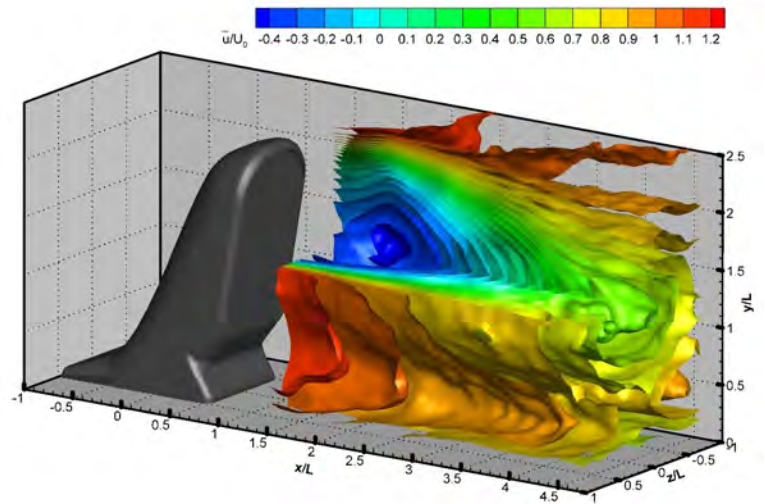
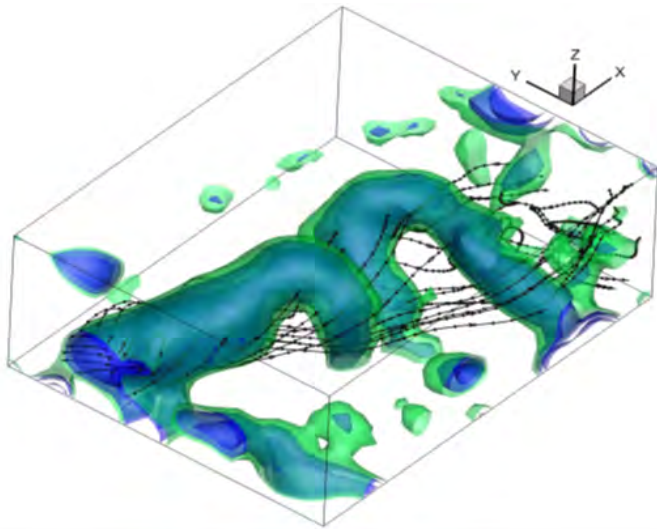


MicroVec TOMO PIV

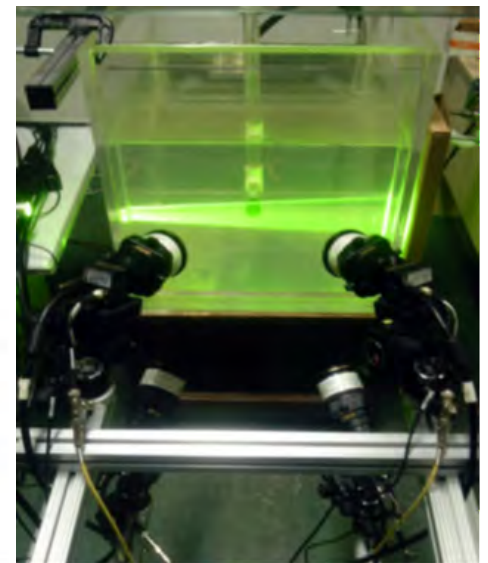
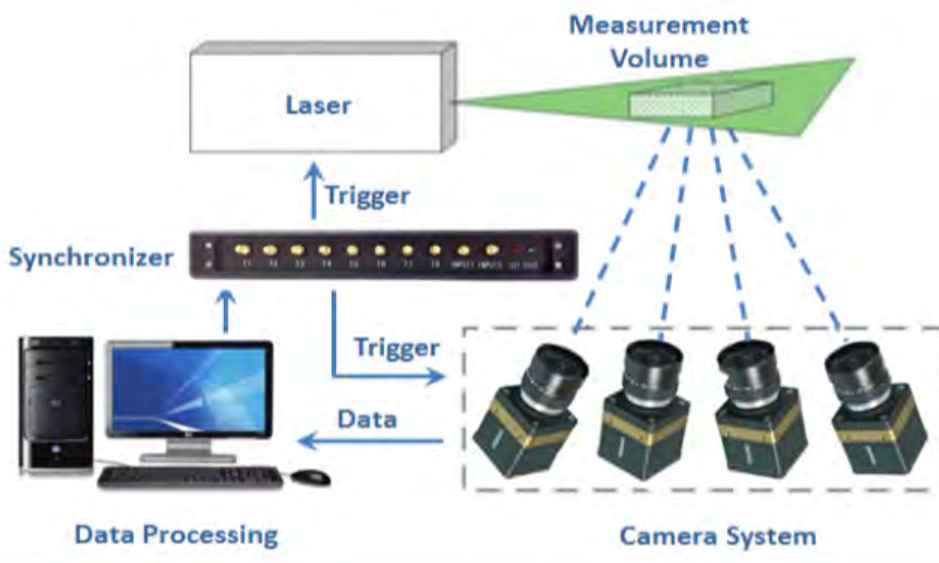
Tailor-made solution for volumetric flow measurements

In the last few years a new technique called Tomographic PIV (TOMO-PIV) has been developed. TOMO-PIV is a volumetric three-component velocimetry technique. Full velocity and velocity gradient tensor fields can be obtained from the TOMO-PIV method, which can provide comprehensive information on complicated three-dimensional flows like turbulent boundary, including the nature and distribution of coherent vortex structures.

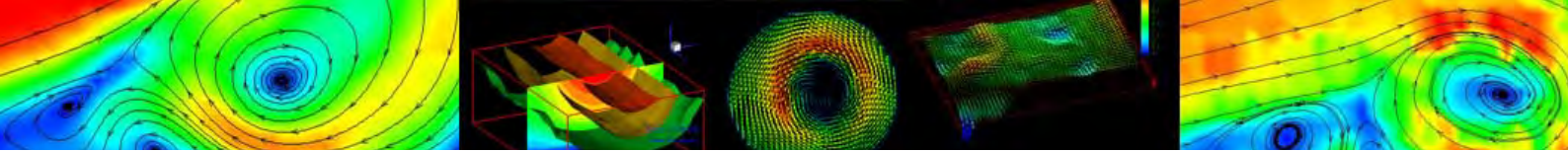


(a) Microvec TOMO-PIV example showing spiral vortex break-down on delta wing. (b) Isosurface of velocity contour showing flow field behind the mirror.

“Tomography” is a word originally from medical science meaning imaging by sections or sectioning through the measurement volume. TOMO PIV reconstructs the images of the particles in the sections of the measurement volume, and then does the volume correlation between two neighbor time steps to get the velocity field. In a sense, TOMO-PIV is the most orthodox 3D PIV technique extended from the traditional 2D PIV. A typical Microvec TOMO-PIV setup is shown below.

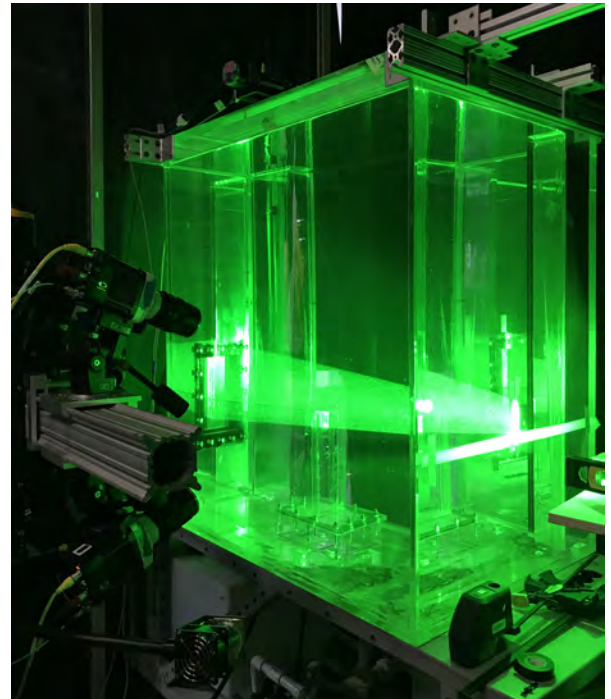
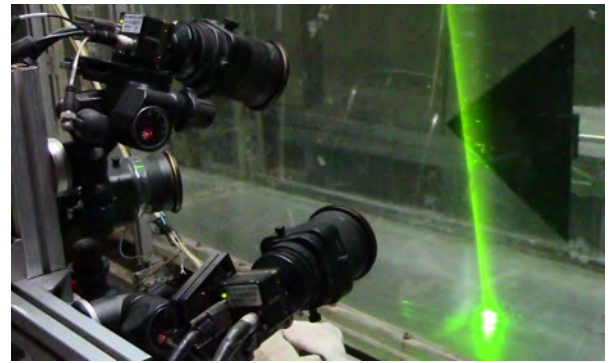


MicroVec has implemented a new software module to add TOMO-PIV module to its PIV products.



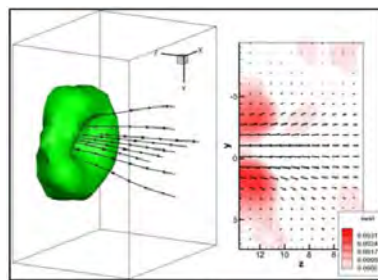
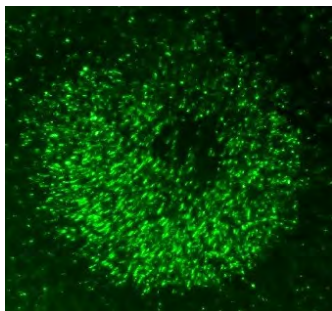
MicroVec TOMO-PIV software module: Features and algorithms

- Automatic recording images to hard disk or to memory
- Volumetric calibration and its refinement algorithm
- Particle images enhancement technique
- Sliding background elimination
- Particle density compensation
- Geometric reconstruction technique
- Several Multiplicative Algebraic Reconstruction Technique (MART): Sparse MART, intensity enhanced MART, Spatial Filter MART, Convolution MART
- Volumetric cross-correlation with window deformation algorithm and multi-pass iterations
- Outlier detection and correction
- Velocity post-process technique
- Multi core & parallel processing support
- GPU acceleration support
- Data export to TecPlot format

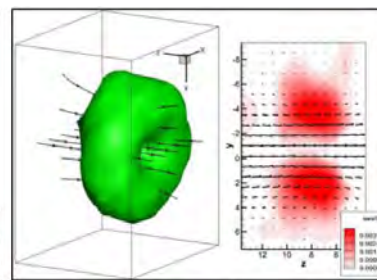


Case 1: Vortex Ring and Swirl

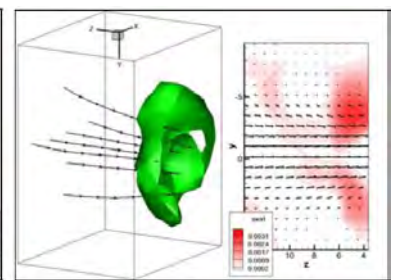
The experiment was conducted in a water channel. 4 cameras were used at 200fps with an 8W DPSS laser in a water tank.



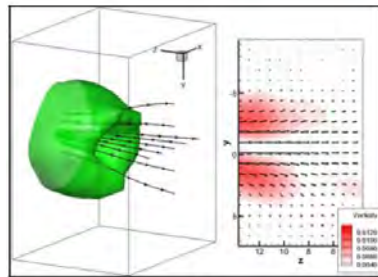
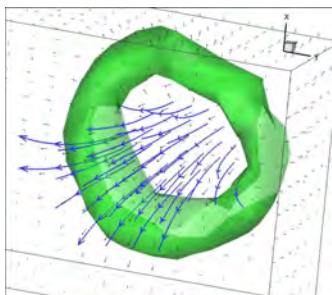
a1



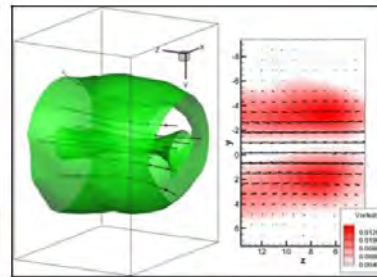
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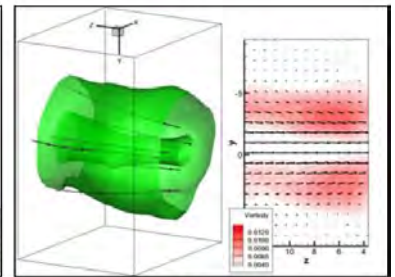
a3



b1



b2



b3

