

Wave Suite

WAVEVIEW
WAVEFRONT ANALYSIS

WAVETUNE
ADAPTIVE OPTICS CONTROL

WAVEKIT
SOFTWARE DEVELOPMENT KIT



The most advanced metrology and adaptive optics control software package in the market backed by 20 years of wavefront sensing and control experience.

A UNIQUE SET OF ADVANTAGES

- Complete software package for high-end applications
- Continuous improvement driven by customers' feedback
- User friendly and intuitive GUI
- Easy installation

Contact us for more details: contact@imagine-optic.com or +33 (0) 1 64 86 15 60

Specifically designed for HASO™ wavefront sensors, WaveView can be used by both beginners and experts. Behind the ergonomic interface, powerful functionality (more than 150 features) unique to the HASO™ series awaits for you.

Using only one program, you can measure phase and intensity simultaneously and independently. Each user can customize the WaveView screen layout and import or export data in several formats.



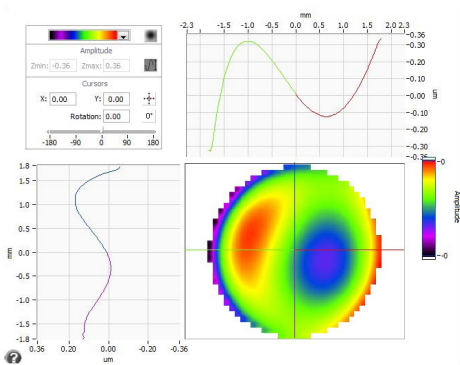
WITH WAVEVIEW, YOU CAN

- PERFORM ZONAL AND MODAL WAVEFRONT RECONSTRUCTION
- VIEW THE RAW CAMERA DATA
- DISPLAY WAVEFRONT AND INTENSITY MAPS
- MODIFY VARIOUS ALGORITHM SETTINGS
- ACTIVATE OPTIONS TO SIMULATE WAVE PROPAGATION AS THE POINT SPREAD FUNCTION (PSF), STREHL RATIO, MODULATION TRANSFER FUNCTION (MTF) AND ADVANCED LASER PARAMETER M²

WAVEFRONT ANALYSIS

Wavefront reconstruction

Wavefront reconstruction by either Zonal or modal methods from computed local slopes*



Modal coefficients

Displaying coefficients that result from the projection of slopes* on the bases of Zernike or Legendre polynomials

N°	Equation	Name	Value (µm)
1	$p \cos(\theta)$	Tilt at 0°	-43.0665
2	$p \sin(\theta)$	Tilt at 90°	6.2828
3	$2p^2 - 1$	Focus	13.5711
4	$p^2 \cos(2\theta)$	Astigmatism at 0°	-0.5241
5	$p^2 \sin(2\theta)$	Astigmatism at 45°	-1.5963
6	$(3p^2 - 2)p \cos(\theta)$	Coma at 0°	-0.1700
7	$(3p^2 - 2)p \sin(\theta)$	Coma at 90°	-0.2504
8	$6p^4 - 6p^2 + 1$	3th order spherical aberration	-0.0879

Throughout Shack-Hartmann formalism, local slope* is defined as the tangent of the angle between the wavefront and a theoretical perfect plane located on the principal object plane of the microlens matrix

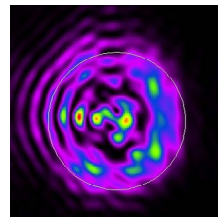
SOFTWARE OPTIONS

PSF

Encircled energy calculation

Strehl ratio

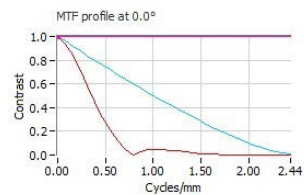
Comparing the actual maximum intensity at the focal plane to a perfect theoretical distribution of intensity without aberrations



MTF

Representing MTF as a curve, using contrast to indicate the spatial frequency in a given direction

Calculating for all directions at the same time



M²

Calculating the propagation of the electromagnetic field at different planes

Reconstructing the envelope of propagation

Providing information on the waist and divergence of the beam or in a given direction

WaveTune is an easy-to-use adaptive optics control software with an intuitive user-oriented interface. It is perfectly adapted to HASO™ sensors as well as a wide variety of active optics including ILAO Star™, Mirao™ and Spatial Light Modulator (SLM).

WaveTune controls active optics and HASO™ wavefront sensor in a feedback loop. It computes commands to be sent to the deformable element according to the measurement supplied by the wavefront analyzer. WaveTune is optimized for high-power laser applications.



WITH WAVETUNE, YOU CAN

- CONTROL HASO™ AND ACTIVE COMPONENTS BASED ON MEASUREMENTS
- MEASURE AND ANALYZE INFLUENCE MATRIX
- CORRECT THE WAVEFRONT IN OPEN-LOOP OR CLOSED-LOOP PROCESS
- INTEGRATE SECURITY CHECK FUNCTIONS WITH DIFFERENT CONFIGURATION OF SETTINGS
- MODIFY THE TARGET WAVEFRONT IN REAL-TIME USING ZERNIKE POLYNOMIALS
- CREATE SESSIONS TO CONTROL DIFFERENT OPTICAL SET-UPS WITH A SINGLE SOFTWARE
- CONNECT WITH WAVEVIEW TO EMPLOY ITS ADVANCED WAVEFRONT ANALYSIS FEATURES

WAVEFRONT CORRECTION

The screenshot shows the WaveTune software interface. At the top, it displays session information: "Session: demo21122015", "Wavelength (nm): 655", and "AO calibration: OK 1/27/2016 4:07 PM". The main control panel includes sections for "AD", "AD calib", and "PHARAO calib". Under "AD", there are controls for "Correction mode" (set to Custom), "Additional aberrations" (set to None), and "Closed loop" (set to on). There are also buttons for "BEAM SHAPER" and "3D POINTING". Below this, the "Continuous loop" section shows "Amplitude (%)" at 12 and "Frequency (Hz)" at 5.0. A 2D wavefront map is displayed. A zoomed-in view of the focal plane shows a blurred spot "BEFORE CORRECTION AT THE FOCAL PLANE" and a sharp spot "AFTER CORRECTION AT THE FOCAL PLANE". The RMS value is shown as 0.030. At the bottom, there are controls for "Saturation (%)" at 100.0 and "Frequency (Hz)" at 11.8.

SOFTWARE OPTION

Pharao, a "Phase Retrieval" software

Diagnosis camera for correcting residual aberrations at the end of the laser chain

Focal spot optimization module for WaveTune software

PHARAO DIAGNOSIS

The screenshot shows the Pharao diagnosis software interface. It is divided into two columns: "PRE-PROCESSED IMAGES" and "RECONSTRUCTED IMAGES". Each column contains three images. The first row shows "On focus" images, which are sharp spots. The second row shows "Defocus +" images, which are blurred spots. The third row shows "Defocus -" images, which are also blurred spots. The reconstructed images in the second column are significantly sharper than the pre-processed images in the first column.

WaveKit

ADD INDIVIDUALITY TO YOUR APPLICATION

Imagine Optic's Software Development Kit (SDK) provides the building blocks with which one can write fully customized software for specific applications using HASO™ and wavefront correction active optics including ILAO Star™ and Mirao™.

The WaveKit tool is a set of APIs that enables integration of Imagine Optic solutions into external end-user applications. This SDK is addressed to different programming users such as engineers, scientists and researchers.



WITH WAVEKIT, YOU CAN

- INTEGRATE IMAGINE OPTIC SYSTEMS INTO YOUR OWN APPLICATION USING EITHER THE C, THE MATLAB OR THE LABVIEW API
- FULLY CUSTOMIZE YOUR ADAPTIVE OPTICS SET-UPS IN OPEN OR CLOSED-LOOP
- EXPERIENCE MORE THAN SEVERAL HUNDREDS FUNCTIONS AND TENS OF EXAMPLES

3 WAVEKIT EDITIONS ARE AVAILABLE

