Wavefront Curvature Sensor

Features

- Wavefront diagnostics at CCD pixel resolution
- Self-referencing method
- No beam coherence required
- Compact design

Specifications

- CCD camera with USB3.0 interface
- Spatial resolution $< 10 \mu m$
- Various sensors covering spectral range from 1100nm (NIR) to 1nm (soft x-rays)
- Real-time wavefront analysis
- Supported by software MrBeam (ISO standards)

**Principle of operation**

Intensity profiles

$I_1(x, y)$ and $I_2(x, y)$

Transport of intensity equation

$-\partial_z I = \nabla I \cdot \nabla w + I \Delta w$

Wavefront $w(x, y)$

**Transport of intensity equation**

$\frac{\partial}{\partial z} I = \nabla I \cdot \nabla w + I \Delta w$

Intensity profiles $I_1(x, y)$ and $I_2(x, y)$

$\frac{\partial}{\partial z} I_1(x, y) = \nabla I_1(x, y) \cdot \nabla w(x, y) + I_1(x, y) \Delta w(x, y)$

$\frac{\partial}{\partial z} I_2(x, y) = \nabla I_2(x, y) \cdot \nabla w(x, y) + I_2(x, y) \Delta w(x, y)$
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Principle of operation
By recording two beam profiles at neighbouring z-positions simultaneously, it is possible to reconstruct the wavefront from the solution of the transport of intensity equation. In contrast to the Hartmann-Shack wavefront sensor, the technique does not require a micro-lens array or pin-hole plate in front of the monitoring camera. Thus, a much higher spatial resolution comparable to interferometers is achieved. In addition, the sensor does not require an external reference wavefront. From wavefront and beam profiles the beam propagation parameters are computed according to ISO standards.

Applications
- Comprehensive beam characterization, in particular at small beam diameters
- Surface topography
- Optics testing
- Absorption control
  ↔ thermal lens effect

→ Beam Characterization
→ Optics Test (NIR - EUV)
→ Surface Topography