Report on EUROMECH 260
"Advanced non-intrusive experimental techniques in Fluid and Plasma Flows"

Poitiers, France, 5-7 September 1990

The aim of the Colloquium was to bring together scientists from Fluid, Combustion, Chemistry and Plasma, in order to associate several fields of knowledge, as complementary as possible, in the development of new non-intrusive experimental techniques. Emphasis was given on advanced techniques, mainly optical ones, based on optical or molecular properties of the flows. These purposes were achieved during the Symposium where 55 participants from 7 countries were present : France (36); West Germany (11); U.K. (2); USSR (2); USA (2); Italy (1); Finland (1). As far as experimental methods essentially based on Laser systems were concerned, one should notice the presence of several industrial exhibitions : DANTEC S.A. and T.S.I. Inc. for Fluid Mechanics measurement systems, SOPRA and SPECTRA Physics for Lasers and Société Anonyme des Télécommunications for Infrared Optics and detectors. The registration fees were of 800 french francs.

Five sessions were organized with 29 oral presentations, covering the following fields : - Coherent Anti-Stokes and Rayleigh Elastic Scattering, Non Linear Dynamics, Fluorescence, Molecular Tracking and Particle Image Velocimetry. For each topic, an invited lecture was given by a specialist to give the state of the art. In addition, two lectures were given by non-specialists : one was devoted to the needs from the industrial side, (from BERTIN Inc.), the other was the requirements of theoreticians for the validations of calculations and theory.

Some of the papers were concerned by recent developments of yet relatively well known techniques as CARS, Elastic Scattering or Fluorescence for example and new improvements or special applications were presented. Comparisons between use in Plasma, neutral Fluid, Combustion or chemical processes were then possible. Other papers, more prospective, were devoted to very new diagnostics, sometimes only under development. These aspects were one of the main objectives of this colloquium ; between others, let us point out the Laser Fourier Densitometry, the filtered RELIEF method, the altered Rayleigh Scattering, the Laser Induced Photochemical Anemometry, the Fluorescence by Electron Beam, the Scattering of Ultrasonic waves, etc... These fields are under rapid development. On other hand, some planned applications of techniques in severe conditions (hypersonic flows, high enthalpy tunnels, etc...) were discussed. Finally, a summary of the Symposium has been given and a panel discussion organized. The main ideas emerging were that :

- the rapid development of Laser technologies opens new areas of developping or improving experimental techniques. As an example, the RELIEF technique, previously requiring three Lasers, can be used now with two ones, with simple adjustements,
- the collaboration of scientists of various areas (Plasma, Chemistry, Fluids etc...) is one crucial point for the elaboration and improvements of future diagnostic techniques.

One should notice a very satisfactory fidelity of the audience during all the sessions and social event, despite the various domains covered. A number of participants expressed an interest in a follow-up meeting on these rapidly evolving topics, within two or three years time.

We are grateful to EUROMECH Committee for approving this Colloquium. The financial supports come from Centre National de la Recherche Scientifique, C.N.R.S., the French Ministery of Defense, DRET/DGA, plus local institutions as Université de Poitiers, Région Poitou-Charentes, Département de la Vienne, Ville de Poitiers and UFR-C.E.A.T., the host institution which provide us the efficient staff. Finally we acknowledge the participations of Industrials, particularly the financial supports of DANTEC Electronique, TSI France and SAT Poitiers-Paris.

10 October 1990

J.P. BONNET
C.E.A.T.-L.E.A.
43 rue de l'Aérodrome
F-86036 POITIERS Cedex

D. GRESILLON
Laboratoire P.M.I.
Ecole Polytechnique
F-91128 PALAISEAU