TEMPO 1D

Ultra High Frequency Measurement

All Surface Types

LASER ULTRASONICS FOR NON-DESTRUCTIVE TESTING

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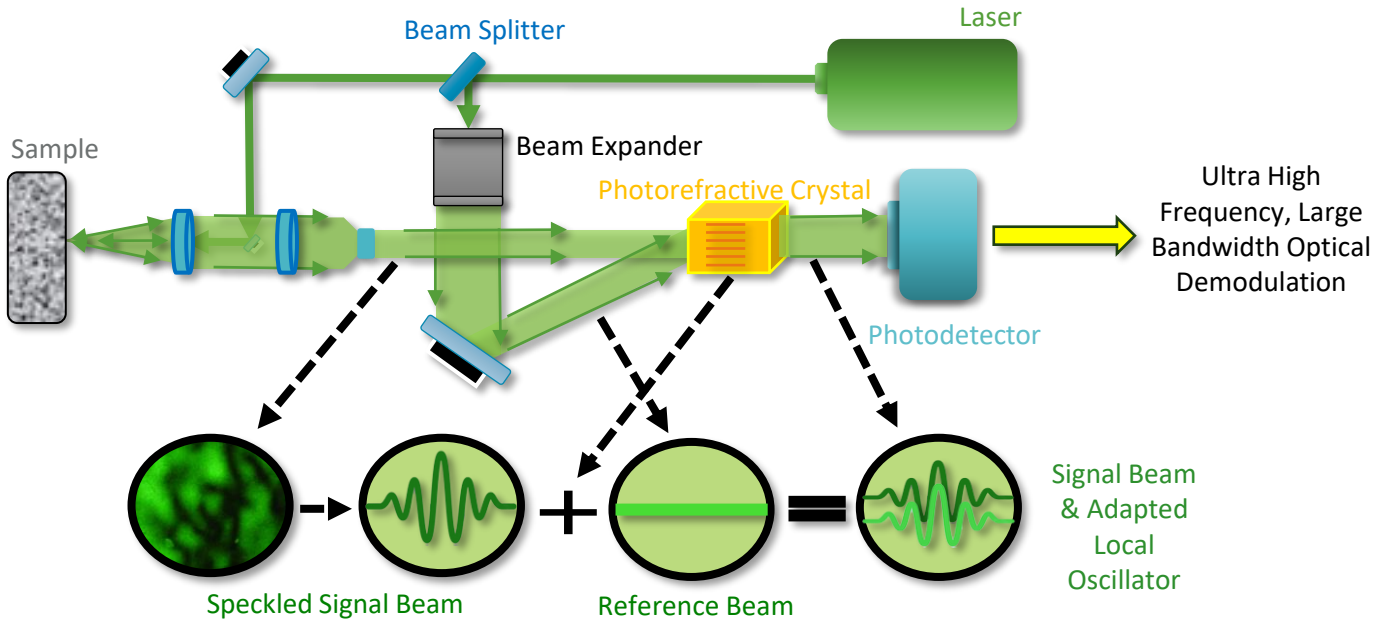
Technology

Ultra-High Frequency Interferometry

The cornerstone of the Tempo 1D's exceptional performance is the two-wave mixing (TWM) approach to laser interferometry utilizing a photorefractive crystal, offering unmatched combination of precision, adaptability, and reliability. Optimized for light-scattering surfaces, the design offers a high field of view to collect a large number of speckles. Together with its high sensitivity, it is an ideal choice for laboratory non-destructive testing.



Adaptive Beam Splitting

In TWM, the reference and sample beams are combined in the photorefractive crystal to form a real-time hologram. The photorefractive crystal acts as an adaptive beam splitter, combining the reference and signal beams with exact wavefront matching. It compensates for slow variations in the signal beam's wavefront, crucial for maintaining accuracy in measurements. Quadrature biasing, achieved through the application of a high-voltage DC electric field, ensures linear detection of transient phase-modulated signals, enhancing the strength of real-time holograms.

Performance and Reliability

The Tempo 1D harnesses the high-performance of photorefractive crystals, meticulously selected for their reliable properties to optimize the TWM process. Through decades of extensive research and development, photorefractive TWM has evolved into a reliable technology, guaranteeing consistent and precise measurements across a wide range of applications.

Application Examples

This technology has been applied in various fields, including:

- Measurement of carbon fiber volume fraction within a composite laminate. (https://doi.org/10.1177/00219983211011229)
- Noncontact measurement of inner cracks in thick aluminum specimen. (https://doi.org/10.1016/j.ndteint.2020.102273)
- Fatigue crack detection. (https://doi.org/10.1016/j.optlastec.2011.04.003)
- Characterization of roll-cladded aluminum plates. (https://doi.org/10.1115/QNDE2021-74927)
- Online cracking detection during laser-cladding process. (https://doi.org/10.1002/stc.2291)

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Specifications

NESD (Noise Equivalent Surface Displacement)	2. 10^{-7} nm/$Hz^{1/2}$
Detection Bandwidth Upper limit	Up to 1 GHz
Detection Bandwidth Lower limit	100 kHz
Suitable CW Laser power	500mW to 1.5W internal laser
Laser wavelength	532nm (Visible)
Focusing	Motorized and controllable via USB
Spot diameter on sample	60µm to 1.5mm (depend on stand-off)
Optical stand-off	100mm, 200mm and 500mm
Diameter of collecting aperture	2” (50mm)
Depth of focus	from 2mm to 50mm
Analog Outputs	Calibrated output – 100mV/nm Direct output, Calibration level and DC level
Options	2D scanning set-up including PC, software, digitalization card and X-Y translations
Electrical Requirements	110V / 220V - 50Hz / 60Hz
Dimensions	492 x 302 x 114 mm
Weight	16kg

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