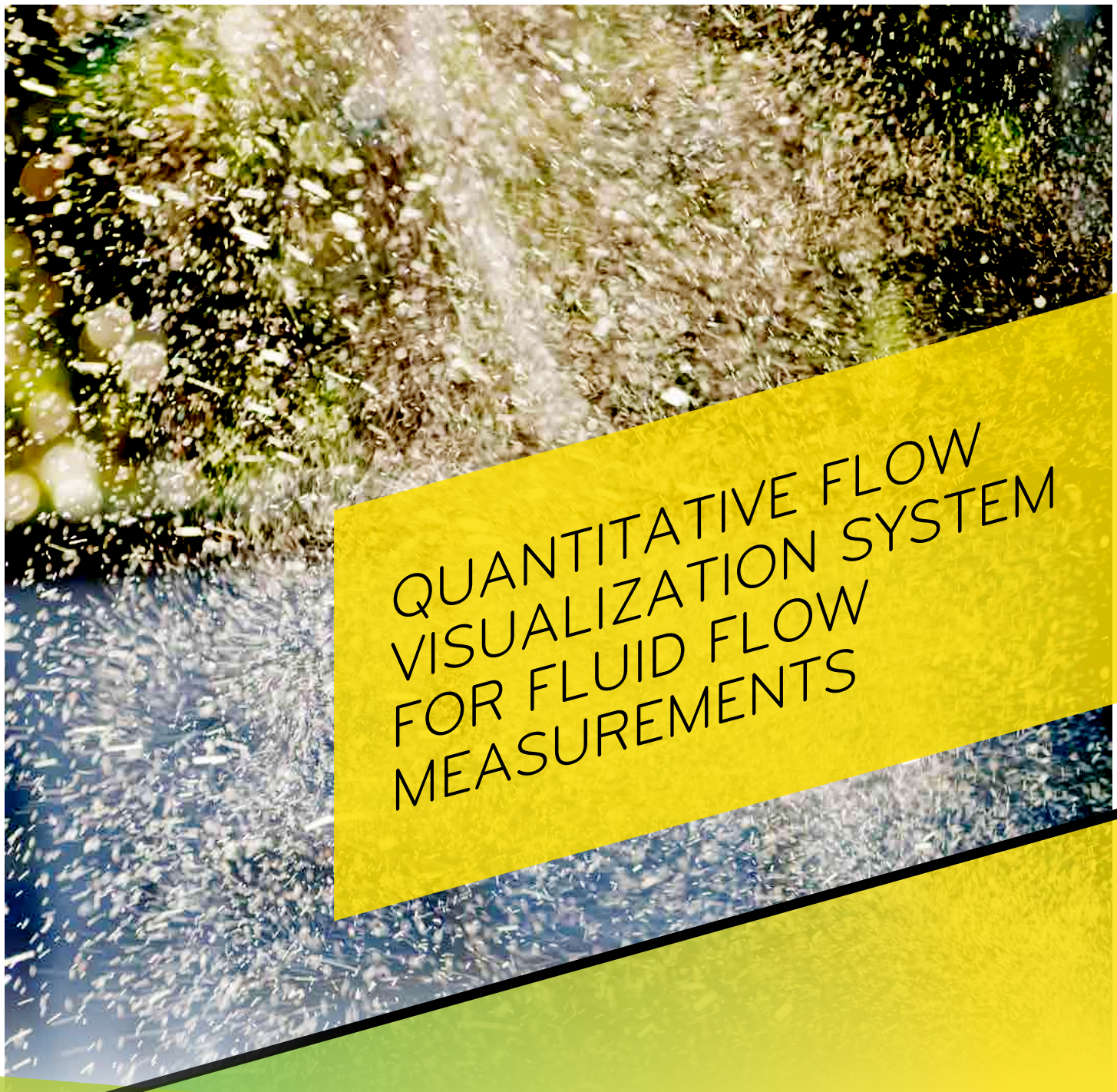


QUANTITATIVE FLOW VISUALIZATION SYSTEM FOR FLUID FLOW MEASUREMENTS

QUANTITATIVE FLOW VISUALIZATION SYSTEM

FOR FLUID MECHANICS APPLICATIONS

The TSI Model FM-1000 Quantitative Flow Visualization System provides a turn-key solution to investigate quickly and accurately the flow field for your applications. The system is non-intrusive and offers high spatial and temporal resolution as well as the ability to resolve turbulent structures.

The FM-1000 system consists of:

1. Continuous laser with integrated laser light sheet optics
2. High resolution and high frame rate camera
3. LaserPulse Synchronizer
4. Insight 4G software package to control the data acquisition and data processing
5. Micro bubble generator to seed air flows (optional)

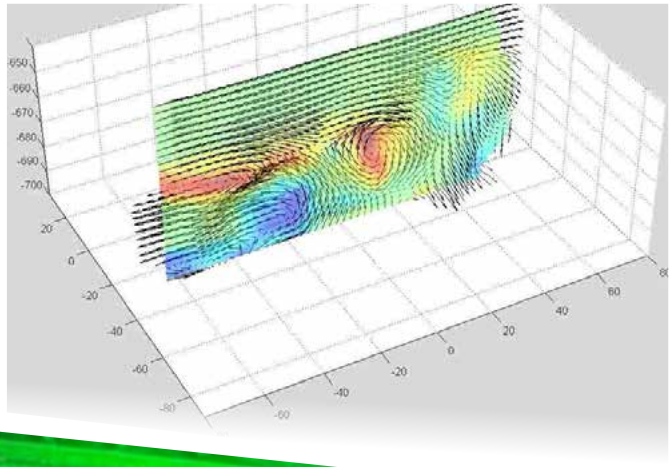
Flow measurements

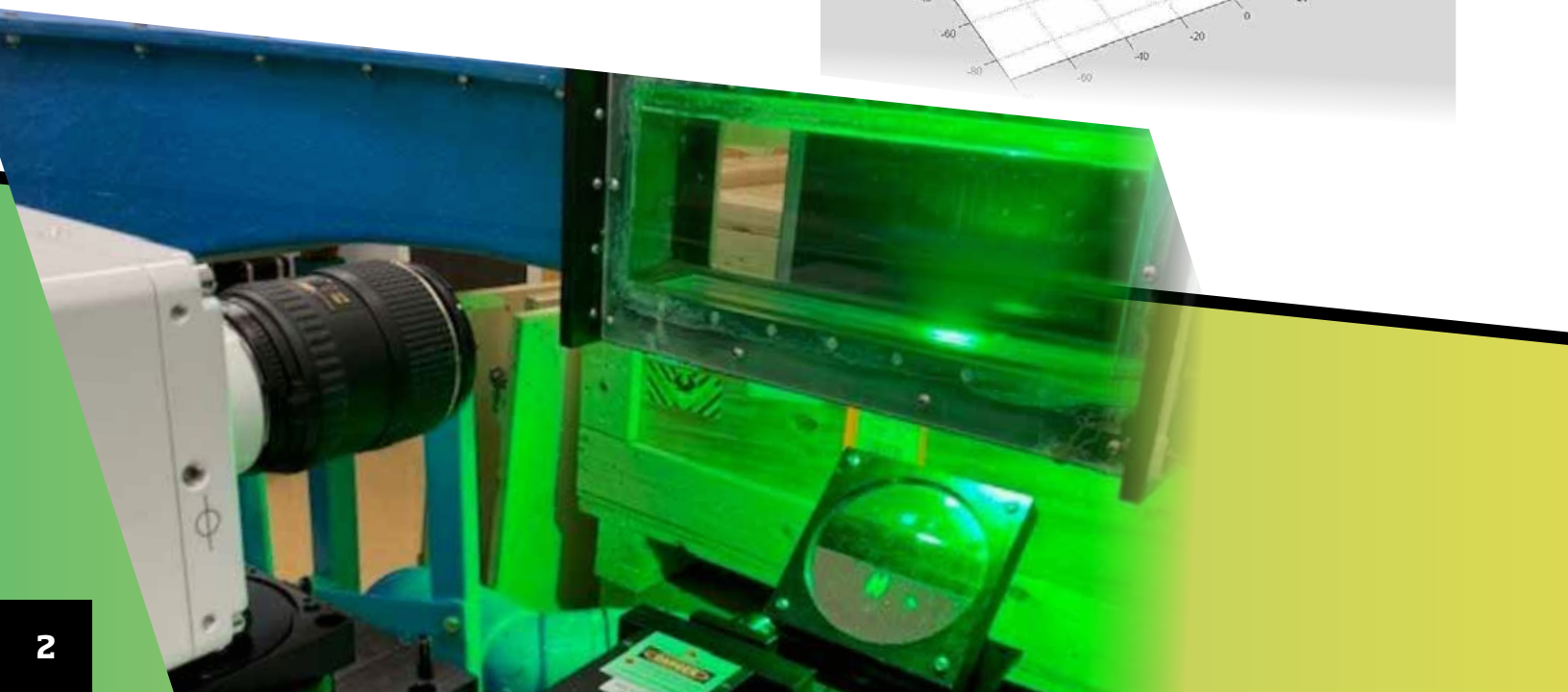
The FM-1000 system is easily set up for flow investigations. Once the camera is focused on particles in the laser light sheet, flow information is captured and analyzed, giving instantaneous velocity field results for that particular plane. Capturing a sequence of the images provides useful statistical information such as average velocity field, vorticities, and shear, as well as time-animations providing detailed information regarding vortex trajectories and evolving regions of high and low velocity.

The optional BG-1000 micro bubble generator provides non-toxic tracer particles of 15 microns with high fidelity, resulting in accurate flow measurements.

INVESTIGATION OF VORTEX SHEDDING FROM A CYLINDER IN A WATER CHANNEL

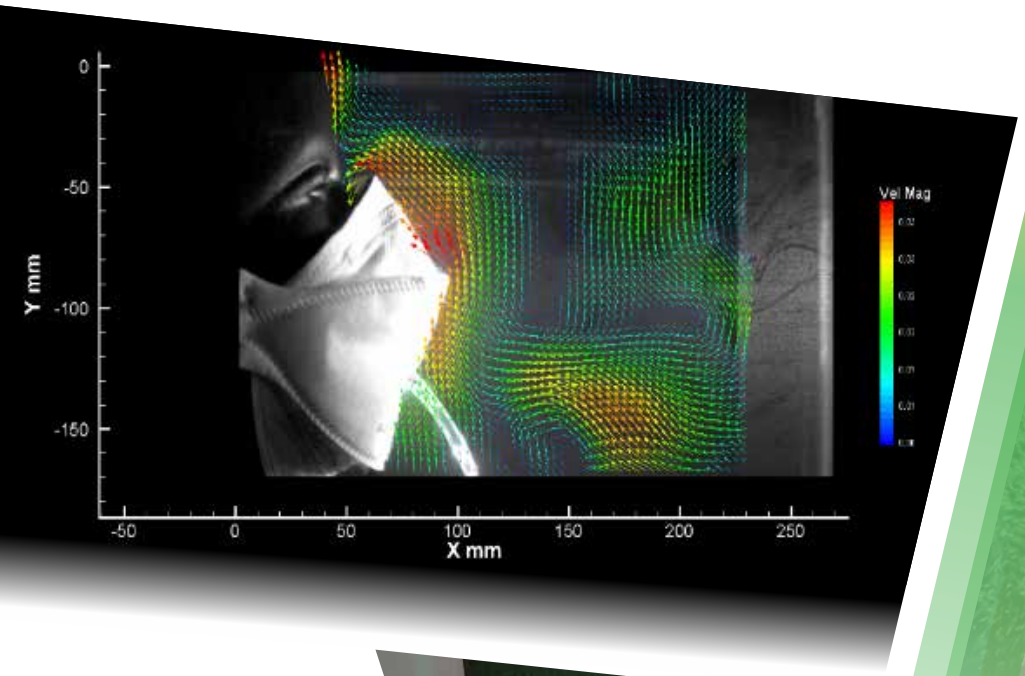
The FM-1000W system was also used to study the vortex shedding from a cylinder. The cylinder was located in the water tunnel with the free stream velocity of 0.2 m/s. The measurements were taken at two diameter lengths away from the cylinder. Hollow glass spheres of 15 microns were used as seed particles to provide the flow information. The plot shows the positive and negative vorticity structures shedding behind the cylinder.





INVESTIGATION OF AIR FLOW AROUND N95 MASK

The FM-1000 system was used to determine the source of a leak on a mannequin wearing an N95 mask. The airflow around the mannequin head form was seeded with tracer particles that were illuminated by a laser sheet. The high-speed camera took a series of images in order to determine the source of a leak on a mannequin wearing an N95 mask. The Insight 4G software was used to analyze the images providing flow velocities in the region surrounding the mask. Results of the investigation reveal leakage occurring at the bridge of the nose, as indicated by the high velocity region (red vectors) shown in the plot below.



SPECIFICATIONS

Image capture rate	2600 Hz max at full pixel resolution
Field of view	Up to 0.5 m by 0.5 m
Velocity range	< 5m/s

Applications

+ Flow distribution and aerosol transport in coughing and sneezing
+ Measurements in wind tunnels and water channels
+ Turbulent flow investigations

Specifications are subject to change.

UNDERSTANDING, ACCELERATED

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