Modeling of Graded-Index (GRIN) Multimode Fiber
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**

**Fundamental Gaussian mode**
- Wavelength: 532 nm
- Polarization: Linear in y-direction
- Beam waist: 5 µm

![Diagram showing a Gaussian beam and a GRIN fiber with a refractive index profile.](image)
Ray Tracing Results

Gaussian beam

GRIN fiber

160 μm

100 μm

dot diagram
Field Tracing Results

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

\[ E_x \quad [V/m] \]
\[ 20 \mu m \]
\[ E_y \quad [V/m] \]
\[ 20 \mu m \]
\[ E_z \quad [V/m] \]
\[ 20 \mu m \]
## Document Information

<table>
<thead>
<tr>
<th>title</th>
<th>Modeling of Graded-Index (GRIN) Multimode Fiber</th>
</tr>
</thead>
<tbody>
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</table>
| further reading        | - Construction and Modeling of a Graded-Index Lens  
                         |   - Gaussian Beam Focused by a Thermal Lens     |