

Interferometric Capture & Analysis Using IntelliWave™: Course Overview

Who should attend: Engineers who need to learn how to set up and configure entire interferometric test stations, or who need a thorough understanding of interferometric fringe data reduction.

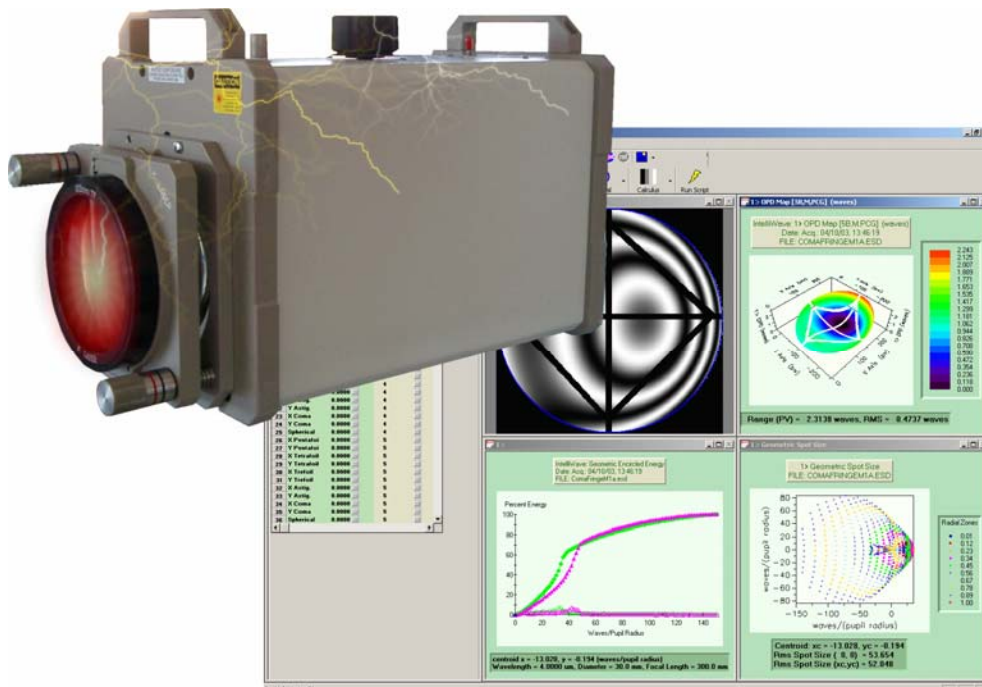
Attendees will learn how to use the IntelliWave™ interferometric analysis software, including attaching and configuring cameras, frame grabbers and phase shifters; using static and phase-shifted interferometers; and performing complex data reduction. Particular emphasis will be placed on analyzing imperfect fringes, e.g. those made in the presence of noise, stray light, poor fringe contrast, etc.

Attendees will also learn how to write macros and otherwise configure IntelliWave™ to produce custom applications for pass/fail shop floor testing, collecting SPC data, and transferring data to other applications.

The course includes demonstrations and workshop sessions using IntelliWave™ to capture images from Fizeau interferometers.

This is the perfect course for those who need to set up an interferometric test station, or who need to add software control and analysis to an existing interferometer.

You do not need any prior knowledge of interferometry or IntelliWave™ to benefit from this class.



Interferometry Course Content

Interferometric Techniques

- Static & phase-shifted interferometry
- Temporal and Spatial Phase Measurement interferometry
- Fizeau Interferometers
- Twyman-Green interferometers
- The Michelson interferometer
- Simultaneous Phase Shifting
- Holographic Speckle Interferometry
- Beam-Shearing Interferometers
- Infrared Interferometers
- Scanning White Light Interferometers
- Shearing Interferometers

Interfacing to an Interferometer

- Camera choice
- Frame grabbers and interface standards
- Phase-shifters
- Interfacing to phase shifters
- Interfacing to other sensors (e.g. temperature, movement) via LabVIEW or the serial port

Interferometric Data Acquisition

- Phase-shifter calibration
- Video & test optic alignment
- Choosing the correct number of interferograms to acquire
- Data acquisition
- Assessing the quality of interferograms

IntelliWave Overview

- Program Structure & menus
- Image and graphic views
- Spreadsheets and reports
- Interferometric hardware independence
- Application independence

Phase Unwrapping and OPD Generation

- Choosing an unwrapping method
- Phase unwrapping
- Multi-region unwrapping
- Spatial Carrier method

Wavefront Analysis

- Statistical analysis techniques
- Aberration analysis
- Zernike and other polynomial sets
- Geometric analysis (spot size, encircled energy etc)
- Diffraction Analysis (PSF, MTF, encircled energy)

Angle Measurements

- Wedge measurements
- Corner cube angle measurements

Common Applications

- Three Flat Test
- Radius of curvature measurement
- Homogeneity measurements

Masking Operations

- Setting apertures and obscurations
- Creating a library of mask types

Image Processing

- Filtering techniques for noise reduction
- Unwanted regions
- Data averaging
- Fiducial alignment

Quality Control

- Setting minimum and maximum values for statistics and aberrations
- Automatic Pass/Fail display
- Automating interferogram acquisition and analysis with automation scripts

Automating IntelliWave

- Automation scripts
- IntelliWave plug-ins
- ZEMAX, Code V and other application data transfer
- Controlling and communicating with MS Excel, MATLAB, IDL and LabVIEW from IntelliWave™
- Application programming interface
- Custom user interfaces
- Controlling custom hardware
- Custom analysis routines

Real-world examples are used throughout the course to demonstrate both principles and actual practice with Fizeau interferometers. Participants undertake real fringe analysis problems, and are invited to discuss their own measurement problems during class time and privately.

Course Instructor

[Mary Turner](#) is the Manager of Technical Support and Training Instructor of Engineering Synthesis Design, Inc.