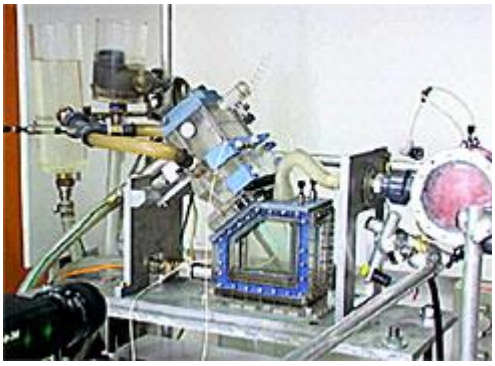
FLOW BEHIND A MITRAL VALVE

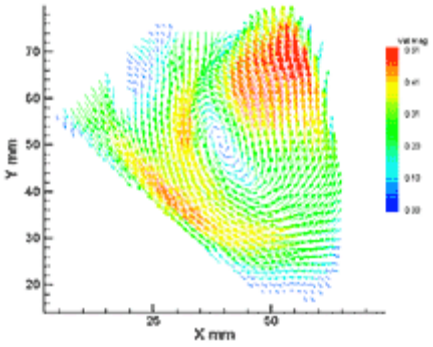
APPLICATION NOTE PIV-003

The application focuses on the flow in the ventricle which is typically a triangular cavity (see figure below) and the PIV measurements presented here were performed in the mid section (mid depth) of this cavity. This section was chosen because of the size and shape of the ventricular cavity. The average dimensions for this cavity are 90 × 60 × 30 (height × width × depth) resulting in a probable average two-dimensional flow (the depth playing here a minor role). The activation system controls and records a set of parameters enabling a high level of reproducibility and comparisons with clinical observations.

The flow rate through the mitral valve was measured with a Carolina Medical Model SR670 magnetic flow meter, and the atrial, ventricular and aortic pressures measured with Millar Instruments Model MPC500 piezoelectric pressure transducers. The blood flow circuit was seeded with small (30 µm in diameter) neutrally buoyant polyamide particles with high refractive index.

The instantaneous velocity fields were determined by means of a PIV system from TSI Incorporated. This system uses a LASERPULSE™ synchronizer and PIVCAM 10-30 camera. The camera working in the cross-correlation mode was equipped with a 60mm Nikon lens. System control and data analysis was done using INSIGHT™ software.





Courtesy: Y. Knapp, E. Bertrand , F. Mouret and J. Stefanini
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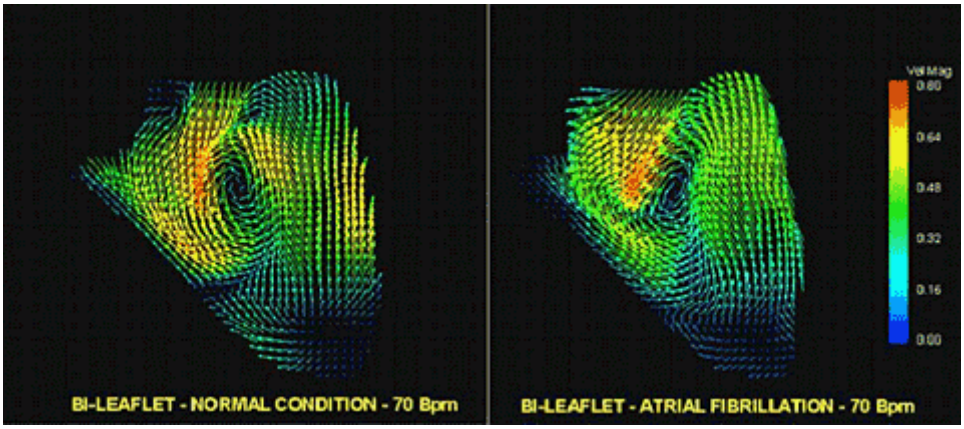

Reference

Knapp, Y., Bertrand, E., Mouret F., Stefanini, J., "Flow structure characterization behind mitral valves in a double activated heart simulator," 5th International Symposium on Particle Image Velocimetry, Busan, Korea, September 22–24, 2003.