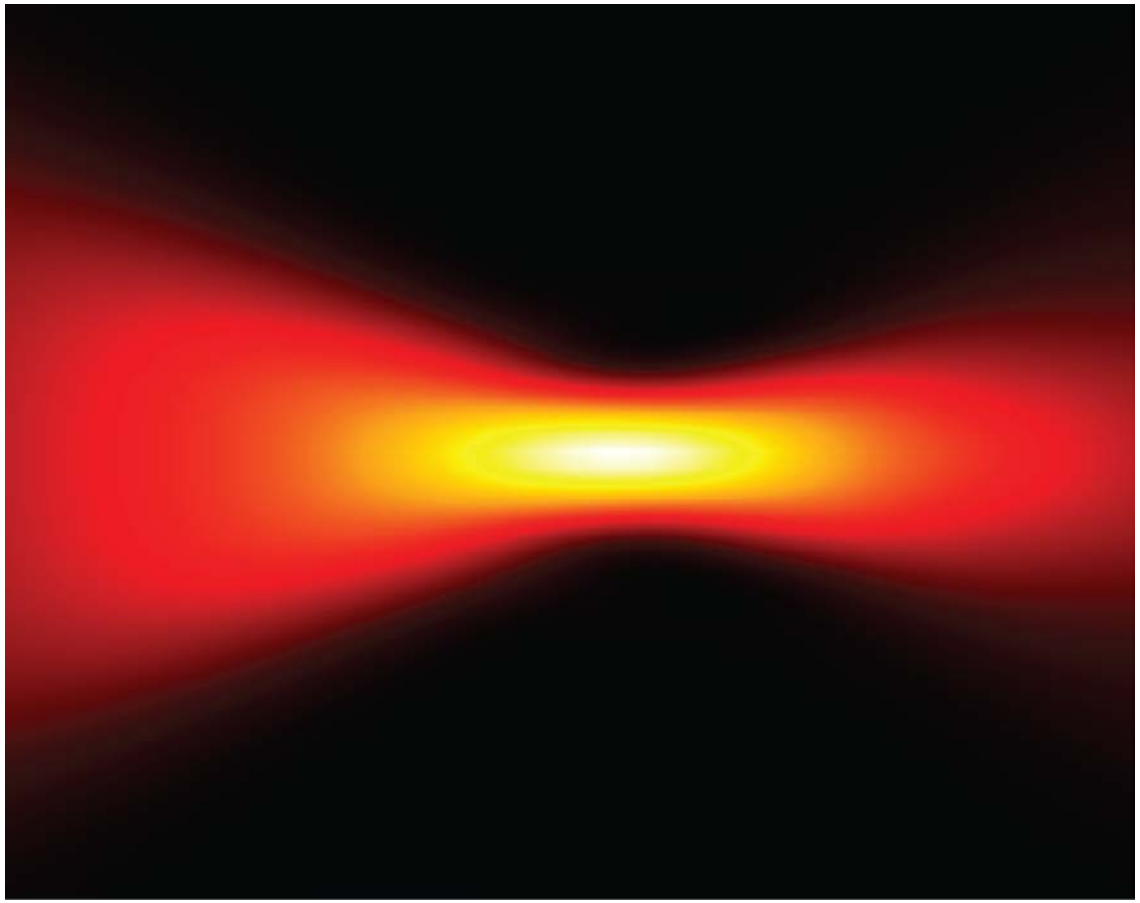
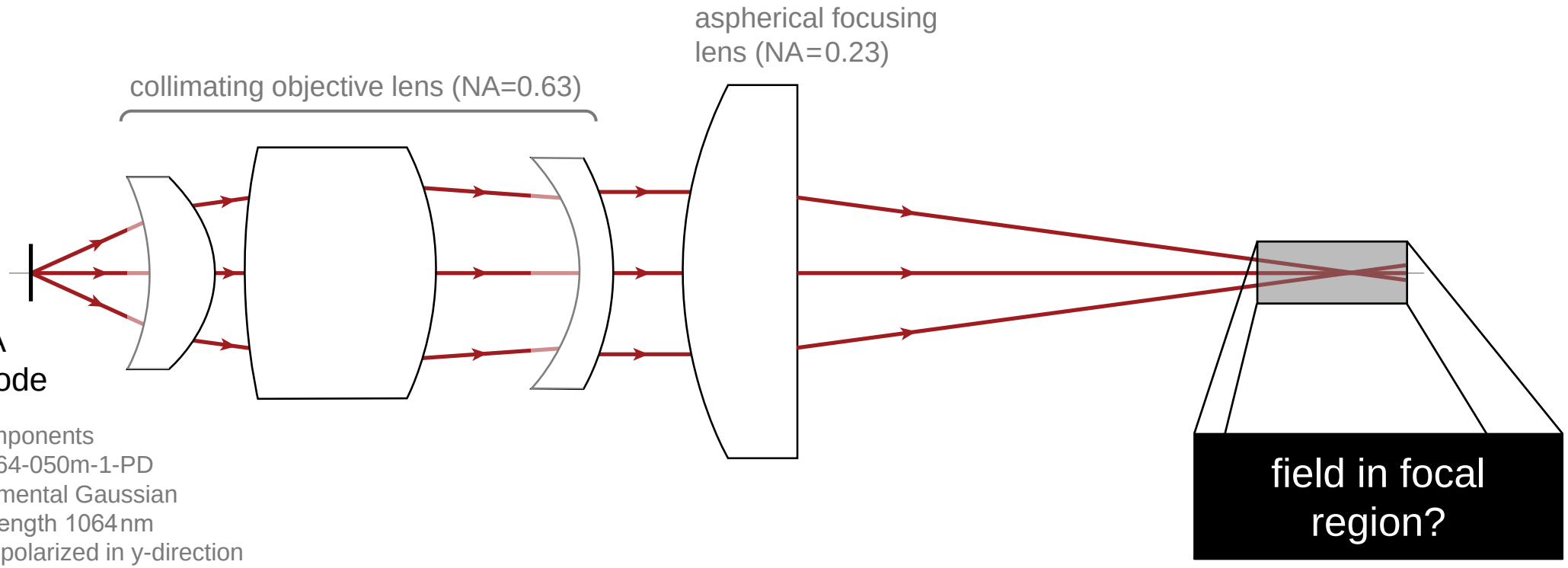
Focus Investigation behind Aspherical Lens

Abstract



High-power laser diodes often show asymmetric divergence and astigmatism between two directions. As an example, a laser diode is firstly collimated by an objective, then focused by an aspherical lens, and the evolution of the field in focal region is investigated in VirtualLab. The influence from the astigmatism on the field in focal region is clearly presented, with comparison to the case without astigmatism.

Modeling Task

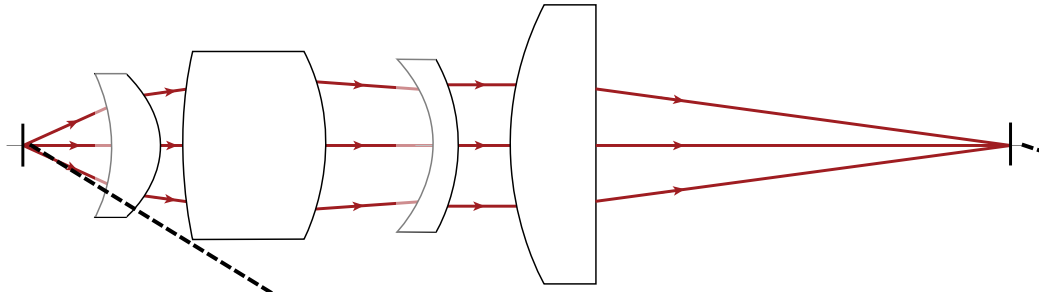


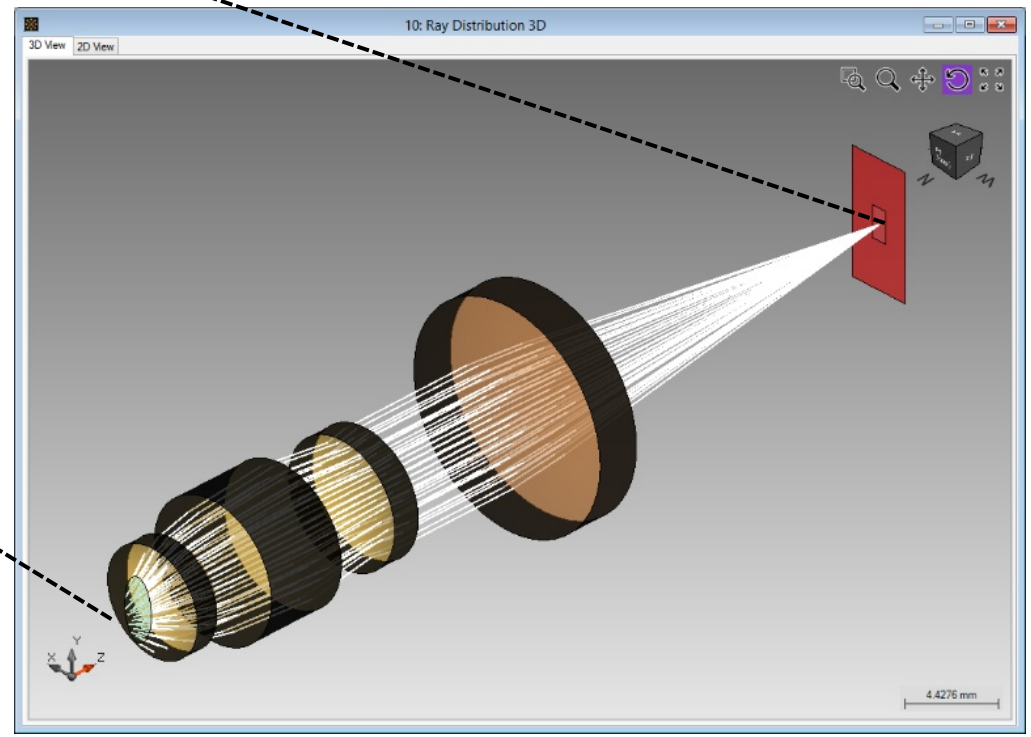
Laser Components
WSLD-1064-050m-1-PD

- fundamental Gaussian
- wavelength 1064 nm
- linear polarized in y-direction
- divergence (FWHM) 20° x 10°
- astigmatism 11.6 µm between *x*- and *y*-plane

What is the field in focal region behind an aspherical lens? Especially, the astigmatism of the laser diode must be taken into account.

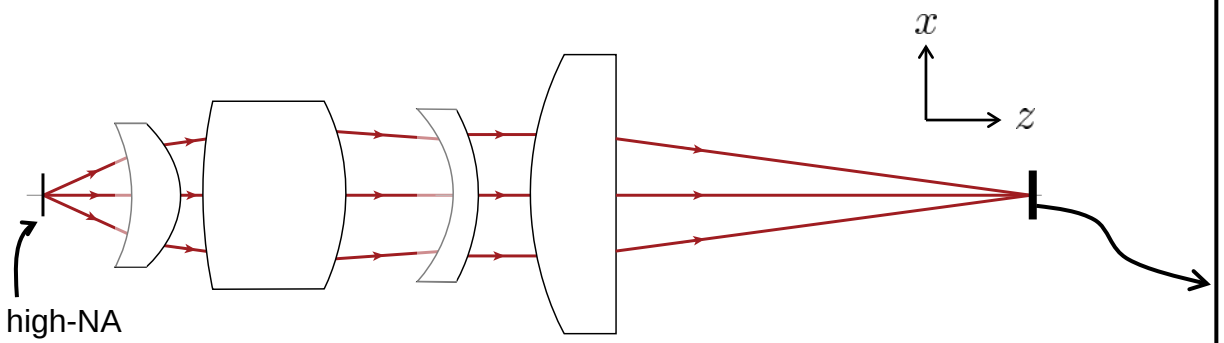
System Analysis with Ray Tracing





Ray-tracing analysis provides a fast overview of the system in space.

Investigation on Focal Plane



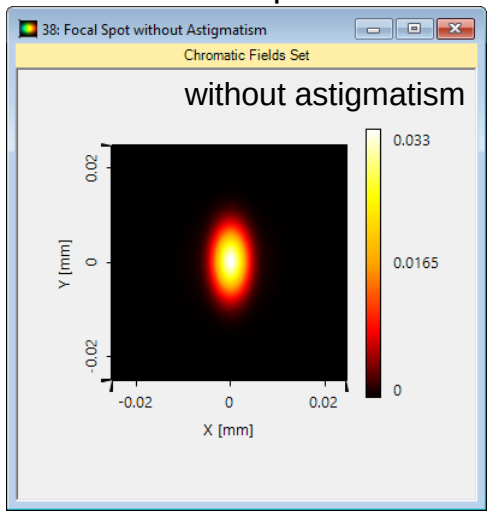
high-NA
laser diode
with or w/o
astigmatism

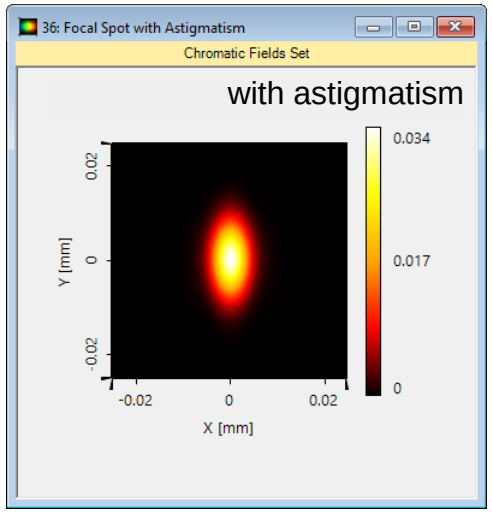
diameters of focal spots

diameter	without astigmatism	with astigmatism
x direction	11.3 µm	11.8 µm
y direction	19.0 µm	21.9 µm

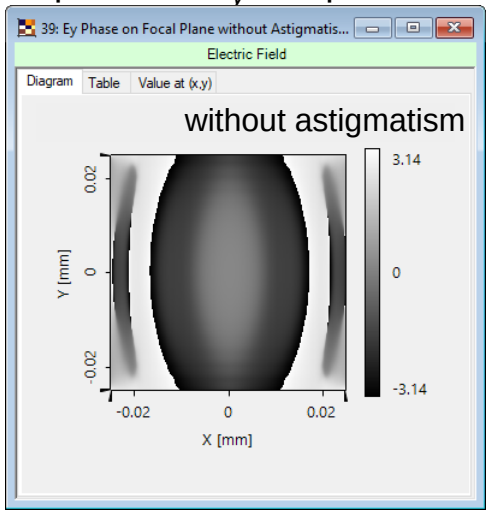
Physical-optics simulation of whole system, including collimation and focusing lenses, takes only 2 seconds!

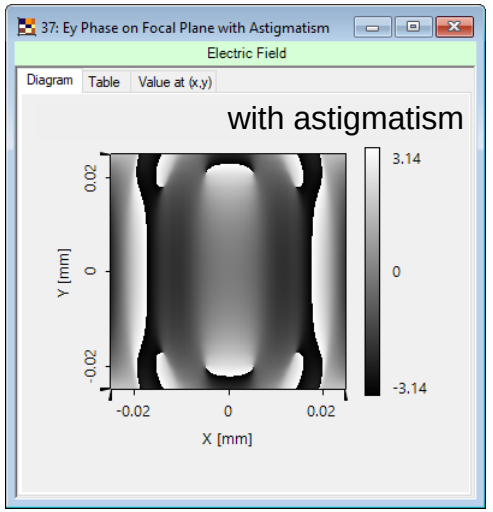
focal spot



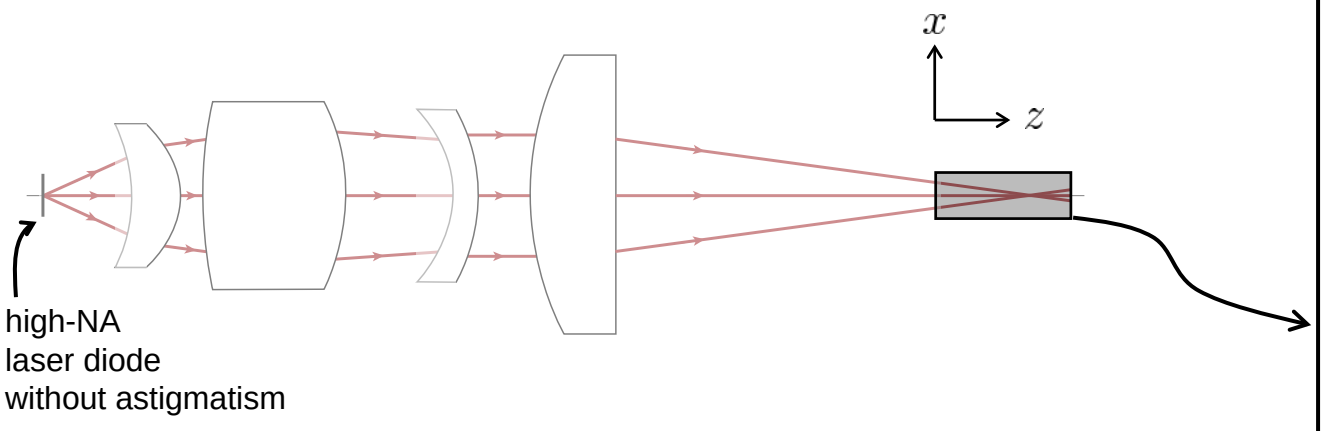


phase of E_y component

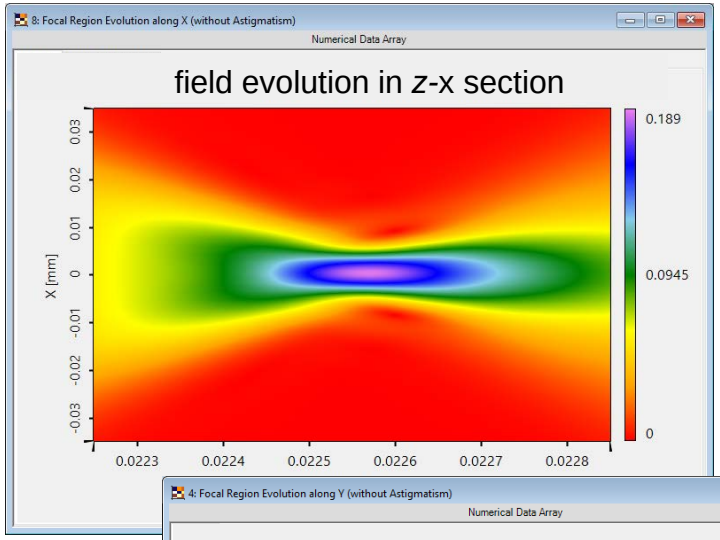


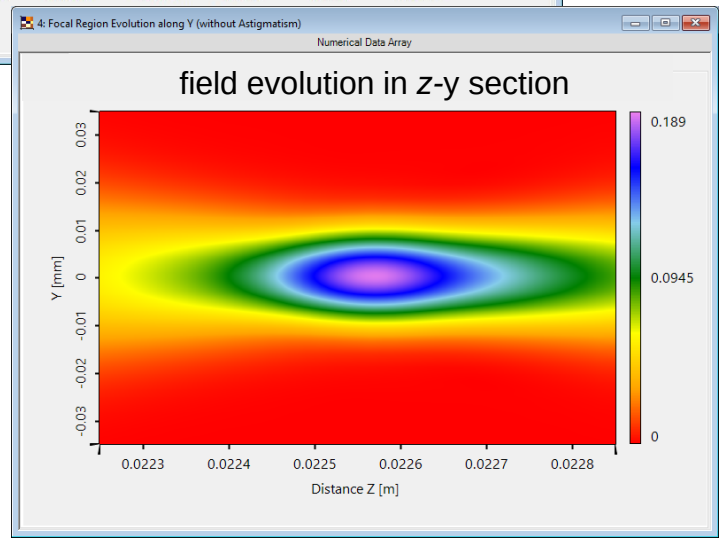


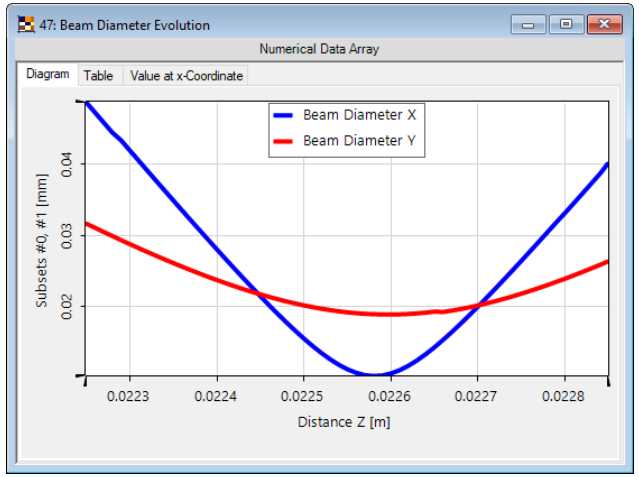
Focal Region Investigation (without Astigmatism)



high-NA
laser diode
without astigmatism

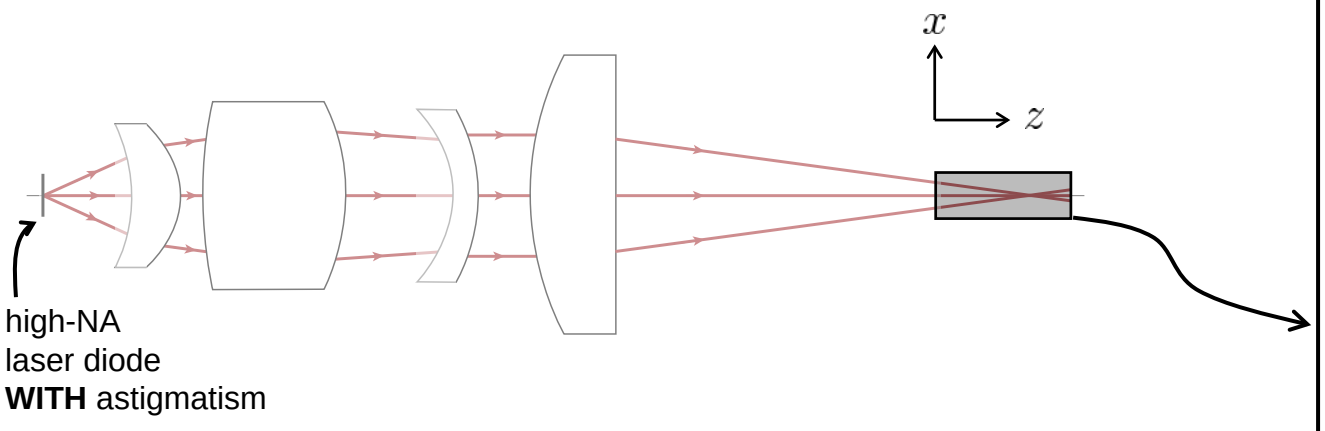




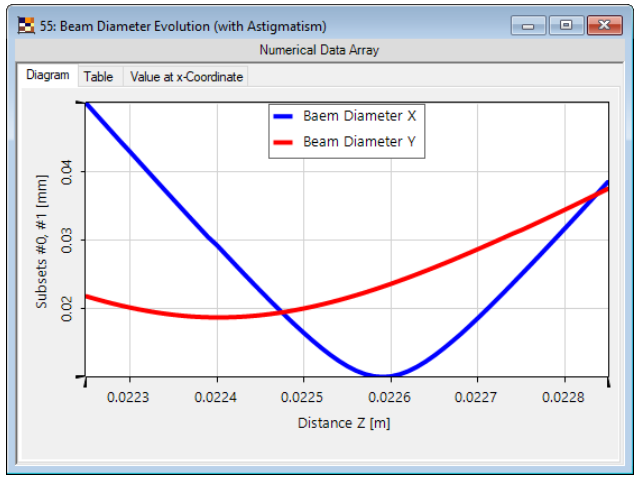


changes of spot diameters
along both *x* and *y* directions

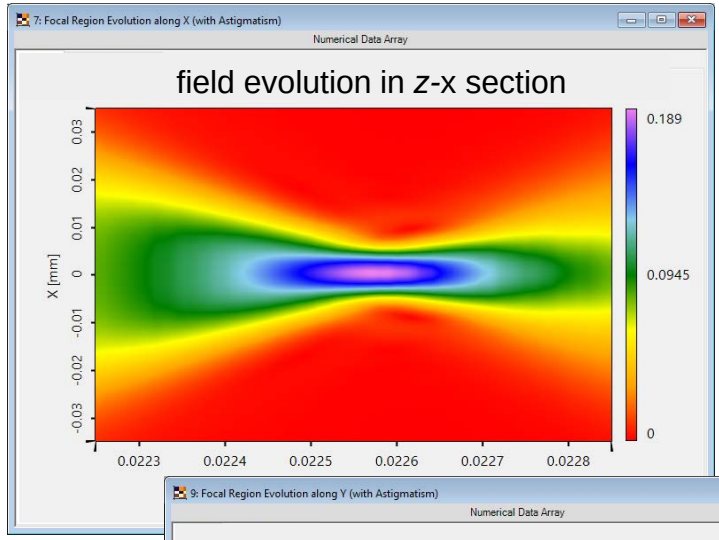
Focal Region Investigation (with Astigmatism)

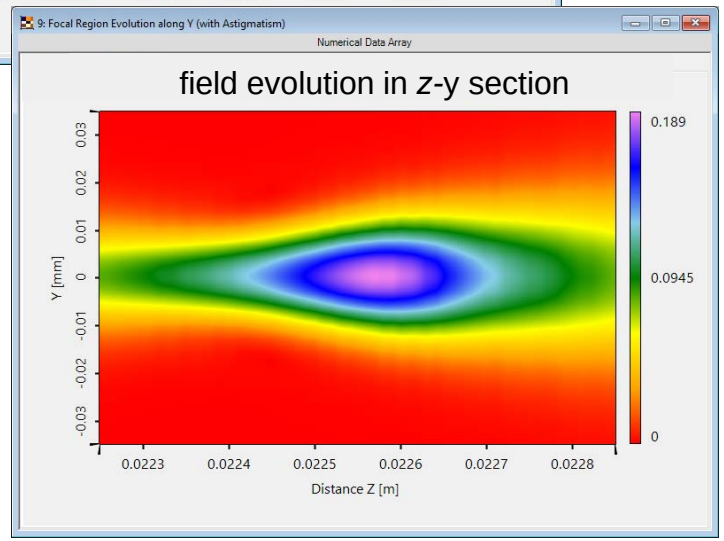


high-NA
laser diode
WITH astigmatism



Minimum beam diameters appear at different positions along *x* and *y* directions, due to astigmatism.





Document Information

title	Focus Investigation behind Aspherical Lens
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