

Laser World of Photonics

Physical-Optics Simulation of Optical Interferometry Systems

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Optical Design Software and Services



Physical-Optics System Modeling by Connecting Field Solvers



Physical-Optics System Modeling: Regional Field Solvers



Physical-Optics System Modeling by Connecting Field Solvers

Connection of solvers via I/O channel concept which enables non-sequential physical-optics system modeling

Setting A

1st ×

X

2nd

Setting A

Setting A

1st	×
2nd	×

2nd

Setting A

Surface	+/+	+/-	-/-	-/+
1st	×			
2nd	×			

Setting B

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 +/ -/ -/+

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Setting C

2nd

Х

Setting D

Setting E

Surface	+/+	+/-	-/-	-/+
1st	×	×	×	×
2nd	×	×	×	×

Parallel Planar-Planar Surfaces

Parallel Planar-Planar Surfaces

Constructive and destructive interference alternatively shows up when the thickness of etalon varies.

Tilted Planar-Planar Surfaces

Cylindrical-Planar Surfaces

Spherical-Planar Surfaces

Non-sequential field tracing simulation of etalons allows the consideration of arbitrary surface types. **Why Physical Optics?**

Why Physical Optics?

Why Physical Optics?

- Modern interferometers may use ...
 - ... advanced light sources
 - ... innovative optical components
 - ... different types of detectors
 - ... complex light paths

Field Tracing Enables Fast Physical Optics

Field Tracing comprises:

- Application of different electromagnetic field solvers in different regions of one system.
- Interconnection of any type of general and specialized field solver.
- Source mode concept to represent coherent, partially coherent, and incoherent sources.
- ... and many more techniques

Fizeau Interferometer for Optical Testing

Modeling Task

Tilted Planar Surface under Observation

Cylindrical Surface under Observation

Spherical Surface under Observation

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Coherence Measurement Using Michelson Interferometer and Fourier Transform Spectroscopy

Modeling Task

Lateral Interference Fringes – 50nm Bandwidth

Lateral Interference Fringes – 100nm Bandwidth

Pointwise Measurement

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Mach-Zehnder Interferometer

Modeling Task

Interference Fringe Due to Component Tilt

Calculation of interference pattern including element tilt takes less than 2 seconds!

Interference Fringe Due to Component Shift

Calculation of interference pattern including element shift takes less than 2 seconds!

Polarization Interference

Modeling Task

Interference Pattern Changes with Polarizer Rotation

Interference fringes start to disappear, when polarizer rotates from parallel to orthogonal orientation.

Interference Pattern Changes with Polarizer Rotation

Interference Pattern

Examination of Sodium D Lines with Etalon

Modeling Task

Visualization of Both Spectrum Lines

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Finesse vs. Coating Reflectance

Finesse vs. Coating Reflectance

the higher reflectance, the higher finesse

extracting 1D data along the diagonal direction

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