Feature.0002

Usage of Focal Length Analyzer

Calculate the effective focal length and the back focal length of a real component in an optical system.

About This Use Case

- The following toolboxes are required:
    - Starter toolbox

- This use case was created using VirtualLab Fusion (Build 7.0.0.35).

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This Use Case Shows...

- what the *Focal Length Analyzer* is.

- how to apply the *Focal Length Analyzer* in a *Parametric Optimization* task.
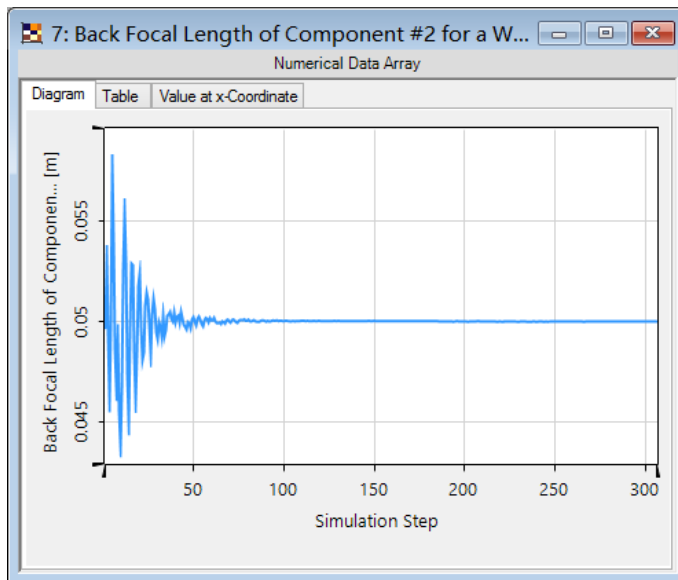
The *Effective Focal Length* converges to the target value in *Parametric Optimization.*

Overview

- The focal length is an important parameter to evaluate an imaging system. But for real thick lenses, or systems consisting of several lenses and mirrors, the effective focal length is not easy to calculate.

- By using the *Focal Length Analyzer*, the effective and back focal length of an *Optical Interface Sequence (OIS)*, a *Single Optical Interface* or a *Spherical Lens* can be obtained.

- The *Focal Length Analyzer* can also be applied in a *Parametric Optimization*. The corresponding result can be configured as a merit function for optimization.
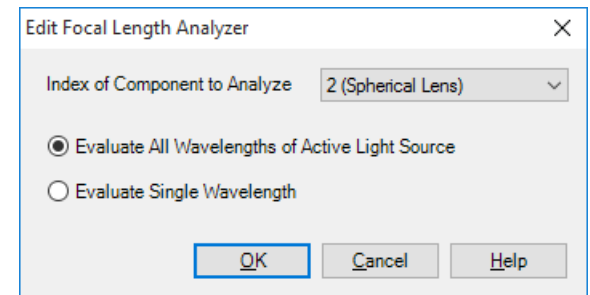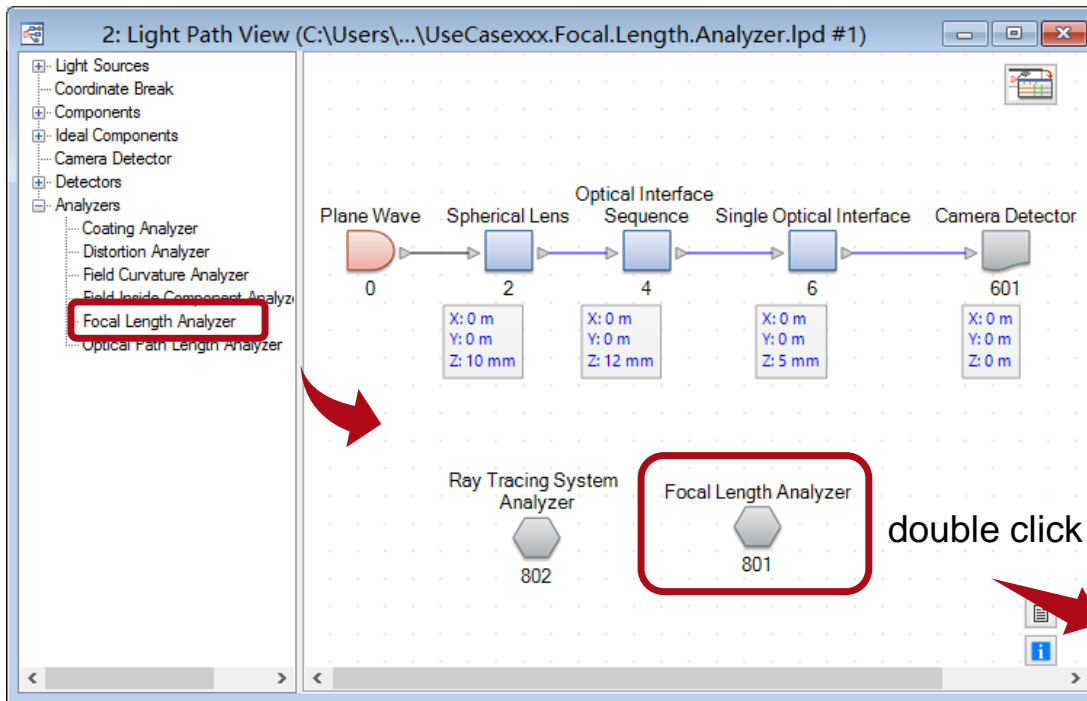
Thick Lens Diagram and Definition
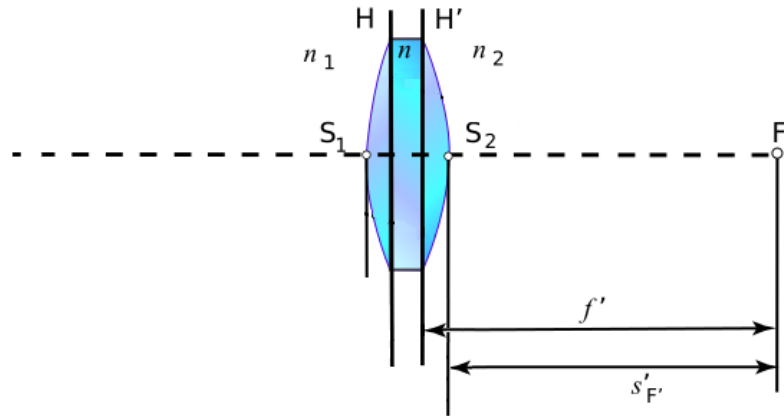
[1]

- **effective focal length (f′):** distance from the rear principal plane (H′) to the rear focal point (F′)

- **back focal length ($s'_{F'}$):** distance from the vertex of the last optical surface of the system (S_2) to the rear focal point (F′)

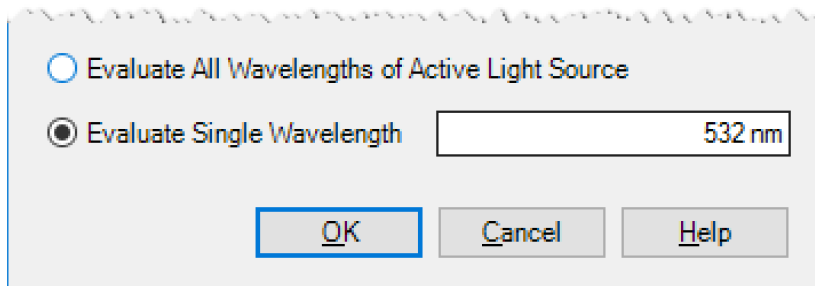[1] Wikipedia, https://en.wikipedia.org/wiki/Focal_length

Focal Length Analyzer in LPD
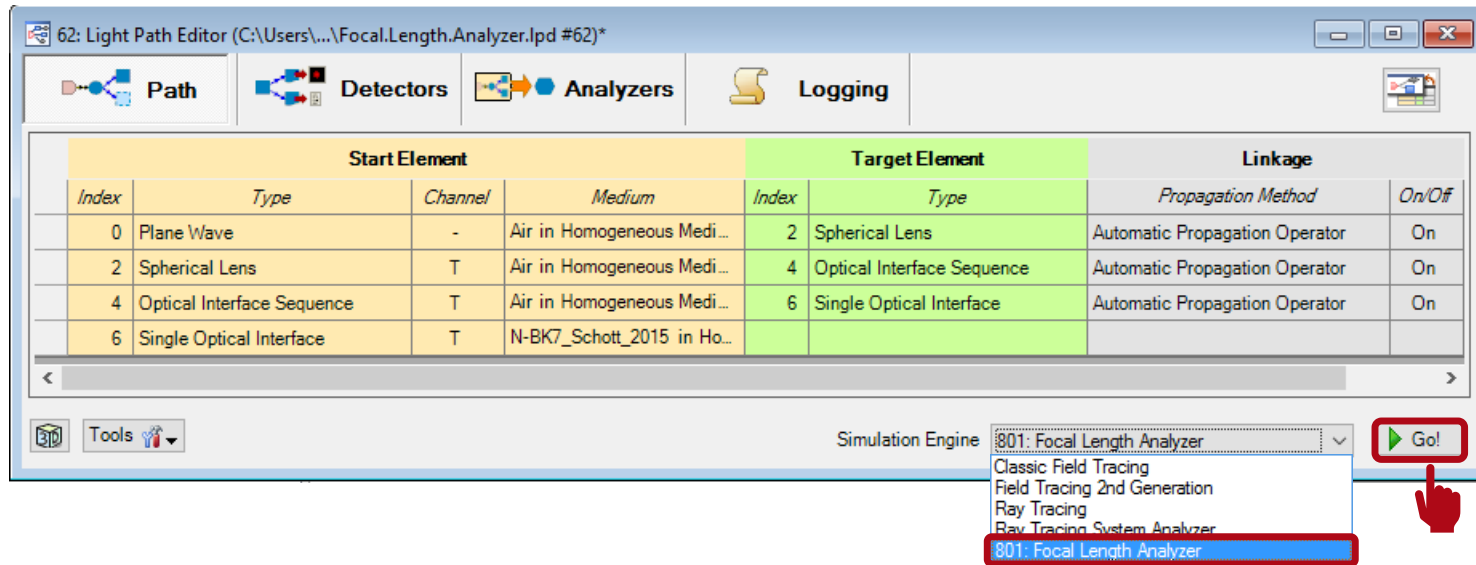
Configuration of Focal Length Analyzer
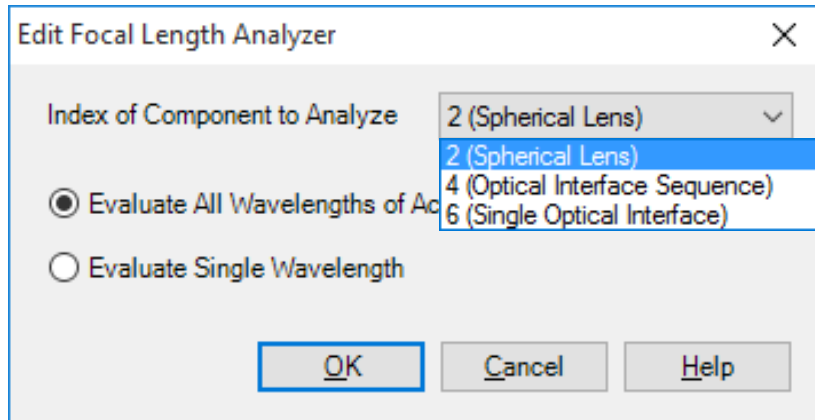
- select the component to be analyzed

and

- choose whether to evaluate all wavelengths or a given single wavelength

Running the Analyzer and Result Display

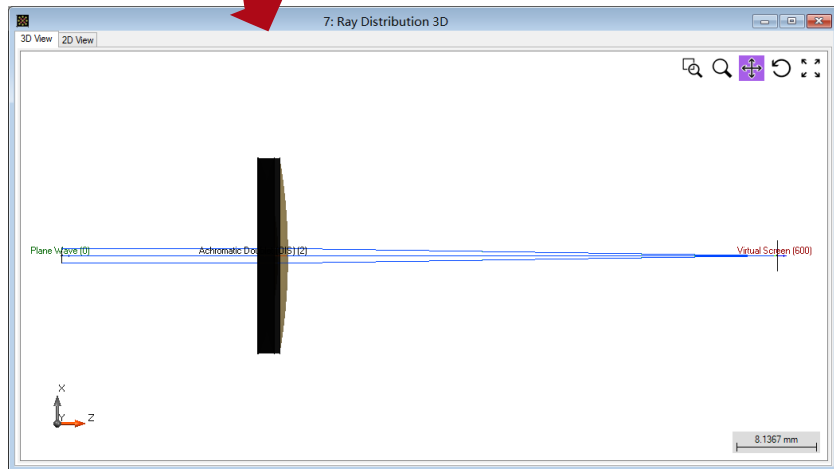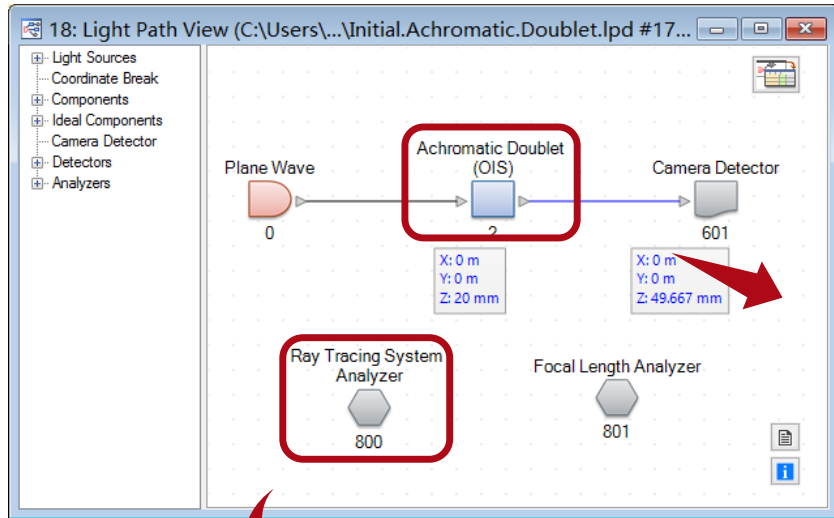

The results are shown in the tab *Detector Results*.

Parametric Optimization of An Achromatic Doublet

Task Description

- source
  - plane wave: wavelength 473 nm, 532 nm and 635 nm

- component
  - Optical Interface Sequence (achromatic doublet): four conical interfaces

- detectors and analyzers
  - Camera Detector
  - Ray Tracing Analyzer
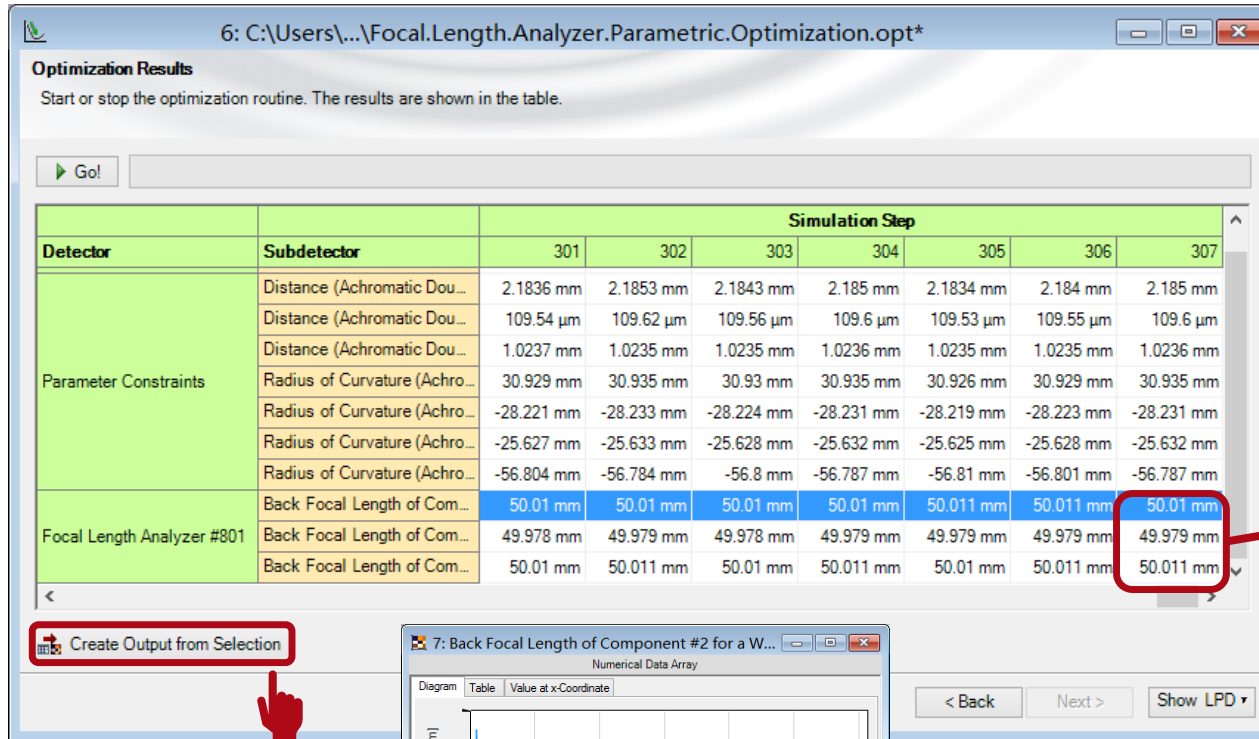 - Focal Length Analyzer

Schematic and Light Path Diagram

Set Optimization Target
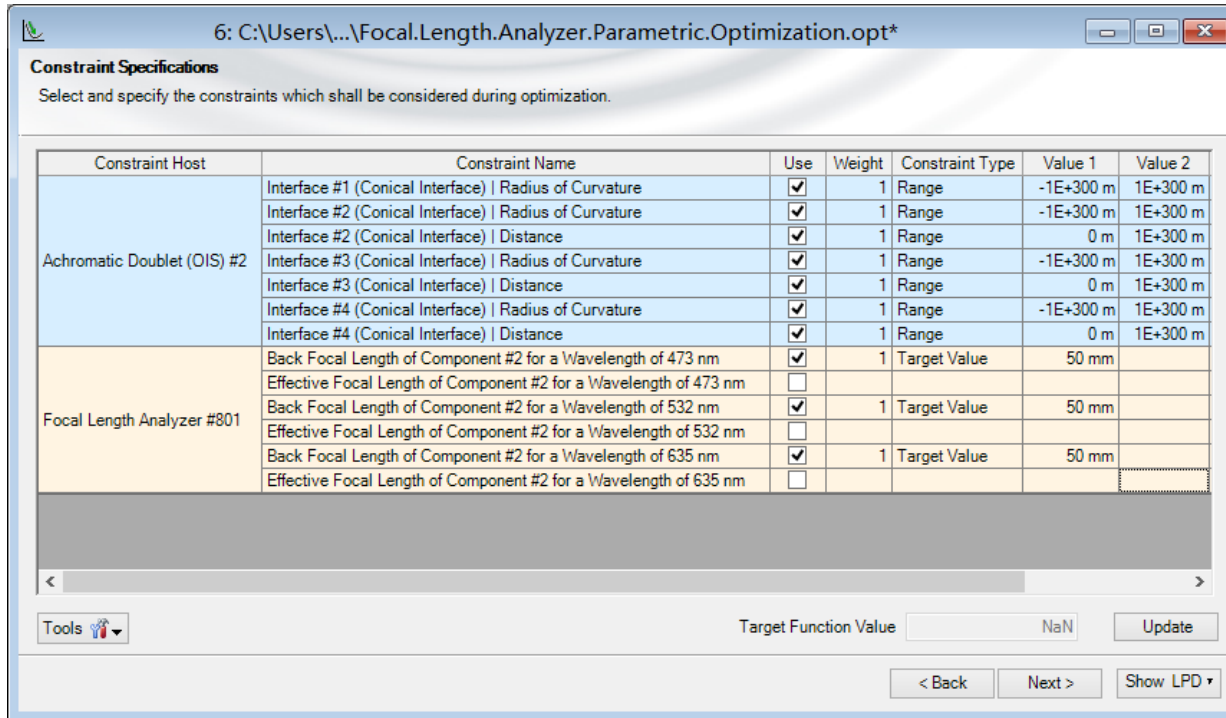
- Focal Length Analyzer
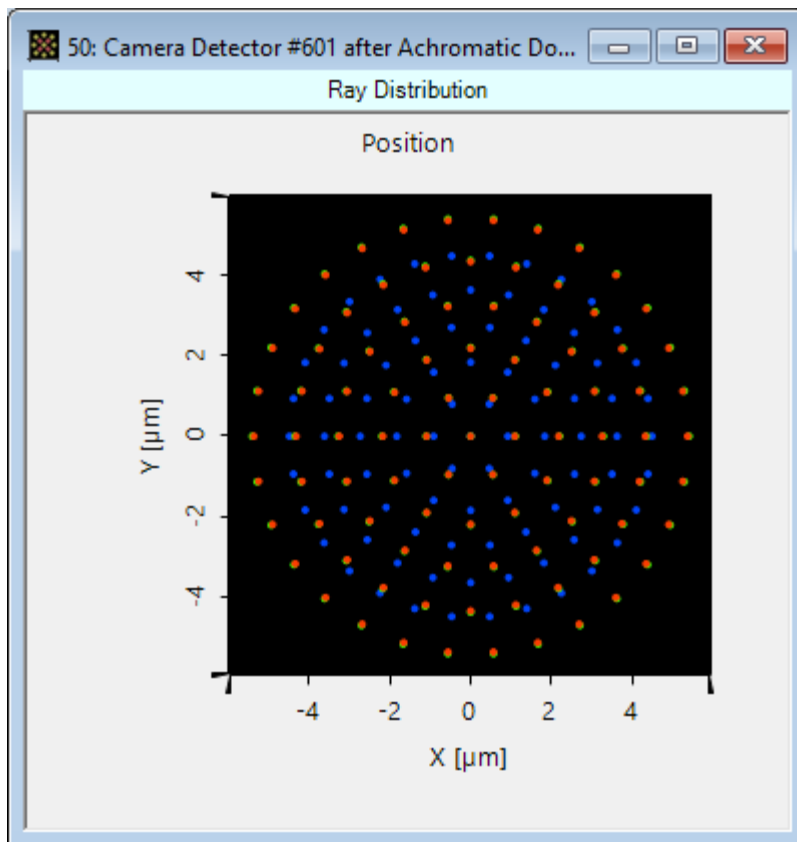 - Effective Focal Length is set to 50 mm: for all chosen wavelengths
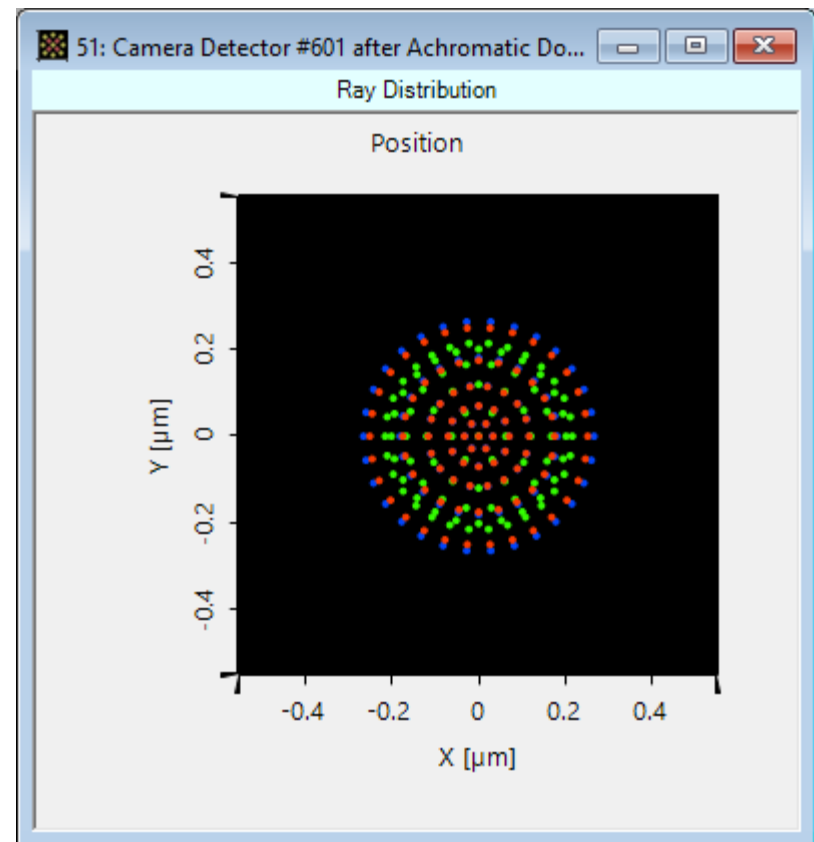
Optimization Result

Comparison of Results

Dot Diagram (initial setup)

Dot Diagram (optimized)

Document & Technical Info

code	Feature.0002
version of document	1.0
title	Usage of Focal Length Analyzer
category	Simulation
created by	Zongzhao Wang (LightTrans)
used VL version	7.0.0.35
last modified on	August 24, 2017