Measurements by Particle Streak Velocimetry: first step to the PIV ?

DAVID L., TEXIER A.

Laboratoire d'Etudes Aérodynamiques, Université de Poitiers, CNRS, ENSMA, SP2MI, Bd Marie et Pierre Curie, Téléport 2, 86962 Futuroscope cedex, France Tel.: +33 5 49496944, Fax: +33 5 49496968, E-mail: Laurent.David@univ-poitiers.fr

In France, the first chronophotographic studies are published by EJ. Marey in 1893 who was interested in the visualization of flows around obstacle. Full-field velocity measurements began more tardily with Ch. Camichel during the 1930s, Ch. Chartier (1937) carried out stereoscopic quantitative flow measurements around obstacles and marine propellers. Installed at Poitiers in the IMAP, which will become the ENSMA, he carried out aerodynamic and hydrodynamic measurements in flows at various velocities. J.M. Bourot (1949) worked on the ability of particles to follow gas flows, especially at high speeds (200, 300 m/s). The studies started from photography have been continuously improved during many years, under the impulse of M. Coutanceau. At the end of the 1980s, the technique of particle streak velocimetry was automated on microcomputer by MF Collin and A. Texier. Digitized images at high-resolution allowed the extraction of instantaneous velocity fields for flows in channels or starting wakes. With the emergence of digital cameras at the laboratory in the 1990s, other flow measurement techniques were developed (PIV, PTV, Polychromatic PSV 3D) and in 1996 the comparative results between PSV, PTV and PIV signed the end of the PSV.

EJ. Marey, 1893 : Le mouvement des liquides étudié par la chronophotographie. Comptes rendus hebdomadaires des séances de l'Académie des Sciences, 1893, 116 : 913-924

Ch. Chartier, 1937: Chronophotogrammétrie plane et stéréoscopique. Publications scientifiques et techniques du ministère de l'air.

J.M. Bourot, 1949 : Chronophotographie des champs aérodynamiques. Publications scientifiques et techniques du ministère de l'air.

M.F. Collin, A. Texier, M. Coutanceau, 1989: Velocity field determination based upon flow image analysis. 5th International Symposium on Flow Visualization - Prague 1989.

A. Texier, L. David, 1996: A kinematic study of hydrodynamic flow using particle streak velocimetry. *Journal of Flow Visualization and Image Processing* Vol 3, n°3, 479-498.

L. David, A. Texier, J. Fayolle, J. Jay, 1996: Three PIV technique comparisons in hydrodynamic flows. *4th Asian Symposium on Visualization*, ed. QD.Wei, pp 273-276.