

MicroVec 2D PIV System

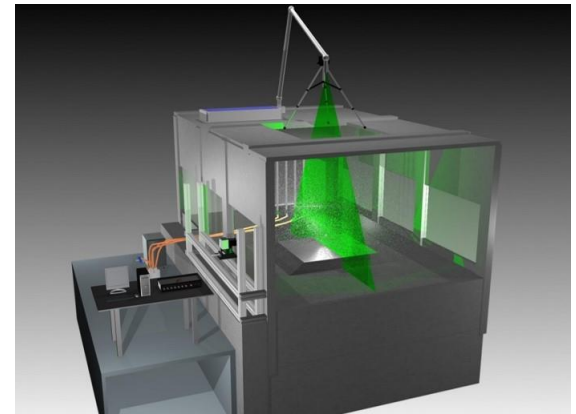
Flow field diagnostics made easier

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.

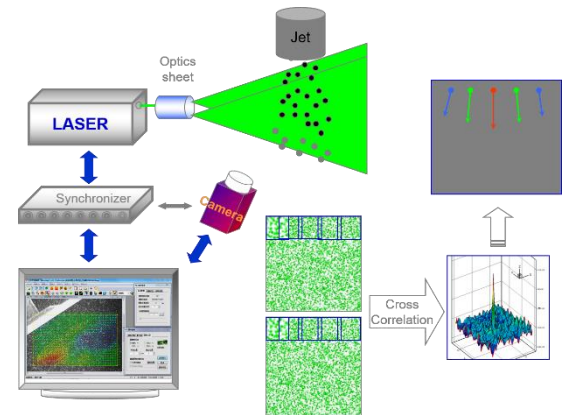
Particle Image Velocimetry (PIV): Principle

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 under 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.

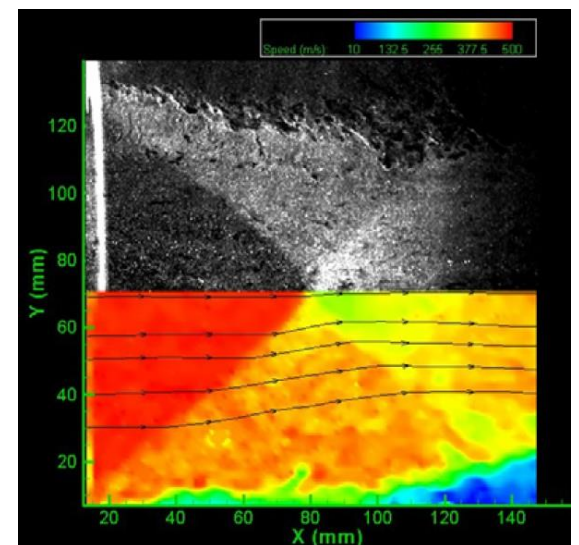
MicroVec brings you a wide range of products to select from and expert application knowledge to assist in configuring the PIV systems that meet your needs. Used from microscopic distances to 1 meter testing field, from speeds of few mm/sec to 7 Mach in air and water as well as ability to observe flow in flames. The MicroVec PIV systems are integrated with world leading PIV lasers from Litron (UK), Lumibird (France), Photonics Industries (USA) and Beamtech Optronics (China) as well as with high-speed CMOS cameras from Fastec Imaging (USA), Photron (Japan), Vision Research (USA), Mikrotron (Germany) and high-resolution CCD cameras with double frame mode from Imperx (USA) or Vieworks (Korea). MicroVec - located in high tech centre – Singapore – brings these solutions to the international market.



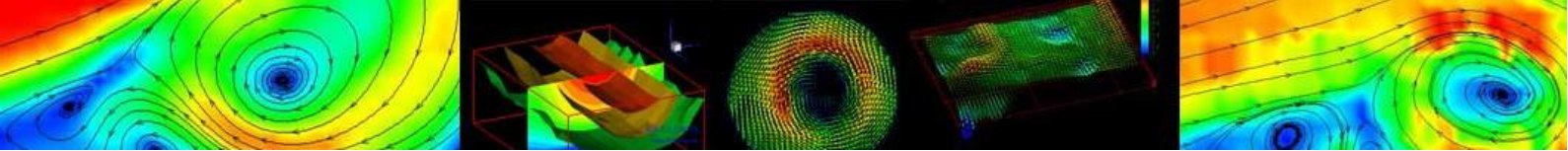
PIV is being used to study blowing sand boundary layer and wind-sand two phase, which is affected by the different rough surface atmospheric boundary layer



An illustration of 2D PIV principle

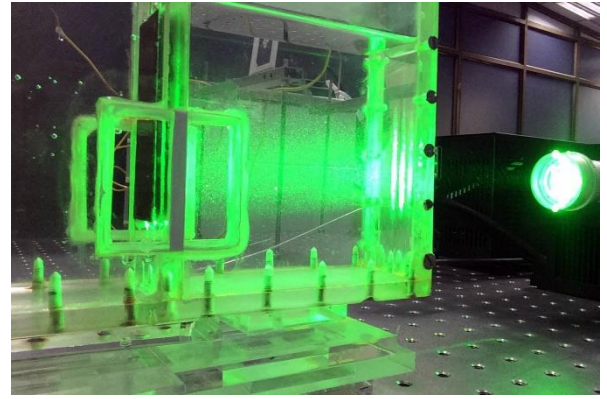


Flow over a sharp cone at Mach 4

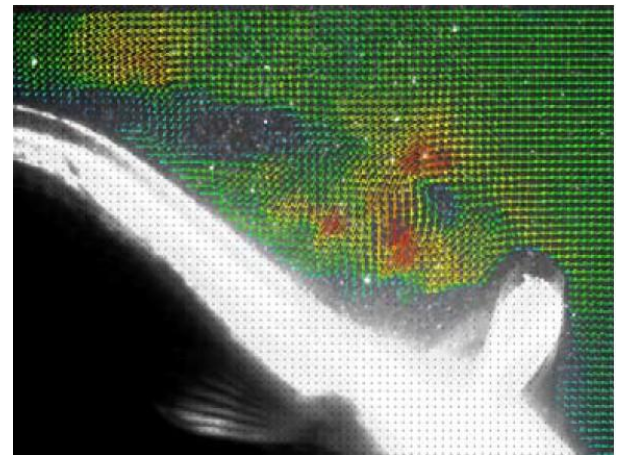


Selected Features

- **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 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: PCI, PCI-E x1/x16
- **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 MatLab, Tecplot and Origin for analysis and visualization
 - Uncertainty Quantification
 - Includes GPU parallel processing support improving computing acceleration by factor 10



Application: Heat exchange experiment



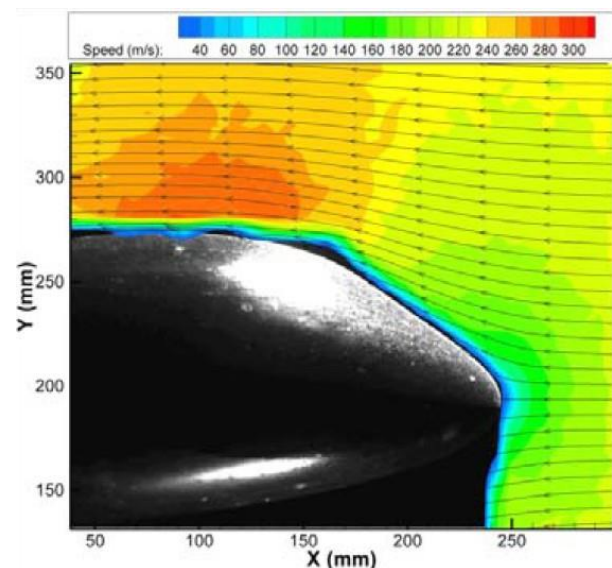
Application: Viscoelastic characteristics of fins, muscles & skin in Crucian carp

Applications

- Wind tunnels and water tanks
- Aerospace and aeronautics
- Compressors, turbines, fans, pumps, sprays
- Micro electromechanical systems (MEMS)
- Chemical mixing equipment

Options

- Proper Orthogonal Decomposition (POD) module
- Dynamic Mode Decomposition (DMD) module
- Pressure measurement with PIV module
- Artificial Intelligence PIV (AI) module



Application: Measurement of aircraft nose flow characteristic