

Feature.0001

Construction and Modeling of a Graded-Index Lens

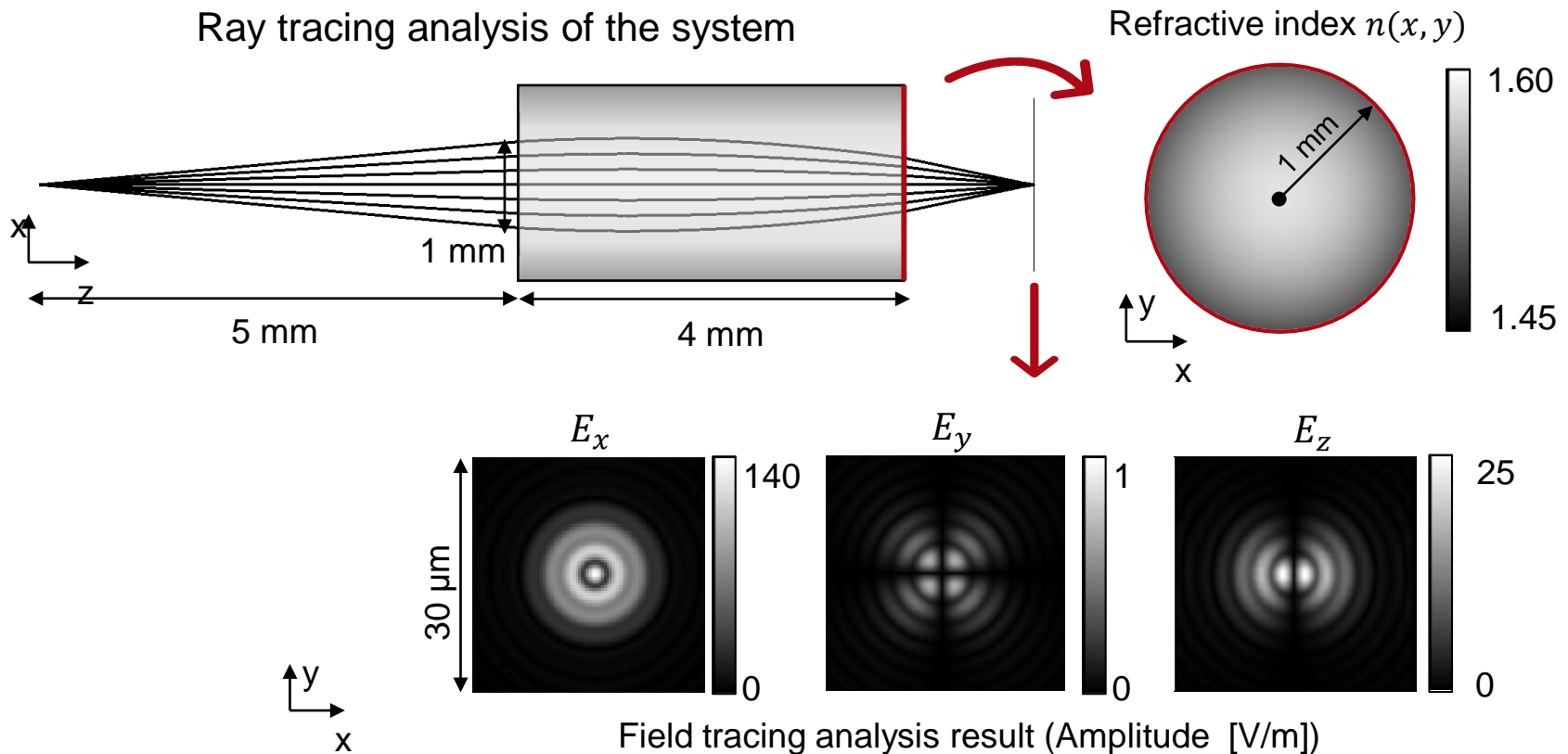
Construction of an imaging system with a graded-index (GRIN) lens, and introduction of ray and field tracing analysis of this imaging system.

About This Use Case

- The following toolbox is required
 - Starter toolbox
- This use case was produced with VirtualLab Fusion (Build 7.0.0.35).
- Get your free trial version [here!](#)

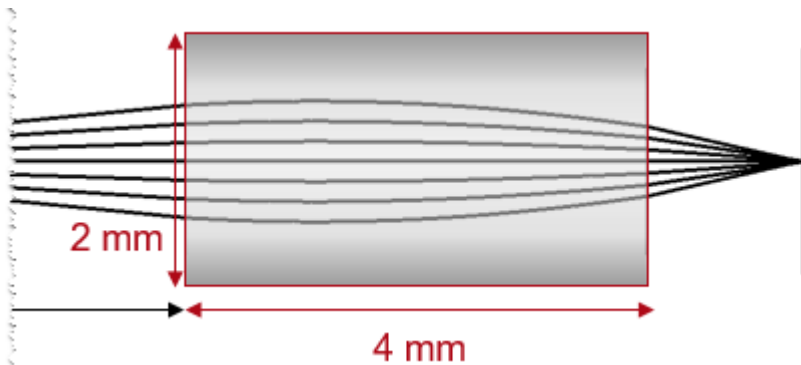
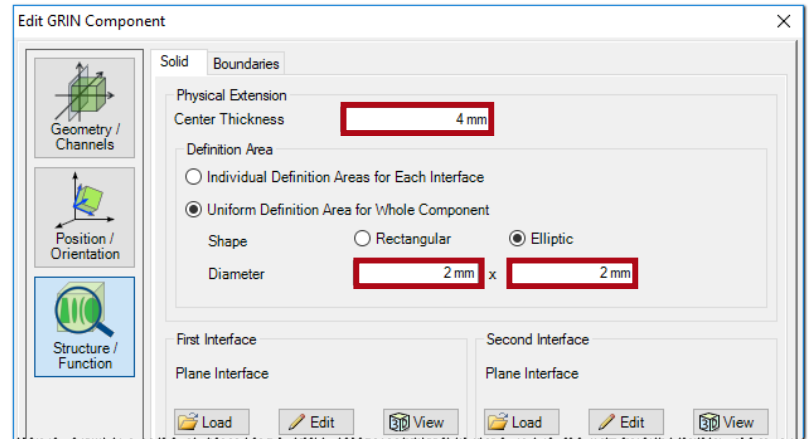
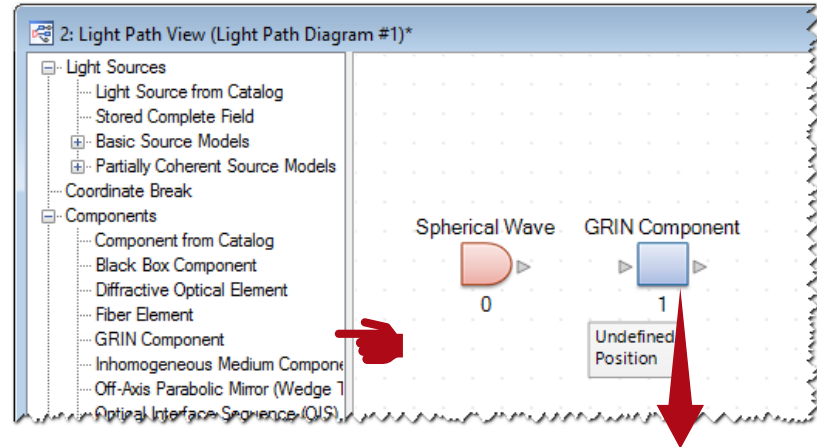
This Use Case Shows ...

- how to construct a GRIN lens.
- how to perform either ray and field tracing analysis of it.



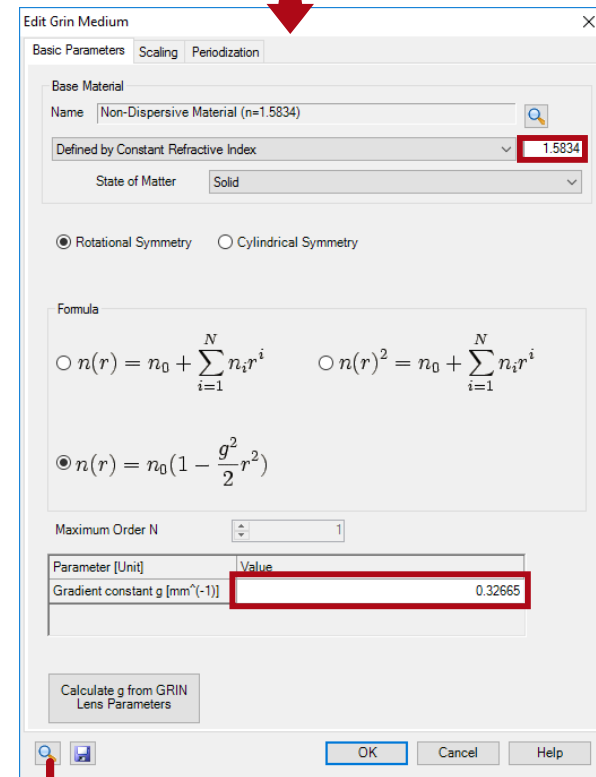
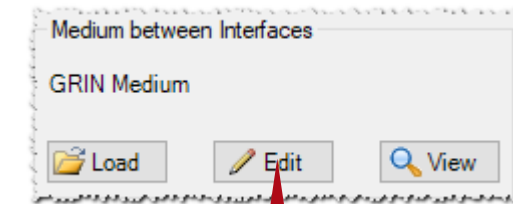
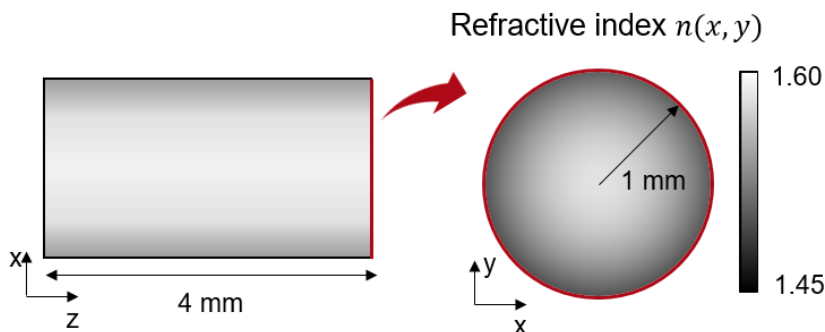
Construction of a GRIN Lens

- Specifications of the GRIN lens
 - Components → *GRIN Component* is used to model the GRIN lens.



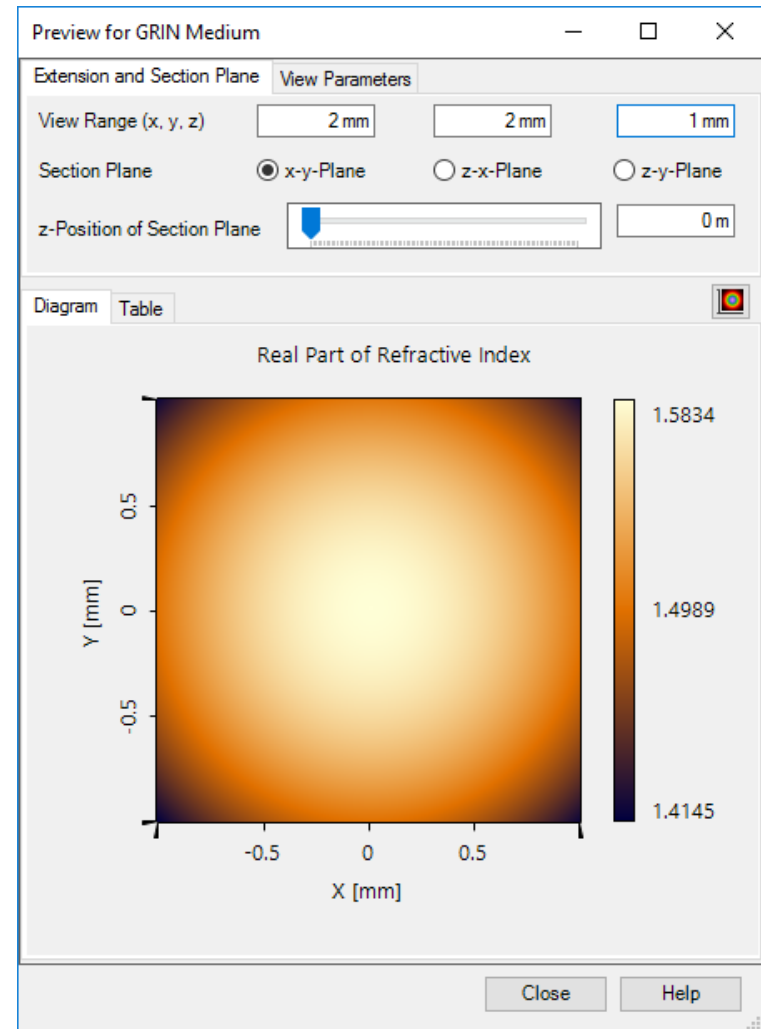
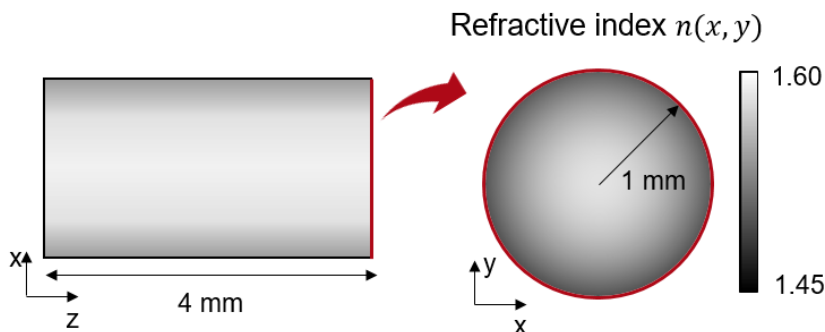
GRIN Lens: GRIN Medium

- Refractive index $n(x, y)$
$$n(x, y) = n_0 \left(1 - \frac{g^2}{2} \cdot r^2 \right)$$
with $r = \sqrt{x^2 + y^2}$.
- In this case [1]:
$$n_0 = 1.5834$$
$$g = 0.32665 \text{ mm}^{-1}$$



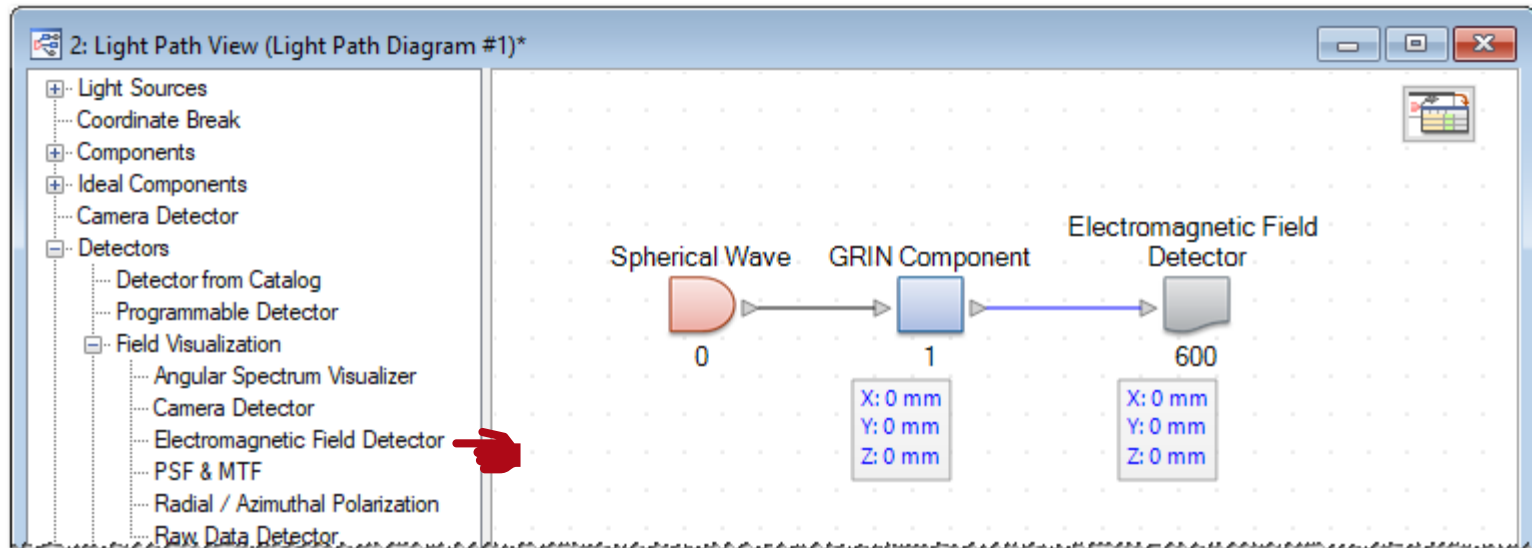
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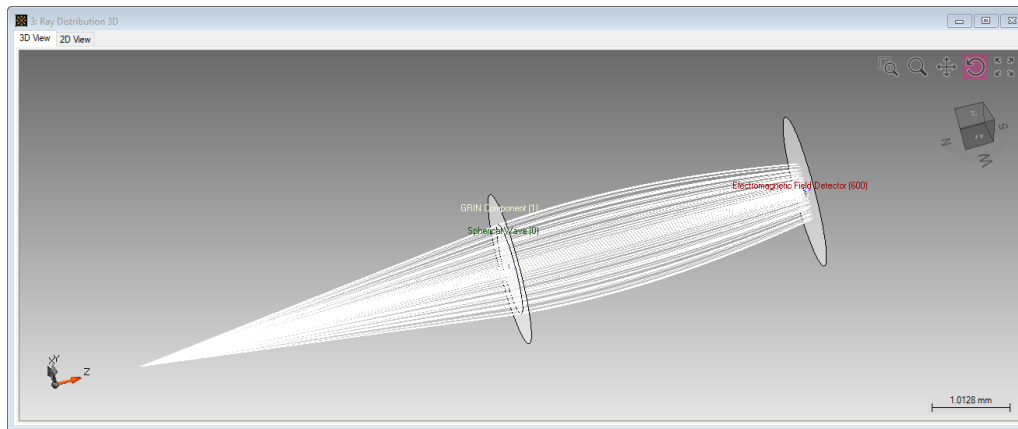
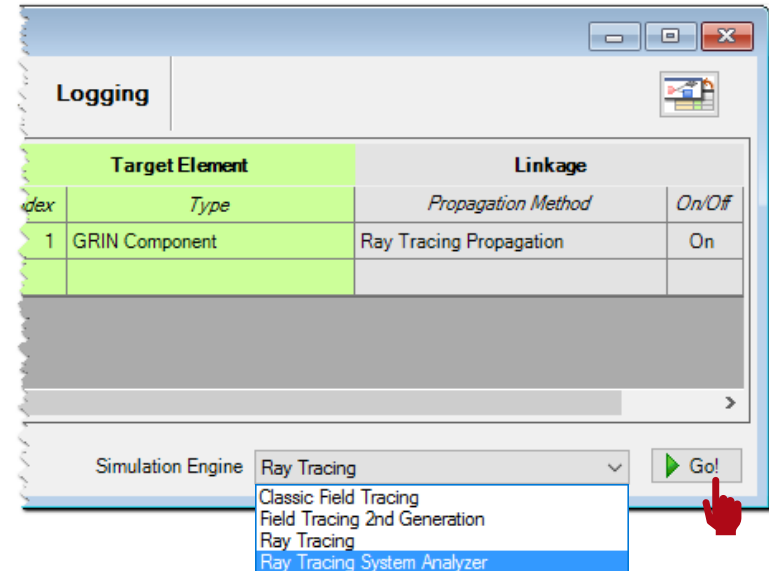
System Setup: Detector and Linkage

- Specifications of detector:
 - *Electromagnetic Field Detector* is used to detect the image.

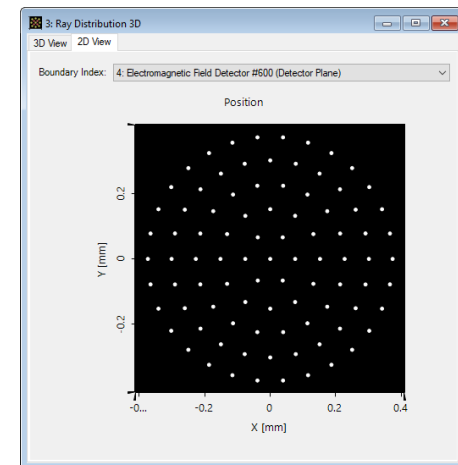


Simulation Results: Ray Tracing Analysis

- Simulation engine:
 - Choose *Ray Tracing System Analyzer*
 - click **Go!**



Ray bundle in the imaging system

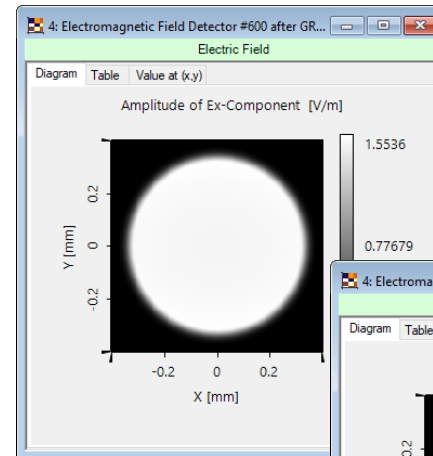


Spot diagram

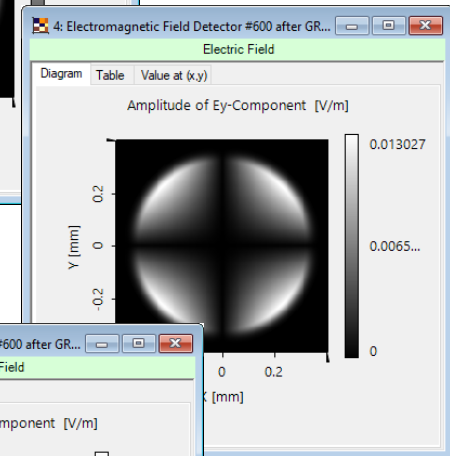
Simulation Results: Field Tracing Analysis

- Simulation engine:
 - Choose *Field Tracing 2nd Generation*.
 - Click **Go!**

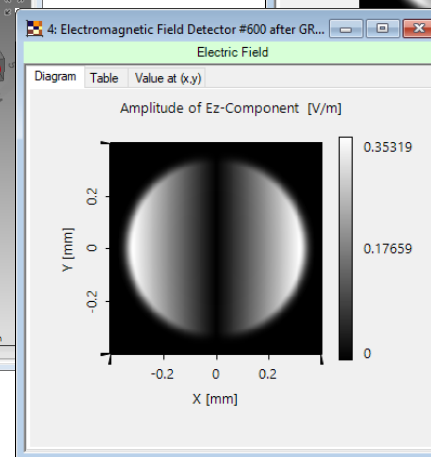
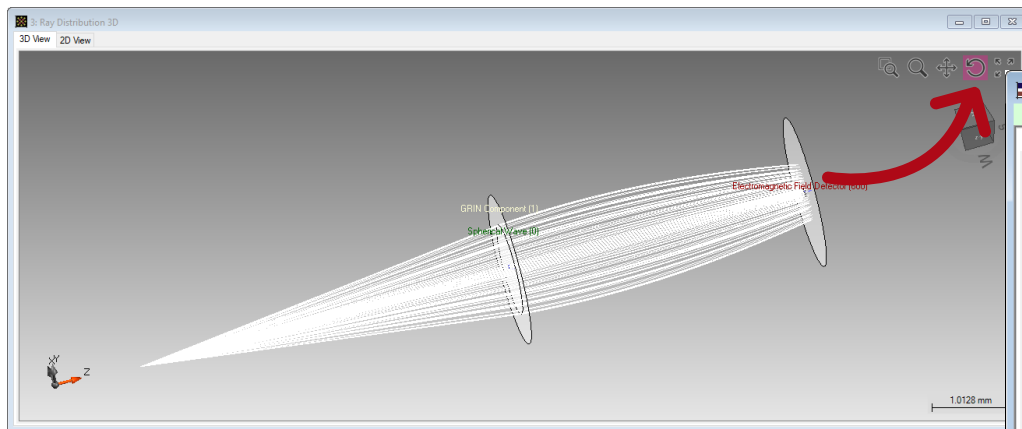
Amplitude of the field [V/m]



E_x



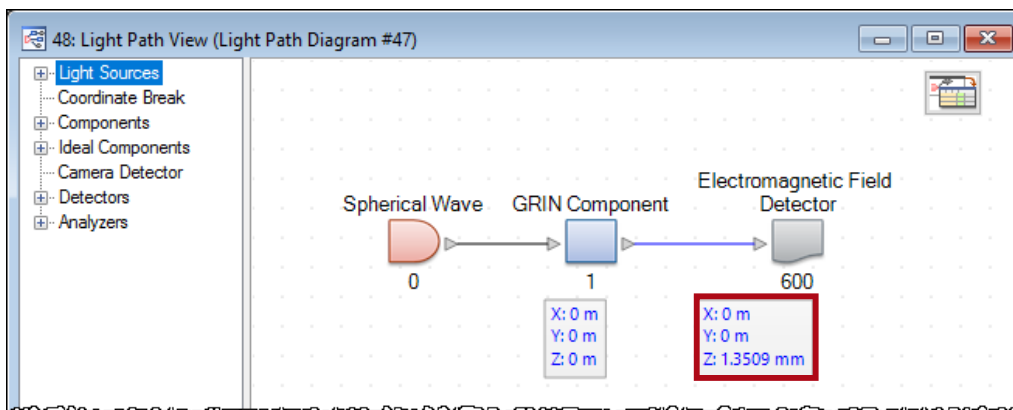
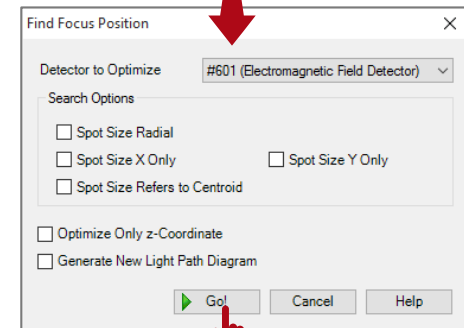
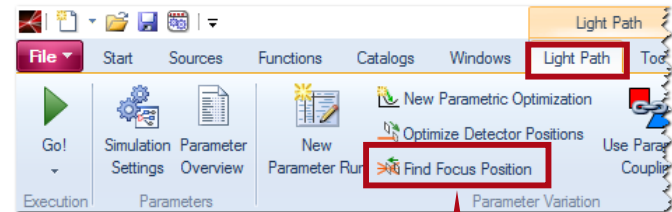
E_y



E_z

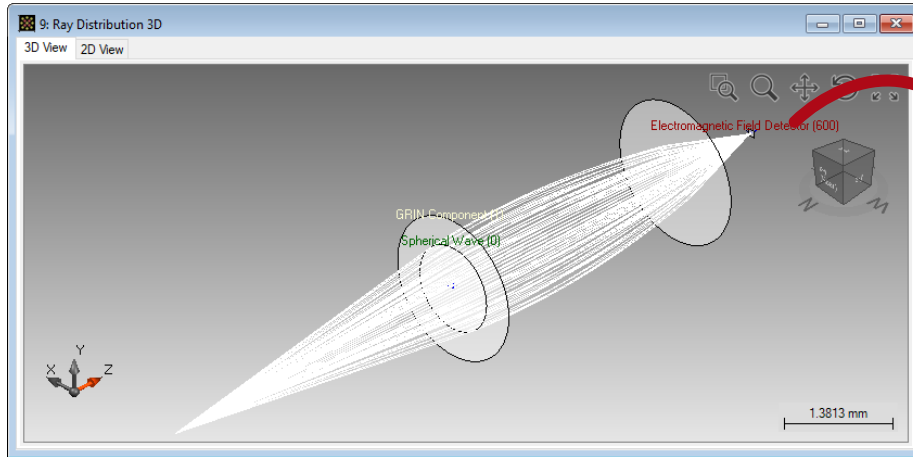
System Setup: Find the Image Plane

- Find the position of image plane
 - *Light Path* → *Find Focus Position*.

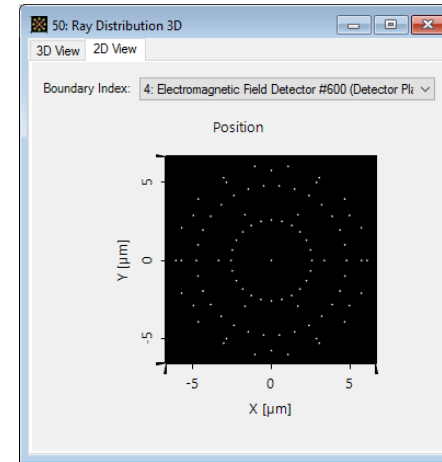


Simulation Results: Ray and Field Tracing

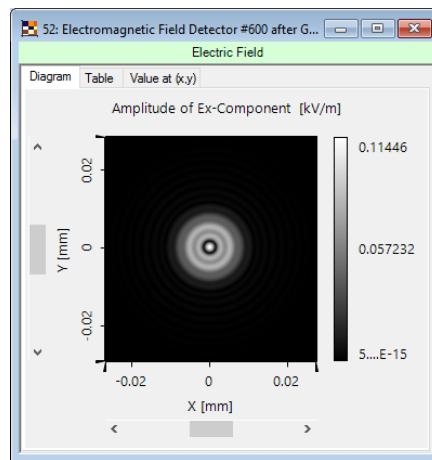
Ray bundle in the imaging system



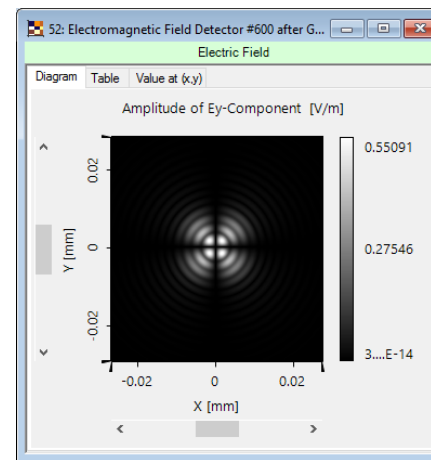
Spot diagram



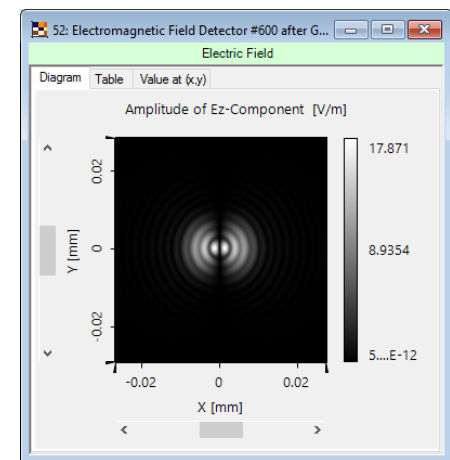
Field Tracing
Results:



Amplitude E_x



Amplitude E_y



Amplitude E_z

Document & Technical Info

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