Advanced PSF Calculation in a High-NA Lens System
Abstract

It is known that the vectorial nature of light plays a non-negligible role in high-NA focusing situations. In this example, focusing of a linearly polarized Gaussian beam by a high-NA aspheric lens is presented, and the asymmetric PSF in the focal plane is shown. By examining the electromagnetic field components in the focal plane, it can be found that the asymmetry is caused by a relatively strong $E_z$ component.
Modeling Task

- **input field**
  - fundamental Gaussian
  - wavelength 532nm
  - diameter (waist) 40mm
  - linearly polarized in x direction

- **aspheric lens**
  - ashericon AHL50-40
  - NA = 0.54

- PSF in focal plane

![Diagram showing the interaction of the input field with the aspheric lens](image-url)
Results

Calculation of PSF in the focal plane behind the high-NA lens takes 4 seconds.

Asymmetry is seen in the PSF, because of vectorial effects.
Asymmetry in PSF is due to the relatively strong $E_z$ component.

Amplitude $E_x$ [kV/m]

Amplitude $E_y$ [V/m]

Amplitude $E_z$ [kV/m]
## Document Information

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