

MEASUREMENTS IN A SWIRLING AIR FLOW

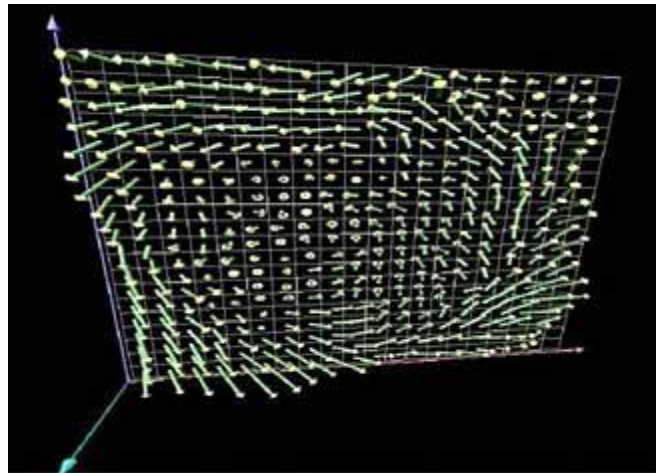
APPLICATION NOTE STEREOPIV-004

The three-dimensional swirling flow field generated by a rotor was measured using a TSI Stereoscopic PIV System. These velocity measurements were made in the phase-locked mode of operation. The airflow downstream of the exit plane of the rotor was measured. The plane of the light sheet (measurement plane) was parallel to the exit plane of the rotor. Hence, the main flow direction was perpendicular to the plane of the light sheet.

The two-camera system (two PIVCAM 10-30 cameras, 1k × 1k resolution) using the optimum Scheimpflug configuration was set up in the horizontal plane to make three-component velocity measurements. Data was collected at the maximum frame rate of the cameras to get a 15 Hz sampling rate of the velocity field. TSI's INSIGHT™ stereo acquisition and analysis package exploits the power of the Windows® NT platform to provide on-line analysis of the images, and display of the velocity vector field.

The figure shows the three-component velocity field at one instant in time. The spatial gradients of the velocity field, including vorticity and strain rate, are some of the flow properties obtained from these measurements. Temporal evolution of the flow field, captured at the maximum frame rate of the camera, provides a visual display of the dynamics of the flow field and its properties. Phase-averaged statistics of the flow field were also obtained from these measurements.

*Swirling Airflow
Stereoscopic PIV Measurements*





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