

Conference on Advanced Mathematical and Computational Tools in Metrology and Testing

23 – 25 June 2008 – Paris (France)

Provisional Conference Programme

The programme is a digest of the typical activities of IMEKO TC21. It presents a broad range of subject matters of interest for both fields of metrology and of testing, and includes at least one **invited** presentation for each of the Sessions, delivered by a recognised authority in each field coming from world leading Institutions (CIPM CCQM, LNE, NIST, NPL, NRC, PTB, leading Universities, VSL-NMi). Other leading scientists in both fields of metrology and testing are performing outstanding **oral** presentations, together with younger scientists, from a total of more than 20 countries all round the world.

The parallel sessions account for only 1/2 of the presentations, leaving a wide opportunity to fully appreciate the Conference programme from **plenary talks** and, due to schedule restrictions, from a number of **poster** presentations that can be amply discussed in a dedicated Session and during all the conference breaks.

A Round Table is taking place as the core of the Conference, concerning the new GUM and new ISO 5725 in preparation, of interest of both metrology and testing, conducted by a panel of scientists directly and deeply involved in the process, who will make an introduction to the theme to facilitate the debate.

Monday, June 23

9:00

CONFERENCE OPENING

Session 1 - Fundamentals in measurement

Chairs: G.B. Rossi (IT), E.Benoit (FR)

9:20 . Possibility distribution: a useful tool for representing coverage intervals with and without the probability density knowledge. G.P. Mauris (FR)

9:45 . Derivation of an output PDF from Bayes' theorem and the principle of maximum entropy. I. Lira (CI), C. Elster (DE), W. Wöger (DE), M.G. Cox (UK)

10:10 . Transferring Monte Carlo distributions in the analysis of uncertainty. R. Willink (NZ)

10:35 . Tolerance verification with CMM: a point sequential determination by Kriging modellisation. P. Pedone, D. Romano, G. Vicario (IT)

11:00–11:20

Break

11:20 . Uncertain complex numbers. B.D. Hall (NZ)

11:45 **A.B. Forbes** (NPL, *invited Session 1*): Nonlinear Least Squares, maximum likelihood estimation and Bayesian inference.

12:15 **R. Kenett** (KPA & ENBIS, *invited Session 3*): Quality by design applications to analytical methods in the pharmaceutical Industry.

12:45

Lunch

13:30

POSTER SESSION

14:35

A. Clément (LISMMA, *invited Session 2*): Declaration and specification of a geometrical part in the language of Geometric Algebra.

Session 2

Metrology, Calibration and Testing

Chairs: E.Filipe (PT), J.-M; Linares (FR)

15:05 . Gear metrology of statistical tolerancing by numerical simulation. J.-P. Vincent, C. Baudouinc, J. Bruyere, J.-Y. Dantan, R. Bigot (FR)

15:30 . Multi-determination of aerodynamic loads using calibration curve with a polynomial and MLP neural network combination. I.M. Barbosa, E. Del Moral Hernandez, M.L. Collucci da Costa Reis, O.A. de Faria Mello (BR)

15:55 . Likelihood maximisation against the probability density function shape. S. Aranda, J.-M. Linares, J.-M. Sprauel (FR)

16:20–16:40

Break

16:40 . Orthogonal distance fitting of precision free-form surfaces based on L-1 norm. X.C. Zhang, X.Q. Jiang, P.J. Scott (UK)

17:05 . Uncertainty evaluation for pose estimation by multiple camera measurement system. M. Douilly, N. Anwer, P.Bourdet, N. Crevassus, P. Le Vacon (FR)

17:30 **R. Kaarls** (CIPM-CCQM, *invited Session 6*): Considerations and developments in uncertainty evaluations in chemical metrology.

18:00–18:30 **C. Elster, A. Link** (PTB, *invited Session 4*): Analysis of dynamic measurements: compensation of dynamic error and evaluation of uncertainty.

Session 3

Industrial Statistic and Metrological

Traceability

Chairs: R.Kenett (IL), M. Saporta (FR)

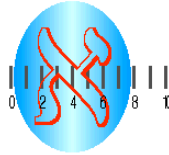
. An optimised uncertainty approach to guard-banding in global conformity assessment. L.R. Pendrill (SE)

. Sensitivity analysis in metrology: study and comparison on different indices for measurement uncertainty. A. Allard, N. Fischer (FR)

. Evaluation of uncertainties on datum-system reference. J. Maihle, J.-M. Linares, J.-M. Sprauel (FR)

. Expert programs supporting the form deviations measurement. M. Pawlowski, B. Gapinski, M. Grzelka, M. Rucki (PL)

. Kalman filter type sequential method with stopping rule for calibration of measurement instruments. C. Hajiyev (TR)



Tuesday, June 24

Session 4 - Dynamic Measurements

Chairs: A.B. Forbes (UK), N. Fischer (FR)

- 9:00 . Uncertainty assessment in the measurement of dynamic stiffness of rubber components. I. Bodini, M. Lancini, D. Vetturi (IT)
- 9:25 . Digital estimation of the signal lag time based on the sign-function analogue-stochastic quantisation. V.N. Yakimov (RU)
- 9:50 . Impact of correlation on the results of a dynamic calibration. G. Wübbeler, A. Link, T. Bruns, C. Elster (GE)
- 10:15 . Digital filtering for dynamic uncertainty. J.P. Hessling (SE)
- 10:40 . Challenges in practical dynamic calibration. T. Bruns, M. Kobusch, E. Franke (GE)

Session 5 - Health Metrology and Testing

Chairs: M.P. Sassi (IT), M.Priel (FR)

- . Lossless compression of computer tomography point clouds. R. Schmitt, S. Fritz (GE)
- . Multivariate and functional clustering applied to measurements of laboratory analysis systems I. Winzenborg, A. Geistanger, U. Stadtmüller (GE)

Session 6 - Chemistry and Environment Metrology and Testing

Chairs: K.-D. Sommer (DE), P. Charlet (FR)

- . Implementation of some mathematical approximation methods of functions for study of the factors which influence the ferment activity of beer yeast. M. Milici, R. Rotar, D. Milici (RO)
- . Uncertainties of standard concentrations, calibration line and predictions. C. Yardin (FR)
- . Optimal decision rules and limits of detection. J.A. Sousa (PT), A.B. Forbes (UK)

11:05–11:25

Break

- 11:25 . Evaluation of uncertainty of Arrhenius parameter in chemical kinetics fitting. R. Kessel, W.S. McGivern, R. Kacker (GE, USA, Session 6)
- 11:50 **G.B. Rossi** (DIMEC, *invited Session 5*): Measurement of characteristics related to human perception.
- 12:20 **N.F. Zhang** (NIST, *invited Session 4*): Allan Variance and the Uncertainty of Autocorrelated Measurements.

12:50

Lunch

- 14:10 **G. Rietveld** (VSL-NMi, *Invited Session 7*): Quality of measurement software and new opportunities for remote calibration.

Session 7 - Measurement Software and IT

Chairs: I. Kishimoto (JP), P. Bourdet (FR)

- 14:40 . A framework of multivariable-simultaneous measurement by a single device. T. Ishigaki, T. Higuchi, K. Watanabe (JP)
- 15:05 . A software simulation tool to evaluate the uncertainties for a lock-in amplifier. P. Clarkson, T.J. Eward, P.M. Harris, K.J. Lines, F.O. Onakunle, I.M. Smith (UK)
- 15:30 . A new guide for the development and assessment of measurement software. N. Greif, G. Parkin (GE, UK)
- 15:55 . Calculate measurement uncertainty using MUSE. M. Müller, M. Wolf, M. Rösslein (CH)

Session 8 - Written Standards for Metrology and Testing

Chairs: L. Pendrill (SE), C. Perruchet (FR)

- . An approach to uncertainty analysis using nested analysis. M. do Ceu Ferreira, A. Furtado, E. Filipe (PT)
- . A comparison among methods for measuring uncertainty based on the ISO standards. L. Deldossi (IT)
- . Current issues in the evaluation of ionising radiation measurements. D. Grientschnig (AT)
- . To which degree the concepts for the expression of uncertainty are consistent in present international written standards and guides for metrology and testing? F. Pavese (IT)

16:20–16:40

Break

- 16:40 **M. Priel** (LNE, *Invited Session 8*): From GUM to alternative methods for measurement uncertainty evaluation.

17:10–18:40

ROUND TABLE

The new GUM and the new ISO 5725: similarities and dissimilarities

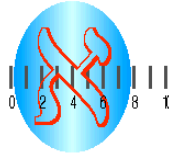
Moderator: F.Pavese.

Panel and introductions from:

M.G. Cox (BIPM WG on GUM),
P. De Bièvre (CIPM WG on VIM),
C. Perruchet (ISO TC69, Chairman)

20:30

CONFERENCE DINNER



Wednesday, June 25

Session 9 - Key Comparisons

Chairs: R.J. Douglas (CA), G. Geneves (FR)

- 9:00 . Analysis of key comparison data using detailed uncertainty information. A.G. Chunovnika (RU), I. Lira (CI), C. Elster, W. Wöger (GE)
- 9:25 . Proficiency testing for calibration laboratories. E. Filipe (PT)
- 9:50 . Computer experiments for an alternative approach to mass measurement. H.K. Liu (USA)
- 10:15 . Defining an intercomparison reference value: ongoing arguments and new challenges. W. Bremser (DE)
- 10:40 . Modelling of dynamic measurement systems and uncertainty analysis employing discretised state-space. K.-D. Sommer (PTB, Session 10)

11:05–11:25

Break

- 11:25 . Modelling and uncertainty estimates for numerically reconstructed profiles in scatterometry. H. Groß, A. Rathsfeld, M. Bär (PTB, Session 10)
- 11:50 **R.J. Douglas, A.G. Steele** (NRC, *Invited Session 9*): Methods for aggregating key comparisons.
- 12:20 **B. Toman** (NIST, *Invited Session 10*): Model based uncertainty analysis in inter-laboratory studies.

12:50–13:00

CONFERENCE CLOSE

13:00

Lunch (on request)

14:00–16:00

IMEKO TC 21 MEETING (open meeting)

POSTER PRESENTATIONS

Statistics and uncertainty

- 1) R. Willink (New Zealand): Mathematical entropy – and a criticism of the usage of the principle of maximum entropy in metrology
- 2) P. Ciarlina, U. Maniscalco, L. Appolonia (Italy): An application of mixture of soft sensors to simulate accurate air ambient measurements

Calibration

- 3) M.S. Boulahlib, B. Renou, A. Boukhalfa (Algeria): Temperature measurement using a fine wire compensated thermometry technique in lean premixed flame
- 4) T. Barashova (Estonia): Methods for estimation the effect of correlation at the measurement of alternating voltages
- 5) B. Gapinski, M. Rucki, M. Pawlowski (Poland): Measurement strategy analysis for out-of-roundness measurement with CMM
- 6) E. Batista, E. Filipe, N. Almeida (Portugal): Uncertainty analysis in calibration of standard volume measures
- 7) P. Andesson, H. Ingason, A. Lönnermark, A.C. Carlsson, C. Wadman (Sweden): Visualisation of experimental data from tunnel fires
- 8) M.J. Guiomarh M. Lito, M.F. Camões, M.J. Nunes (Portugal): Advances on potentiometric pH measurements
- 9) P. Lange (Russia): Correction of the dynamic error of measuring converters on the basis of the signal spline approximations
- 10) F. Arias, G. Panfilo (BIPM, Sèvres): ALGOS: the time scale algorithm used to calculate UTC
- 11) V.S. Bormashov, A.S. Baturin, A.V. Zablotskiy (Russia): Virtual atomic microscope as a tool for nanometrology
- 12) P. Otal (France): Weighted least-squares method for the calibration of pressure balances

Health, biology, chemistry

- 13) I. Picioarea, S. Liviu, M. Buzoianu (Romania): Heavy water standard
- 14) M. Milici, D. Milici (Romania): Errors computing in using extrapolation functions for forecasting of sportive performances
- 15) K. Grzebyk, P. Hruszowiec, M. Szymrka-Kaczmarek (Poland): Applications of statistics to medical researches

Software

- 16) A. Valcu, S. Baicu (Romania): PC tools for data analysis in mass calibration
- 17) S. Giunta, A. Merlone, P. Marcarino, S. Botta, V. Giovanetti (Italy): Dedicated software package for pressure regulation at 1 ppm level using a Gas Controlled Heat Pipe