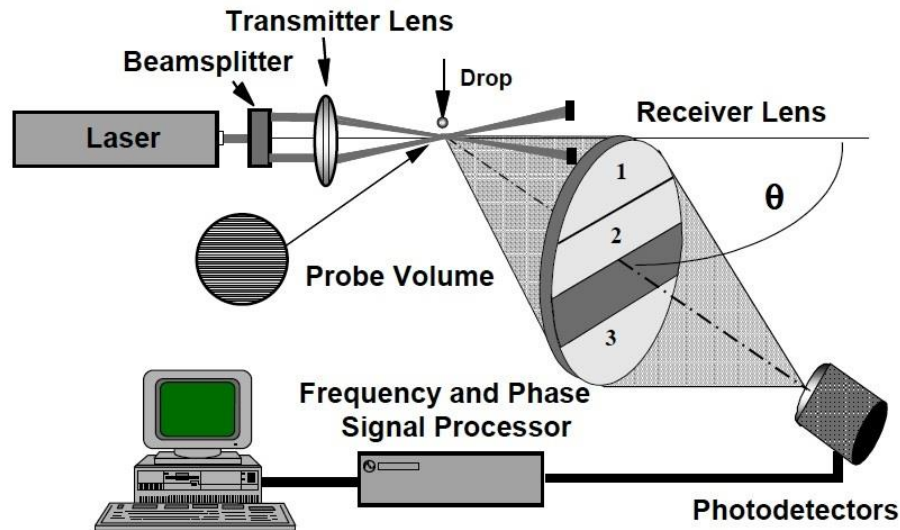


2D and 3D Phase Doppler Interferometer (PDI)

(Make: Artium Technologies Inc.)

Brief description

This instrument is used for determination of spray droplet diameter distribution and droplet velocities (2D and 3D) in a fuel sprays, inside and engine combustion chamber or in a spray chamber.



Schematic of the basic Phase Doppler Interferometer (PDI) system

Components of the PDI: The instrument includes the optical system consisting of diode-pumped solid-state lasers (DPSS), frequency shifting modules, optical receiver with compact photo-detectors, pre-amplifiers, ASA signal processing system, and the advanced Automated Instrument Management System (AIMS) software package. The salient features of this system are described below:

Optical System:

- Diode-pumped solid state (DPSS) lasers for high efficiency, high quality signals
- Lasers are fully computer controlled with safety interlocks, 24 volt power supply.
- Large aperture optics for high signal quality, high resolution size and velocity measurements.
- Easily interchangeable optics to optimize full size range.
- High efficiency receiver optics, 100 mm diameter lenses.
- Automated slit aperture selection to change probe volume, 15 μm to 1000 μm .
- Built-in phase calibration.

Advanced Signal Analyzer (ASA):

- Fully automated setup of instrument parameters including detector gain.
- Innovative Digital Burst Detector for optimum Doppler signal detection and to minimize retriggering on low SNR Doppler signals.
- Quadrature down-mixing and sampling for maximum accuracy in frequency and phase measurements.
- Only signal processors that utilize high resolution complex Fourier transform algorithms for processing and validating Doppler signals to obtain frequency and phase measurements.

- Automatically adapts the sampling to the variable Doppler burst lengths to maximize signal information used in processing.
- Built-in phase calibration system to eliminate detector and electronics phase lags.

Automated Instrument Management System (AIMS) Software:

- Controls all aspects of instrument operation
- Facilitates automated instrument setup, data acquisition, and remote monitoring and analysis.
- Performs full complex Fourier analysis on signals with upto 8192 samples.
- Real-time data presentation and extensive statistical analyses on selectable screens.
- Acquires and saves sampled signals allowing reprocessing for optimization of validation parameters.
- Incorporates advanced signal validation and analyses.
- Easy data export to MS Excel, or other programs.
- External input feature for coordinating data with other external information.
- Traverse drivers incorporated for most common traverses to automate data collection and spray field mapping.

List of testing, research and consulting areas where it can be useful

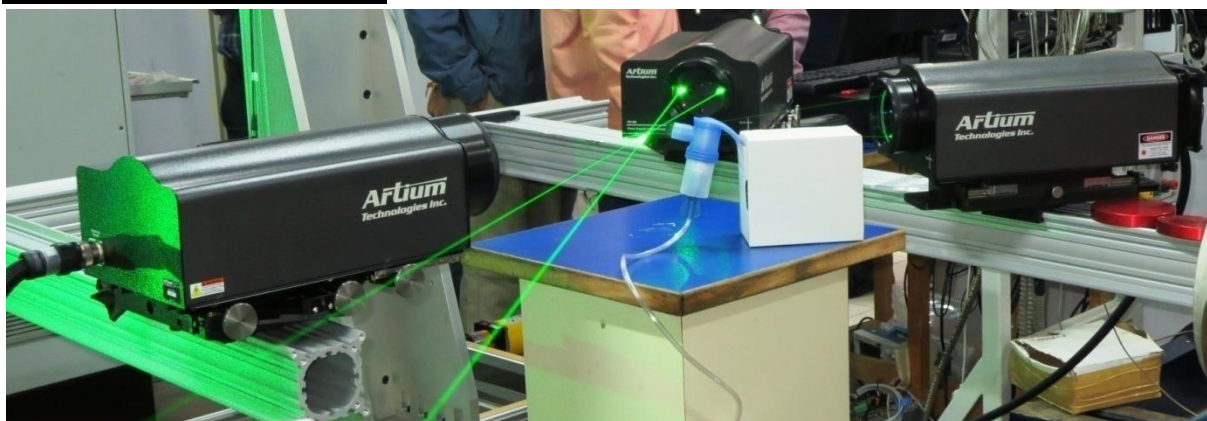
The Phase Doppler Interferometer (PDI) can be used for detailed measurement of:

- Droplet size, velocity, number density and volume flux in realistic spray combustion environment.
- Study of sprays injected into turbulent flow fields, reactive fuel sprays in swirl-stabilized combustors.
- Characterization of injectors in a high pressure environment.
- Study of transient fuel sprays such as in spark ignition (SI) and diesel engines.
- Understanding various complex spray and combustion processes.

List of keywords for which it should be findable

Droplet size distribution, droplet velocity, spray droplet number density, spray volume flux, Injectors characterization, fuel sprays.

Photos related to the facility



Characterization of spray from Nebulizer

