

CONFERENCE REPORT

9–10 June 1983, Gaithersburg, Maryland, USA

Fundamental Research Issues in Orifice Metering

One million dollars per day is the cost, estimated by the US gas industry, of 'unaccounted for natural gas' and was the motivation for the Gas Research Institute Workshop held at the National Bureau of Standards (NBS). The objective of the Workshop was to discuss the practical problems in flow measurement confronting orifice meter users and to suggest ways to achieve solutions.

In response to the spreading concern about the contribution to that million dollar figure from the uncertainty levels in the orifice-based custody transfer measurements of natural gas, this international Workshop was convened by the sponsors GRI, NBS[†] and the UK National Engineering Laboratory (NEL). The Workshop brought together a broad spectrum of fluid measurement personalities. These ranged from orifice and other instrument manufacturers and the many users of this equipment to test specialists, and from mathematicians and computer analysts to academicians whose research areas could have significant impact in obtaining better accuracies in practical orifice measurements.

Nearly 100 attended from 10 countries. After hearing general overviews from R. W. Miller of the Foxboro Company, Dr G. E. Mattingly of NBS and Professor K. N. Ghia of the University of Cincinnati, the invited attendees were split into Task Groups. These Task Groups were selected to provide a mixture of talents to discuss the flow measurement problems in using orifice metering from four different viewpoints. Half the time of the Workshop was spent in this way, the Task Groups being charged to identify how desired improvements could best be achieved. As a result they each recommended limited numbers of key projects into which available and newly-funded effort could be funnelled. These were discussed in a full assembly later on the second day when

presentations were also made to describe the various test programmes currently being carried out in the USA and Western Europe.

The combined set of priority projects, which was defined as the end-product of the Workshop, included:

- To improve the accuracy and reliability of the equipment in use to measure the differential pressure created by the presence of the orifice plate in the pipeline.
- To confirm the absolute accuracies of the laboratory calibration facilities used to validate the predicted discharge coefficients.
- To resolve the differences in the present national and international standard specifications.
- To combine experimental and numerical computer modelling to achieve better explanations of flow phenomena in the upstream pipeline and through the orifice meter.

These and other specific projects were spelled out in detail. It is felt that some could provide benefits quite quickly while others will mature in the years ahead to advance the science and practice of orifice metering.

The first target, undoubtedly, will be to halve the contribution from the measurement errors and uncertainties to the amount of 'unaccounted-for-gas'. It is anticipated that similar benefits can be gained in the UK and other industrialized nations using natural gas. Thus the resulting effects would be felt both directly, by translation into reduced gas costs to the consumer and, indirectly, by the consequent reduction in production costs.

E. A. Spencer

[†] Assistance was received from the US National Science Foundation.

CALENDAR

Two-Phase Flow Metering (Course)

4–6 October 1983
Cranfield, UK

Design and Operational Problems of Turbomachinery

18–19 October 1983
Dresden, GDR

Tokyo International Gas Turbine Congress

24–28 October 1983
Tokyo, Japan

5th International Seminar on Boundary Elements

8–11 November 1983
Hiroshima, Japan

Miss A. L. Roff, Short Course Officer, Cranfield Institute of Technology, Cranfield, Bedford MK43 0AL, UK

Professor G. Schramm, Technical University Dresden, Section of Energy Transformation, 8027 Dresden, GDR

1983 Tokyo International Gas Turbine Exhibit Secretariat, Japan Convention Services Inc, Nippon Press Center Building, 2-1 Uchisaiwai-cho 2-chome, Chiyoda-ku, Tokyo-100, Japan.

Dr C. A. Brebbia, University of Southampton, Southampton, Hampshire SO9 5NH, UK

ASME Winter Annual Meeting	13–18 November 1983 Boston, MA, USA	ASME, 345 East 47th Street, New York, NY 10017, USA
Numerical Methods in Heat Transfer (ASME Winter Annual Meeting)	13–18 November 1983 Boston, MA, USA	ASME, 345 East 47th Street, New York, NY 10017, USA
Heat Transfer Measurements in Microwave Systems (ASME Winter Annual Meeting)	13–18 November 1983 Boston, MA, USA	Dr Maurice R. Berry Jr (Chairman), US Food and Drug Administration, 1090 Tusculum Avenue, Cincinnati, OH 45226, USA
Engineering Heat Transfer (Course)	21–25 November 1983 Cranfield, UK	Miss A. L. Roff, Short Course Officer, Cranfield Institute of Technology, Cranfield, Bedford MK43 0AL, UK
Electromagnetic and Ultrasonic Flowmeters (Short Course)	6–8 December 1983 Cranfield, UK	Fluid Engineering Unit, Cranfield Institute of Technology, Cranfield, Bedford MK43 0AL, UK
5th International Symposium on Finite Element Methods in Flow Problems	23–26 January 1984 Austin, TX, USA	The University of Texas, Austin, TX 78712, USA
International Symposium on Gas–Solid Flows (ASME Spring Meeting)	11–17 February 1984 New Orleans, LA, USA	Professor J. J. Jurewicz, Chairman, Mechanical and Aerospace Engineering, W. Virginia University, Morgantown, WV 26506, USA
Symposium on Liquid–Solid Flows and Erosion Wear in Industrial Equipment (ASME Spring Meeting)	11–17 February 1984 New Orleans, LA, USA	Professor M. C. Roco, Chairman, Mechanical Engineering, University of Kentucky, Lexington, KY 40506-0046, USA
International Conference on Flow Measurement in The Water Industry	10–12 April 1984 East Kilbride, UK	P. Collier, Conference Organiser, National Engineering Laboratory, East Kilbride, Glasgow G75 0QU, UK
Computational Methods in Design of Turbine Machinery (Rotating)	10–12 April 1984 Birmingham, UK	The Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, London SW1H 9JJ, UK
Second Symposium on Thermo-technical Measurements	16–18 April 1984 Budapest, Hungary	MATE Secretariat, H-1372 Budapest, POB 451, Hungary
IEA Conference on Heat Pumps: Current Situation and Future Prospects	22–25 May 1984 Graz, Austria	Dipl Ing Hochegger, Energiesparhaus Graz, 8010 Graz Peterstrasse 45, Austria
World Conference on Thermal Analysis	4–5 June 1984 Amsterdam, The Netherlands	Alena Enterprises of Canada, PO Box 1797, Cornwall K6H 5V7, Ontario, Canada
International Gas Turbine Conference and Exhibit	4–7 June 1984 Amsterdam, The Netherlands	International Gas Turbine Center, Suite 108, 4250 Perimeter Park South, Atlanta, GA 30341, USA
International Symposium on Two-Phase Annular and and Dispersed Flows	24–29 June 1984 Pisa, Italy	Paolo Andreussi, Dipartimento di Ingegneria Chimica, Università di Pisa, Via Diotislavi 2, 56100 Pisa, Italy
2nd International Symposium on Applications of Laser Anemometry to Fluid Mechanics	2–4 July 1984 Lisbon, Portugal	Professor D. G. F. Durao, Department of Mechanical Engineering, Instituto Superior Tecnico, Avenida Rovisco Pais, 1096 Lisbon, Portugal
19th Intersociety Energy Conversion Engineering Conference	19–24 August 1984 San Francisco, CA, USA	Dr G. Graves, M/S 102, Los Alamos Science Laboratory, PO Box 1663, Los Alamos, NM 87545, USA
CHISA '84: International Congress of Chemical Engineering	3–7 September 1984 Prague, Czechoslovakia	Congress Secretariat, Attention: Dr J. Skarka, 8th Congress CHISA '84, PO Box 857, CS 111 21, Praha 1, Czechoslovakia
International Conference on Direct Fired Heat Pumps	19–21 September 1984 Bristol, UK	P. W. Fitt, Department of Mechanical Engineering, University of Bristol, Queen's Building, University Walk, Bristol BS8 1TR, UK
International Gas Turbine Conference and Exhibit	17–21 March 1985 Houston, TX, USA	International Gas Turbine Center, ASME Gas Turbine Division, Suite 108, 4250 Perimeter Park South, Atlanta, GA 30341, USA
20th Intersociety Energy Conversion Engineering Conference	19–23 August 1985 Miami, FL, USA	G. P. Townsend, United Technologies Corp, Windsor Locks, CT 06096, USA