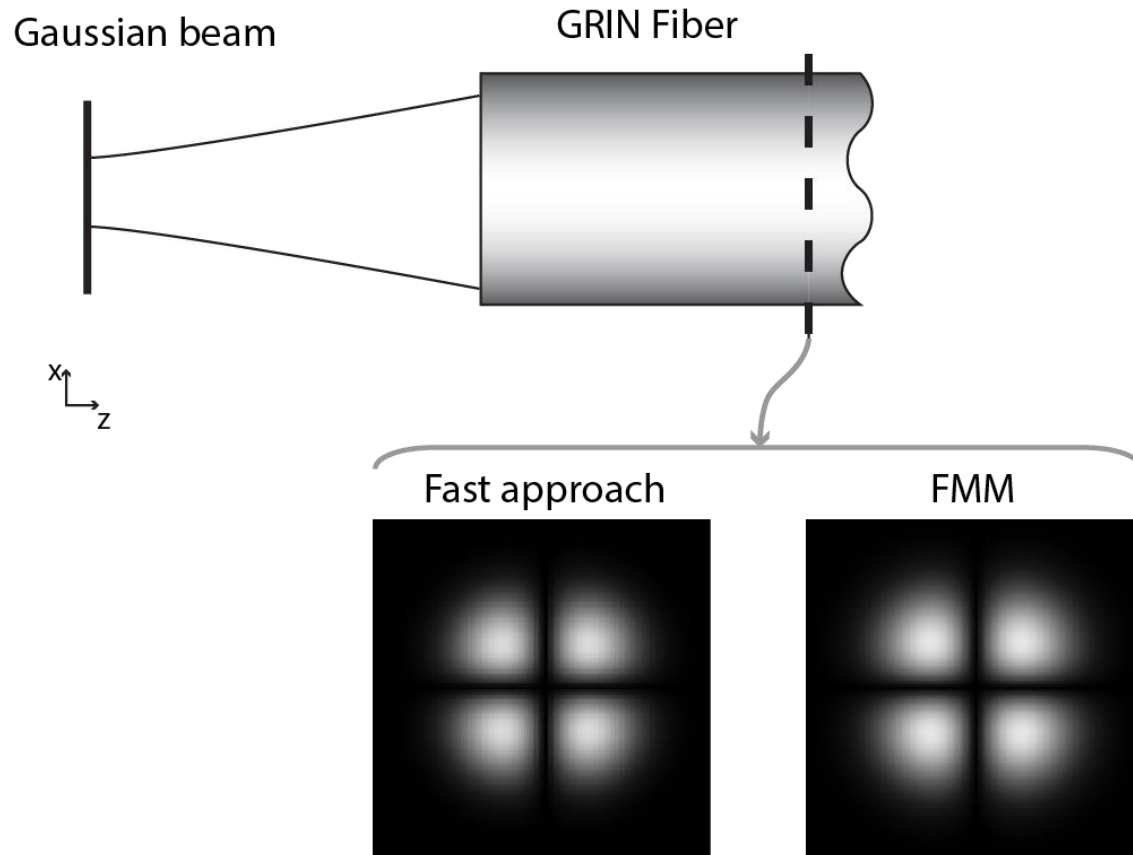


# Modeling of Graded-Index (GRIN) Multimode Fiber

# Abstract



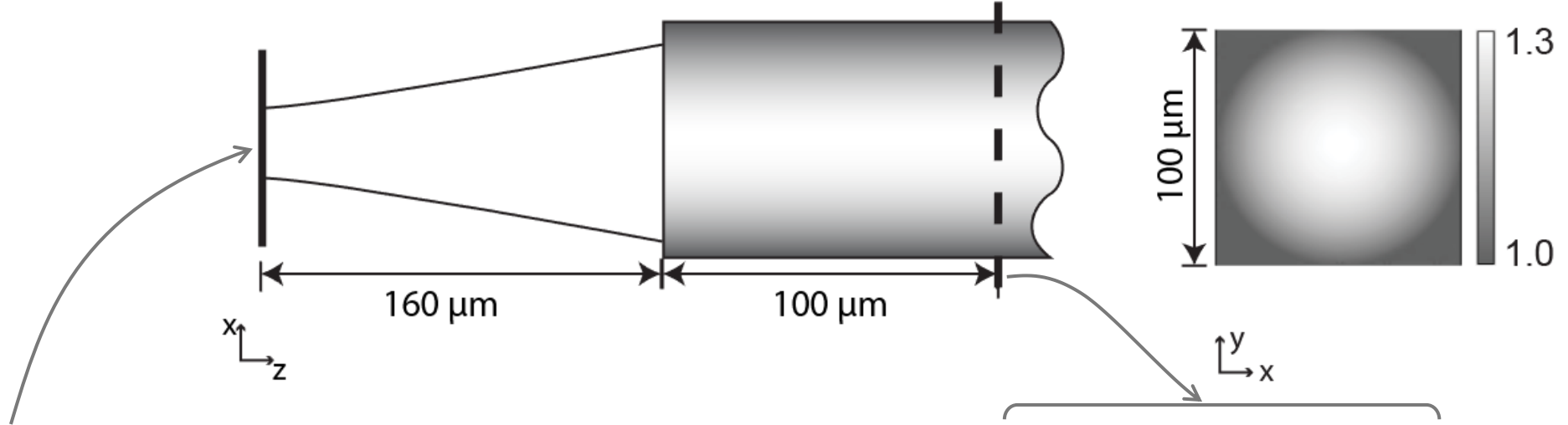
Multimode fibers made out of graded-index media are widely used in optical applications. To simulate light propagating through the fiber, VirtualLab Fusion implements an approach, which solves Maxwell equation in a fast manner and includes polarization crosstalk effect. The validity and advantages of the fast approach is shown by comparing with the result from the rigorous Fourier modal method (FMM) with perfectly matched layers (PMLs). This example is published in [H. Zhong, J. Opt. Soc. Am. A **35**(4): 661-668].

# Modeling Task

Gaussian beam

GRIN fiber

refractive index



## Fundamental Gaussian mode

wavelength	532nm
polarization	linear in y-direction
beam waist	$5\ \mu\text{m}$

fast approach

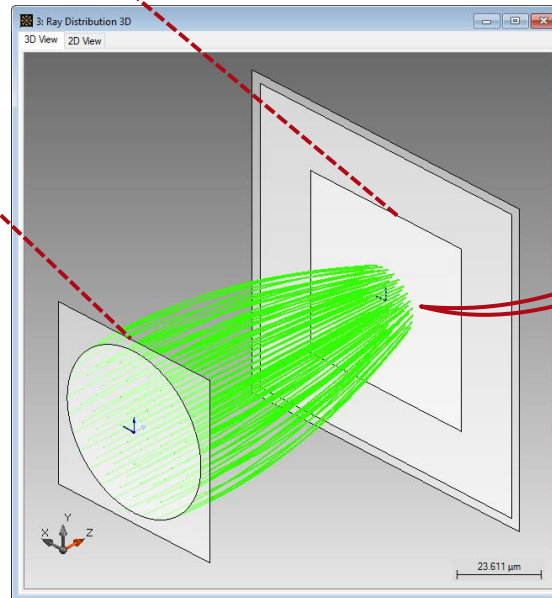
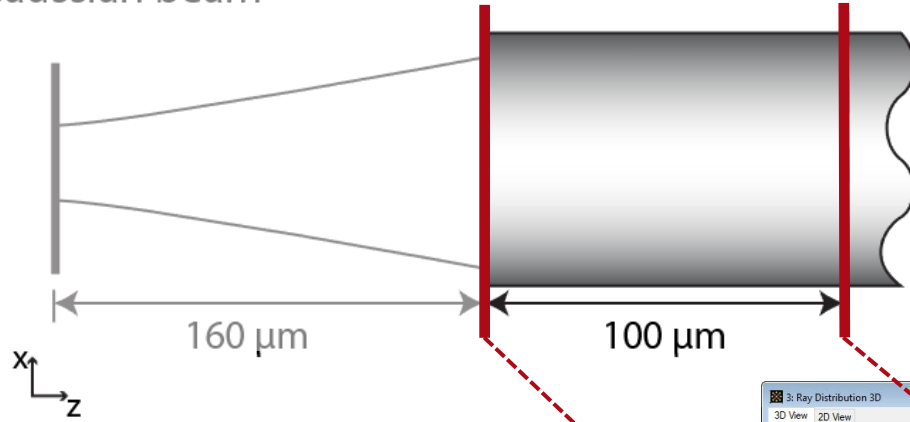
FMM



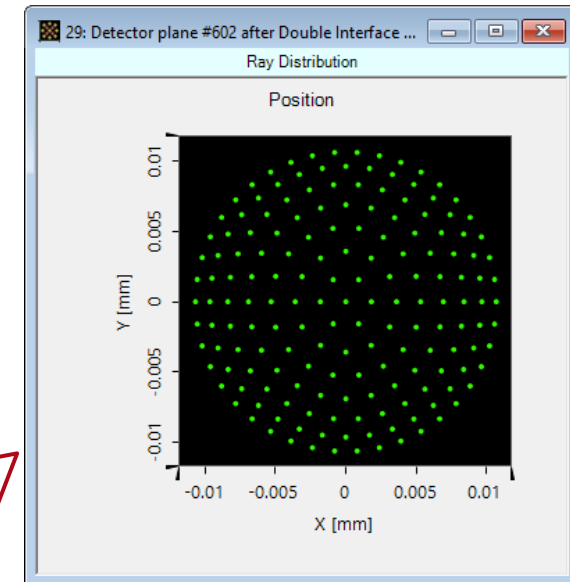
# Ray Tracing Results

Gaussian beam

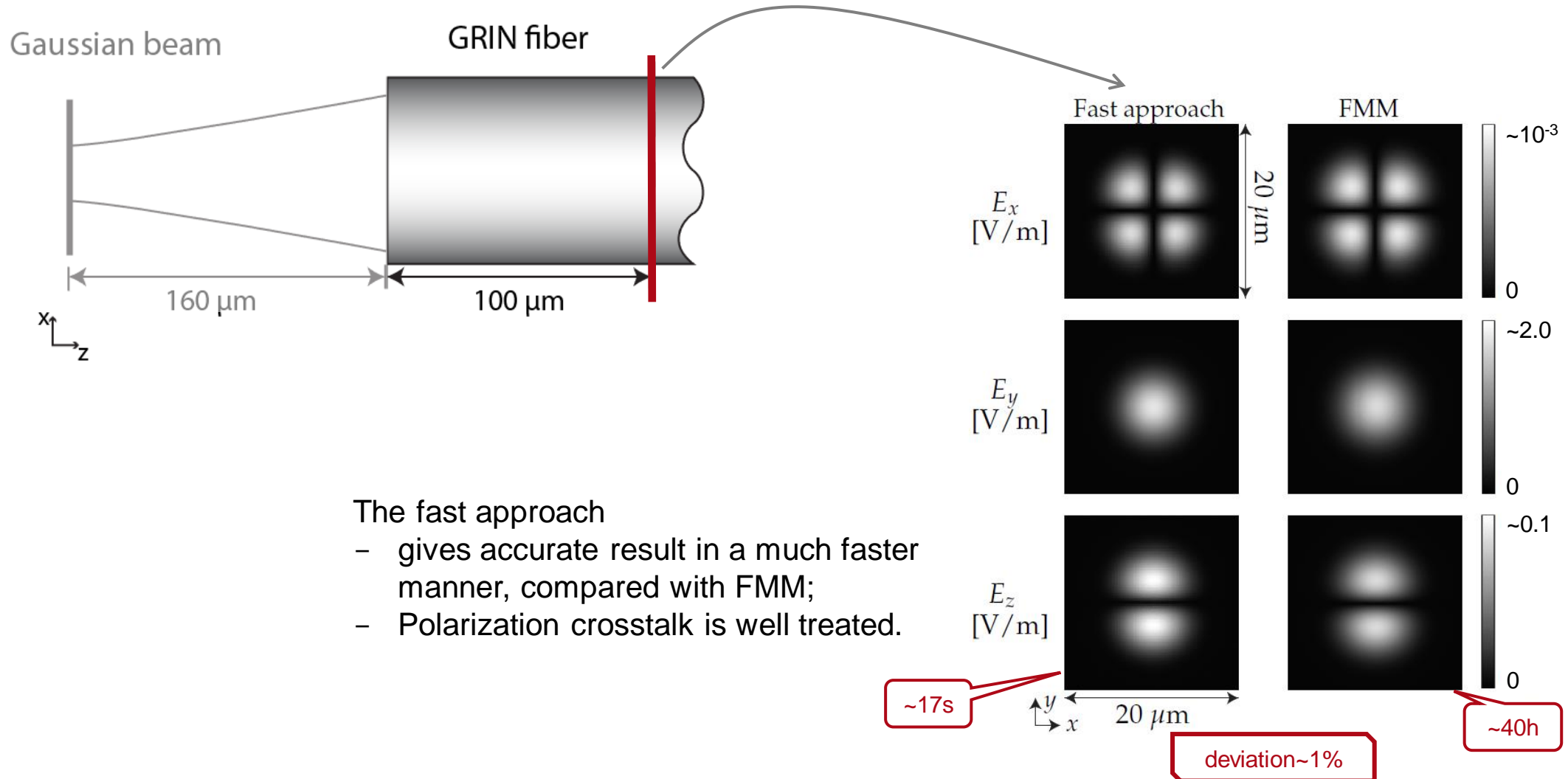
GRIN fiber



dot diagram



# Field Tracing Results



- The fast approach
- gives accurate result in a much faster manner, compared with FMM;
  - Polarization crosstalk is well treated.

# Document Information

title	Modeling of Graded-Index (GRIN) Multimode Fiber
document code	GRIN.0003
version	2.0
toolbox(es)	Starter Toolbox
VL version used for simulations	VirtualLab Fusion Spring Release 2019 (7.4.0.49)
category	Application Use Case
further reading	<ul style="list-style-type: none"><li>- <a href="#"><u>Construction and Modeling of a Graded-Index Lens</u></a></li><li>- <a href="#"><u>Gaussian Beam Focused by a Thermal Lens</u></a></li></ul>