WYROWSKI PHOTONICS

Feature.0026

Electromagnetic Field Detector

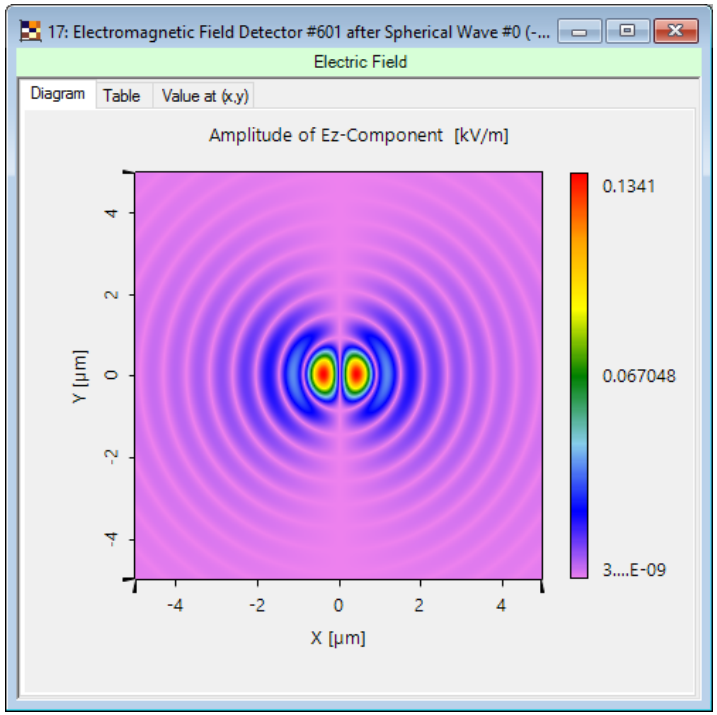
By fast physical optic simulation it is possible to evaluate the electromagnetic field within the simulation. The electromagnetic field detector allow the evaluation of the field.

About This Use Case

- The following toolboxes are required:
  - Starter toolbox
- This use case was created using VirtualLab Fusion (Build 7.0.0.35).
- Get your free Trial Version here!

This Use Case Shows...

- the usage of the *Electromagnetic Field Detector*.
- how to customize the settings of the *Electromagnetic Field Detector* for different visualization options.

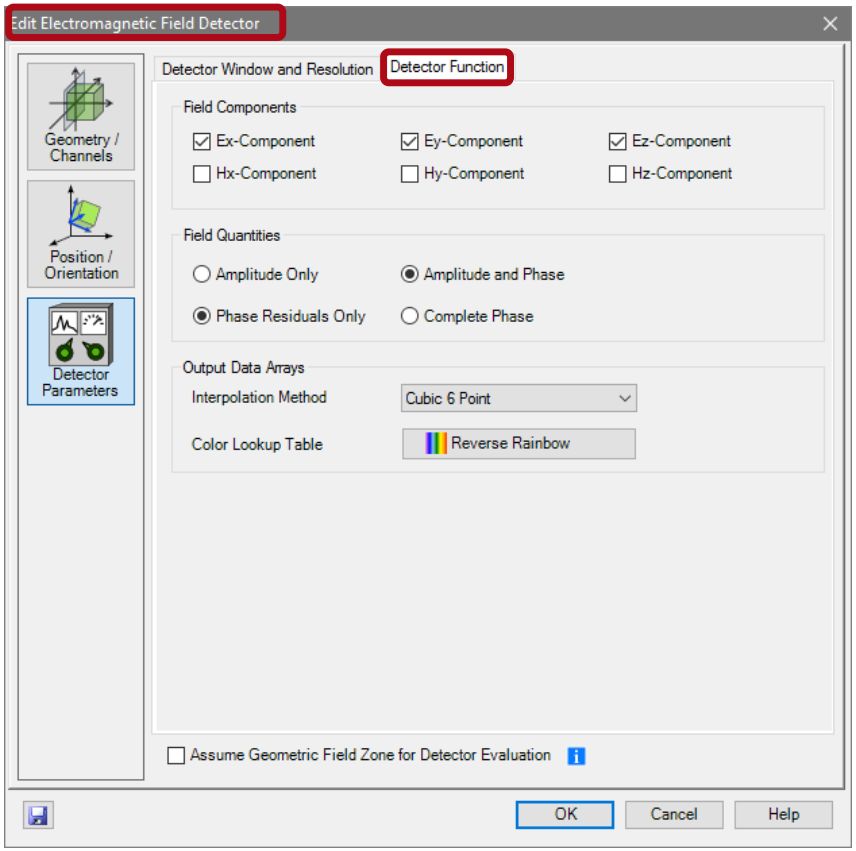


The *Electromagnetic Field Detector* generates a data array which contains the selected field component. The user select between E_x, E_y, E_z, H_x, H_y and H_z.

Overview

- The electromagnetic field detector can be found in the section *Detectors* ➔ *Field Visualization*.
- Its task is to calculate the electromagnetic field component and store the data into a data array which can be used for visualization of the components.
- The user has several options for customization of the detector output, which will be discussed within this use case.

Edit Options of Electromagnetic Field Detector

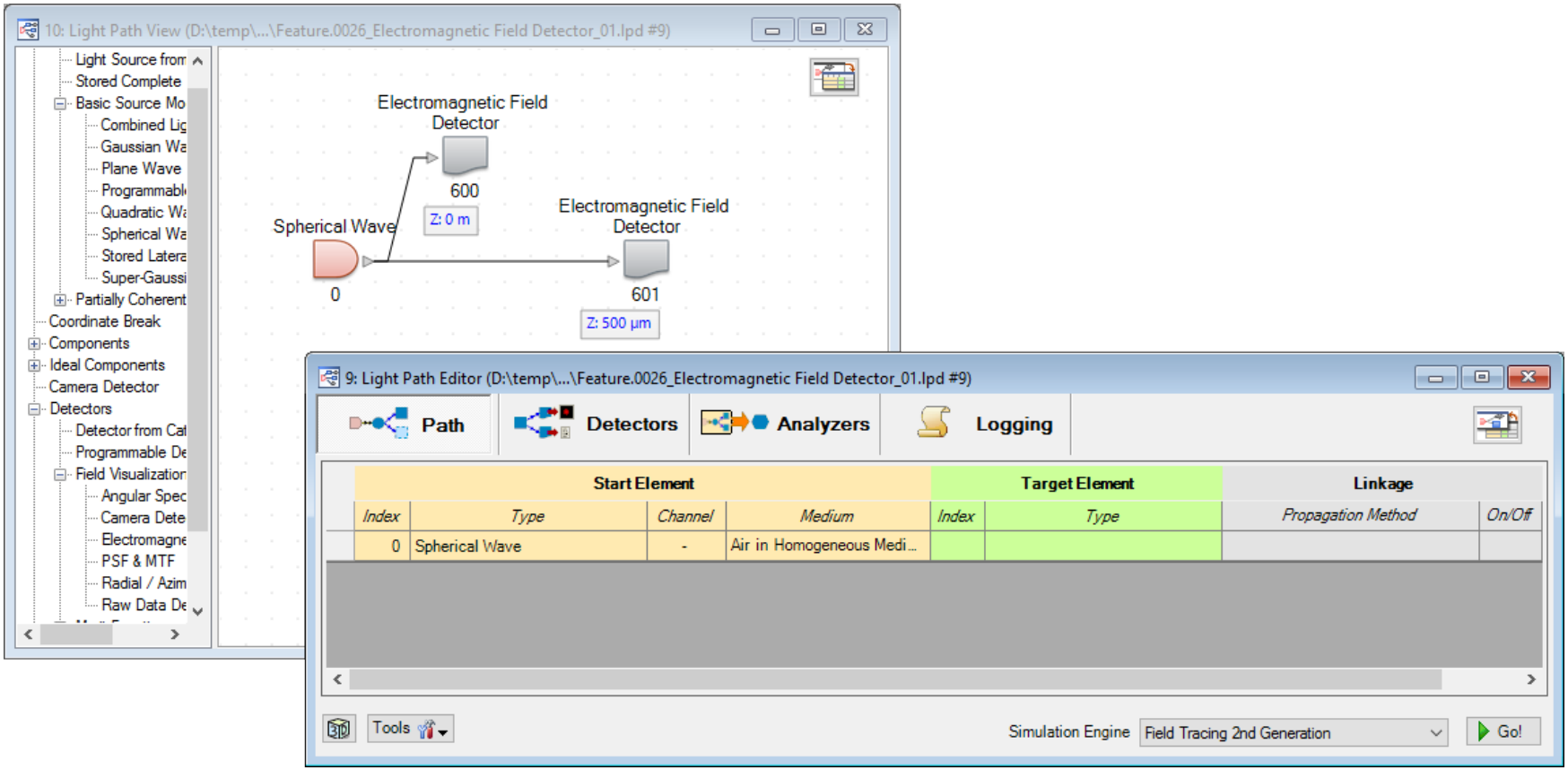


- The edit dialog of the electromagnetic field detector can be accessed by double clicking on the detector item within the light path diagram view.
- Several options can be preconfigured in the edit dialog.

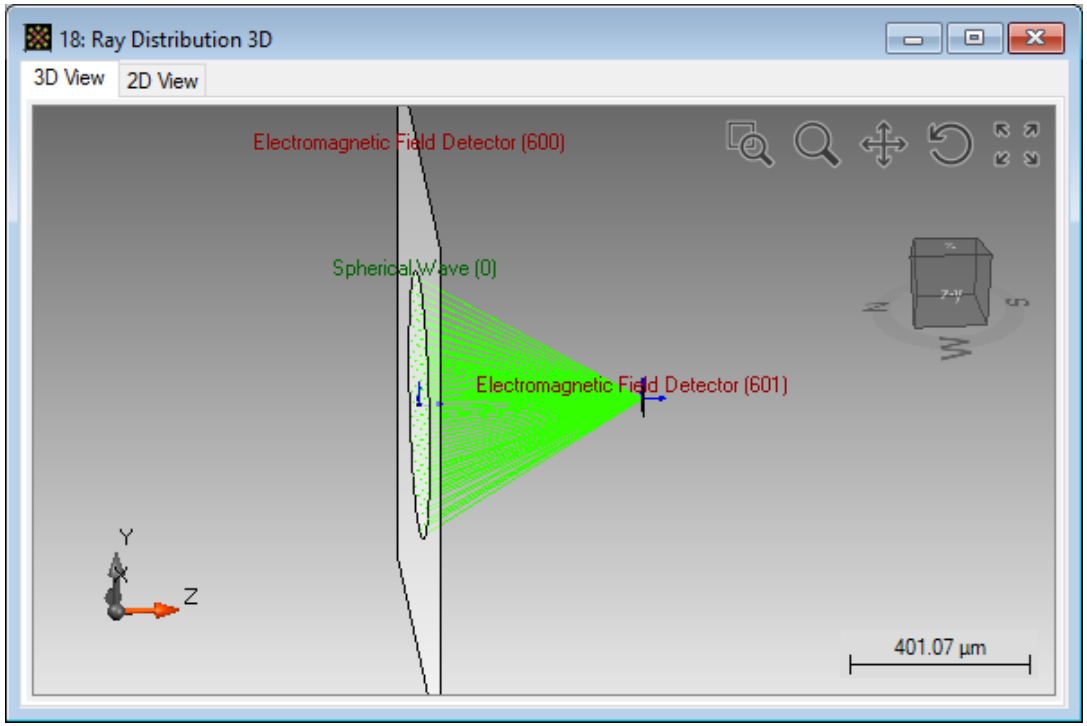
Parameters of the Electromagnetic Field Detector

Parameter	Description
Field Components	The user can select which field components shall be calculated by the detector. The user can select whether to calculate E_x, E_y, E_z, H_x, H_y and/or H_z.
Field Quantities	In the field quantity section it is possible to define which field quantities shall be stored in the data array. The user can select whether to show only the amplitude or amplitude and phase information. For amplitude and phase it is possible to select whether to show only the phase residual or the complete phase.
Interpolation Method	By setting the interpolation method the user select the interpolation method used for visualization of the selected field components.
Color Lookup Table	The display of the field components is realized by a data array. The user can preconfigure the LUT used for viewing. The setting of the LUT can be changed later again by the user in the data array view.

Sample System for Electromagnetic Field Detector

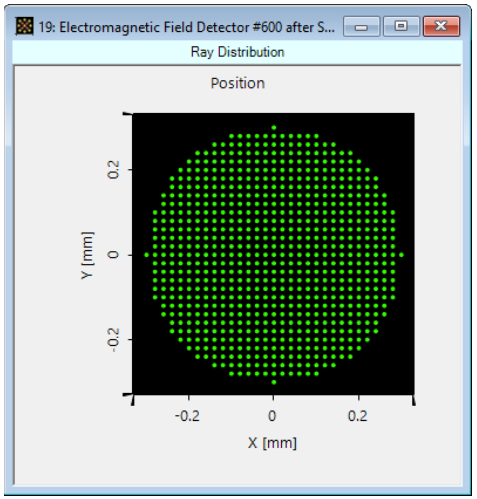


Result of Ray Tracing System Analyzer

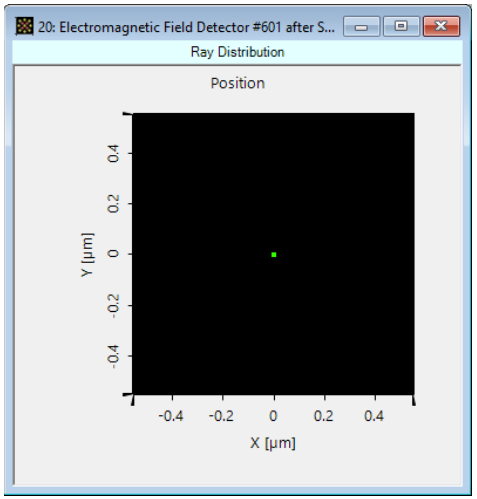


- The sample system contains a spherical wave and two E/H field detector. One is placed in the focus, and the other directly behind the source.
- The NA of the spherical wave is 0.7.

E/H Field Detector Output for Ray Tracing



After Source

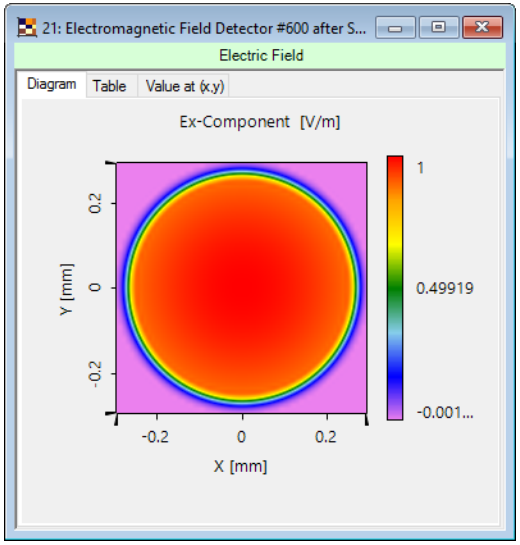


In Focus

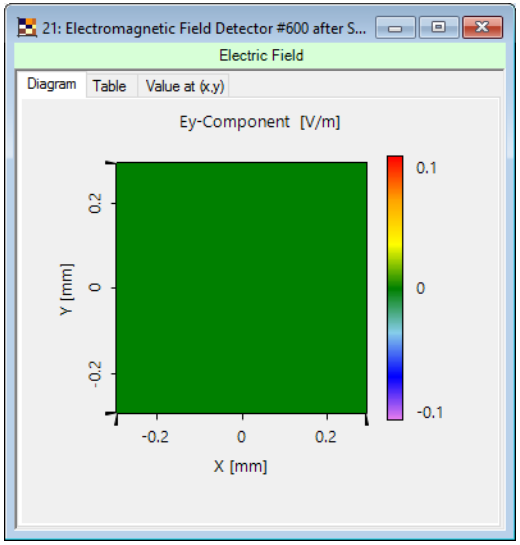
- If the user performs ray tracing analysis of the system which contains a electromagnetic field detector, a dot diagram showing the rays in the detector plane is shown.

E/H Field Detector after Source

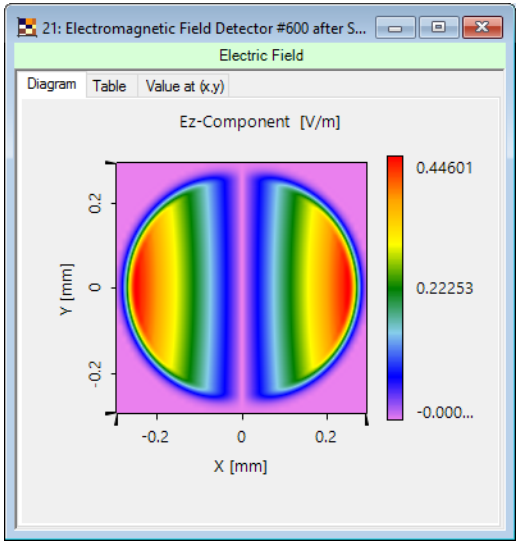
- The screenshots below show the output of the electromagnetic field detector directly behind the source.
- The detector is configured to show only amplitudes for E_x, E_y and E_z.



Amplitude of E_x

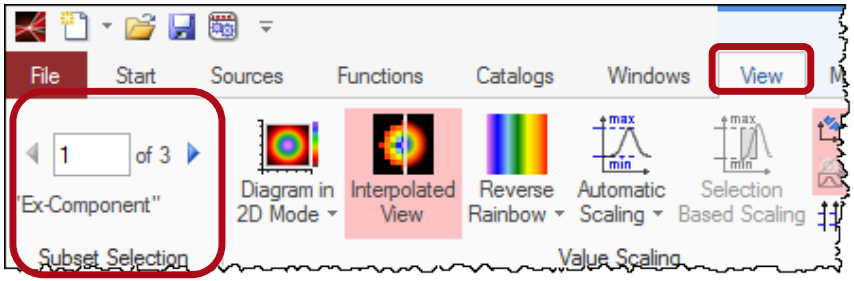


Amplitude of E_y



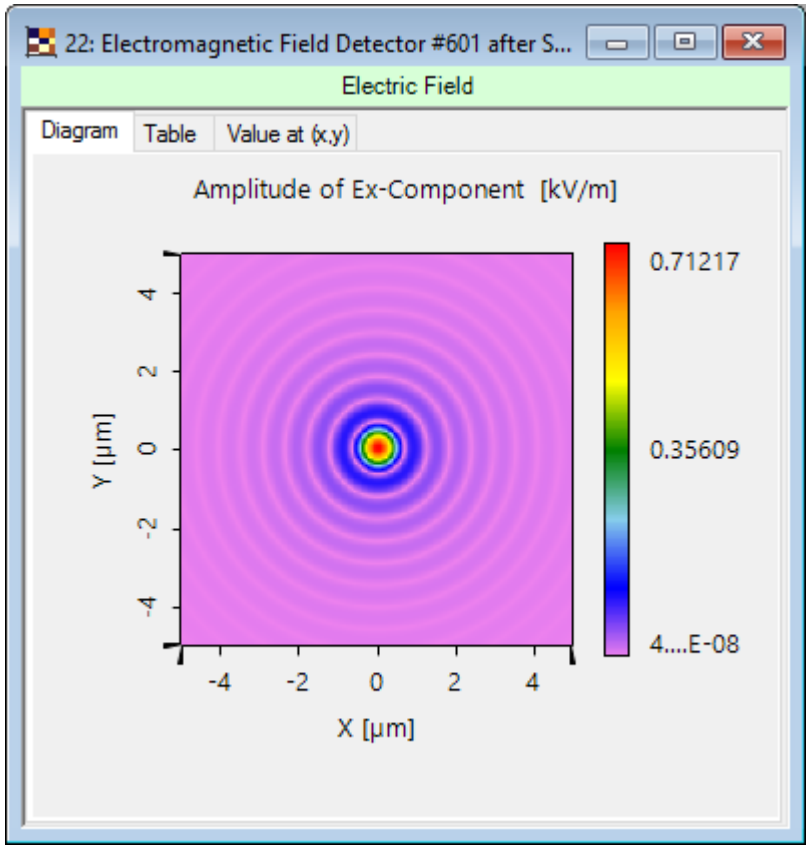
Amplitude of E_z

Switching Between E/H Field Components



- The output of the detector is a data array with one or more subset.
- Each subset contains the information of one field component.
- By changing the subset index within the view ribbon of the data array the user can toggle between the evaluated field components.

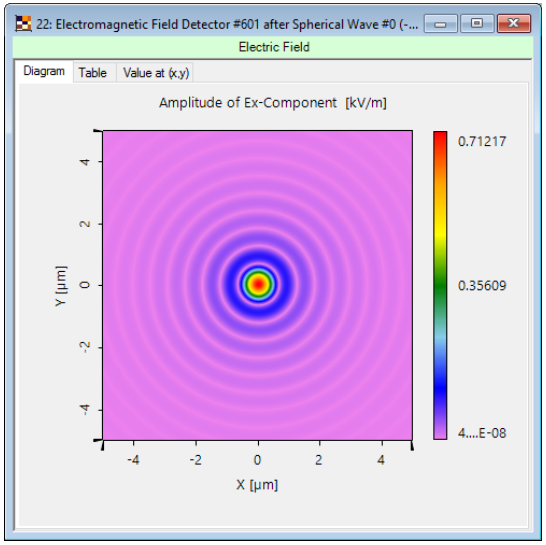
E/H Field Detector in Focus



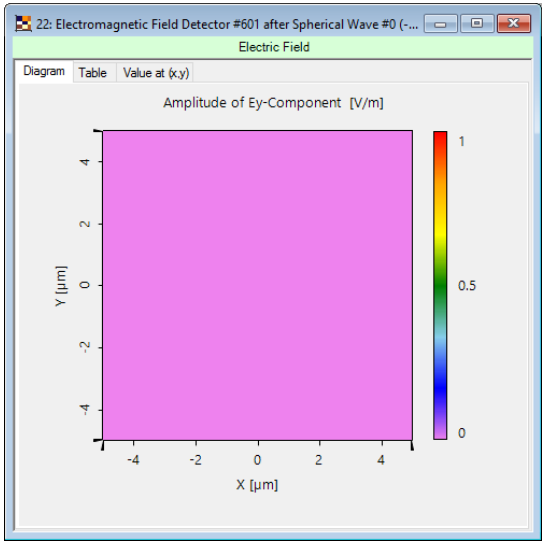
- VirtualLab decides automatically which propagation algorithm shall be used to calculate the field within the detector plane.

E/H Field Detector in Focus

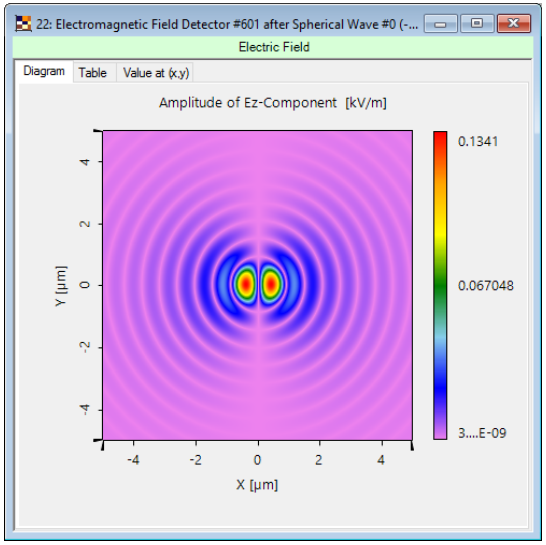
- The generated data array contains all selected field components.
- The user can switch between the field components in the view ribbon of the data array.



Amplitude of E_x



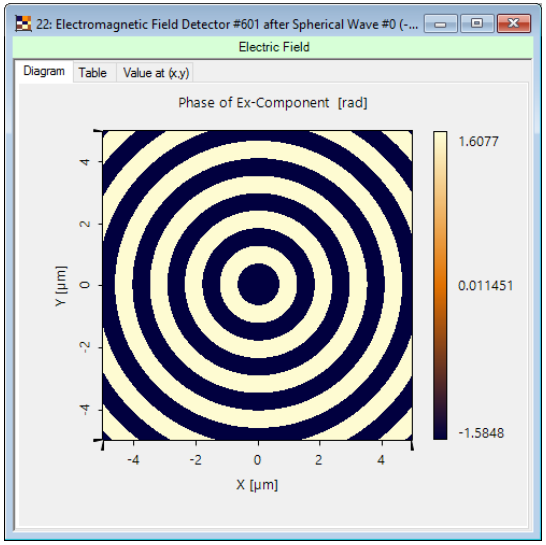
Amplitude of E_y



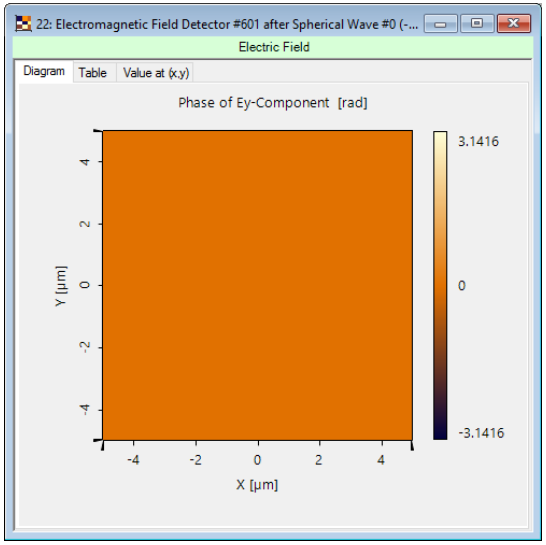
Amplitude of E_z

E/H Field Detector in Focus

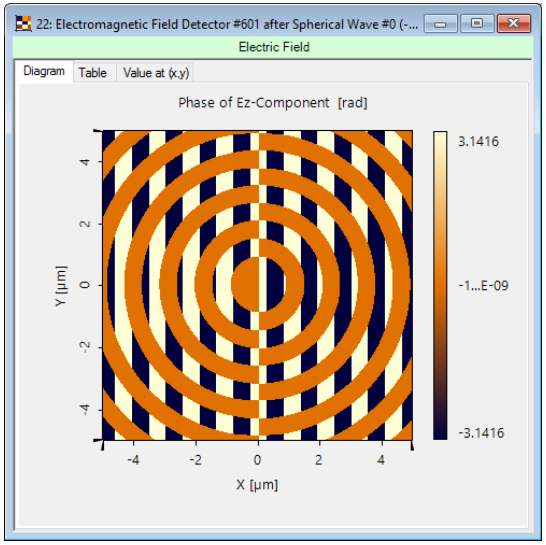
- For complex valued data array it is possible to switch between the field component.
- This can be done in the view ribbon of the data array.



Phase of E_x



Phase of E_y



Phase of E_z

Document & Technical Info

code	Feature.0026
version of document	1.0
title	Electromagnet Field Detector
category	Simulation
author	Christian Hellmann (LightTrans)
used VL version	7.0.0.35
last modified on	August 28, 2017