

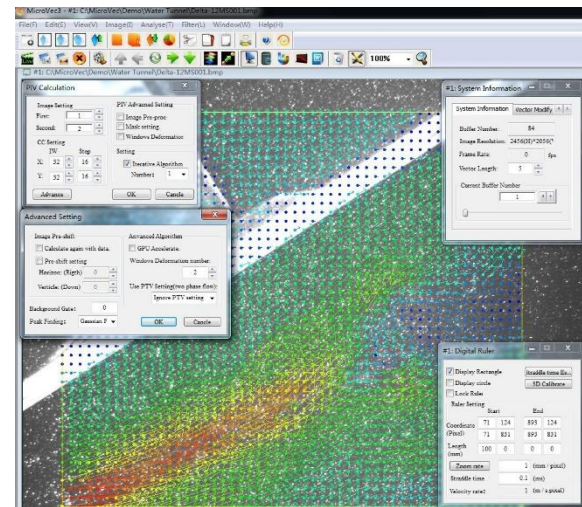
Microvec PIV Software

The most versatile software platform for Particle Image Velocimetry

Microvec offers an easy way to use software platform for hardware control, image acquisition and processing as well as PIV analysis. It offers a variety of complex PIV and 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 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.

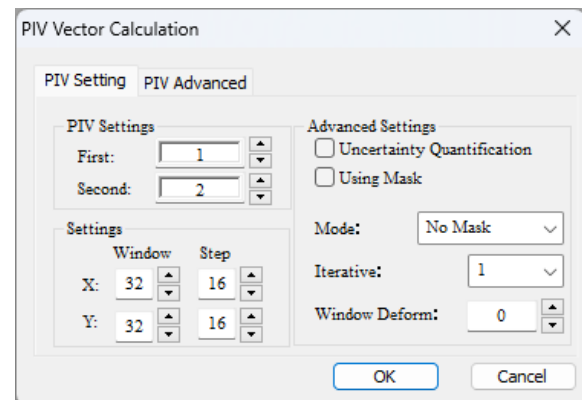
Over the years Microvec implemented a multitude of techniques and algorithms including the most recent addition is AI PIV module, which eliminates the limitation of interrogation window. The software can be used for calculating and visualizing data results: U, V, W components of mean and fluctuating velocity, vorticity, RMS, turbulent kinetic energy values and many others. It includes window deformation iterative multi-grid (WIDIM) method, batch processing function for single directory and multiple directories 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, MatLab or Origin. It also includes GPU support for acceleration and parallel processing, which can significantly reduce the time of calculations.



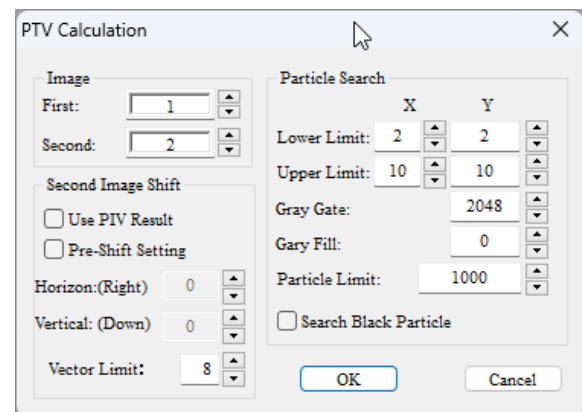
Microvec software platform



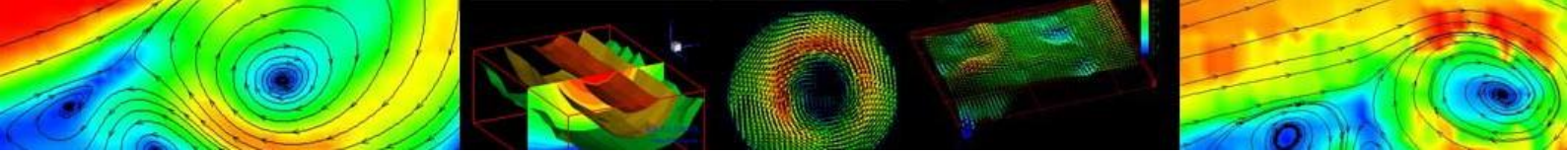
Menu & tool bar



PIV computational settings



PTV computational setting



Basic algorithms and functions

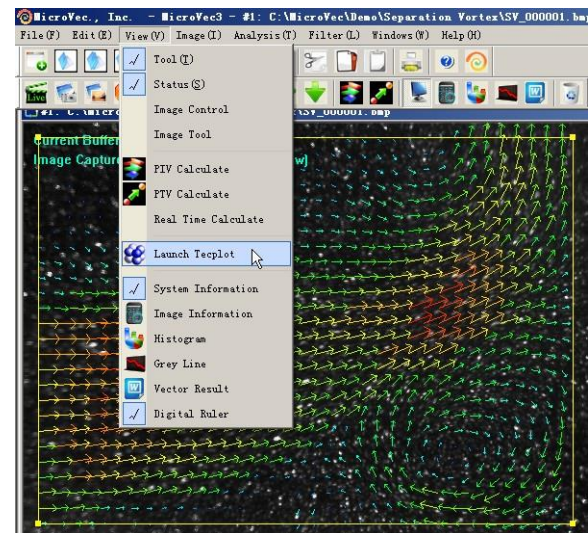
- Cross correlation with FFT and IFFT
- Sub-pixel precision fitting
- Bias vector detection and correction
- Multi-grid multi-pass cross-correlation with window deformation
- Multi-zone data stitching
- Particle Tracking Velocimetry (PTV) with bubble analysis
- Temperature and concentration analysis in fluids
- Masking functions
- Multi-core parallel processing
- Uncertainty quantification
- GPU support for acceleration
- Flexible methods for image pre-processing
- Flexible methods for postprocessing of results
- Bubble advanced analysis, e.g. moments, major axis, minor axis, angular velocity
- Tecplot MACROS and MatLab support

Optional Software Modules

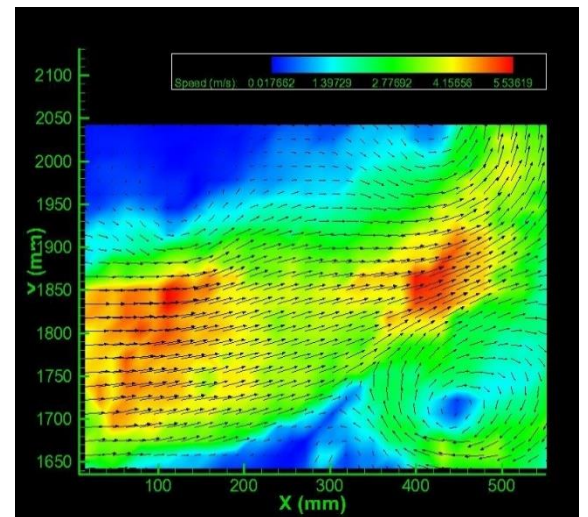
- 3D Stereo PIV (Stereo-PIV)
- Tomographic PIV (Tomo-PIV)
- Pressure Reconstruction Module (Pressure PIV)
- Tomographic Pressure Reconstruction Module (Tomo Pressure PIV)
- Proper Orthogonal Decomposition (POD)
- Dynamic Mode Decomposition (DMD)
- Light Field PIV (LF PIV)
- Planar Laser Induced Fluorescence (PLIF)
- Artificial Intelligence PIV (AI PIV)

Applications

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



2D PIV result visualization in MicroVec.



2D PIV result visualization in Tecplot