

18. Chandrasekhara M. S. and Ramaprian B. R. Measurements in Two-Dimensional Jets and Plumes. *University of Iowa, USA*
19. Quinn W. R., Pollard A. and Marsters G. F. Measurements in a Turbulent Rectangular Free Jet. *Queen's University, Kingston, Canada*

#### Free Shear and periodic flows

20. \*Sherikar S. V. and Chevray R. Investigation of a Plane Mixing Layer. *State University of New York, USA*

#### Geophysical flows

21. Jirka G. H. Transition From a Horizontal Turbulent Boyant Jet to a Mixing Layer: An Entrainment Model. *Cornell University, Ithaca, USA*

#### Experimental techniques

22. Acharya M. and Escudier M. P. Measurements of Wall Shear Stress in Boundary Layer Flows. *Brown-Boveri Research Centre, Baden, Switzerland*
23. Dengel F. and Vagt J. D. A Comparison Between Hot-Wire and Pulsed-Wire Measurements in Turbulent Flows. *Technische Universität, Berlin, FRG*
24. Nitsche W., Thunker R. and Haberland C. A Computational Preston Tube Method. *Technische Universität, Berlin, FRG*

20–22 September, 1983, Budapest, Hungary

## FLOMEKO'83

FLOMEKO'83 was the third flow measurement conference to be sponsored by the Technical Committee No. TC9 of IMEKO (the International Measurement Konfederation). This Technical Committee was created after the London Congress of IMEKO since it had been found that Congress sessions devoted to flow measurement were increasingly stimulating and well-attended.

I was invited to be Chairman and believed that a succession of conferences specifically on flow measurement held in different parts of the world would provide opportunities for participation to many who would otherwise have no chance of attending. The first FLOMEKO was held at Groningen in The Netherlands in 1978 and the second in Tokyo at the end of 1979. As a co-sponsor the IMEKO Technical Committee was then involved in 1981 in the Instrument Society of America Conference at St Louis so maintaining this movement around continents.

FLOMEKO'83, held in Budapest on 21–23 September 1983 was another successful event, this time with 100 delegates from 20 countries, thus maintaining a strong international flavour. It had been hoped that more delegates from the Eastern European countries would have come on this occasion, although Hungary itself was well represented.

One of the noteworthy aspects of these conferences has been the use of the English language. It was remarkable and most laudable to find, in Budapest, so many delegates willing and able to make presentations and take part in discussions in English.

With just 30 papers on a range of topics

#### Heat transfer

25. Anand M. S. and Pope S. B. Diffusion Behind a Line Source in Grid Turbulence. *Cornell University, Ithaca, USA*
26. Cheesewright R. and Dastbaz A. The Structure of Turbulence in a Natural Convection Boundary Layer. *Queen Mary College, London, UK*
27. Iritani Y., Kasage N. and Hirata M. Heat Transfer Mechanism and Associated Turbulence Structure in the Near Wall Region of a Turbulent Boundary Layer. *University of Tokyo, Japan*
28. Warhaft Z. The Interference of Multiple Line Sources in Grid Turbulence. *Cornell University, Ithaca, USA*

#### Recirculating flows

29. Hallett W. L. H. and \*Gunther R. The Turbulent Structure of Swirling Flow in a Sudden Expansion. *Universität Karlsruhe, FRG*
30. \*Johnson B. V. and Bennett J. C. Mass and Momentum Turbulent Transport Experiments With Confined Coaxial Jets. *United Technologies Research Centre, East Hartford, USA*
31. Ruderich R. and Fernholz H. H. An Experimental Investigation of the Turbulent Shear Flow-Downstream of a Normal Flat Plate with a Long Splitter Plate-Modification of a Model. *Technische Universität, Berlin, FRG*
32. Suzuki K., Ida S. and Sato T. Turbulence Measurements Related to Heat Transfer in an Axisymmetric Confined Jet with Laser Doppler Anemometer. *Kyoto University, Japan*

which covered both the conventional and the novel flowmeters in use around the world there had to be gaps. For once there were no 'straightforward' papers dealing with the problem of coefficients of pressure difference devices: instead the session on these devices had some unusual papers, for instance two from Poland dealt with the use of an orifice Wheatstone bridge arrangement for measuring the fuel flow to internal combustion engines.

Two papers which attracted significant interest and comment were from the UK and Japan. That from the UK dealt with the development of a four-path ultrasonic flowmeter for the measurement of large flows of natural gas which has had field trials on British Gas Corporation pipelines. Professor Yamasaki presented the paper on a novel electromagnetic flowmeter.

The conference started, however, with several sessions on transfer standards and calibration facilities and the importance of a reliable, accurate and traceable network of measurement facilities was again emphasised. Of the nine papers in these sessions the two, in my opinion, which were of significance to the whole pattern of measurement were presented by Dr W. C. Pursley, from the National Engineering Laboratory in the UK, and by Dr J. Gyory from the Hungarian Company, Vegyepszer. Dr W. C. Pursley described an exercise in which the volumetric standards of six standards laboratories in five countries were compared using a transfer package incorporating two positive displacement meters. This twin-meter package concept has been developed at NEL from a technique

used by the National Bureau of Standards in the USA. The results of this EEC intercomparison showed agreement of the order of  $\pm 0.1$  per cent.

The paper by Dr J. Gyory of Hungary was on tests carried out at the Vegyepszer works to determine the uncertainty of a prover's base volume. The paper could be seen to highlight the different approaches set by the American Petroleum Institute (API), the Physikalisches Technische Bundesanstalt (PTB) in Western Germany and the Hungarian Office of Measures. The latter's is based on a GOST standard of the Soviet Union. After hearing the presentation and discussion and studying the paper one is led to conclude that this subject deserves fresh consideration; proof of absolute accuracies of better than 0.1% cannot be demonstrated by the API method while that stipulated by the GOST standard requires enormous cost and time without substantial improvement

in the level of accuracy achieved. The author concludes that provers should be calibrated by 11 consecutive round-trip measurements and these must show a repeatability of  $\pm 0.02\%$  to combine with the rest of the checks if the upper limit of  $\pm 0.08\%$  at the statistical 95% level is to be achieved.

In addition to the paper sessions, there were technical visits, a Technical Committee meeting, and a superb autumn to ensure that this Hungarian conference was both a useful and a pleasurable event. Preprints in book form were made available to participants by the IMEKO Secretariat, Budapest; the Proceedings are to be published by Akademiai Kiado in Budapest with the support of the North Holland Publishing Co in early 1984.

The next FLOMEKO is now being planned for Melbourne in 1985.

E. A. Spencer



# CALENDAR

<b>International Conference on Flow Measurement in The Water Industry</b>	10-12 April 1984 East Kilbride, UK	P. Collier, Conference Organiser, National Engineering Laboratory, East Kilbride, Glasgow G75 0QU, UK
<b>Computational Methods in Design of Turbine Machinery (Rotating)</b>	10-12 April 1984 Birmingham, UK	The Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1H 9JJ, UK
<b>Second Symposium on Thermotechnical Measurements</b>	16-18 April 1984 Budapest, Hungary	MATE Secretariat, H-1372 Budapest, POB 451, Hungary
<b>Shell and Tube Heat Exchangers</b>	May 1984 New Jersey, USA	The Center for Professional Advancement, PO Box H, East Brunswick, NJ 08816-0257, USA
<b>Mathematics of Finite Elements &amp; Applications</b>	1-4 May 1984 Brunel, UK	The Secretary, The Institute of Computational Mathematics, Brunel University, Uxbridge, Middlesex UB8 3PH, UK
<b>5th International Heat Pipe Conference</b>	14-17 May 1984 Tsukuba, Japan	Professor K. Oshima, The Institute of Space & Astronautical Science, Komaba 4, Meguro-ku, Tokyo 153, Japan
<b>IEA Conference on Heat Pumps: Current Situation and Future Prospects</b>	22-25 May 1984 Graz, Austria	Dipl Ing Hochegger, Energiesparhaus Graz, 8010 Graz Peterstrasse 45, Austria
<b>29th International Gas Turbine Conference and Exhibit</b>	3-7 June 1984 Amsterdam, The Netherlands	International Gas Turbine Center, 4250 Perimeter Park South, Suite 108, Atlanta, GA 30341, USA
<b>World Conference on Thermal Analysis</b>	4-5 June 1984 Amsterdam, The Netherlands	Alena Enterprises of Canada, PO Box 1797, Cornwell K6H 5V7, Ontario, Canada
<b>5th IMACS International Symposium on Computer Methods for Partial Differential Equations</b>	19-21 June 1984 Bethlehem, PA, USA	Professor W. E. Schiesser, Dept of Chemical Engineering, Whitaker Lab 5, Lehigh University, Bethlehem, PA 18015, USA
<b>International Symposium on Two-Phase Annular and Dispersed Flows</b>	24-29 June 1984 Pisa, Italy	Paolo Andreussi, Dipartimento di Ingegneria Chimica, Universita di Pisa, Via Diotislavi 2, 56100 Pisa, Italy
<b>2nd International Symposium on Applications of Laser Anemometry to Fluid Mechanics</b>	2-4 July 1984 Lisbon, Portugal	Professor D. G. F. Durao, Department of Mechanical Engineering, Instituto Superior Tecnico, Avenida Rovisco Pais, 1096 Lisbon, Portugal
<b>NATO Advanced Study Institute: Natural Convection—Fundamentals and Applications</b>	16-27 July 1984 Izmir, Turkey	Dr S. Kakac, Department of Mechanical Engineering, University of Miami, Coral Gables, FL 33124, USA
<b>22nd ASME/AIChE National Heat Transfer Conference</b>	5-8 August 1984 Niagara Falls, NY, USA	ASME, 345 East 47th Street, New York, NY 10017, USA