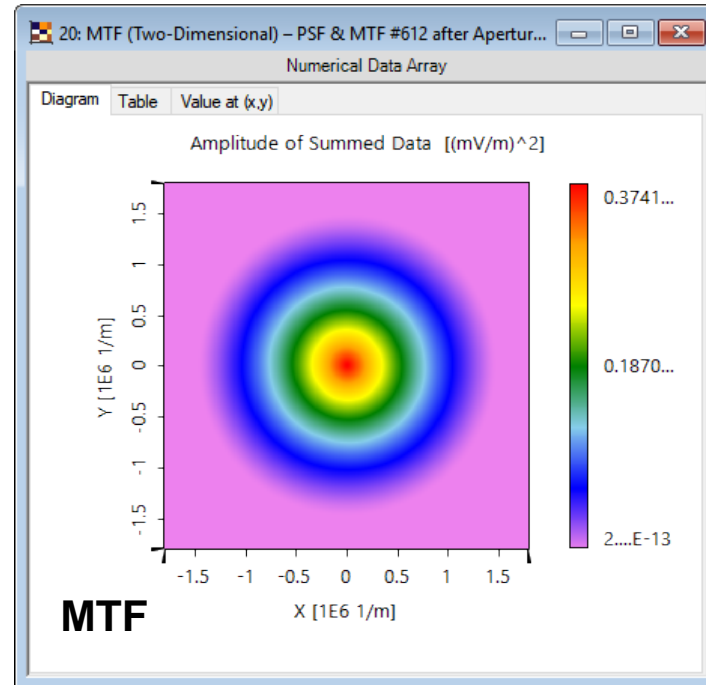
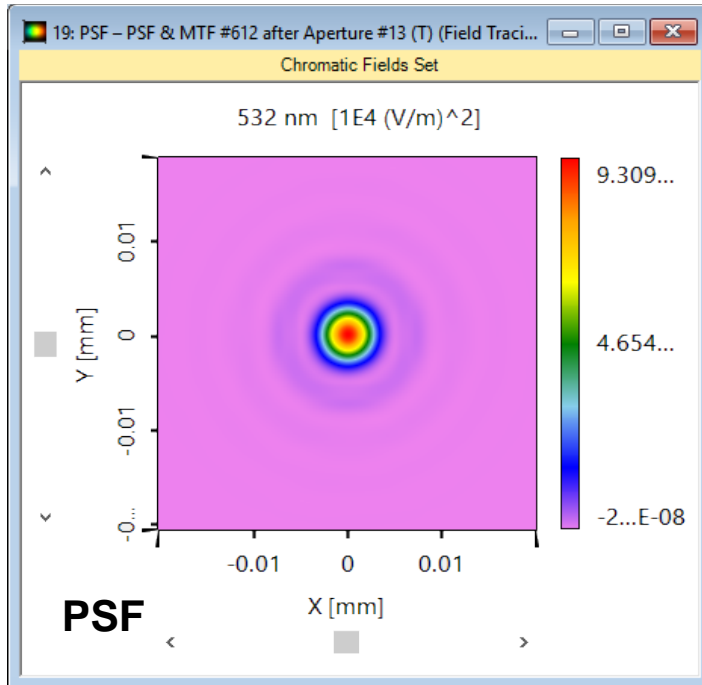


Position	Modeling Technique	Detector/Analyzer
full system	3D ray tracing	3D ray tracing system visualization
a	field tracing	evaluation of 2D PSF and MTF

Result: 3D Ray Tracing



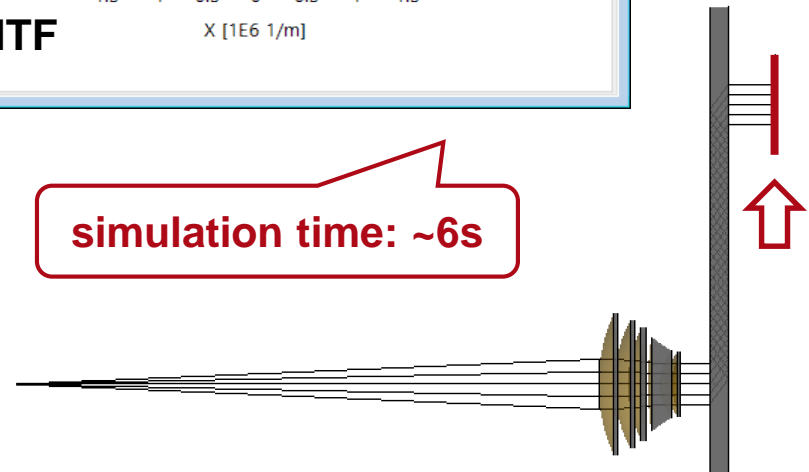
Result: 2D PSF & 2D MTF



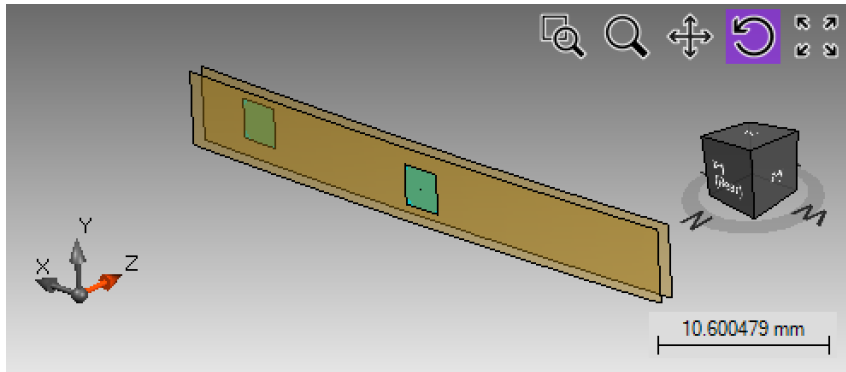
Highlights

- non-sequential analysis of propagation in the waveguide
- regard of wavefront aberrations for PSF and MTF calculation

simulation time: ~6s



Simulation of Waveguide with Curved Surfaces

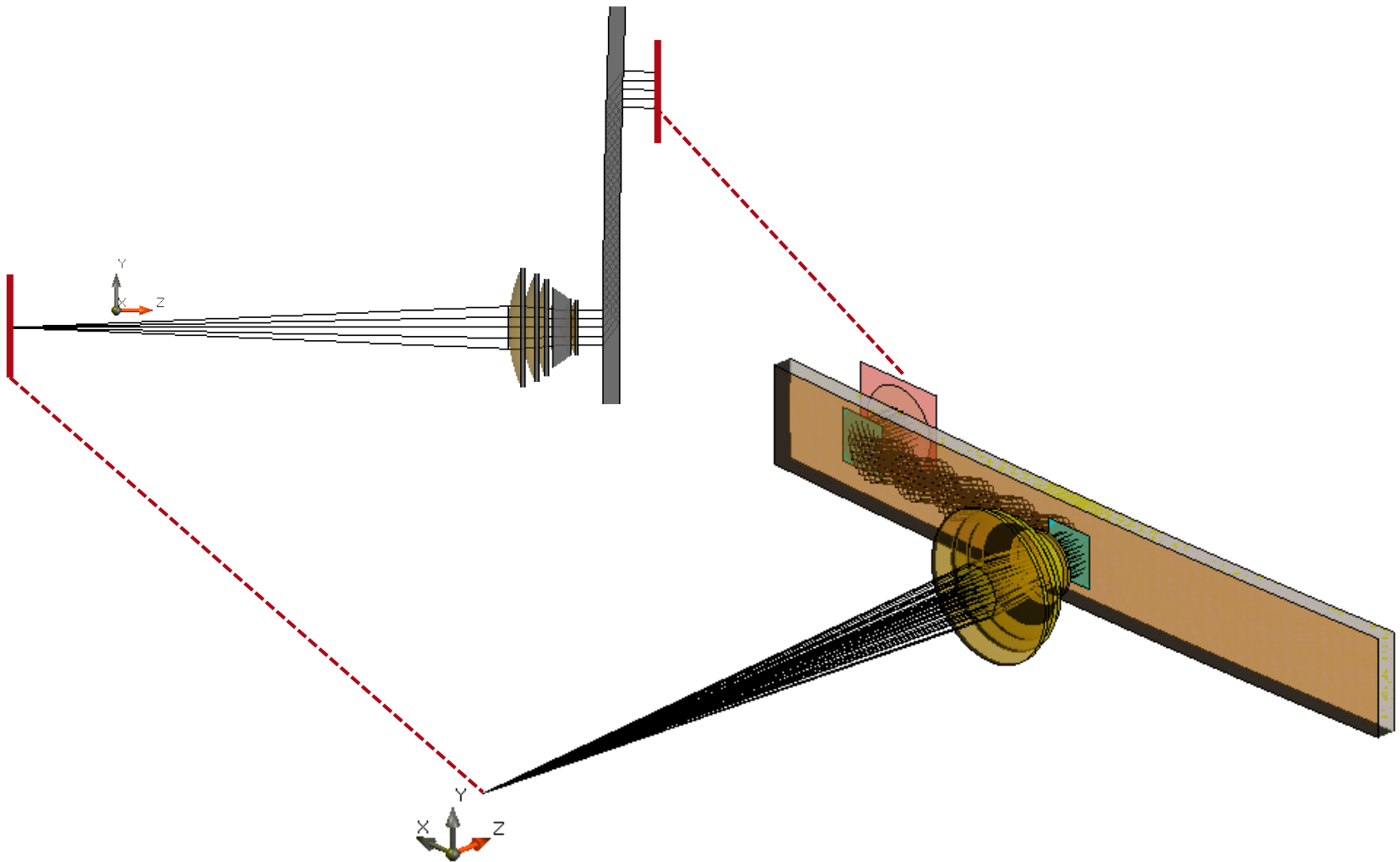


- investigation the effect of surface deformations
- introduction of curved surfaces instead of planar

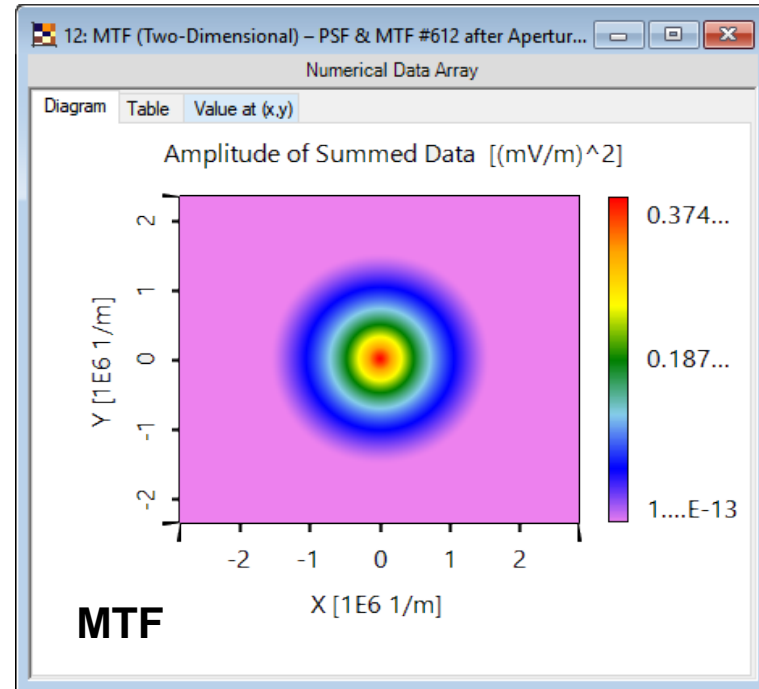
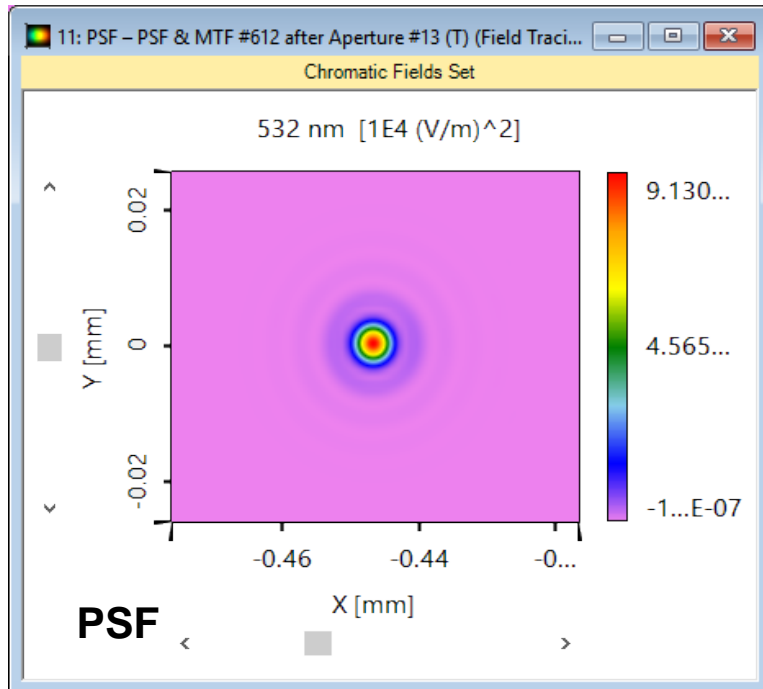
#	Position	Orientation	Surface	Back Medium	Comme
1	(0 m; 0 m; 0 m)	(0°; 0°; 0°)	Conical Interface W	Fused_Silica in...	Enter cx
2	(0 m; 0 m; 1 mm)	(0°; 0°; 0°)	Conical Interface W	Air in Homogene ...	Enter cx

Parameter	Value & Unit
type surface(s)	conical
radius of curvature	500 mm
size of surface(s)	40 x 5 mm
total profile height	6.2500391 μm

Result: 3D Ray Tracing



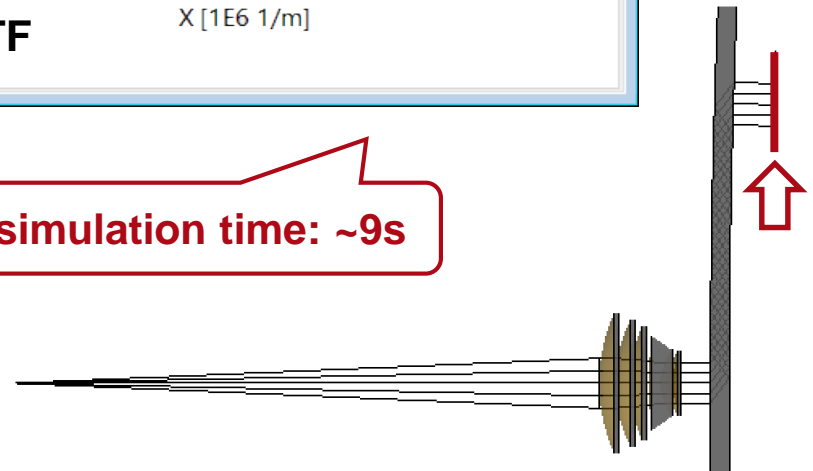
Result: 2D PSF & 2D MTF for Curved Surfaces



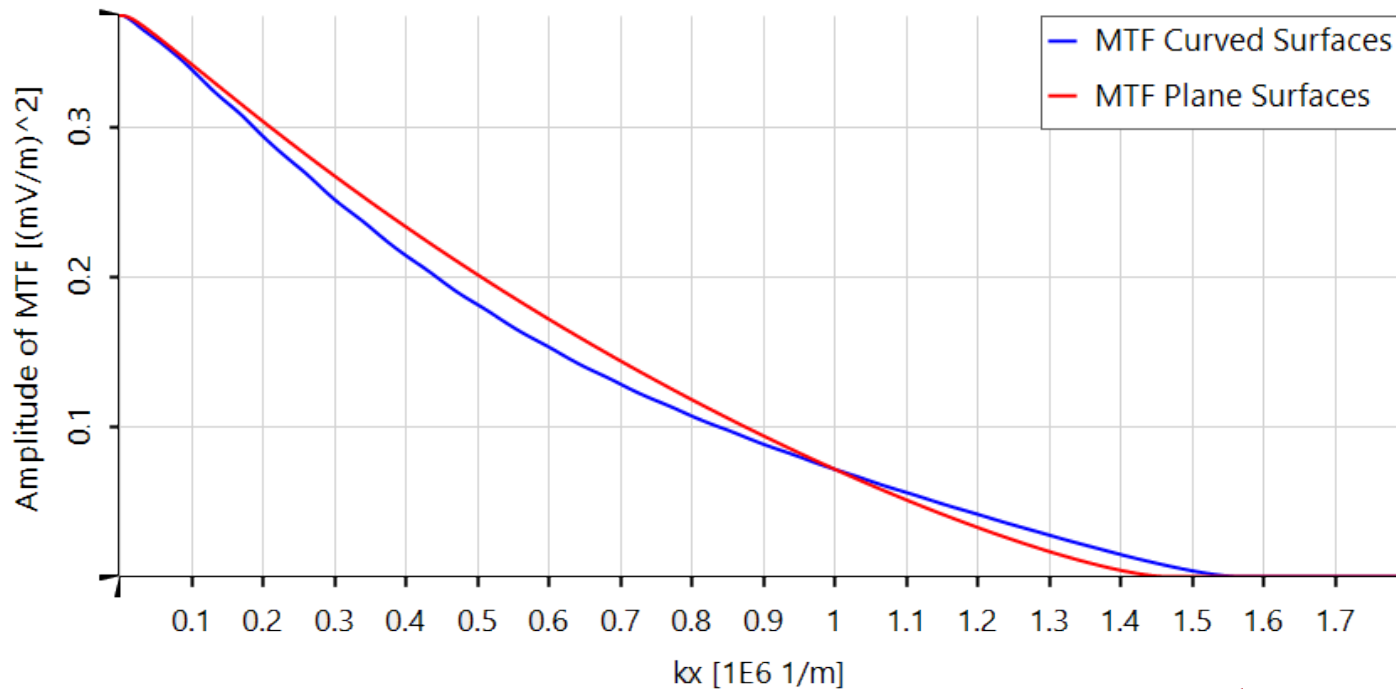
Highlights

- non-sequential analysis of propagation in the waveguide
- regard of wavefront aberrations for PSF and MTF calculation

simulation time: ~9s



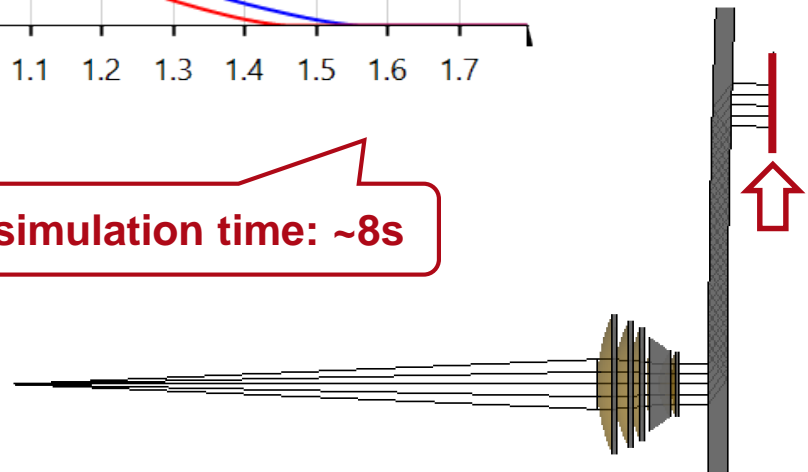
Result: 1D MTF Curved vs. Planar



Highlights

- non-sequential analysis of propagation in the waveguide
- regard of wavefront aberrations for PSF and MTF calculation

simulation time: ~8s



Document & Technical Info

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category	Virtual and Mixed Reality > Near-Eye-Displays
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