

PhaseCam ESPI

4D Technology extends the flexibility of dynamic interferometry by introducing a new *Electronic Speckle Pattern Interferometry* (ESPI) system. Ideally suited for the measurement of diffuse objects, this turn-key instrument includes an optical mainframe, a fast Pentium IV computer system and revolutionary 4Sight™ phase analysis software.

Incorporating 4D Technology's instantaneous phase measurement imaging, the PhaseCam ESPI simultaneously acquires four phase shifted interferograms. This unique, patented single camera pixelated sensor developed by 4D Technology eliminates the alignment, calibration, and pixel registration problems of multiple camera implementations, enables high spatial sampling with 1K x 1K or 2K x 2K data arrays, and the implementation in a compact and sturdy mechanical configuration.

30 millionths of a second

phase acquisition is possible with this camera exposure limited technique! Enabling the PhaseCam ESPI to operate as much as 10,000 times faster than a conventional temporal phase shifting interferometers.

A baseline measurement is made of the object and subsequent measurements are compared with the baseline to determine deformation. Measurements can be made synchronously or asynchronously with respect to object motion. For measurement of vibrational deformation, synchronous capture can examine changes over a wide frequency and phase spectrum.

Vibration insensitive, rapid data acquisition permits accurate Optical testing and quality control during manufacture on the production floor -without the need for costly vibration isolation hardware. Sensitivity to air turbulence is reduced further Improving accuracy and repeatability of data.

4Sight™ software's intuitive interface sets a new bench mark for simplicity, ease of use and graphical display for measurement set-up and data analysis. Measure and analyze, mask data, subtract reference on-the fly! Perform Zernike and Seidel, geometric and diffraction analyses; save, print and export data or cut and paste results with unrivaled flexibility.

User selectable mono-static or bi-static illumination – detection optical configurations permit greater flexibility In measuring diffuse and specular samples with PhaseCam ESPI! Conventional optics and zoom lenses can be used as receiving optics when the high energy illumination beam is transmitted via a separate path. User adjustable fringe contrast enables the operator to optimize signal-to-noise and ensure the minimum data acquisition time independent of surface reflectance.



Specifications

Description: Turn-key vibration insensitive *Electronic Speckle Pattern Interferometry* (ESPI) system

Function	Strain measurement of diffuse objects
Optical Configuration	Selectable Mono-static or Bi-Static illumination 6x Zoom detection imaging
Acquisition Mode	Simultaneous Phase Shift of speckle interferograms
Laser	Pulsed solid state laser @ 532nm, water cooled 275mJ/pulse (min), 10nsec pulse length, >1Hz rep rate
Polarization	Linear, horizontal
Pupil focus range	TBD
Detector	Single camera, pixelated sensor, 1K x 1K pixel data array (2K x 2K optional sensor upgrade)
Acquisition rate	30 μ sec minimum exposure time, >25 frames/sec display; 4 interferograms/frame >25 frames/sec max data acquisition with post processing
Cables	Power supply, camera and power cables
Computer system	Pentium IV - Minimum configuration: 3 GHz, 1 GByte RAM, 80 GByte Hard Drive, CDRW, 18.1" LCD Monitor, mouse, keyboard
Operating System	Windows XP
Software	4Sight™, Version 1.0 or later Instantaneous Phase Shifting data acquisition, Burst acquisition On the fly data processing with terms / reference removal Reference generation, subtraction, data averaging, masking Fiducial aided data set mapping, 2D and 3D surface maps Zernike, Seidel, slope, PSF, MTF
User Manual, Upgrades	Free upgrades during warranty period
Physical Envelope	< 45 x 30 x 12 inches
Weight	< TBD Kg
Temperature range	Operational: 60-80 deg F, non-condensing
Storage	30-100 deg F, non-condensing

On-site System Installation and Operator training included

Configuration Options

4 MegaPixel camera	2048 x 2048 pixels / 2000 x 2000 data array
Laser power/wavelength Options	20mW@ 638 or 657nm, 800mW @ 532nm, 2W CW @ 532nm
Special Analysis	Temporal Phase unwrapping

System Performance

Rms repeatability*	<0.001 wave (Specular sample, reflectivity 1 to 100%) < 5 nm (Differential diffuse sample measurements)
--------------------	--

*One sigma for rms of 10 data sets of calibration mirror, each data set being an average of 16 measurements.

3280 E Hemisphere Loop, Suite 112
Tucson AZ 85706-5024
Tel (520) 294 5600
www.4DTechnology.com
Info@4DTechnology.com

US Patents 6,304,330 and 6,552,808
OTHER PATENTS PENDING