

## Contents

	Page
<i>R. S. Buttle and A. Kimpton</i>	ESKOM'S Flow Calibration Facility 1
<i>A. Aschenbrenner</i>	Calibration of the New Test Rig for Large Gas Meters of the Physikalisch-Technische Bundesanstalt 11
<i>J. E. Johnson, R. E. Harris and R. J. McKee</i>	Primary Mass flow Calibration for a Recirculating Gas Flow Loop 23
<i>C. R. Sparks, R. D. Durke and R. J. McKee</i>	Pulsation-Induced Errors in the Primary and Secondary Systems of Orifice Meters 31
<i>J. Gorter</i>	Investigation of the Flow Coefficient of a 600 mm Orifice Plate 39
<i>Ch. F. Sindt, J. A. Brennan, S. E. McFaddin and R. W. Wilson</i>	Effect on Pipe Surface Finish on the Orifice Discharge Coefficient 49
<i>C. R. Smith, J. J. Greco and P. B. Hopper</i>	Low-loss Flow Conditioner for Flow Distortion/Swirl Using Passive Vortex Generation Devices 57
<i>G. E. Mattingly and T. T. Yeh</i>	Flowmeter Installation Effects – Single and Double Elbow Configurations 65
<i>B. Harbrink, W. Zimig, H.-J. Hassenpflug, W. Kerber and H. Zimmermann</i>	The Disturbance of Flow through an Orifice Plate Meter Run by the upstream Header 75
<i>M. Kaiho</i>	Computer Aided Engineering System for an Electromagnetic Flowmeter 91
<i>J. S. Humphreys and J. M. Hobbs</i>	The NEL Installation Tolerant Orifice Plate Package 99
<i>Sh. H. Alvi</i>	Choice of Quadrant-edged Orifice Meters for Low and Moderate Reynolds Numbers 107
<i>K. Komiya and F. Higuchi</i>	A Thermal Flowmeter Based on heat Transfer 119
<i>P. Procházka</i>	Microprocessor Controlled Device for Precise Measurement in Supersonic Wind Tunnels 127
<i>K. Kuromori, Sh. Goto and Y. Matsunaga</i>	Advanced Magnetic Flowmeters with Dual Frequency Excitation 135

## Contents

	Page
<i>J. van Bekkum, M.M. Warffemius and D.M. Oldenziel</i>	On the Hydrodynamical Stability of Electromagnetic Flowmeters 143
<i>T. Cousins, A.J.T. Hayward and R. Scott</i>	Design and Performance of a New Vortex Shedding Flow Meter 151
<i>M. Hohenstatt</i>	Explosion-proof Thermal Mass Flow Meter for Gases 169
<i>S. Agrawal, D.P. Goel and S.R. Gowariker</i>	Microprocessor Based Cross-Correlation Type Ultrasonic Flowmeter 181
<i>A. Rivetti, G. Martini, R. Goria, G. Cignolo, A. Capelli and F. Alasia</i>	Oil, Kerosene and Water Flowmeter Calibration: The Integrated IMGC Gravimetric/Volumetric Primary Facility 189
<i>B. Birker</i>	Theory and Performance of the Vibrating Straight Tube Massflow meter 199
<i>A. Strzelecki, P. Hebrard and P. Gajan</i>	Experimental Analysis of flow Phenomena in a Vortex Flowmeter in Steady and Pulsatile Flow Conditions 207
<i>F. Blieschke and H. Meyr</i>	Improvement of Vortex Flowmeters Through Parametric Frequency Estimation 215
<i>R.C. Mottram and M.S. Rawat</i>	A Flow Straightener – Vortex Meter Package 223
<i>H. Utsumi, M. Takamoto and N. Watanabe</i>	The Effect of Installation Conditions on Vortex Shedding Flowmeters 231
<i>Z. Remenyi</i>	Modernizing of Bell Prover, its Tracing Back and Comparison Measurements 239
<i>W. Pöschel</i>	Investigation and Verification of the Measurement Uncertainty of High Accuracy Flowmeter Calibration Devices by Internal Comparing Measurements 247
<i>H. Kehrmann</i>	Air Mass Flow Generator – A Measuring System for Calibrating Gas Flow Meters 257
<i>A. Aschenbrenner</i>	New OIML Recommendations for Gas Volume Meters 271
<i>P. Gajan, P. Millan, P. Hebrard and P. Trichet</i>	Investigation of the Flow Patterns Through an Orifice Plate Flowmeter 279

## Contents

		Page
<i>E. Jacques and J. Patigny</i>	Mechanical and Numerical Filters Used Together with Electromanometers: A Way to Improve the Performance of Air Flow Measurement by P. D. Methods	287
<i>M. Ricken</i>	The Swirlmeter – An Universal Flow Measuring Instrument	295
<i>M. Jaeschke, S. Audibert, P. van Caneghem, A. E. Humphreys, R. Janssen, Q. Pellei, J. A. Schouten and J. P. J. Michels</i>	Standard GERG 88 Virial Equation for the Compressibility Factor Prediction of Natural Gases in Europe	305
<i>C. W. Koreman</i>	A Quality Assurance System for Flow Measurements in Custody Transfer of Natural Gas	317
<i>H. De Vries, L. L. Loogmann, K. van Dellen and G. J. Broekgaarden</i>	Ultrasonic Gas Flow Measurements with Reflection Mode in Underground Pipelines	325
<i>H. Koning, G. J. Van Essen and J. Smid</i>	Time Behaviour of Turbine Meters – Statistical Analysis of IRelCalibration Results of Turbine Meters	333
<i>D. Dopheide, M. Faber, G. Reim and G. Taux</i>	New Optoelectronic Velocity and Flowrate Measuring Methods Using Semiconductor Lasers and Photodiode	341
<i>H. L. Spoor and D. M. Oldenziel</i>	On the Ultrasonic Flow Measurement in Relation to the Reynolds Number and finite Sensor Sizes	353
<i>A. Hauck</i>	Ultrasonic Tomography for the Non-Intrusive Measurement of Flow-Velocity-Fields	361
<i>K. Nakano, Y. Tanaka and T. Ohsawa</i>	Electrostatic Flowmeter For Oil Flow	371
<i>P. Kesic, V. Pajic and J. Maksimovic</i>	Experimental Evaluation of Fluidic Flowmeter for a heat Metering Application	379
<i>H. Braun</i>	Velocity and Flow Rate Measurement in Pneumatic Conveyors Using the Correlation Gradient Method	387
	List of Author's	399