

EUROMECH Colloquium 581 – Program

Monday, 30 May 2016

08:30 – 09:00 **Registration**

09:15 – 09:30 **Welcome address**

09:30 – 10:00 W. George
Invited Imperial College of Science, UK
**FURTHER ADVANCES IN UNDERSTANDING ‘THE STRUCTURE OF
INHOMOGENEOUS TURBULENT FLOWS’**

Session I

Theoretical and experimental methods for modeling swirl flows with concentrated vortices - 1
Chairmen: Jens Sørensen, Victor Kozlov

10:00 – 10:20 Knud Erik Meyer
Dept. of Mechanical Engineering, Technical University of Denmark, Lyngby, Denmark
**RECONSTRUCTION OF 3D FLOW STRUCTURES IN A CYLINDRICAL
CAVITY WITH A ROTATING LID**

10:20 – 10:40 S. Alekseenko, P. Kuibin, S. Shtork, S. Skripkin and M. Tsoi
Kutateladze Institute of Thermophysics, Novosibirsk, Russia
**ON PHENOMENON OF VORTEX RECONNECTION IN A CONICAL SWIRL
FLOW**

10:40 – 11:00 V. Meledin, V. Glavnny, D. Kulikov and N. Pribaturin
Institute of Thermophysics SB RAS, Lavrentyev Ave., 1, Novosibirsk, 630090, Russia
**MEASUREMENTS AND STRUCTURAL INTERPRETATION OF VORTEX
FLOWS LOCAL PARAMETRES**

11:00 – 11:20 **Break**

Session II

Concentrated vortices in technical applications - 1
Chairmen: William George, Sergey Alekseenko

11:20 – 11:40 Jens N. Sørensen
Department of DTU Wind Energy
Technical University of Denmark (DTU), Lyngby, Denmark
THE DYNAMICS OF VORTICES IN THE NEAR WAKE OF WIND TURBINES

11:40 – 12:00 S.G. Cherny¹, A.E. Lyutov², D.V. Chirkov¹, V.A. Skorospelov³ and P.A. Turuk³
¹ Institute of Computational Technologies SB RAS, Novosibirsk, Russia
² Novosibirsk State University, Novosibirsk, Russia
³ Sobolev Institute of Mathematics SB RAS, Novosibirsk, Russia
NUMERICAL SIMULATION OF VORTEX ROPE IN TURBINE DRAFT TUBE

12:00 – 12:20 D.H. Wood¹, V.L. Okulov² and D. Bhattacharjee³
¹ Department of Mechanical and Manufacturing Engineering, University of Calgary, Calgary, Canada.
² Department of Wind Energy, Technical University of Denmark, DK 2800, Lyngby, Denmark
Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia
³ Department of Mechanical Engineering, University of Alberta, Canada
APPLICATION OF HELICAL VORTEX SOLUTIONS TO DETERMINE WIND

TURBINE TIP LOSS

- 12:20 – 12:40 R. Mikkelsen¹, J.N. Sørensen¹, S. Sarmarst² and D. Henningson²
¹ DTU Wind Energy, Technical University of Denmark, Lyngby, Denmark
² Swedish e-Science Research Centre (SeRC), Linné FLOW Centre, KTH Mechanics,
Royal Institute of Technology, Stockholm, Sweden
ROTOR INDUCED VORTEX BREAKDOWN

12:40 – 14:10 **Lunch**

- 14:10 – 14:40 Yasuhide Fukumoto¹, Valery Okulov² and David Wood³
Invited
¹ Kyushu University, Japan
² Technical University of Denmark, Denmark
³ University of Calgary, Canada
**KAWADA'S CONTRIBUTION TO INDUCED VELOCITY BY HELICAL
VORTICES WITH ITS APPLICATION TO PROPELLER THEORY**

Session III

Concentrated vortices (dynamics, waves, helical vortices, vortex breakdown, PVC) - 1

Chairmen: David Wood, Valery Okulov

- 14:40 – 15:00 J.E. Wesfreid, M. Skarysz, K. Gibiński and S. Goujon-Durand
PMMH, Ecole Supérieure de Physique et de Chimie Industrielles de la Ville de Paris,
France
**INSTABILITIES AND NONLINEARITIES IN THE FLOW BEHIND A
ROTATING SPHERE**
- 15:00 – 15:20 R. Mullyadzhyanov^{1,2}, R. Sandberg³, S. Abdurakipov^{1,2}, and K. Hanjalic^{2,4}
¹ Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia
² Novosibirsk State University, Novosibirsk, Russia
³ Melbourne University, Melbourne, Australia
⁴ Delft University of Technology, Delft, The Netherlands
HELICAL WAVE AS A BUILDING BLOCK OF A ROUND TURBULENT JET
- 15:20 – 15:40 E.A. Ryzhov and K.V. Koshel
Pacific Oceanological Institute, 43, Baltiyskaya Str., Vladivostok, Russia
**CHAOTIC MOTION OF A POINT VORTEX ALONG A BOUNDARY WITH A
CIRCULAR CAVITY**
- 15:40 – 16:00 E. Ryzhov¹, K. Koshel¹ and D. Ovcharenko²
¹ Pacific Oceanological Institute of FEB RAS, Vladivostok, Russia
² Far Eastern Federal University, Vladivostok, Russia
**REGULAR AND CHAOTIC DYNAMICS WITH TWO POINT VORTICES IN A
TWO-LAYER DEFORMATION FLOW**
- 16:00 – 16:20 **Break**

Session IV

Swirl flames. Heat transfer in swirl flows. Two-phase swirl flows. - 1

Chairmen: Yasuhide Fukumoto, Sergey Shtork

- 16:20 – 16:40 T. Kunugi
Kyoto University, C3 Kyoto-Daigaku Katsura, Saikyo, Kyoto, Japan
**WAVY INTERFACE AND DROPLET BEHAVIORS OF ANNULAR TWO-
PHASE FLOW IN ROD-BUNDLE GEOMETRY WITH SPACER**

- 16:40 – 17:00 A. Gorbunova^{1,2}, N. Molevich^{1,2}, D. Porfiriev^{1,2}, S. Sugak¹ and I. Zavershinskii¹
¹ Samara State Aerospace University, Samara, Russia
² Lebedev Physical Institute, Samara, Russia
DYNAMICS OF PVC IN SWIRLING FLOWS WITH HEAT RELEASE
- 17:00 – 17:20 A. Gorbunova^{1,2}, N. Molevich^{1,2}, S. Sugak¹ and I. Zavershinskii¹
¹ Samara State Aerospace University, Samara, Russia
² Lebedev Physical Institute, Samara, Russia
FORMATION OF PLASMA LOOP IN SWIRLING FLOW
- 17:20 – 17:40 V.V. Nikulin
Lavrentyev Institute of Hydrodynamics SB RAS, Novosibirsk, Russia
TURBULENT HOMOGENEOUS AND BUOYANCY HETEROGENEOUS VORTEX RINGS
- 17:40 – 18:00 V. A. Kuznetsov^{1,3}, A. Plummer^{2,3}, J. Gascooke^{2,3}, J. Shapter^{2,3}, and N. H. Voelcker⁴
¹ Weapons and Combat Systems Division, Defence Science and Technology Group, Edinburgh SA, Australia
² School of Chemical and Physical Sciences, Flinders University, Australia
³ Centre of Expertise in Energetic Materials (CEEM), Bedford Park, Australia
⁴ Future Industries Institute, University of South Australia, Australia
CHARACTERISATION OF COMBUSTION OF ENERGETIC POROUS SILICON
- 18:10 – 19:00 **Concert. «Filarmonica» Quartet.**
- 19:00 – 20:00 **Welcome reception (Kutateladze Institute of Thermophysics)**

Tuesday, May 31, 2016

- 09:10 – 09:40 N.G. Berloff
Invited Skolkovo Institute of Science and Technology Novaya St., Skolkovo, Russia and Department of Applied Mathematics and Theoretical Physics, University of Cambridge, Cambridge, United Kingdom
QUANTIZED VORTICES IN CONDENSATES: FROM SUPERFLUID HELIUM TO POLARITON CONDENSATES

Session V

Dynamics of quantized vortices in superfluids - 1

Chairmen: Jere Mäkinen, Viktor Efimov

- 09:40 – 10:00 N. Hietala¹, R. Hänninen¹, H. Salman² and C. F. Barenghi³
¹ Low Temperature Laboratory, Department of Applied Physics, Aalto University, Finland
² School of Mathematics, University of East Anglia, Norwich Research Park, UK
³ Joint Quantum Centre Durham-Newcastle, School of Mathematics and Statistics, Newcastle University, UK
KELVIN WAVE LEAPFROGGING ON SUPERFLUID VORTICES
- 10:00 – 10:20 **MODELING OF CLASSICAL TURBULENCE BY QUANTIZED VORTICES IN SUPERFLUIDS**
Sergey. K. Nemirovskii
Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia
- 10:20 – 10:40 V. Andryushchenko, L. Kondaurova and S. Nemirovskii
Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia

RECONNECTIONS OF QUANTIZED VORTICES AT FINITE TEMPERATURES

10:40 – 11:00 Luiza Kondaurova^{1,2}, Victor L'vov,¹ Sergey Nemirovskii², Anna Pomyalov¹ and Itamar Procaccia¹

¹ Department of Chemical Physics, The Weizmann Institute of Science, Israel

² Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia

DECAY OF QUANTUM TURBULENCE AT LOW AND ULTRALOW TEMPERATURES

11:00 – 11:20 **Break**

Session VI

Dynamics of quantized vortices in superfluids - 2

Chairmen: Natalia Berloff, Sergey Nemirovskii

11:20 – 11:40 J.T. Mäkinen¹, V.B. Eltsov¹ and M. Silaev²

¹ Low Temperature Laboratory, Department of Applied Physics, Aalto University, Finland

² Department of Theoretical Physics and Center for Quantum Materials, KTH-Royal Institute of Technology, Stockholm, Sweden

MUTUAL FRICTION IN SUPERFLUID ³He-B IN THE ZERO-TEMPERATURE LIMIT

11:40 – 12:00 V. Efimov^{1,2} and O. Kolosov²

¹ Institute of Solid State Physics RAS, Chernogolovka, Moscow distr, Russia

² Physics depart., Lancaster University, Lancaster, UK

TORSION AND BENDING FORKS AS GENERATOR OF QUANTUM VORTEXES IN SUPERFLUID HELIUM

Session VII

Concentrated vortices (dynamics, waves, helical vortices, vortex breakdown, PVC) - 2

Chairmen: José Wesfreid, Sergey Golovin

12:00 – 12:20 Valery L. Okulov

Wind Energy Department, Technical University of Denmark, Lyngby, Denmark;

Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia

AN ACENTRIC ROTATION OF HELICAL VORTEX PAIR

12:20 – 12:40 Igor V. Naumov, I. Podolskaya and M. Tsoy

Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia

INFLUENCE OF THE CONTAINER GEOMETRY ON VORTEX BREAKDOWN IN CONFINED VORTEX FLOWS

12:40 – 14:10 **Lunch**

14:10 – 14:40 Thomas Leweke

Invited

Institut de Recherche sur les Phénomènes Hors Equilibre, Marseille, France

EXPERIMENTS ON VORTEX INTERACTIONS AND INSTABILITIES

Session VIII

Concentrated vortices (dynamics, waves, helical vortices, vortex breakdown, PVC) - 3

Chairmen: Renzo Ricca, Nonna Molevich

14:40 – 15:00 E.E. Son

Joint Institute of High Temperatures RAS, Moscow

RECONNECTION IN MHD AND HYDRODYNAMICAL TURBULENCE

- 15:00 – 15:20 S. Fortova
Institute for Computer-Aided Design RAS, Moscow, Russia
VORTEX CASCADES IN SHEAR FLOWS
- 15:20 – 15:40 T. Belonenko¹, I. Bashmachnikov^{2,1}, A. Koldunov¹ and P. Kuibin³
¹ Saint Petersburg State University, St. Petersburg, Russia
² NIERSC- Nansen International Environmental and Remote Sensing Centre, St. Petersburg, Russia;
³ Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia
ON MODELING OF THE LOFOTEN VORTEX STRUCTURE IN THE NORWEGIAN SEA

15:40 – 16:00 **Break**

Session IX

Swirl flames. Heat transfer in swirl flows. Two-phase swirl flows. -2

Chairmen: Vladimir Shtern, Dmitriy Markovich

- 16:00 – 16:20 Victor V. Kozlov^{1,2}, Genrich R. Grek¹ and Yury A. Litvinenko¹
¹Khristianovich Institute of Theoretical and Applied Mechanics SB RAS, Novosibirsk, Russia
²Novosibirsk State University, Novosibirsk, Russia
VISUALIZATION OF CONVENTIONAL AND COMBUSTING SUBSONIC JET INSTABILITIES
- 16:20 – 16:40 M.A. Pakhomov and V.I. Terekhov
Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia
THE EFFECT OF SWIRL ON PARTICLES DISTRIBUTIONS AND HEAT TRANSFER IN A NON-ISOTHERMAL TWO-PHASE CONFINED TURBULENT FLOW
- 16:40 – 17:00 S.V. Alekseenko, S.I. Shtork and R.R. Yusupov
Institute of Thermophysics SB RAS, Novosibirsk, Russia
Novosibirsk State University, Novosibirsk, Russia
EXPERIMENTAL STUDY OF TWO-PHASE GAS-LIQUID SWIRLING FLOW
- 17:00 – 17:20 R. Kh. Abdrakhmanov, N.A. Dvornikov and V.V. Lukashov
Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia
DYNAMICS OF TWO-PHASE FLOW IN THE VORTEX CHAMBER WITH THE LOWER FACE SWIRLER
- 17:20 – 17:40 V.A. Zhigarev¹, A.V. Minakov^{1,2}, D.V. Platonov^{1,2} and D.A. Dekterev²
¹ Siberian Federal University, Krasnoyarsk, 660041, Russia
² Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia
NUMERICAL-EXPERIMENTAL STUDY OF WAYS OF AN INTENSIFICATION OF HYDRODYNAMIC PROCESSES IN THE REACTOR HYDROMETALLURGICAL PRODUCTION
- 17:50 – 19:50 **Excursion over Academgorodok**
- 19:50 – 22:00 **Banquet (House of Scientists)**

Wednesday, June 1, 2016

- 09:10 – 09:40 Renzo L. Ricca
Invited Department of Mathematics & Applications, U. Milano-Bicocca, ITALY
VORTEX KNOTS CASCADE BY HOMFLYPT POLYNOMIAL

Session X

Theoretical and experimental methods for modeling swirl flows with concentrated vortices - 2

Chairmen: Knud Erik Meyer, Pavel Kuibin

- 09:40 – 10:00 S.V. Golovin
Lavrentyev Institute of Hydrodynamics, pr. Lavrentyeva 15, Novosibirsk, 630090, Russia
VORTEX FLOWS DESCRIBED BY EXACT SOLUTIONS OF MAGNETOHYDRODYNAMIC EQUATIONS
- 10:00 – 10:20 D.M. Markovich, M.V. Shestakov, M.P. Tokarev and V.M. Dulin
Kutateladze Institute of Thermophysics, 1 Lavrentyev Avenue, 630090, Novosibirsk, Russia
Novosibirsk State University, 630090, Novosibirsk, Russia
PRIMARY AND SECONDARY VORTICES IN JET FLOWS. DIAGNOSTICS BY 2D AND 3D PIV
- 10:20 – 10:40 E.C. Fernandes¹, I.V. Litvinov^{2,3}, A.S. Mitryakov^{2,3} and S.I. Shtork^{2,3}
¹ Technical University of Lisbon, Portugal
² Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia
³ Novosibirsk State University, Russia
APPLICATION OF ACOUSTICS PROBES FOR CHARACTERIZATION OF HELICAL INSTABILITIES IN ISOTHERMAL AND REACTING SWIRLING FLOWS
- 10:40 – 11:00 M.M. Katasonov¹ and V.V. Kozlov^{1,2}
¹ Khristianovich Institute of Theoretical and Applied Mechanics, SB RAS, Novosibirsk, Russia
² Novosibirsk State University, Novosibirsk, Russia.
EXPERIMENTAL STUDY OF WAVE PACKETS NEAR THE FRONTS OF LOCALIZED DISTURBANCES - STREAKS AT STRAIGHT AND SWEEP WING BOUNDARY LAYER FLOW
- 11:00 – 11:20 **Break**

Session XI

Concentrated vortices in technical applications - 2

Chairmen: Tomoaki Kunugi, Igor Naumov

- 11:20 – 11:40 S. Tolkachev, V. Kozlov and V. Kaprilevskaya
Khristianovich Institute of Theoretical and Applied Mechanics SB RAS, Novosibirsk, Russia
THE INVESTIGATION OF THE LOCALIZED ROUGHNESS INFLUENCE ON THE LAMINAR-TURBULENT TRANSITION ON THE SWEEP WING IN THE FAVORABLE PRESSURE GRADIENT REGION
- 11:40 – 12:00 S. Tolkachev, V. Kozlov and V. Kaprilevskaya
Khristianovich Institute of Theoretical and Applied Mechanics SB RAS, Novosibirsk, Russia
THE ROLE OF TWO-DIMENSIONAL ROUGHNESS ELEMENT IN LAMINAR-TURBULENT TRANSITION IN THE FAVORABLE PRESSURE GRADIENT REGION OF THE SWEEP WING
- 12:00 – 12:20 I. Anufriev, E. Shadrin and O. Sharypov
Kutateladze Institute of Thermophysics SB RAS, Novosibirsk, Russia
EXPERIMENTAL INVESTIGATION OF A FLOW STRUCTURE IN A VORTEX FURNACE

12:20 – 12:40 P. Kuibin
Kutateladze Institute of Thermophysics SB RAS, Novosibirsk, Russia
**ON APPLICATION OF ANALYTICAL VORTEX MODELS TO MODELING
OF PROCESSES IN HYDROTURBINES**

12:40 – 14:10 **Lunch**

14:10 – 14:40 Vladimir N. Shtern¹ and Guy B. Marin²

Invited

¹ Shtern Research and Consulting, Houston, TX 77096, USA

² Ghent University, LCT, Technologiepark 914, B-9052, Gent, Belgium

MECHANISMS OF EDDY FORMATION IN SWIRLING FLOWS

Session XII

Concentrated vortices in technical applications - 3

Chairmen: Thomas Leweke, Eduard Son

14:40 – 15:00 A. Sentyabov^{1,2}, A. Gavrilov^{1,2}, A. Dekterev^{1,2} and A. Minakov^{1,2}

¹ Institute of Thermophysics SB RAS, Novosibirsk, Russia

² Siberian Federal University, Krasnoyarsk, Russia

**NUMERICAL INVESTIGATION OF PRESSURE PULSATIONS INDUCED BY
VORTEX CORE PRECESSION IN DRAFT TUBE OF HYDRAULIC TURBINE**

15:00 – 15:20 D. Platonov^{1,2}, A. Minakov^{1,2} and D. Dekterev^{1,2}

¹ Siberian Federal University, Krasnoyarsk, Russia

² Kutateladze Institute of Thermophysics, SB RAS, Novosibirsk, Russia

**COMPUTATIONAL AND EXPERIMENTAL RESEARCH SWIRL FLOWS IN
THE HYDRO TURBINE ON THE AERODYNAMIC STAND**

15:20 – 15:40 M.V. Alekseev¹, I.S. Vozhakov^{1,2}, S.I. Lezhnin^{1,2}, N.A. Pribaturin¹, and A.L. Sorokin¹

¹ Kutateladze Institute of Thermophysics SB RAS, Novosibirsk, Russia

² Novosibirsk State University, Novosibirsk, Russia

VORTEX STRUCTURES AT THE OUTFLOW OF A BOILING WATER JET

15:40 – 16:00 **Break**

16:00 – 17:00 **Excursion over the experimental laboratories of Kutateladze Institute of
Thermophysics**

17:10 – 17:30 **Closure ceremony of the Colloquium**

17:40 – 19:00 **Reception (Kutateladze Institute of Thermophysics)**