

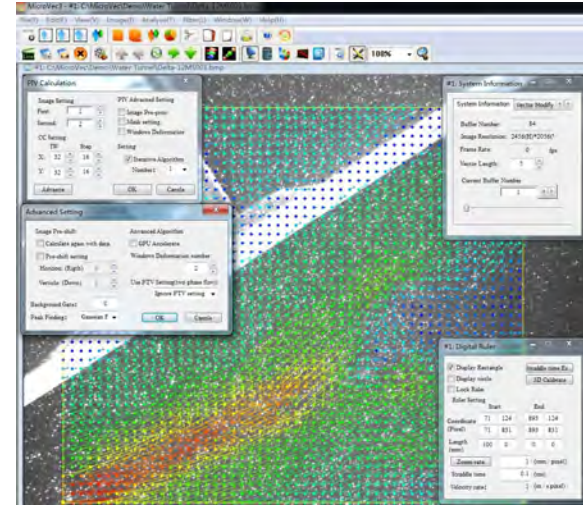
Microvec PIV Software

The most versatile software platform for scientific imaging

Microvec offers an easy way to use software platform for hardware control, image acquisition and processing as well as PIV/PTV analysis. It offers a variety of complex PIV/PTV image measurements and calculations. The software can be used for various research needs such as flow, turbulence, microfluidics, particle diagnostics, spray atomization, medical imaging, combustion processes and others. It supports many research requirements and includes dynamic image capture with image enhancements, calibrated measurement, multi-angle shots, storage, and automated batch processing.

The basic Microvec software includes MicroCap module for image acquisition and MicroVec module for image processing and analysis. MicroCap images software has fully integrated control functions of all hardware components. MicroCap contains all device settings and loads all of them to the system. It includes all the settings, timings and controls needed to run CCD cameras which are used in Microvec PIV systems through the frame grabber, including double frame mode used for experiments in fast flows. It controls the timings of the synchronizer to coordinate the correct interaction between the laser and cameras. The laser pulse separation can be set to match the frame rate of the camera or the frame straddle time. In the end Microcap can generate images in from 8 to 16 bit and multiple image file formats like TIFF, BMP, JPG and/or AVI. MicroCap enables image capture to the computer memory or directly to the hard disk of the computer. In addition MicroCap takes advantage of the image processing, measurement, and analysis libraries contained in the frame grabber DSP chip, making the image acquisition fast without using much processing power of the computer. This is one of the reasons for Microvec PIV systems to be able to acquire images and calculate velocity vectors in near real time. MicroVec

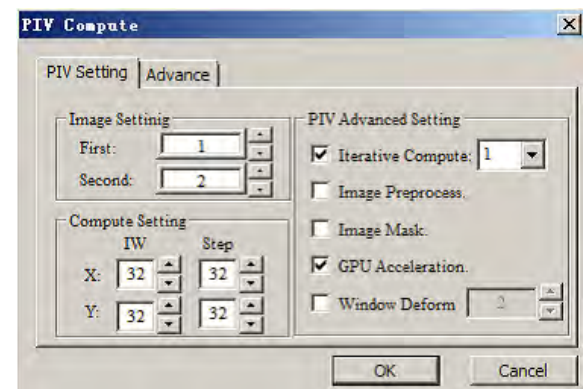
software is a high resolution 2D PIV module. Over the years MicroVec implemented a multitude of techniques and algorithms. It can be used for calculating and plotting data results: U, V, W components of mean and fluctuating velocity, vorticity, RMS, turbulent kinetic energy values and many others. It includes multi-grid cross-correlation and window deformation technique, batch processing function for single directory and multiple directory saving, individual image masking and region of interest. It features various advanced vector filtering and corrections to deal with data smoothing or outlier removal. It supports high density Particle Tracking Velocimetry (PTV) function. It generates data file in formats supported by Tecplot or MatLab. It also includes GPU acceleration and parallel processing support, which can significantly reduce the time of data processing.



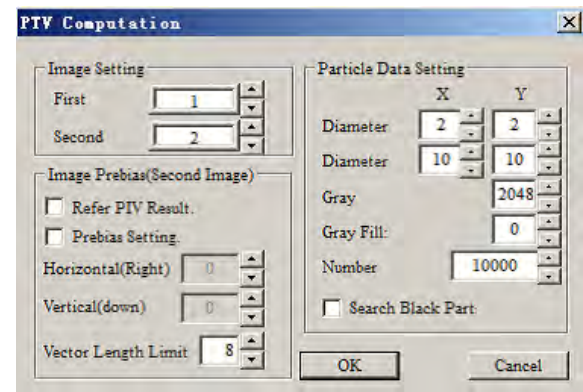
Microvec software platform



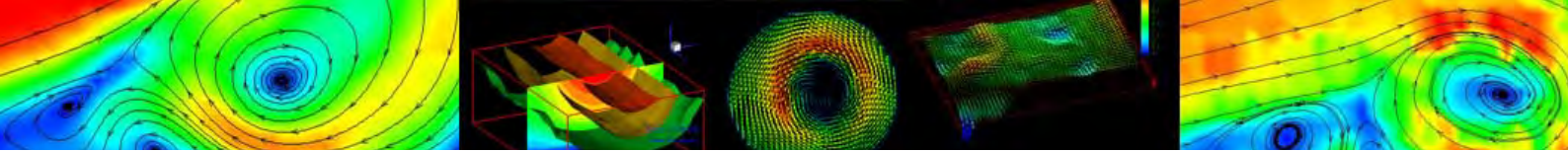
Menu & tool bar



PIV computational settings

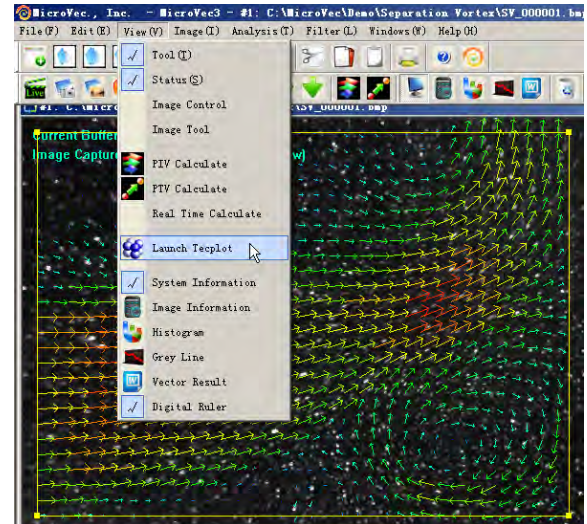


PIV computational settings



Basic algorithms and techniques implemented in Microvec software

- Cross correlation with FFT and IFFT
- Sub-pixel precision fitting
- Bias vector detection and correction
- Multi-grid cross-correlation
- Window deformation
- Multi-zone data stitching
- Particle tracking velocimetry with blob analysis
- Temperature and concentration analysis in fluids
- Image masking
- Multi-core parallel processing
- GPU acceleration
- Flexible methods for image preprocessing
- Blobs advanced analysis, e.g. moments, major axis, minor axis, angular velocity



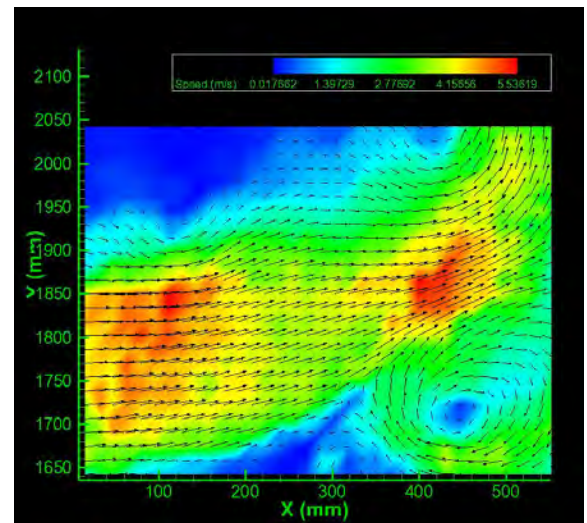
Optional Software Modules

- Tomographic PIV (Tomo-PIV)
- Pressure Reconstruction Module (PRM)
- Dynamic Mode Decomposition (DMD)
- Optimum Mode Decomposition (OMD)
- Proper Orthogonal Decomposition (POD)
- Pattern Tracking (PT)
- Single-pixel ensemble correlation

Applications

- Wind tunnels and water tanks
- Aerospace, aeronautics and hydraulics engineering
- Compressors, turbines, fans, pumps, sprays
- Microfluidics and MEMS
- Chemical mixing equipment
- Combustion and flame
- Multi-phase flows
- Solid mechanics

Tecplot



Tecplot results