ADAPTIVE OPTICS LABORATORY

MOSCOW STATE UNIVERSITY
FACULTY OF PHYSICS
LABORATORY OF ADAPTIVE OPTICS

ShaH

The family of fast, accurate, and reliable wavefront sensors

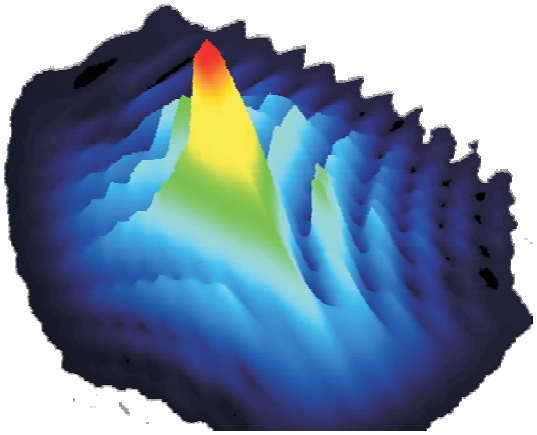
Applications:

- **Optical shop testing**
  Convenient inspection of optical components of various sizes. The high measurement rate and wide dynamic range are suitable for high-volume production.
- **Optical system characterization**
  Precise measurement and reporting of MTF and PSF, RMS and PV wavefront distortions, Focal length, Strehl ratio.
- **Precision optics manufacturing**
  Real time wavefront measurement and visualization, aberration evaluation and display allow fast and easy alignment of high-precision optical systems.
- **Beam analysis in phase and intensity***
  For single-mode lasers, laser diodes, superluminescent diodes, etc., *ShaH* allows to measure the divergence, position and size of the waist, M^2 parameter, Strehl ratio, absolute and relative (to Gaussian beam) wavefront distortion.
- **Active and adaptive optics**
  Wavefront correction in real time with λ/20 PV error. Interfaces to a variety of wavefront correctors.

*Optional

Features:

- The key feature of the *ShaH* wavefront sensors is high-quality lenslet arrays optimized for **reducing the subapereture crosstalk**.
- An interface to a variety of CCD and CMOS sensors allows a wide range of acquisition bands, **from UV to near IR**.
- The sampling and processing rate can reach **1000Hz**.
- User friendly MS Windows™ software with multiprocessor support guarantees **scalability and low maintenance cost**.
- A variety of optical accessories, including refractive and reflective telescopes with **up to 150mm apertures**, micro-optic attachments, etc., makes the *ShaH* wavefront sensors suitable for a broad range of applications.



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STANDARD SPECIFICATION

	ShaH-0620	ShaH-0375
Aperture dimension (diameter) [mm]	6	3
Number of subaperures for analysis	1000	300
Maximum tilt normal/extended mode [rad]	±0.05/0.15	±0.05/0.25
Minimum measured curvature [m]	±0.06	±0.03
Repeatability RMS	λ/100	λ/100
Absolute measurement accuracy RMS	λ/25	λ/25
Relative measurement accuracy RMS(**)	λ/100	λ/100
Relative measurement accuracy P-V*	λ/20	λ/20
Tilt measurement sensitivity [rad]	3E-6	5E-6
Curvature measurement sensitivity [m]	500	140
Spatial resolution [mm]	0.15	0.15
Acquisition frequency [Hz]	20	75
Processing frequency [Hz]	20	75
Working wavelength [nm]	400-1000	400-1000
Calibrated waveband [nm]	100nm	100nm
Working temperature [^{0}C]	+10 to +40	+10 to +40
Weight (Kg)	0.3	0.3
Dimensions (LxHxW) (mm)	155x55x55	155x55x55
(**) At maximum angular source size 0.04 rad. (*) Within 90% of input aperture		

SOFTWARE

➢**Wavefront acquisition**

Continuous or ext. trigger mode; absolute (factory calibration) or referenced (user calibration) mode; background signal: save and subtract in real time. The time history is only limited by the free memory (approx. 50KB per frame). The stored data are available for retrospective display, processing, and analysis.

Real-time functions and displays:

➢**Wavefront reconstruction**

Wavefront display (units: microns or waves): 3D plot; 2D projection; synthesized interferogram; Zernike polynomial coefficients (up to 9th order); time history of 4 Zernike coefficients or orders; RMS and PV phase error.

➢**Point Spread Function measurement**

PSF display: 3D plot; 2D projection. Parameters: Strehl ratio; best focus plane; focal plane of ideal lens.

➢**Laser beam characterization***

Beam location, dimension and position of the waist (Gaussian approximation), display of the beam shape.

➢**Retrospective functions and displays:**

All the functions available in real time, plus:

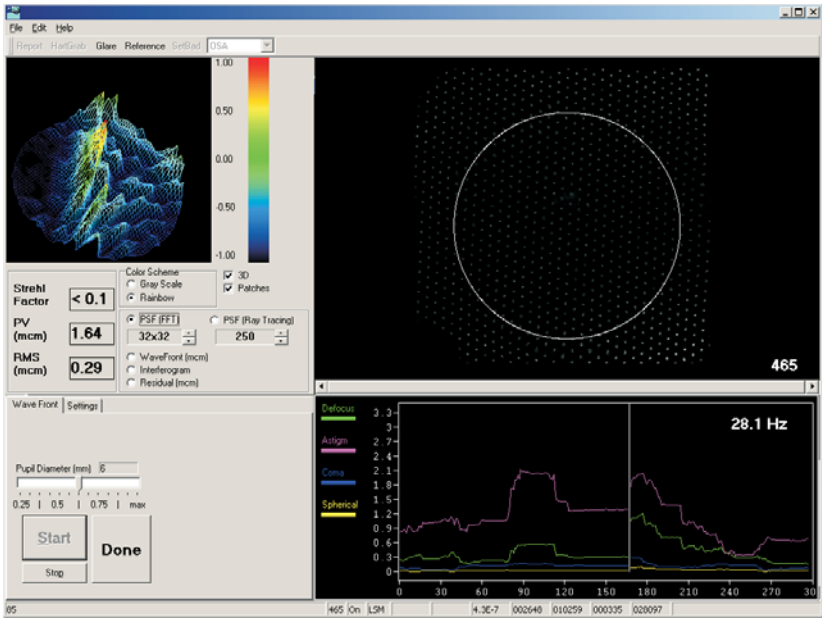
Wavefront display: 3D plot, 2D projection, and XY profile without tilt and/or focus and/or 3rd order aberrations; spot displacement map; residual zonal error of modal approximation.

Pupil calculation: automatic or manual.

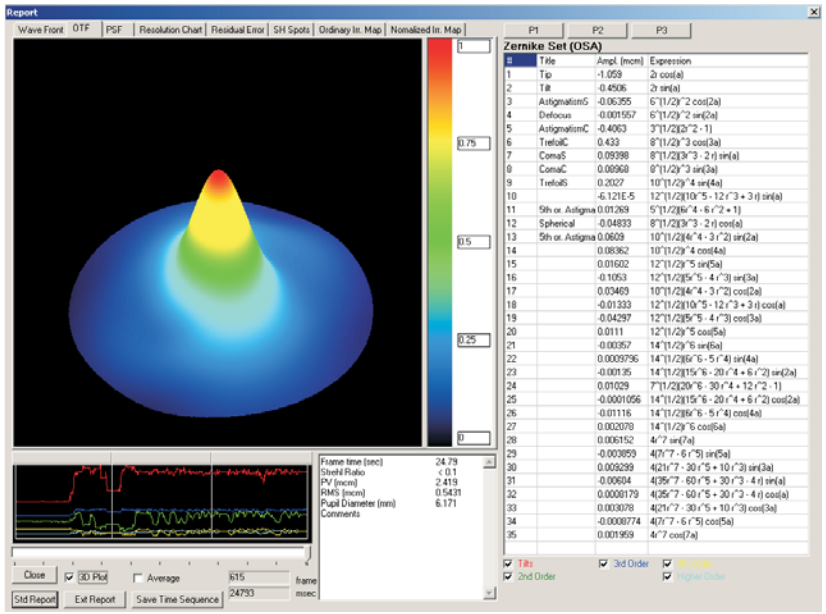
MTF display: 2D or 3D plot; XY profile; best focus plane; user specified plane; focal plane of ideal lens.

Intensity display: 3D plot; 2D projection; XY profile; M² factor; intensity profile at given distance.

*Optional



Sample screenshots



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