UseCase.0078 (1.0)

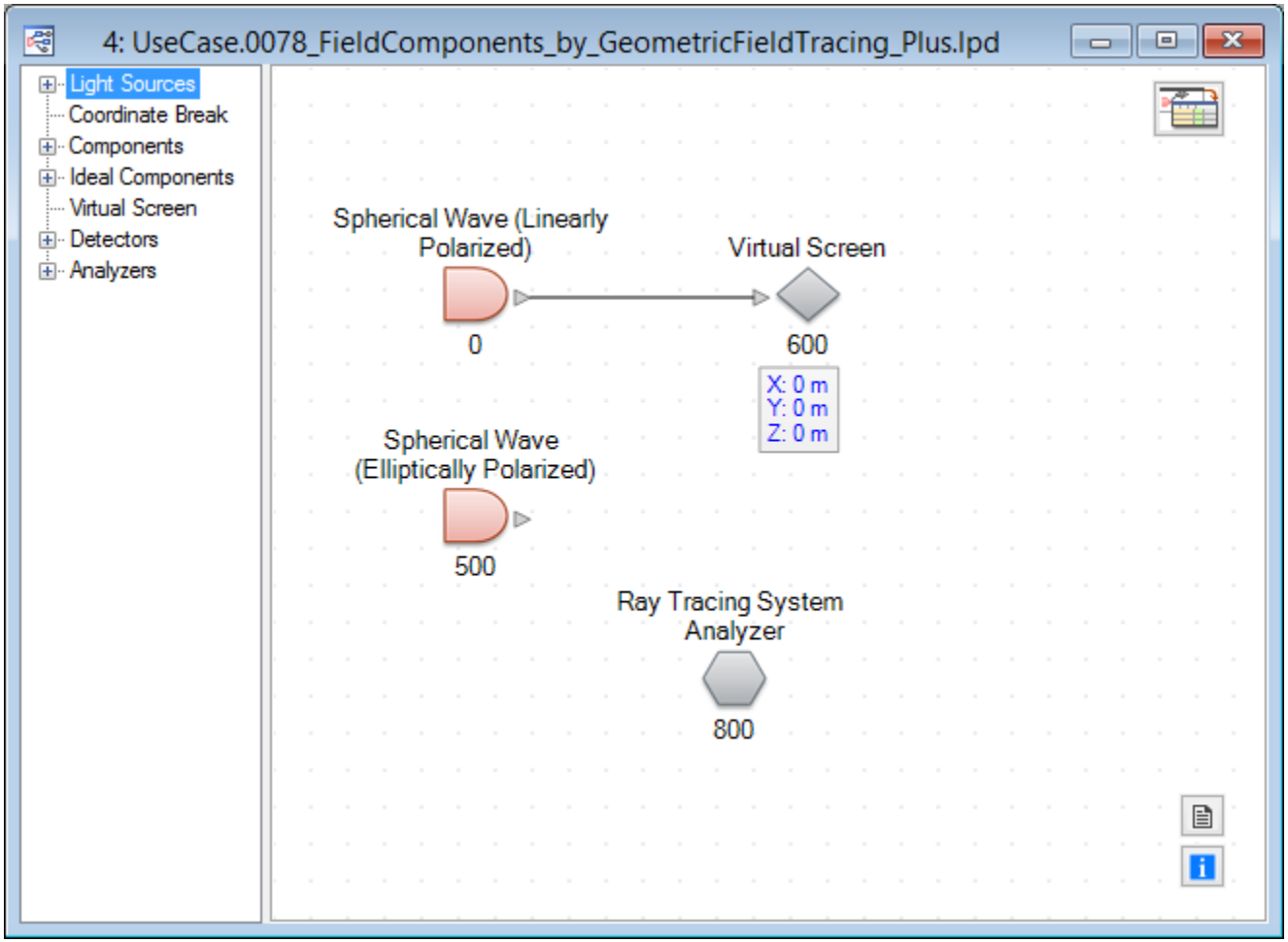
Evaluation of Field Components using Geometric Field Tracing Plus

Keywords: electromagnetic field, maxwell solver, electric field components, magnetic field components, polarization

Description

- This use case explains the usage of the Geometric Field Tracing Plus engine and shows how to get access to the electromagnetic field information of the propagated field in a detector plane.
- VirtualLab always handles the Ex and the Ey component within the information to be propagated. The other field components are calculated on demand.
- The field components Ex, Ey, Ez and Hx, Hy, Hz will be discussed.
- The results of the example system will be shown for linear as well as for elliptic polarization.

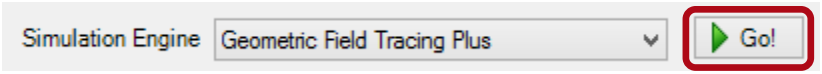
The System



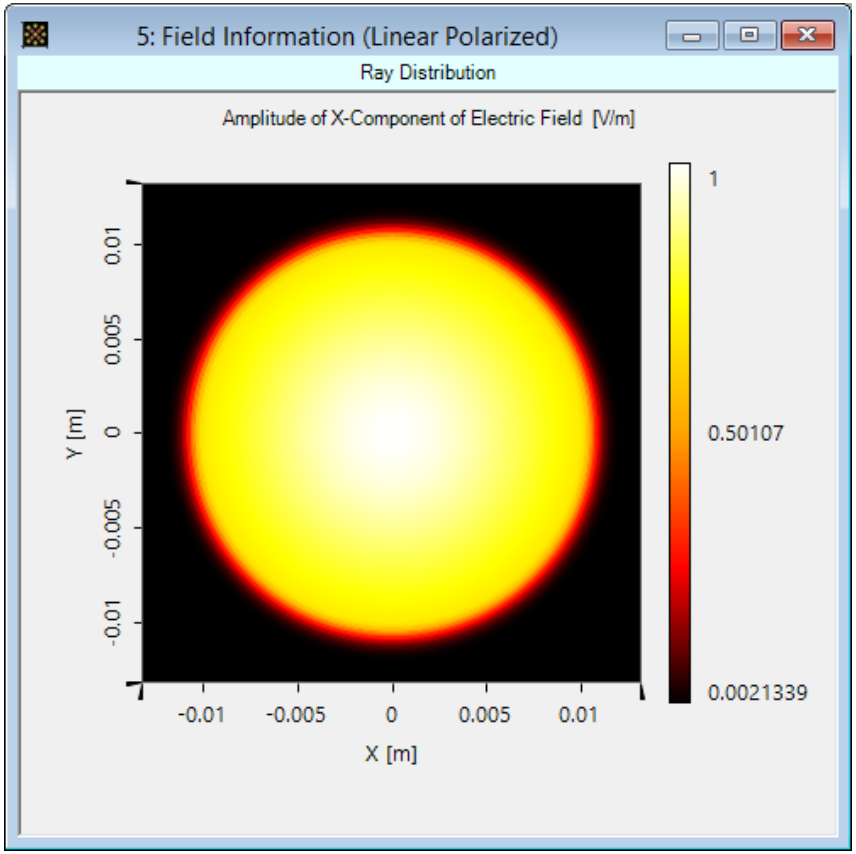
Filename: UseCase.0078_FieldComponents_by_GeometricFieldTracing_Plus.lpd

Simulation with Geometric Field Tracing Plus

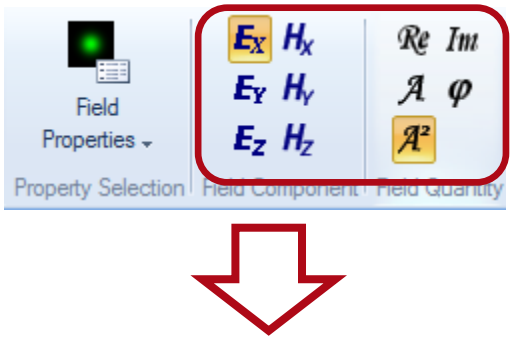
- The system contains a spherical wave and a virtual screen.
- The light is directly shown after the light source.
- VirtualLab allows to specify any global polarization state within the light source specification.
- For the first test we use a linear polarization definition with an angle of 0°.
- Hence the Ey component is zero.
- The simulation is performed by clicking on the Go button.



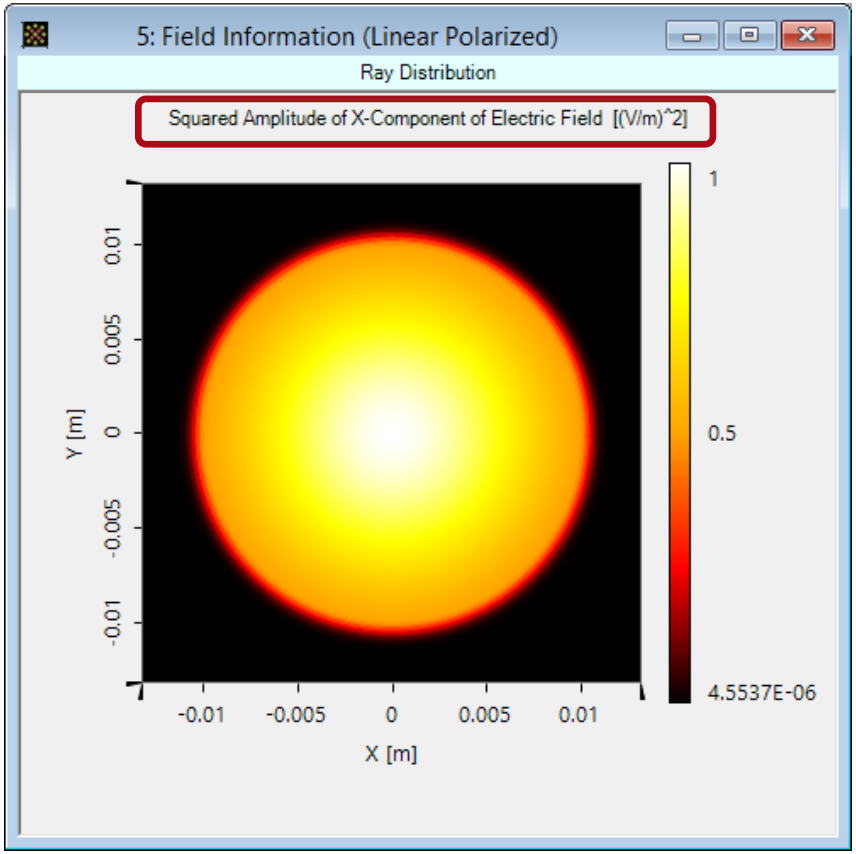
Simulation Result (Linearly Polarized)



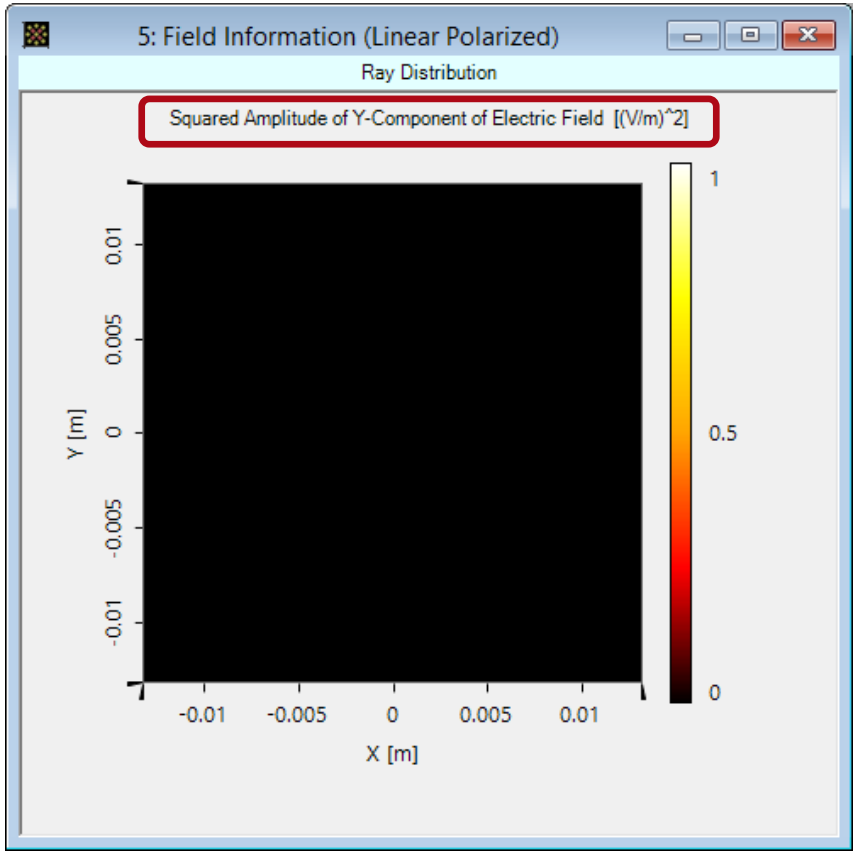
- By clicking on the corresponding ribbon entries, the user can select the Field Component and the Field Quantity that shall be visualized.



Simulation Results (Linearly Polarized)

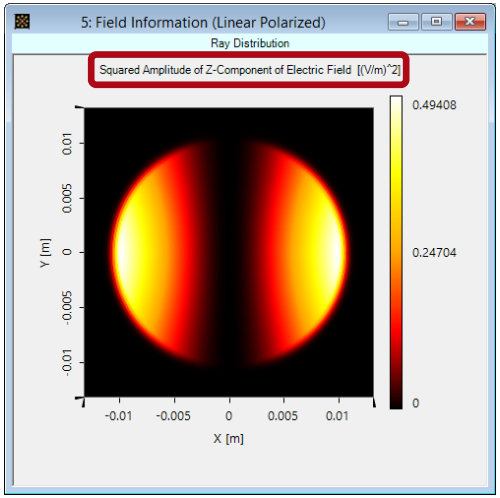


Squared Amplitude of Ex

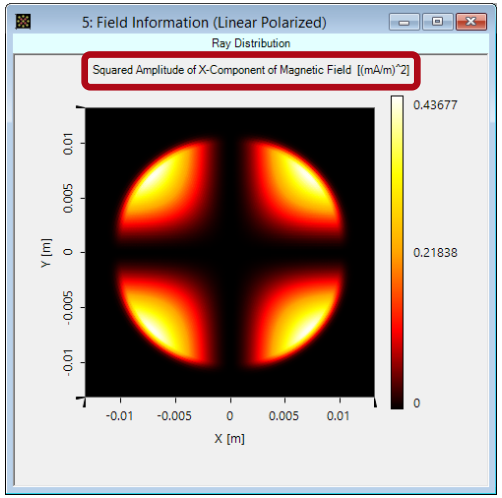


Squared Amplitude of Ey

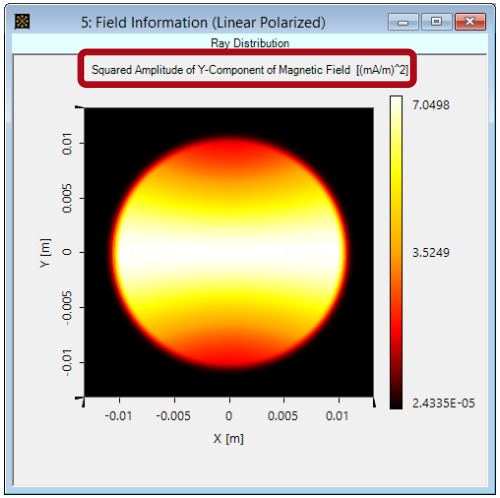
Simulation Results (Linearly Polarized)



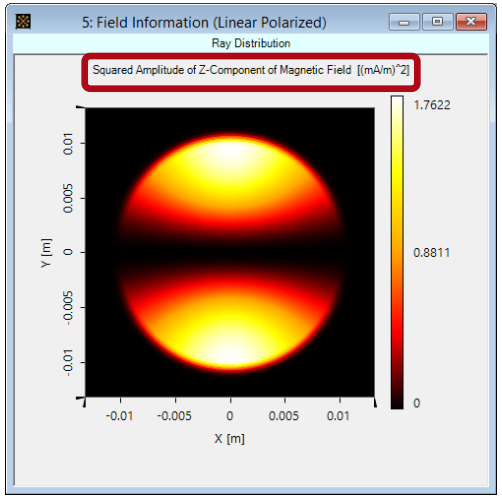
Ez



Hx

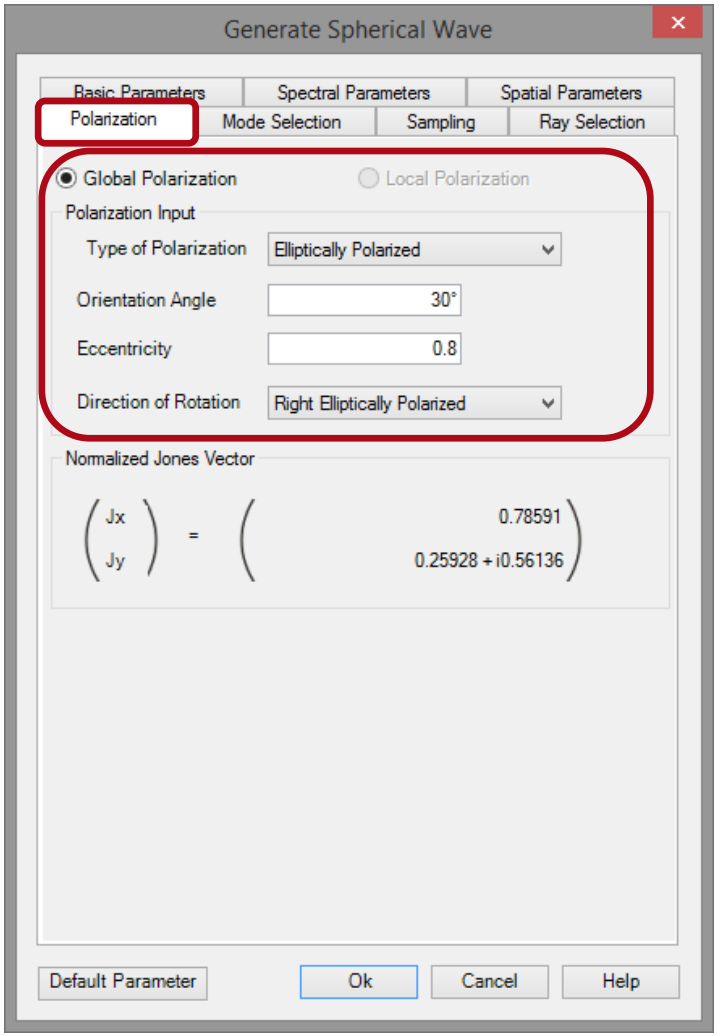


Hy



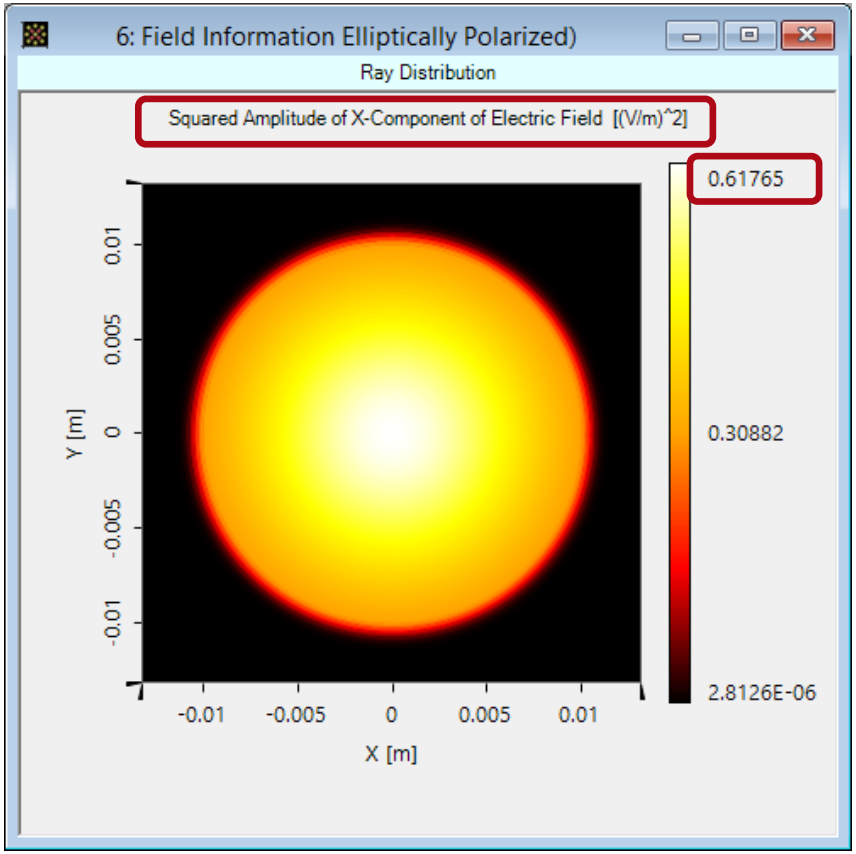
Hz

Using Elliptic Polarization

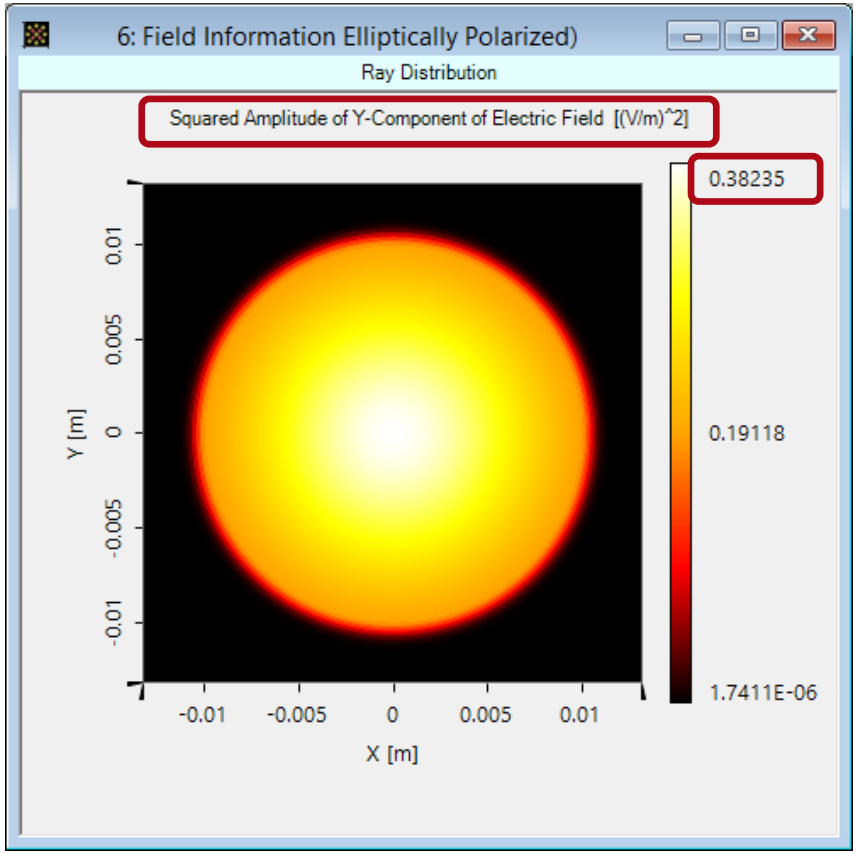


- By clicking on the Light Path tool “Toggle Light Source” the second light source in the system can be activated.
- The polarization of this light source is set to elliptic polarization.
- The controls to enter the elliptic polarization are shown in the screenshot on the left side.

Simulation Results (Elliptically Polarized)

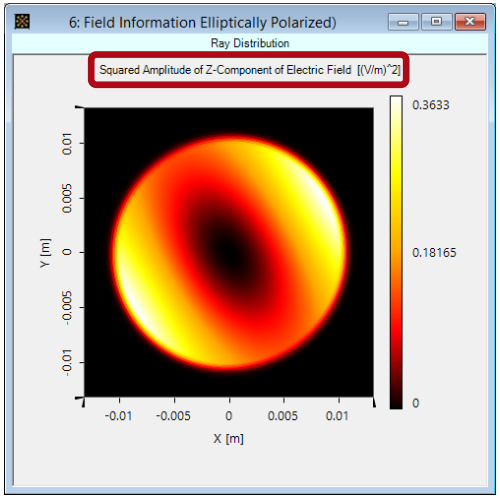


Squared Amplitude of Ex

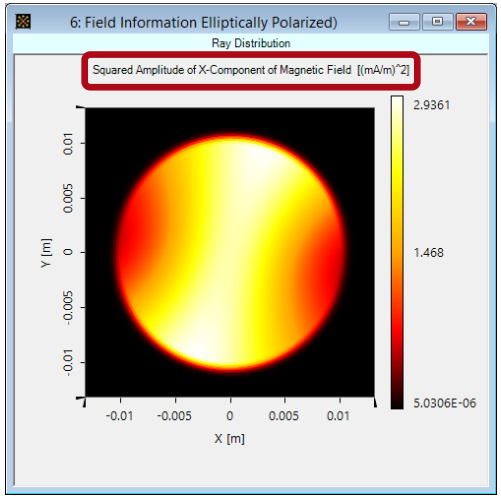


Squared Amplitude of Ey

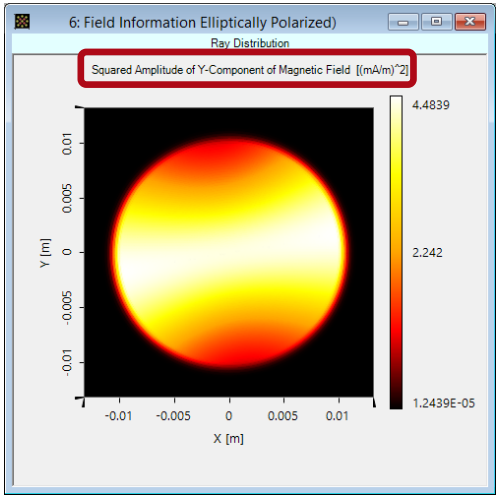
Simulation Results (Elliptically Polarized)



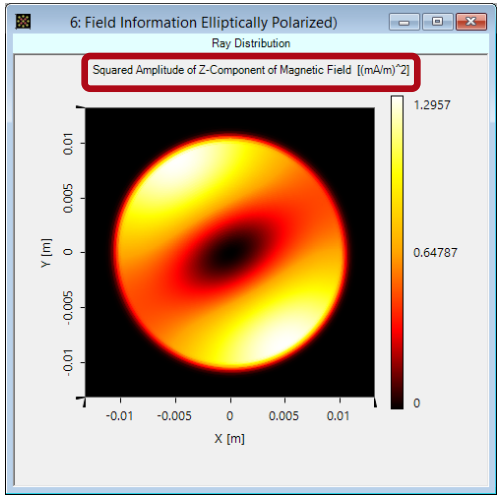
Ez



Hx



Hy



Hz

Summary

- The Geometric Field Tracing Plus engine can be used to propagate electromagnetic field information through your optical system.
- The simulation speed is as fast as for ray tracing.
- The consequent usage of electromagnetic field information within the engine enable the solution of Maxwell’s equation in their geometric approximation.
- VirtualLab always provides the six field components for the output of the Geometric Field Tracing engine.