



XXIV Biennial Symposium on Measuring Techniques in Turbomachinery

Prague, 29-31 August 2018

FINAL PROGRAMME

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Wednesday 29 August 2018

08:00 – 08:40 Registration

08:40 – 09:00 Welcome to XXIV SMTT and opening address

Session A1 09:00 – 10:40 Test Facilities and Techniques

Chair: **I. Aslanidou**, Mälardalen University

09:00 *First operation of a rotating test rig for transient thermochromic liquid crystal heat transfer experiments*

C. Waidmann, R. Poser, M. Göhring, J. v Wolfersdorf

Institute of Aerospace Thermodynamics, University of Stuttgart, Germany

09:20 *Design and development of an experimental supercritical SCO2 facility for bottoming cycle applications*

E. Anselmi-Palma and P. K. Zachos

Propulsion Engineering Centre, Cranfield University, United Kingdom

09:40 *An experimental rig for sub-idle compressor characteristic measurements*

L. Ferrer-Vidal and P. K. Zachos

Propulsion Engineering Centre, Cranfield University, United Kingdom

10:00 *A new facility for dynamic turbomachinery and wind-tunnel testing*

M. Henke, F. Herbst, H. Rätz, J. R. Seume

Institute of Turbomachinery and Fluid Dynamics, Leibniz University Hannover, Germany

- 10:20** *Technique for determination of phase changes in moist air flow in a blade cascade*
P. Šafařík¹, M. Vestfálová², D. Šimurda³
¹Department of Fluid Dynamics and Thermodynamics, Czech Technical University in Prague, Czech Republic
²Department of Power Engineering Equipment, Technical University in Liberec, Czech Republic
³Institute of Thermomechanics of the Czech Academy of Sciences, Czech Republic

10:40-11:00 **Coffee break**

Session A2 **11:00 – 12:20** **Measurement and Modelling of Turbomachinery Flows I**

Chair: **A. Godard**, Ecole Centrale de Lyon

- 11:00** *Evaluation of flow conditions downstream of a turbofan propulsion simulator fan stage*
M. Berens and E. Goldhahn
Airbus, Germany
- 11:20** *Investigation of aircraft engine surge due to ground vortex ingestion*
J. Lepičovský¹, A. duPont²
¹Institute of Thermomechanics of the Czech Academy of Sciences, Czech Republic
²duPont Aerospace, United States of America
- 11:40** *Variable porosity gauzes for axial compressor testing*
J. V. Taylor
University of Cambridge, United Kingdom
- 12:00** *A method for flow profile generation using distortion screens*
M. Migliorini, P. K. Zachos, D. G. MacManus
Propulsion Engineering Center, Cranfield University, United Kingdom

12:20-14:00 **Lunch**

Session A3 **14:00 – 15:20** **Measurement of Turbomachinery Flows II**

Chair: **P. Tsirikoglou**, Vrije Universiteit Brussel

- 14:00** *Measurement of turbulence in LP part of the 1090 MW steam turbine*
P. Antoš¹, V. Uruba¹, P. Jonáš¹, P. Procházka¹, V. Skála¹, M. Hoznedl², K. Sedlák²
¹Institute of Thermomechanics of the Czech Academy of Sciences, Czech Republic
²Doosan Škoda Power, Czech Republic

14:20 *Experimental investigation of flow characteristics inside an axisymmetric cavity of a shrouded single-stage compressor using a five-hole probe*

T. G. Efstathiadis, S. Theodorou, A. I. Kalfas

Laboratory of Fluid Mechanics and Turbomachinery, Aristotle University of Thessaloniki, Greece

14:40 *Measurement of flow field in a turbopump inducer under cavitating condition*

J. Kim¹ and S. J. Song²

¹Doosan Heavy Industry, Republic of Korea

²Seoul National University, Republic of Korea

15:00 *Total pressure and swirl distortion measurement approach for aero-engine intakes*

M. Diakostefanis, P. K. Zachos, D. G. MacManus

Propulsion Engineering Centre, Cranfield University, United Kingdom

15:20-15:40 **Coffee break**

Session A4 **15:40 – 16:40** **Heat Transfer Measurements**

Chair: **A. Terzis**, University of Stuttgart

15:40 *Evaluation of heat transfer coefficients for an impingement cooling cascade: experimental challenges and preliminary results*

M. Gaffuri¹, A. Terzis¹, P. Ott¹, S. Retzko², M. Henze²

¹Group of Thermal Turbomachinery, Swiss Federal Institute of Technology, Switzerland

²ANSALDO Energia, Switzerland

16:00 *Unsteady conjugate heat transfer measurements in the presence of lateral conduction*

S. Brack, R. Poser, J. von Wolfersdorf

Institute of Aerospace Thermodynamics, University of Stuttgart, Germany

16:20 *The decoupling problem: errors in boundary condition separation in metal effectiveness measurements*

M. Michaud and T. Povey

Osney Thermofluids Laboratory, University of Oxford, United Kingdom

19:00 **Banquet**

Thursday 30 August 2018

Session B1 09:00 – 10:00 Novel Instrumentation

Chair: **P. Šafařík**, Czech Technical University in Prague

09:00 *Development of ultra-high temperature multi-hole probes*

G. Bidan and J. L. Champion

Safran Tech, France

09:20 *Oscillating blade design for energy harvesting in autonomous self-powered flowmeter*

T. Efstathiadis, A. Kakafikas, A. I. Kalfas

Laboratory of Fluid Mechanics and Turbomachinery, Aristotle University of Thessaloniki, Greece

09:40 *ECL-B3, a new UHBR fan test-rig for aerodynamic, aeroelastic and aeroacoustic studies*

X. Ottavy, B. Paoletti, C. Brandstetter

Laboratoire de Mécanique des Fluides et d'Acoustique, Ecole Centrale de Lyon, France

10:00-10:20 Coffee break

Session B2 10:20 – 11:40 Pressure Probes and Measurements I

Chair: **J. Braun**, Purdue University

10:20 *Development of an additive manufactured miniaturized wedge probe optimized for 2d transonic wake flow measurements*

M. Boerner and R. Niehuis

Institute of Jet Propulsion, Bundeswehr University Munich, Germany

10:40 *On the modal analysis of fast response aerodynamic pressure probe data*

L. Simonassi¹, M. Zenz¹, S. Zerobin¹, A. Marn¹, T. Selic²

¹Institute of Thermal Turbomachinery and Machine Dynamics, Graz University of Technology, Austria

²Elin Motoren, Austria

11:00 *Impulse-response deconvolution technique to improve effective frequency response of pressure and temperature probes*

D. Burdett, R. Lubock, T. Povey

Osney Thermofluids Laboratory, University of Oxford, United Kingdom

11:20 *On the application of support vector regression models to the calibration of fast response aerodynamic probes*

P. Tsirikoglou¹, F. Contino¹, A. Chasoglou², R. Abhari², A. Kalfas³

¹Department of Mechanical Engineering, Vrije Universiteit Brussel, Belgium

²Laboratory for Energy Conversion, Department of Mechanical and Process Engineering, ETH Zurich, Switzerland

³Department of Mechanical Engineering, Aristotle University of Thessaloniki, Greece

11:40-13:20 Lunch

Session B3 13:20 – 14:20 Pressure Probes and Measurements II

Chair: **P. Zachos**, Cranfield University

13:20 *A novel MEMS-based probe for unsteady aerodynamic measurements: a proof-of-concept study*

W. Morris, J. Coull, T. Dickens, A. de Luca, F. Udea

Department of Engineering, University of Cambridge, United Kingdom

13:40 *High frequency five hole probe for high temperature applications*

G. Paniagua¹, D. G. Cuadrado¹, V. Andreoli¹, J. Braun¹, L. Bhatnagar², Z. Liu²

¹Petal Solutions, United States of America

²Purdue University, United States of America

14:00 *Development of a high-frequency pressure sensitive paint (PSP) technique to interrogate unsteady separated flows*

N. Aye-Addo, G. Paniagua, J. Braun, J. Saavedra

Purdue University, United States of America

14:20-14:40 Coffee break

Session B4 14:40 – 16:20 CTA/CCA Methods and Optical Measurements

Chair: **J. V. Taylor**, University of Cambridge

14:40 *CTHWA dynamic response effects on turbulence measurements in turbomachinery flows*

E. Boufidi¹, M. Cottés², F. Fontaneto¹

¹"Jacques Chauvin" Laboratory von Karman Institute for Fluid Dynamics, Belgium

²Polytechnic department of engineering and architecture, University of Udine, Italy

15:00 *Experimental and numerical investigation of the boundary layer transition on the prismatic turbine blade*

E. Flídr, T. Jelínek, P. Straka

VZLU - Czech Aerospace Research Centre, Czech Republic

15:20 *Spectral analysis of S-duct intake flow distortion using time-resolved, stereoscopic PIV*

D. Gil-Prieto, P. K. Zachos, D. G. MacManus, G. McLelland

Propulsion Engineering Center, Cranfield University, United Kingdom

15:40 *Particle image velocimetry for evaluating the formation of separation regions behind a wall mounted hump*

J. Fisher, J. Saavedra, G. Paniagua, T. Meyer

Purdue University, United States of America

16:00 *Measurements of flow structures in a turbine cascade using a SPIV*

Y. Tian, H. Ma

National Key Laboratory of Science and Technology on Aero-Engines Collaborative Innovation Center of Advanced Aero-Engine, Beihang University, China

16:20-16:40 **Coffee break**

16:40 – 17:10 **Closing session and address – Best Student Presentation Award announcement**

Friday 31 August 2018

9:00 – 15:00 **Facility tour to Doosan Skoda Power**