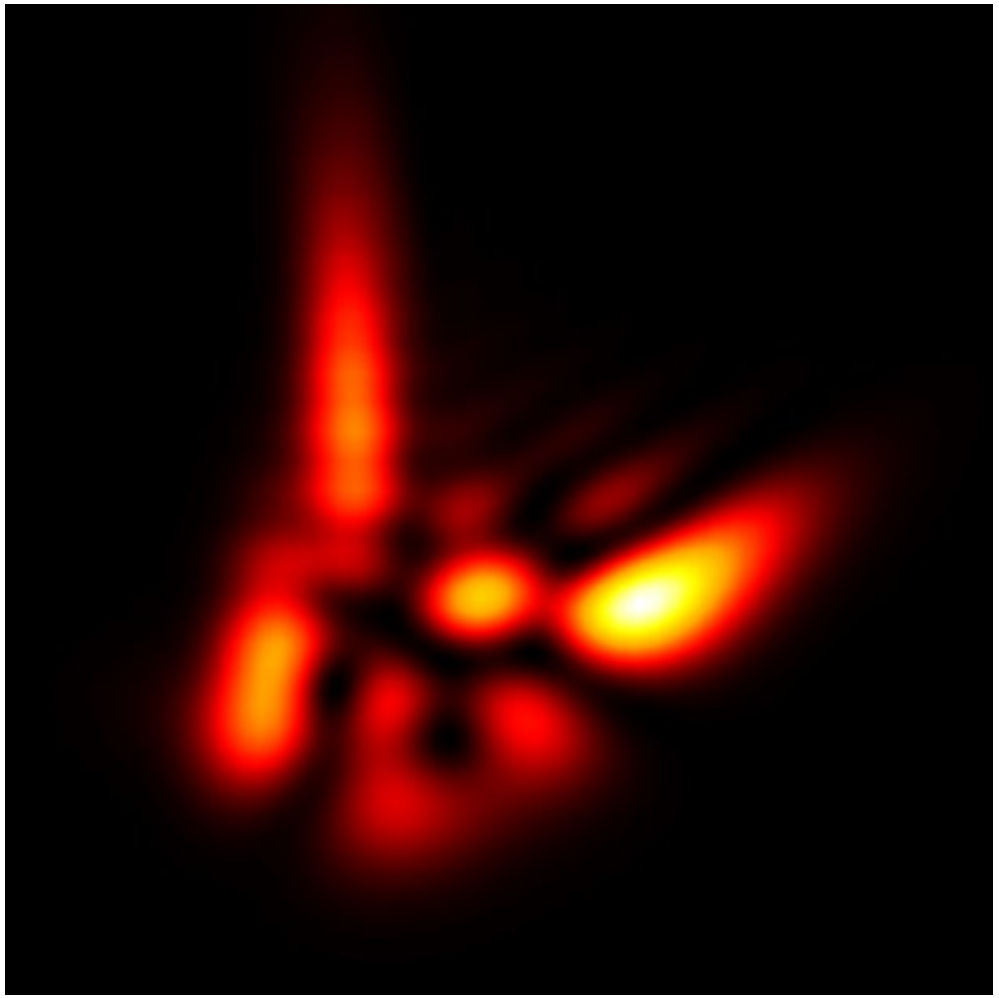
Investigation the Aberration Effects on the Fiber Modes in the Focal Region

Abstract



Fibers are widely used as source of an optical system. It is worthy to investigate the effects of the aberration of the optical system to the propagation of fiber modes. In this use case, we use a specified step-index fiber as source to generate a couple of propagation modes, and evaluate the diffraction pattern after propagation through an aberrated optical system.

Modeling Task

aberration phase

step-index fiber

- wavelength 600nm
- core radius 5um
- n_{core} = 1.455
- $n_{cladding}$ = 1.45

?

In the fiber source, what is the propagation modes?

?

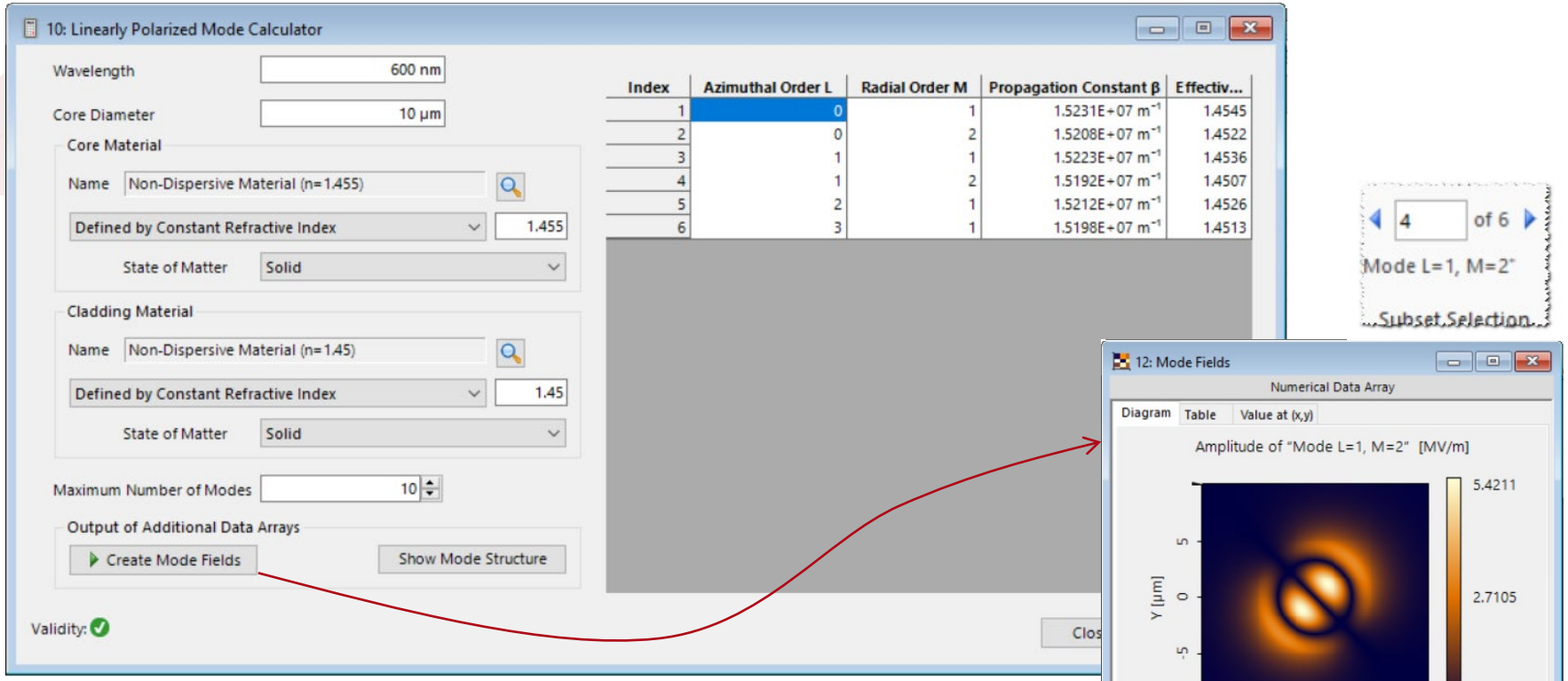
What is the diffraction pattern in the focal region?

Setup from Appl. Opt. 59,6584-6592 (2020)

Linearly Polarized Mode Calculator

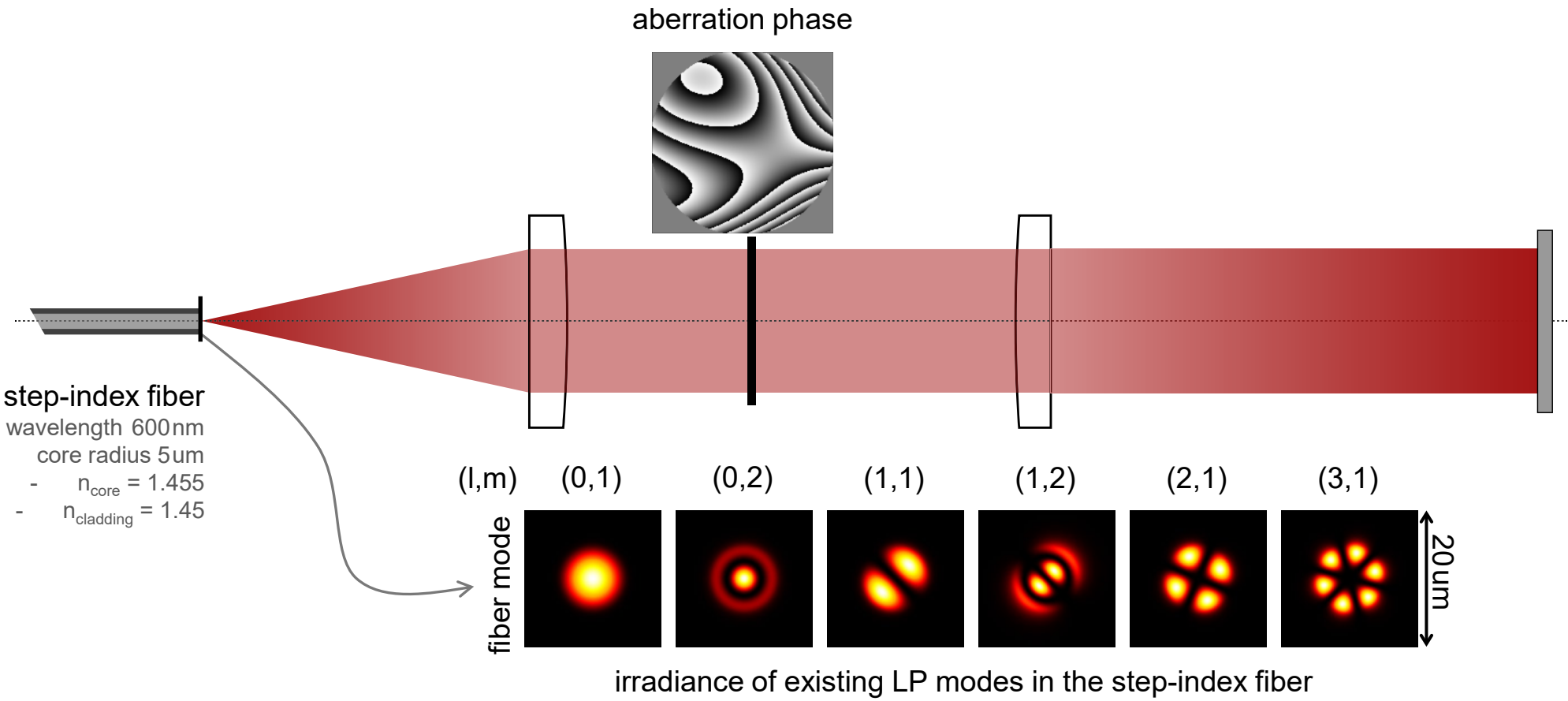
step-index fiber
- wavelength 600nm
- core radius 5um
- n_{core} = 1.455
- $n_{cladding}$ = 1.45

This calculator gives the propagation constants and mode fields of all existing linearly polarized (LP) modes.



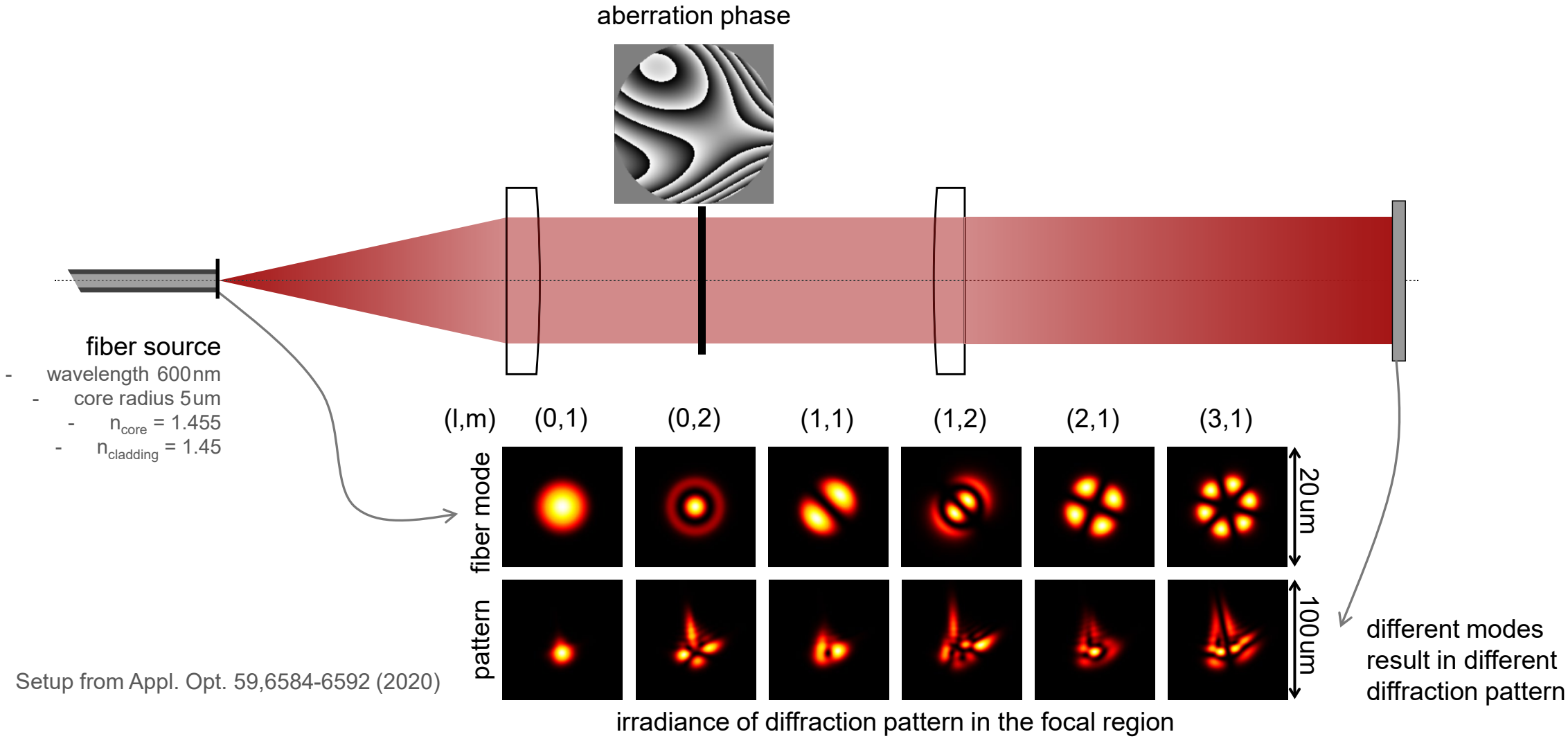
fields of all LP modes

Source of Fiber Modes



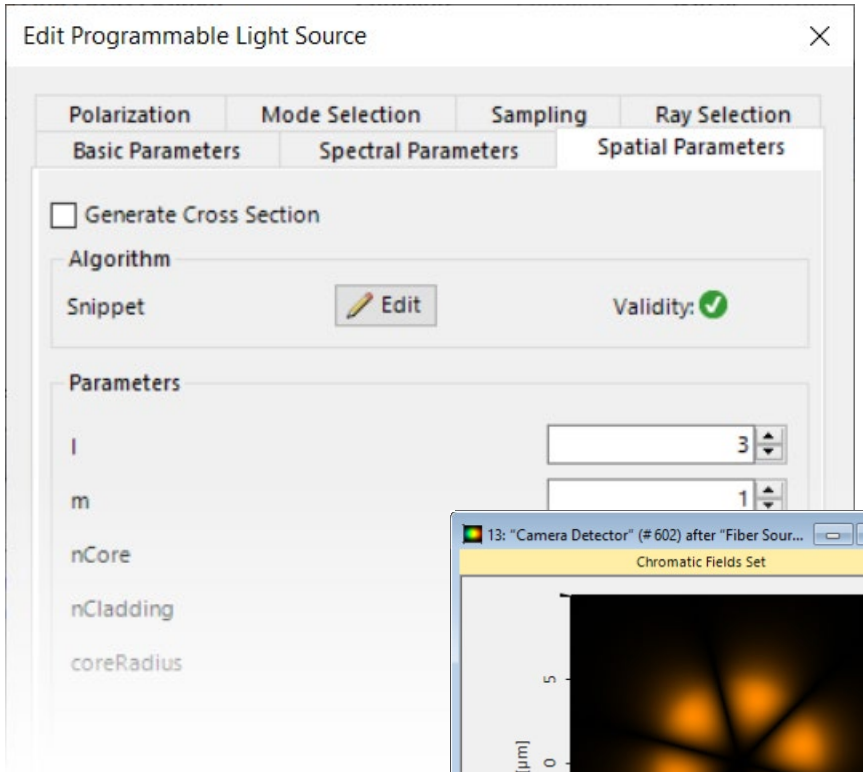
Setup from Appl. Opt. 59,6584-6592 (2020)

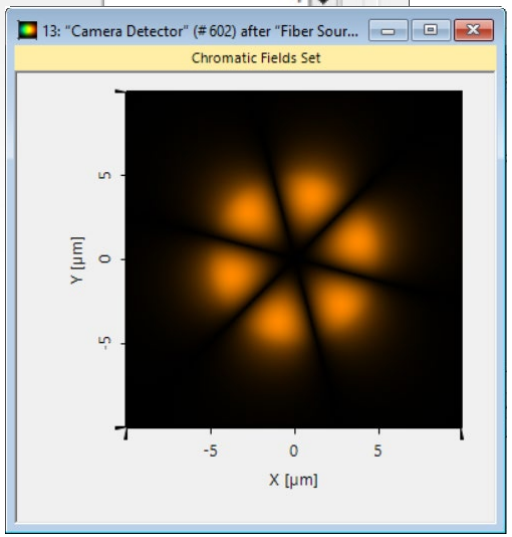
Fiber Modes



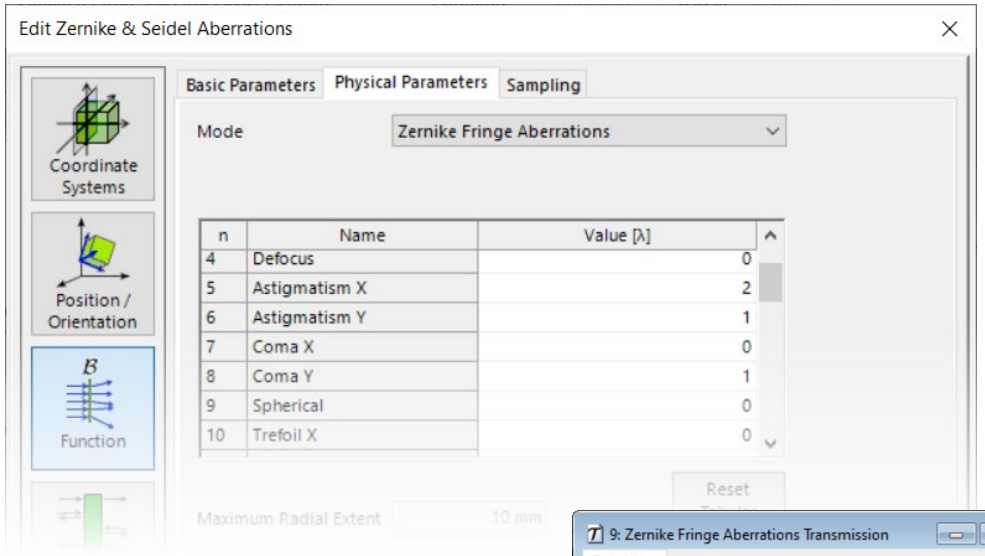
Setup from Appl. Opt. 59,6584-6592 (2020)

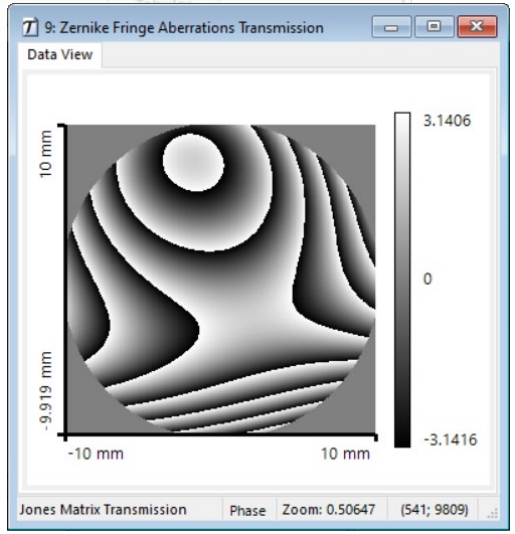
Peek into VirtualLab Fusion





single mode fiber source with specified mode index



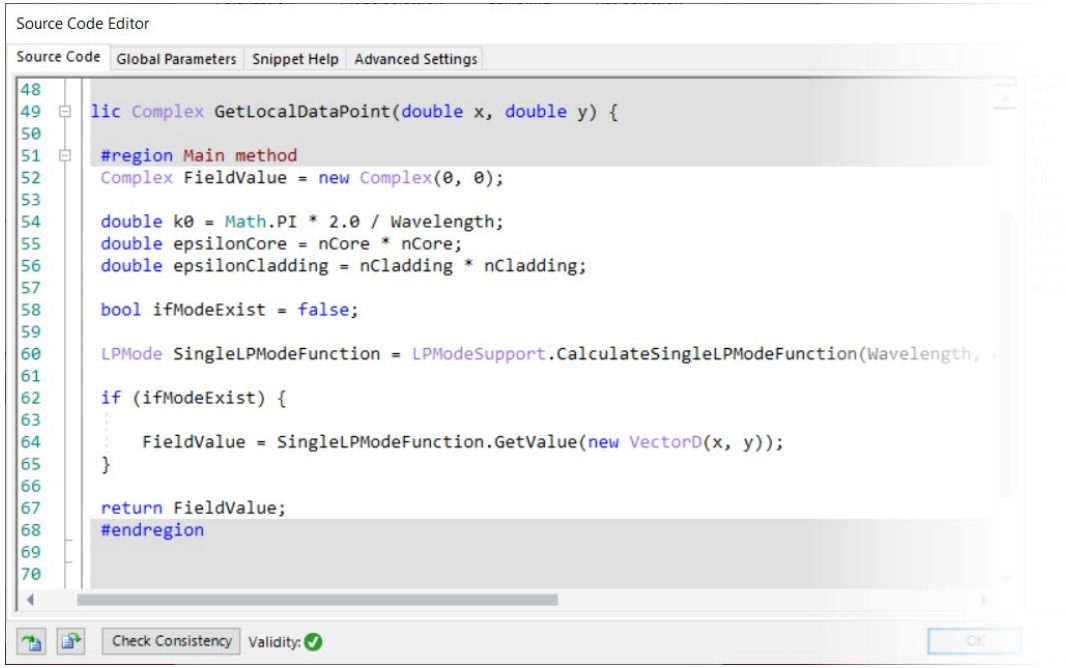


convenient setting of aberration phase

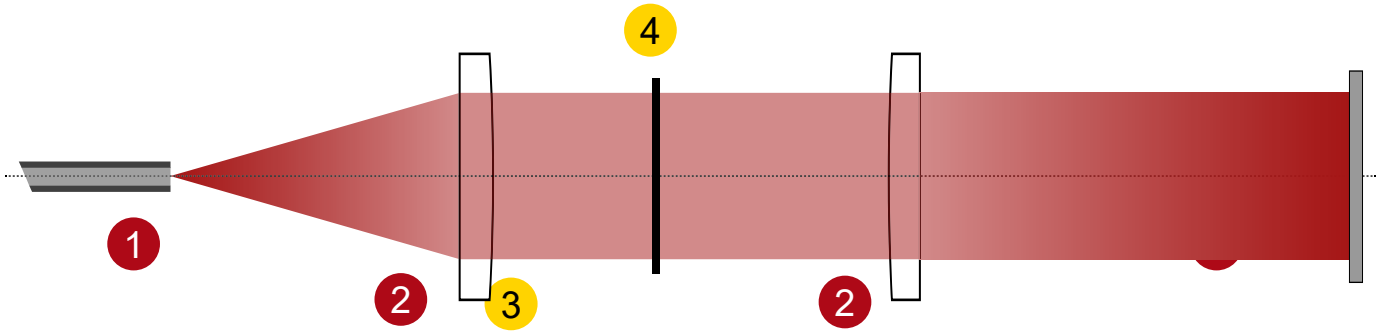
Workflow in VirtualLab Fusion

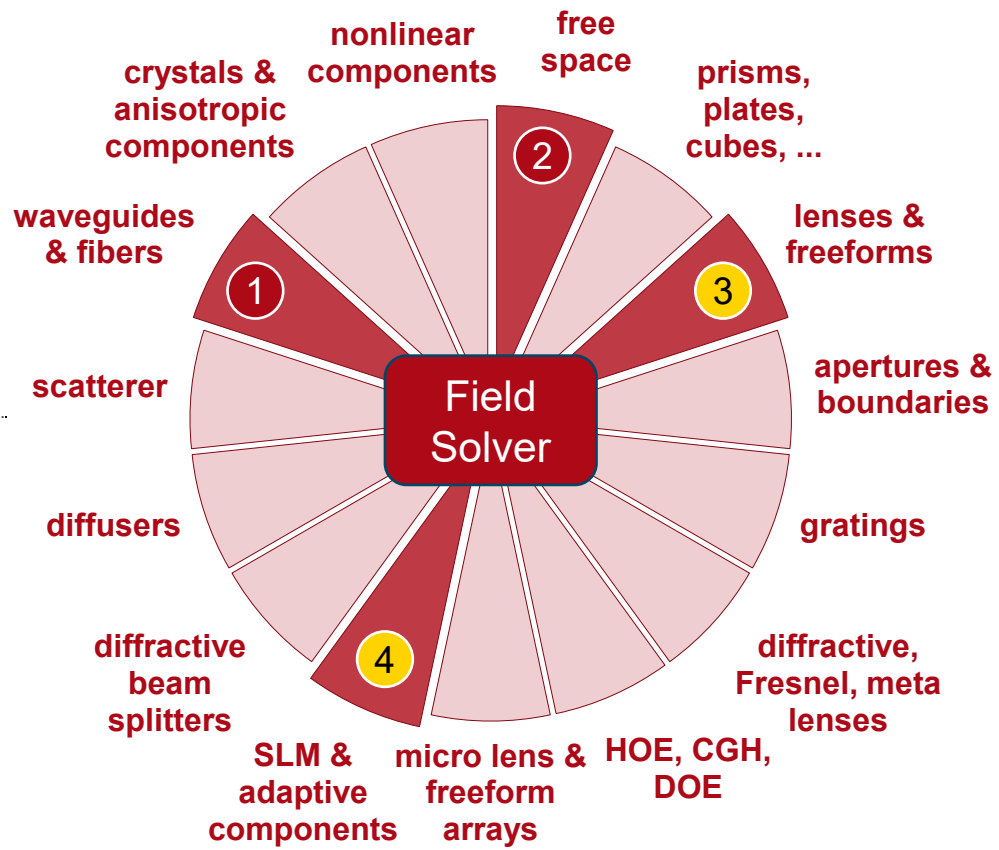
- Set the programmable light source
  - How to work with the programmable light source in VirtualLab Fusion and Example (Gaussian Beam) [Use Case]

- Set the position and orientation of components
  - Position and Orientation [Video]



VirtualLab Fusion Technologies





idealized component

Document Information

title	Investigation the Aberration Effects on the Fiber Modes in the Focal Region
document code	
version	1.0
edition	VirtualLab Fusion Basic
software version	2021.1 (Build 1.18)
category	Application Use Case
further reading	