Fizeau Interferometer for Optical Testing
Abstract

Fizeau interferometers are a common type of optical metrology devices in the industry, and they are often used to test the quality of optical surfaces with high precision. With the help of the channel configuration in VirtualLab Fusion, we build up a Fizeau interferometer, and use it for testing different optical surfaces e.g. cylindrical and spherical ones. It can be shown that the resulting interference fringes are sensitive to the surface profile.
Modeling Task

How does the interference fringe change for different test flats?

spherical wave
- wavelength 532nm
- half-opening angle 26.6°
Reflection from the test planar surface remain as plane waves, but only with slightly different direction, and therefore leading to parallel striped fringes.
Cylindrical Surface under Observation

Reflected wavefront from the test cylindrical surface gets curved in one direction, therefore leading to parallel striped fringes but with varying pitch.
Spherical Surface under Observation

Spherical surface changes the reflected wavefront in radial direction, thus the interference fringes appears as concentric rings.
Peek into VirtualLab Fusion

flexible channel settings

visualization and analysis of interference fringe

non-sequential ray tracing analysis
Workflow in VirtualLab Fusion

• Set up input field
  − Basic Source Models [Tutorial Video]

• Construct real components using surfaces

• Define position and orientation of components
  − LPD II: Position and Orientation [Tutorial Video]

• Set channels properly for non-sequential tracing
  − Channel Configuration for Surfaces and Grating Regions [Use Case]
VirtualLab Fusion Technologies

Free space, prisms, plates, cubes, ...

Lenses & freeforms, apertures & boundaries, gratings

Diffractive, Fresnel, meta lenses, HOE, CGH, DOE

Micro lens & freeform arrays, SLM & adaptive components

Diffractive beam splitters, scatterer, diffusers

Waveguides & fibers

Crystals & anisotropic components, nonlinear components
## Document Information

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| further reading | - Laser-Based Michelson Interferometer and Interference Fringe Exploration  
- Mach-Zehnder Interferometer |