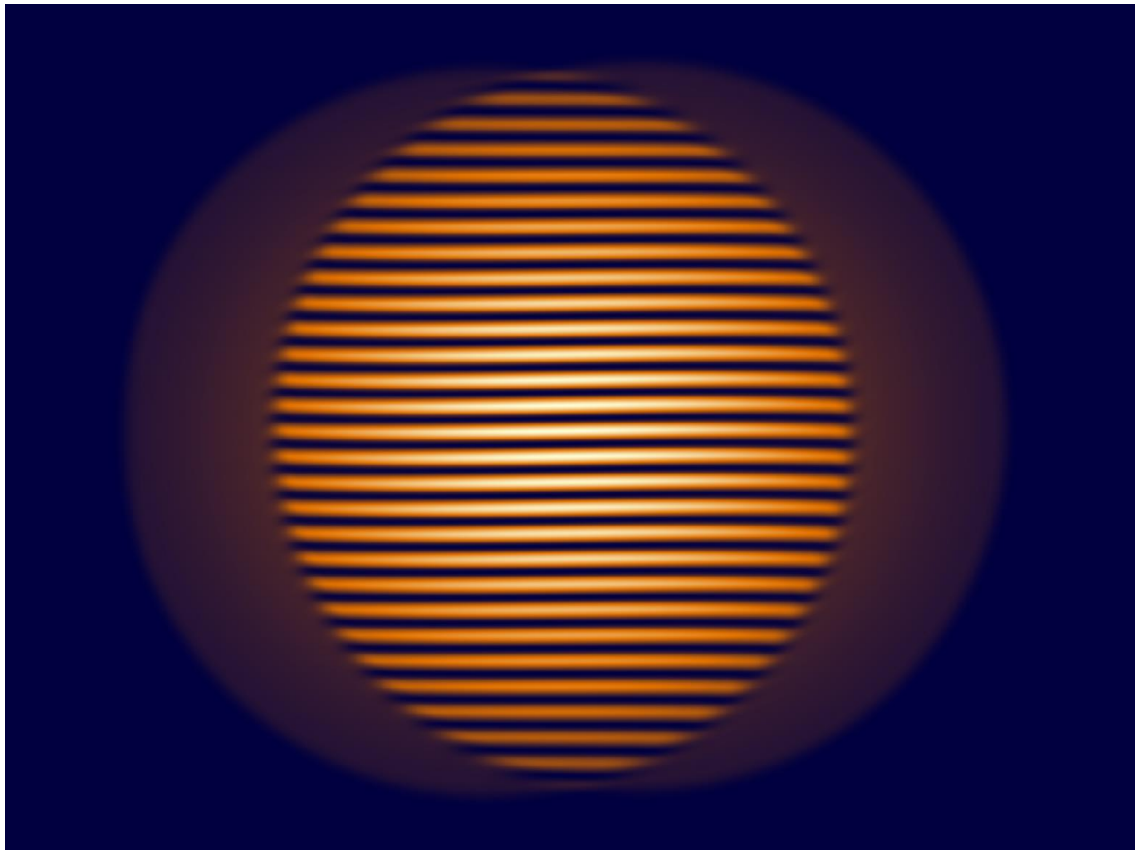
Collimation Testing with Shearing Interferometry

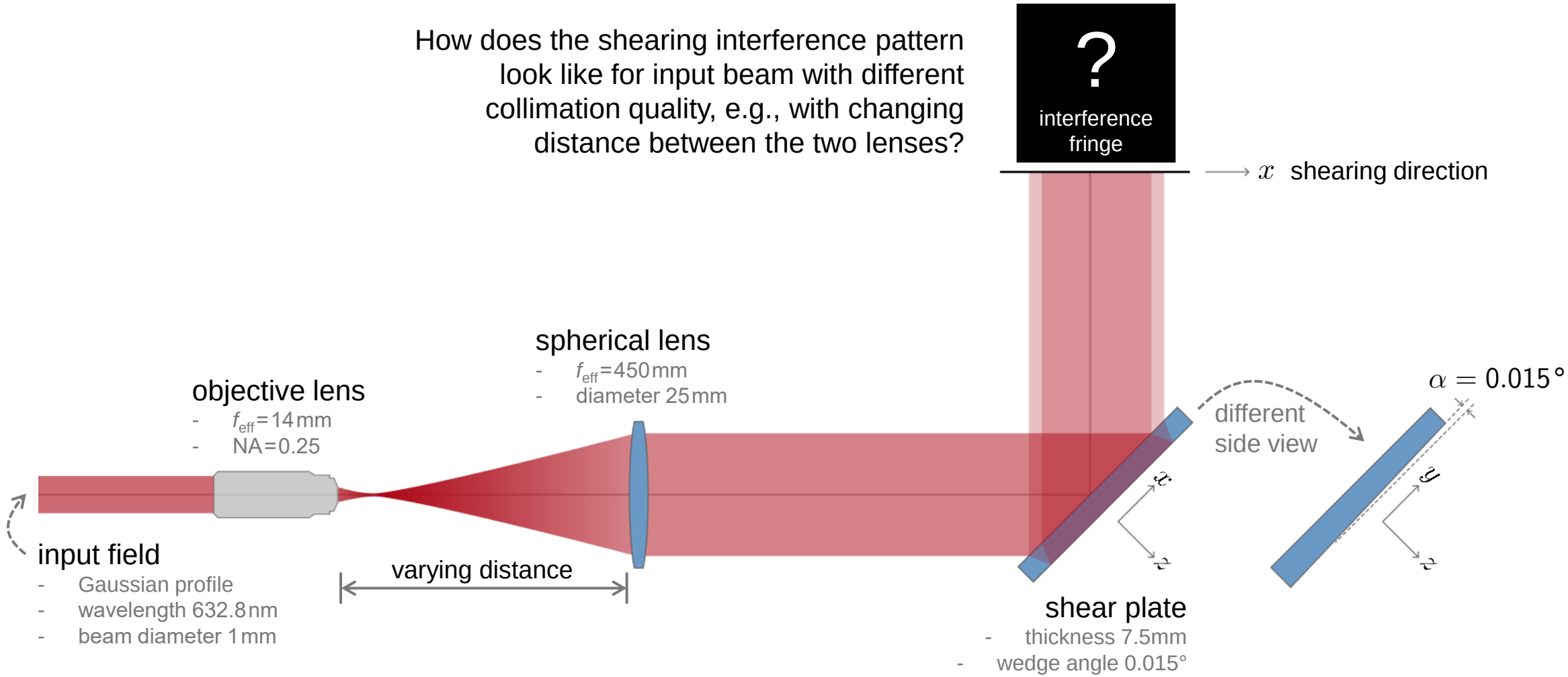
Abstract



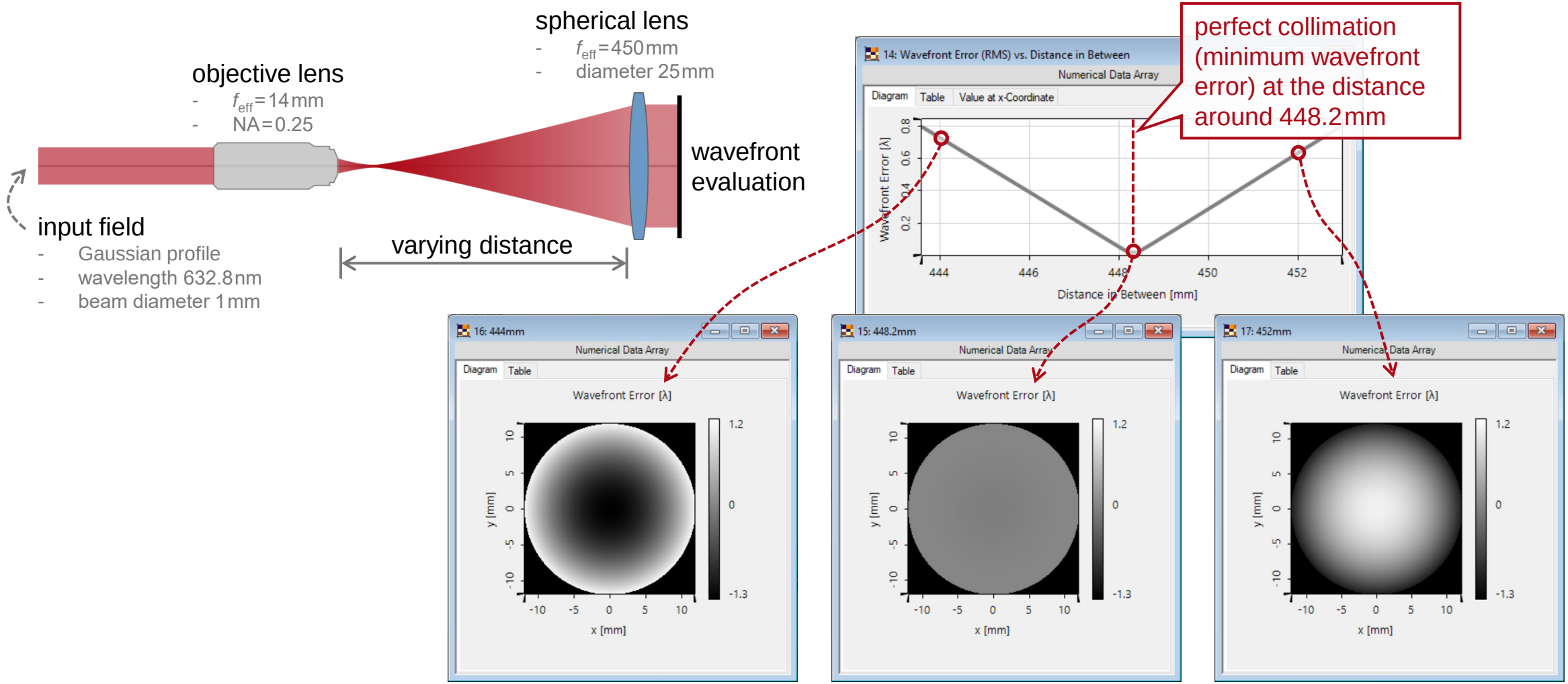
Collimation of laser beams is a fundamentally essential task for various optical applications. Testing of the collimation is therefore of significance as well, and shearing interferometry is often employed for such tasks. In this example, we demonstrate how to build up a shearing interferometer and to use it for testing the collimation. By varying the beam collimation system – in this example, the distance between the two lenses – we observe the interference fringes from the shearing interferometry.

Modeling Task

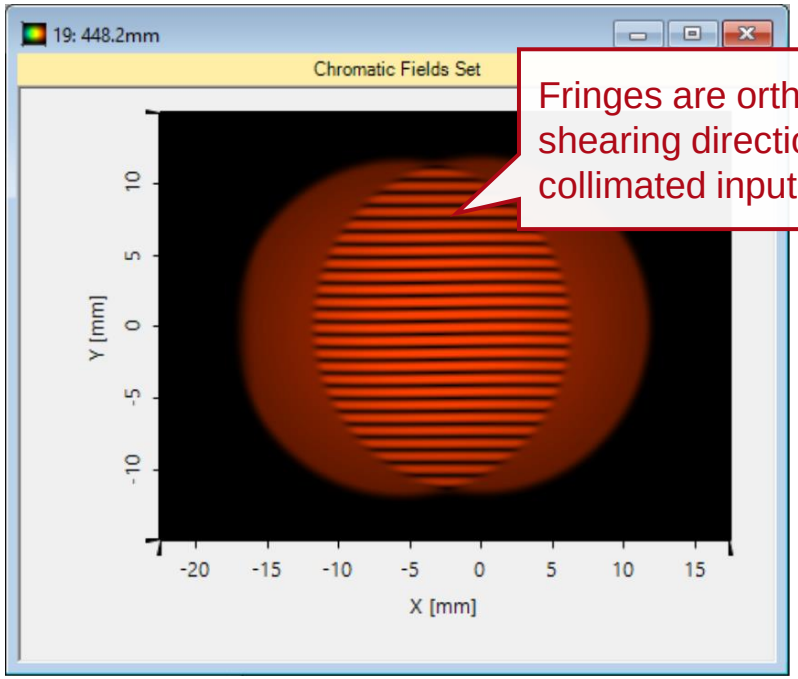
How does the shearing interference pattern look like for input beam with different collimation quality, e.g., with changing distance between the two lenses?



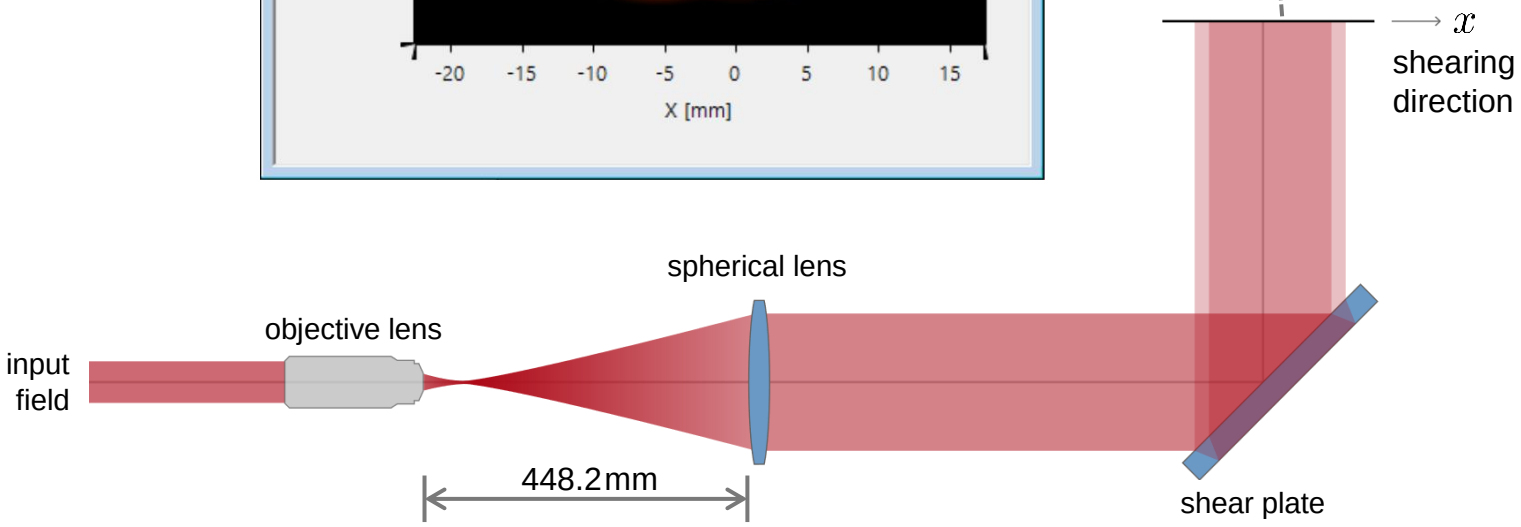
Wavefront Evaluation after Expansion and Collimation



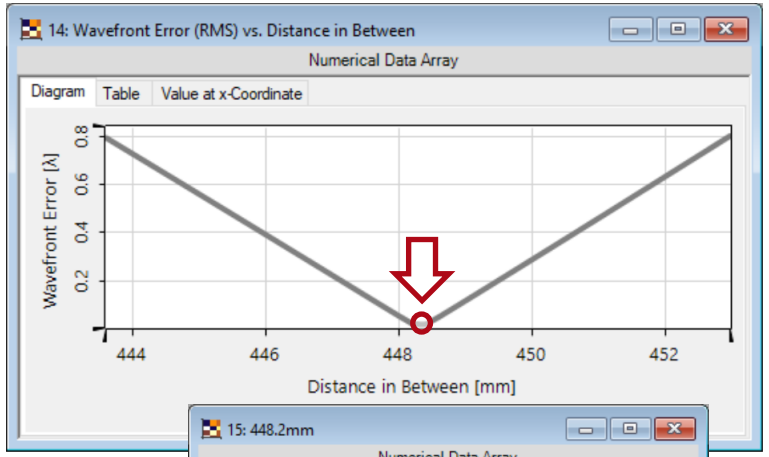
Shear Interference Fringe

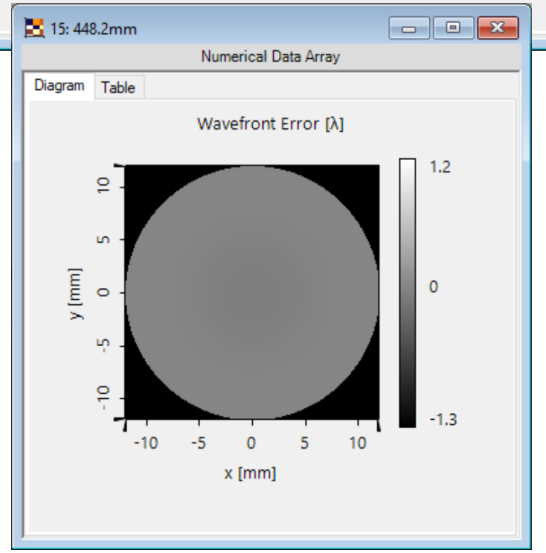


Fringes are orthogonal to the shearing direction for perfectly collimated input beam.

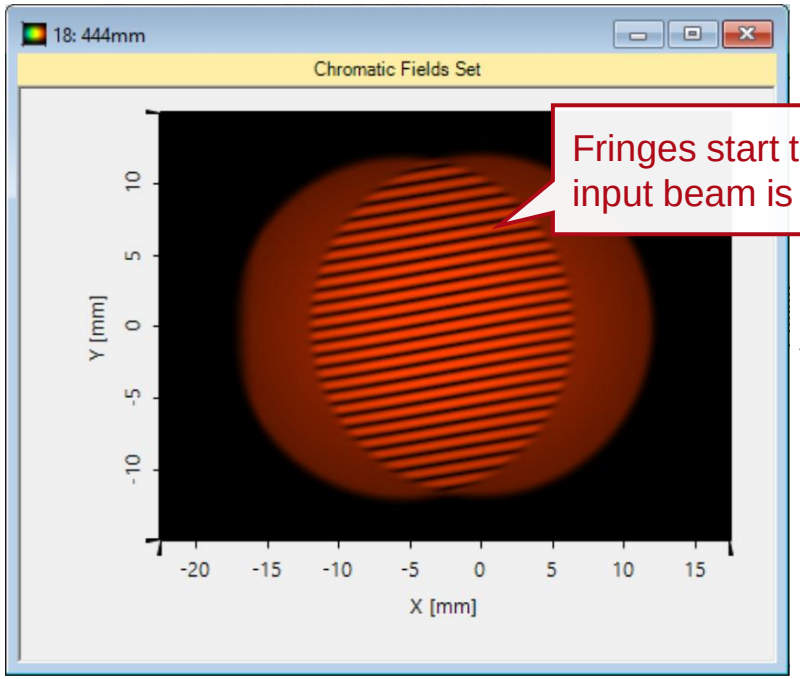


wavefront error behind spherical lens

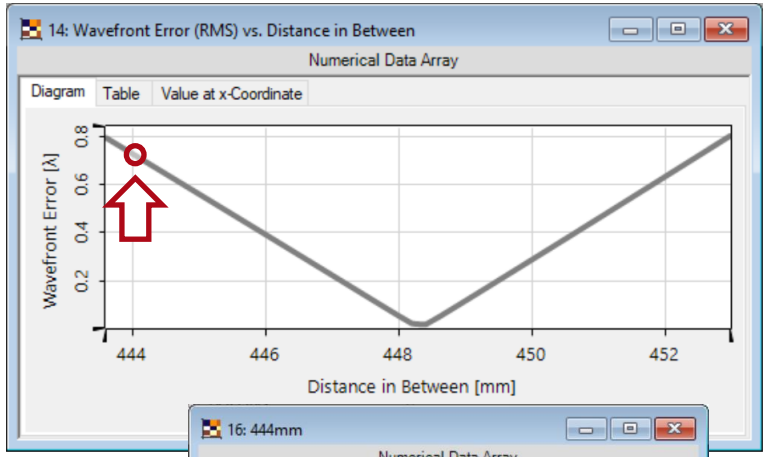


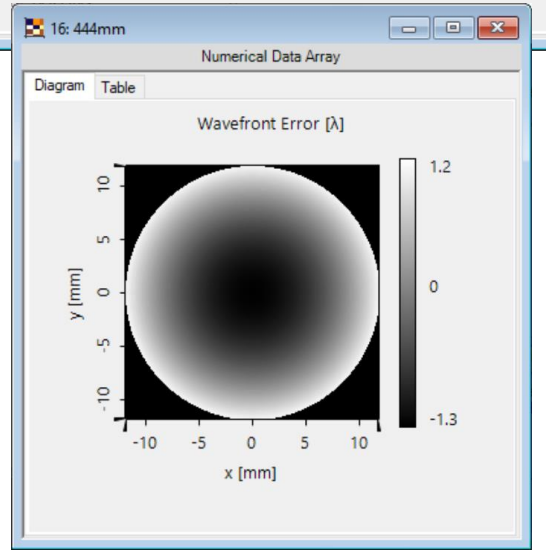


Shear Interference Fringe

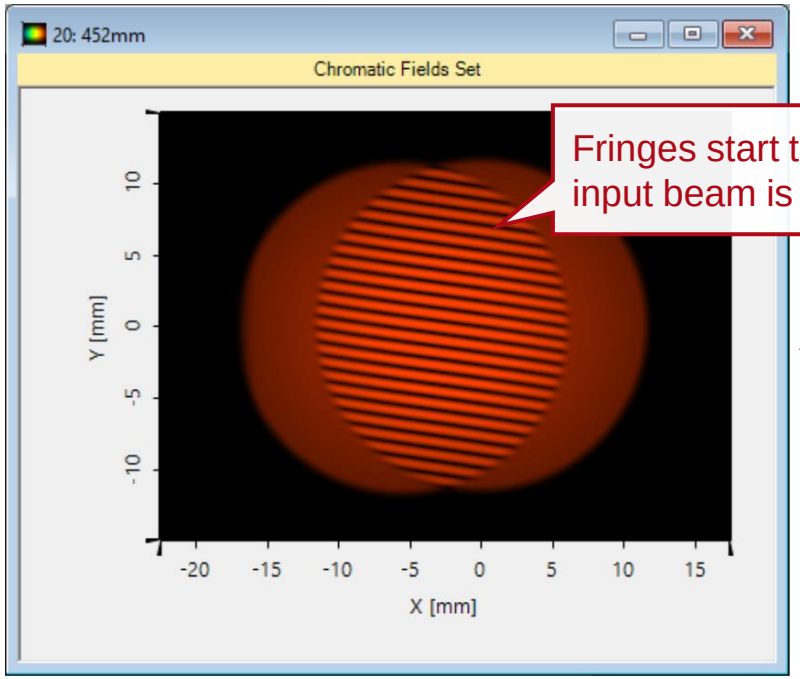


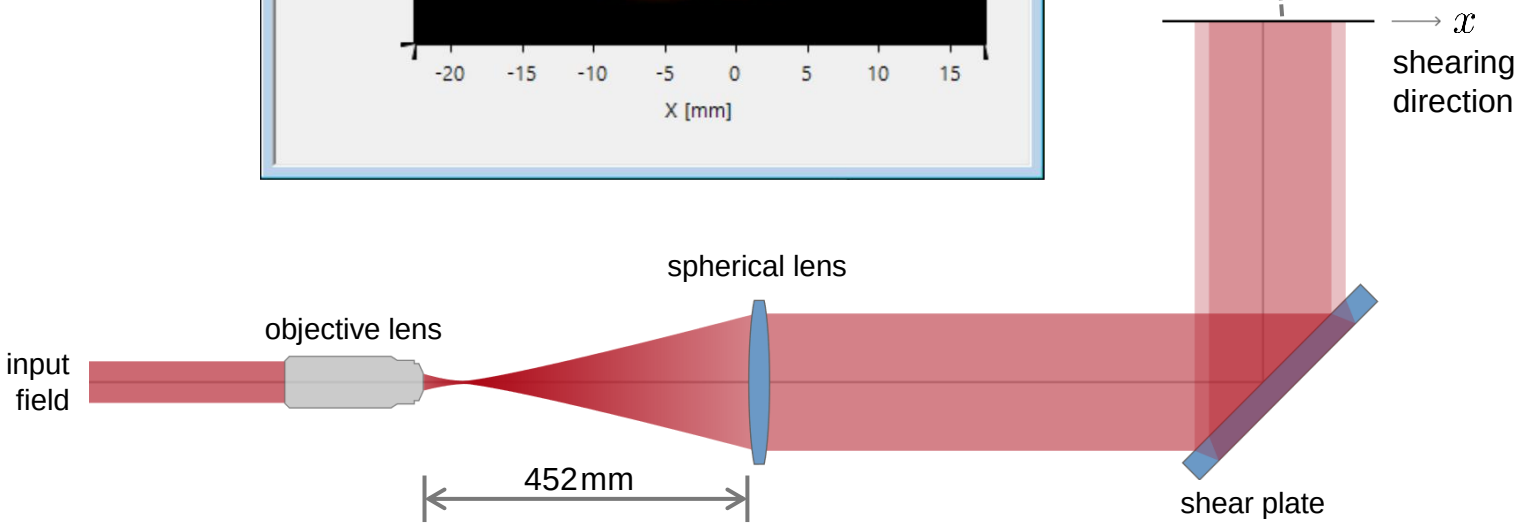
wavefront error behind spherical lens



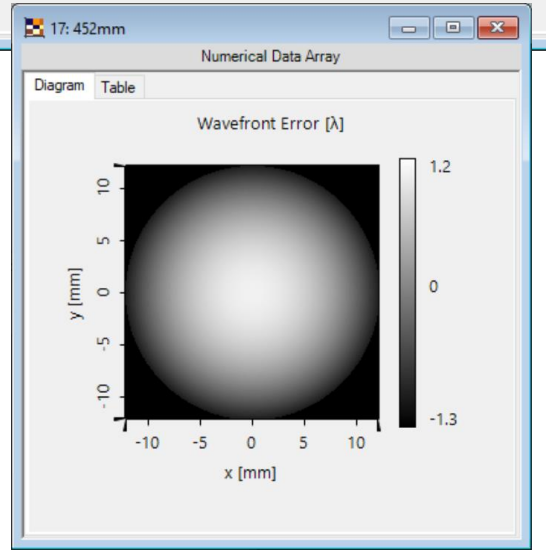


Shear Interference Fringe



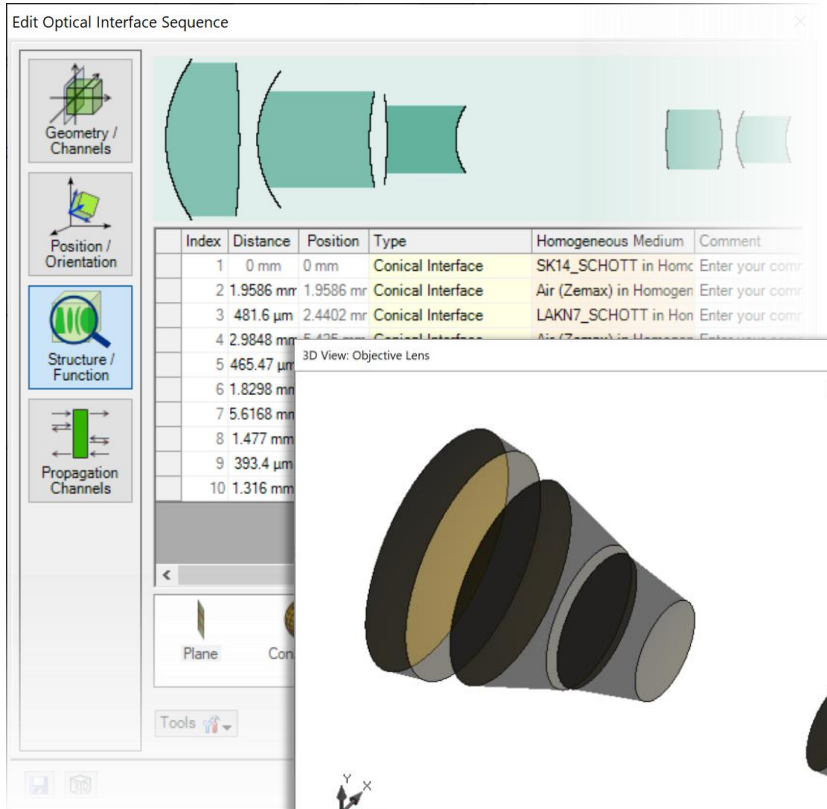


wavefront error behind spherical lens

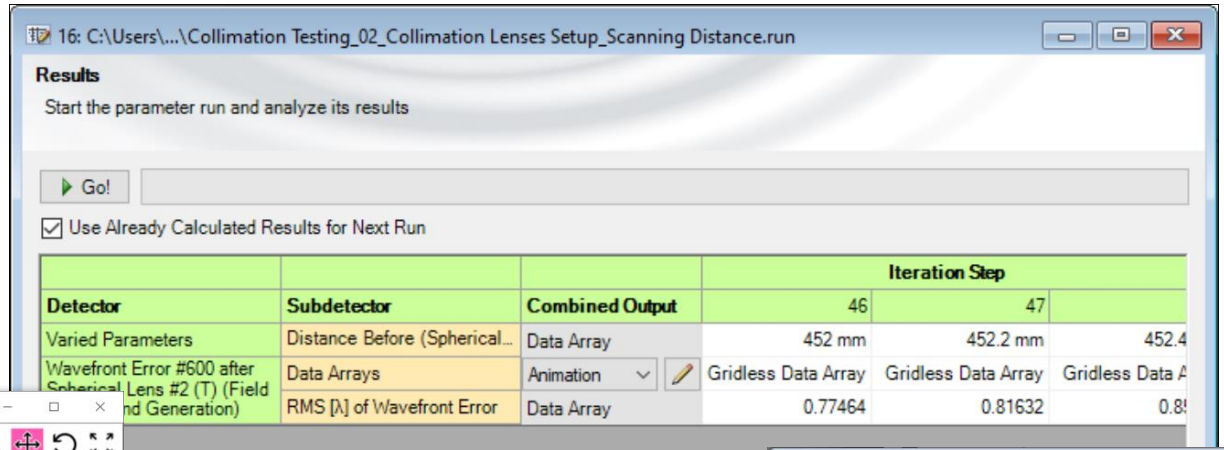


Peek into VirtualLab Fusion

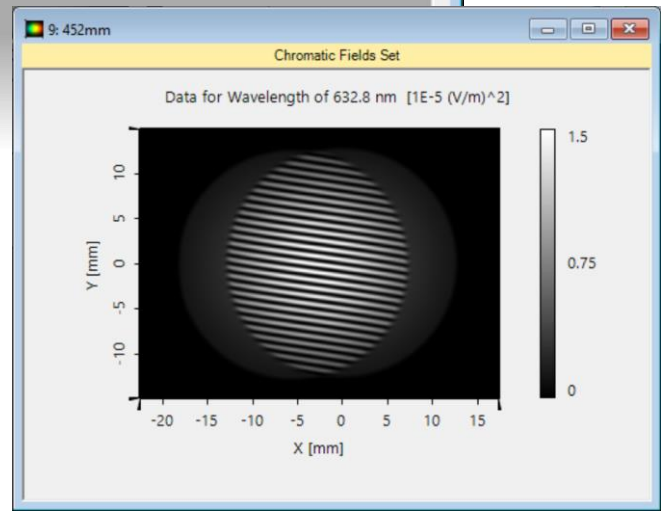
convenient definition of lens systems



display of lens systems in 3D



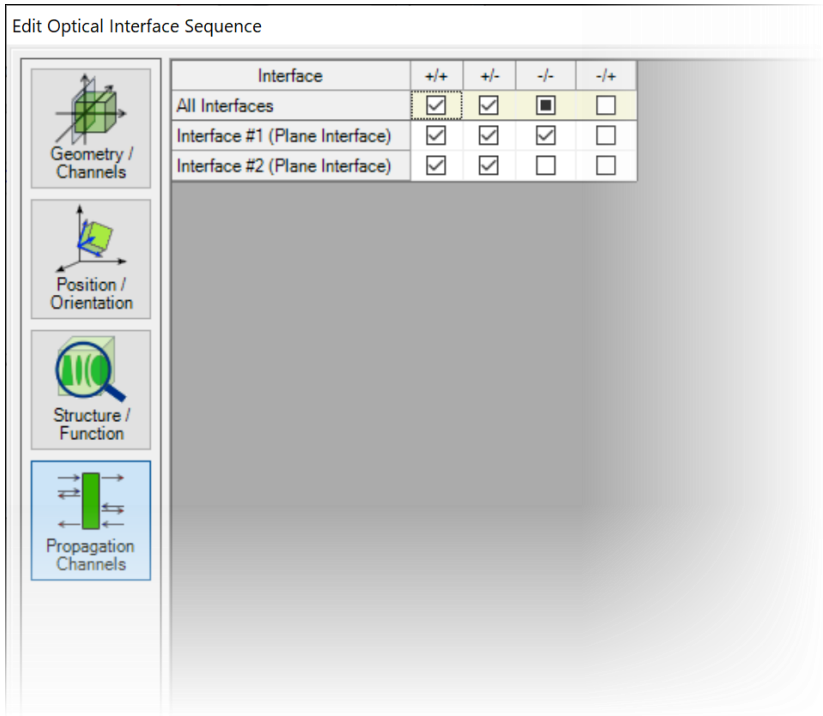
parameter sweep



calculation of interference fringes

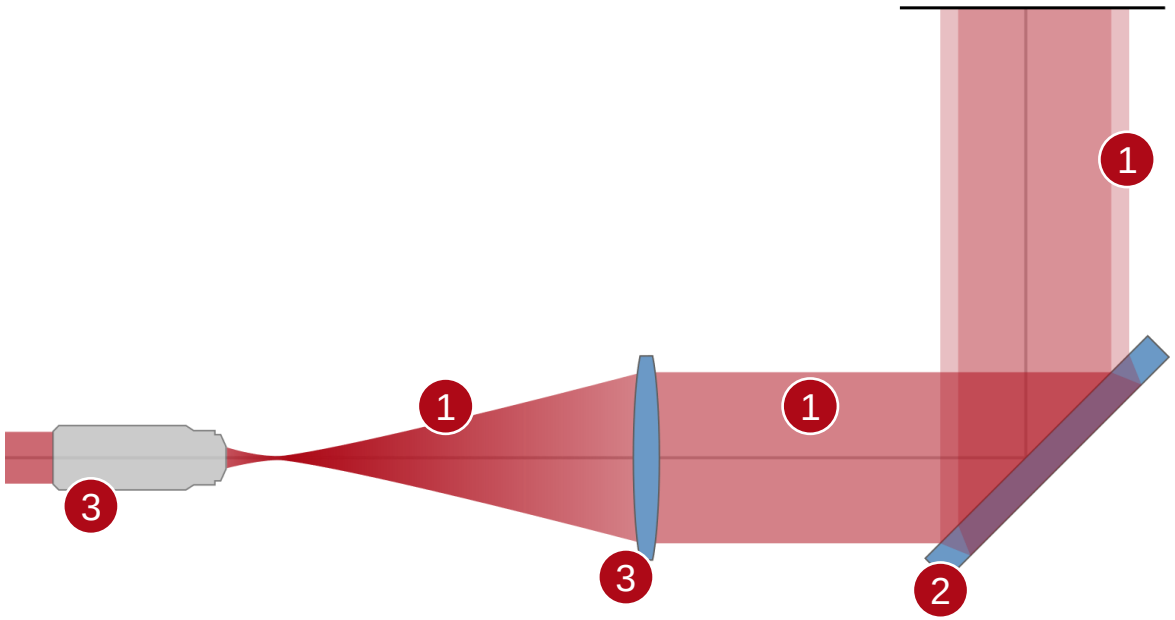
Workflow in VirtualLab Fusion

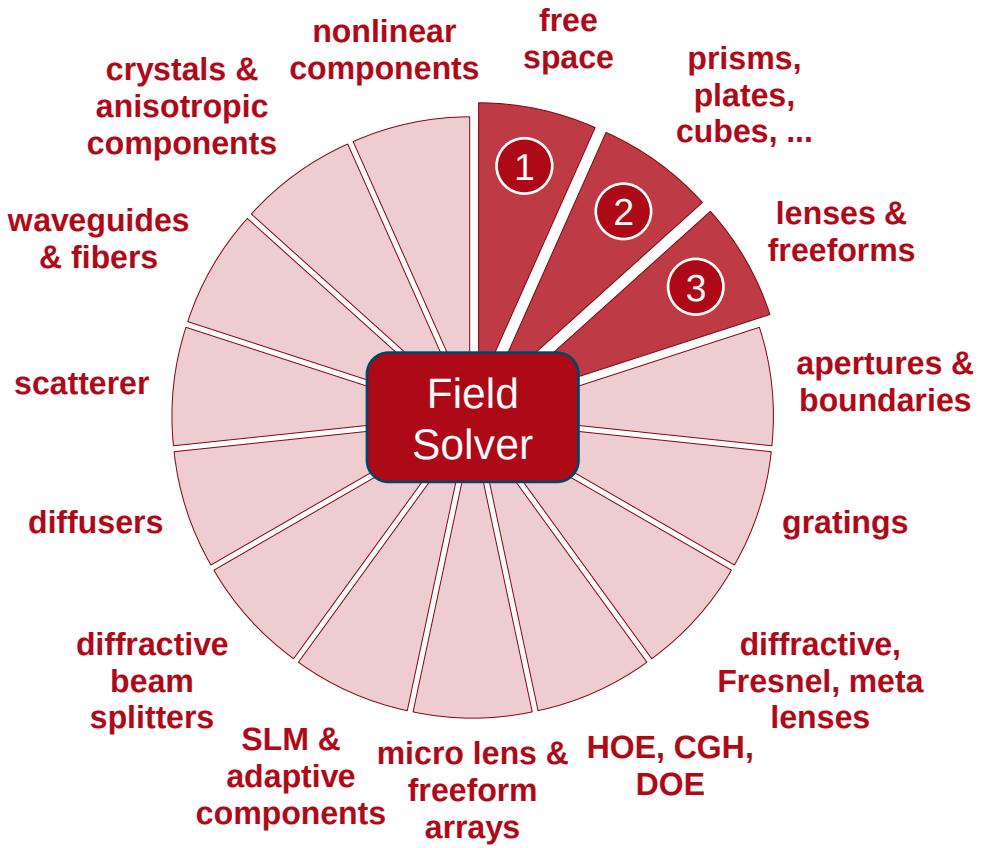
- Set up input Gaussian field
  - Basic Source Models [Tutorial Video]
- Import lens systems from Zemax OpticStudio®
  - Import Optical Systems from Zemax [Use Case]
- Set the position and orientation of components
  - LPD II: Position and Orientation [Tutorial Video]
- Set the non-sequential channels of components
  - Channel Configuration for Surfaces and Grating Regions [Use Case]



- Check influence from selected parameters with Parameter Run
  - Usage of the Parameter Run Document [Use Case]

VirtualLab Fusion Technologies





Document Information

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further reading	- Laser-Based Michelson Interferometer and Interference Fringe Exploration - Fizeau Interferometer for Optical Testing