# MicroVec 2D PIV System

Flow field diagnostics made easier

In combination with well-integrated hardware and software for the most demanding experimental fluid dynamics experiments, MicroVec offers unprecedented and extraordinarily powerful PIV solutions to be used by researchers from all over the world at the affordable prices not seen before in the commercial PIV applications.

Particle Image Velocimetry (PIV): Principle

Particle Image Velocimetry (PIV) is an optical flow visualization method used in education & research.   It can provide instantaneous velocity measurements and related properties in fluids. The fluid is seeded with tracer particles (like smoke in the air or small hollow beads with same density as water) in the flow field which is illuminated by a laser to illuminate the particles to make them visible and to capture images of particles to track them. The sequential images with tracker particles in motion are then processed for cross correlation to calculate the speed and direction (the velocity field) of the flow which is being observed. Further processing provides flow vortices, streamline and iso-speed lines, and flow field parameters distribution. MicroVec PIV systems typically consist of a digital CCD or CMOS camera, a laser with an optical arrangement to limit the physical area to be illuminated, a synchronizer to act as an external trigger for control and timing of the cameras and laser, the seeding particles and the fluid un- der investigation. A laser light arm may be used to connect the laser to the lens setup, which then converts the beam into a light sheet. PIV software is used to process the optical images.

MicroVec brings you a wide range of products to select from and expert application knowledge to assist in configuring the PIV systems that meet your needs. Used from microscopic distances to 1 meter testing field, from speeds of few mm/s to 7 Mach in air and water as well as ability to observe flow in flames. The MicroVec PIV systems are integrated with world leading double pulse PIV lasers (including Microvec own brand manufactured in EU), DPSS lasers as well as with high-resolution CCD cameras with double frame mode and high-speed CMOS cameras for TR PIV systems. MicroVec - located in high tech centre – Singapore – brings these innovative, flexible and scalable PIV system to the international market.
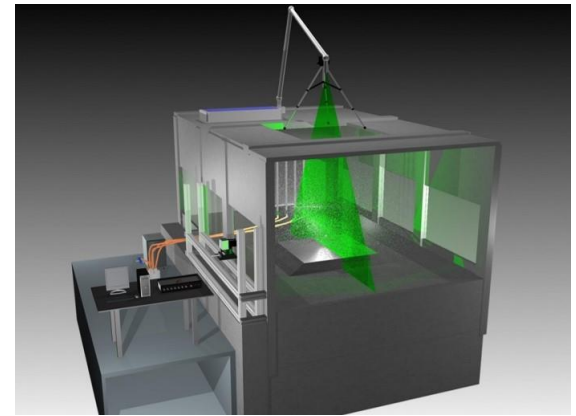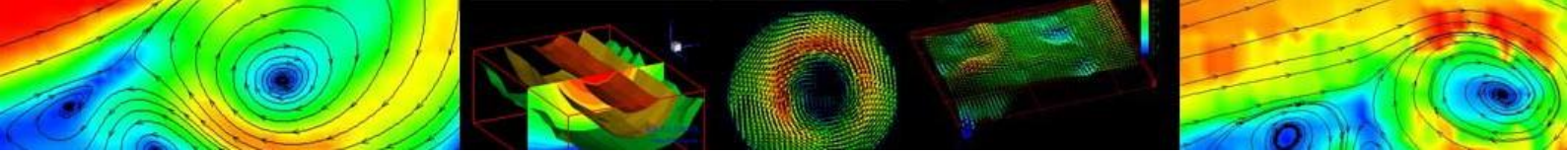

PIV is being used to study blowing sand boundary layer and wind-sand two phase, which is affected by the different rough surface atmospheric boundary layer
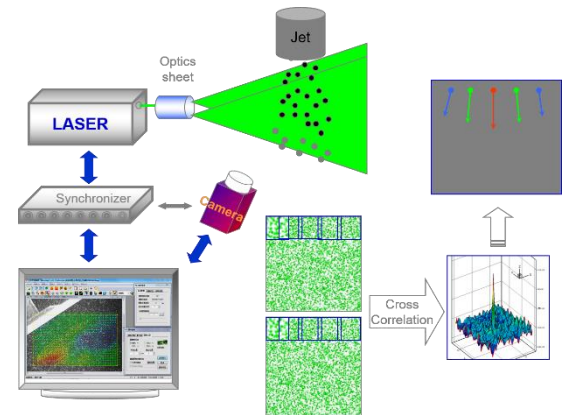
2D PIV principle
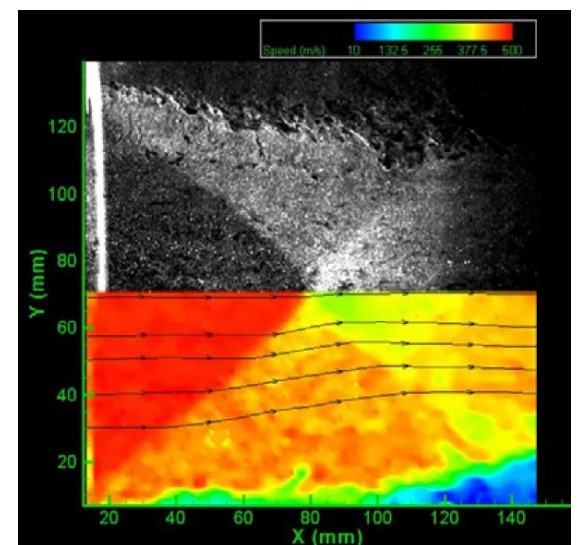
*Flow over a sharp cone at Mach 4*

**MicroVec**

Selected Features

- **MicroCap** software for image capture:

- Integrated and easy control of all components (phase lock control): synchronizer, up to 8 cameras, laser, LED lights

- Camera control: free run, trigger, external trigger, PIV

- Support image types: B/W, Grey scale 8-16 bit, RGB and digitizing function to image file formats: TIFF, BMP, JPG and AVI

- Image store: long time capture, store to RAM or HD controlled by software

- Frame grabber interface: Camera Link, CoaXPress

- **MicroVec** software for image-processing and analysis:

- High resolution 2D PIV & PTV with multi-pass multi-grid window deformation algorithm

- Mask function for removal of invalid image or data, multi-average function (particle image and vector result)

- Calculating and plotting data results: U, V, W components of mean and fluctuating velocity, vorticity, RMS, turbulent kinetic energy values etc.

- Batch processing: single directory or multi-directory

- Support high density PTV function

- Advanced vector filtering and correction

- Export various image and video file formats

- Export data file and links to Tecplot, MatLab and Origin for analysis and visualization

- Uncertainty Quantification

- Includes GPU parallel processing support improving computing acceleration by factor 10

Standard Components

- Double pulse PIV lasers: 50mJ x 2/50Hz, 60mJ x 2/25Hz, 120mJ x 2/20Hz, 200mJ x 2/15Hz, 380mJ x 2/10hz, 500mJ x 2/10Hz

- DPSS lasers: 1W, 2W, 5W, 10W

- CCD or CMOS cameras, including all interface cables and camera frame grabbers: VGA/260fps, 1M/148fps, 2M/30fps, 2.8M/54fps, 4M/41fps, 5M/16fps, 5M/124fps, 6M/25fps, 8M/21fps, 9M/17fps, 16MP/70fps, 20MP/56fps, 24M/46fps or 29MP/4fps

- Synchronizer: MicroPulse 825

- MicroCap PIV Image Capture Module & Microvec 2D High-Precision PIV Software Package
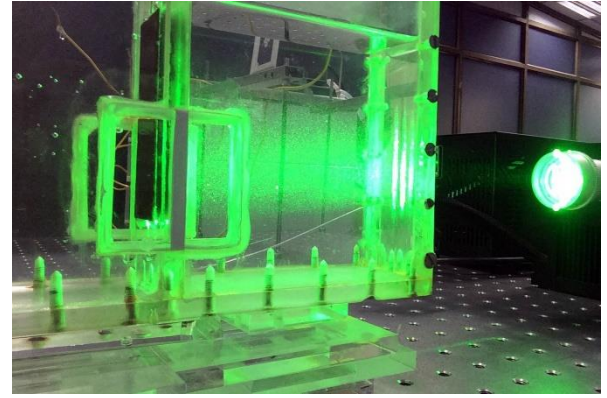
Application: Heat exchange experiment
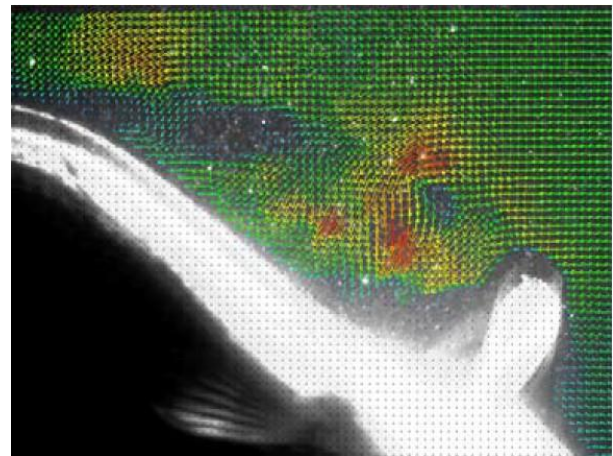
Application: Viscoelastic characteristics of fins, muscles & skin in Crucian carp
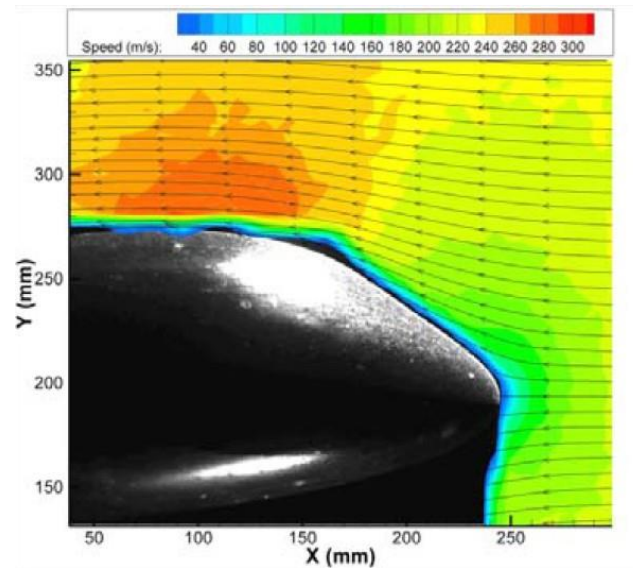
Application: Measurement of aircraft nose flow characteristic