CMFF'18

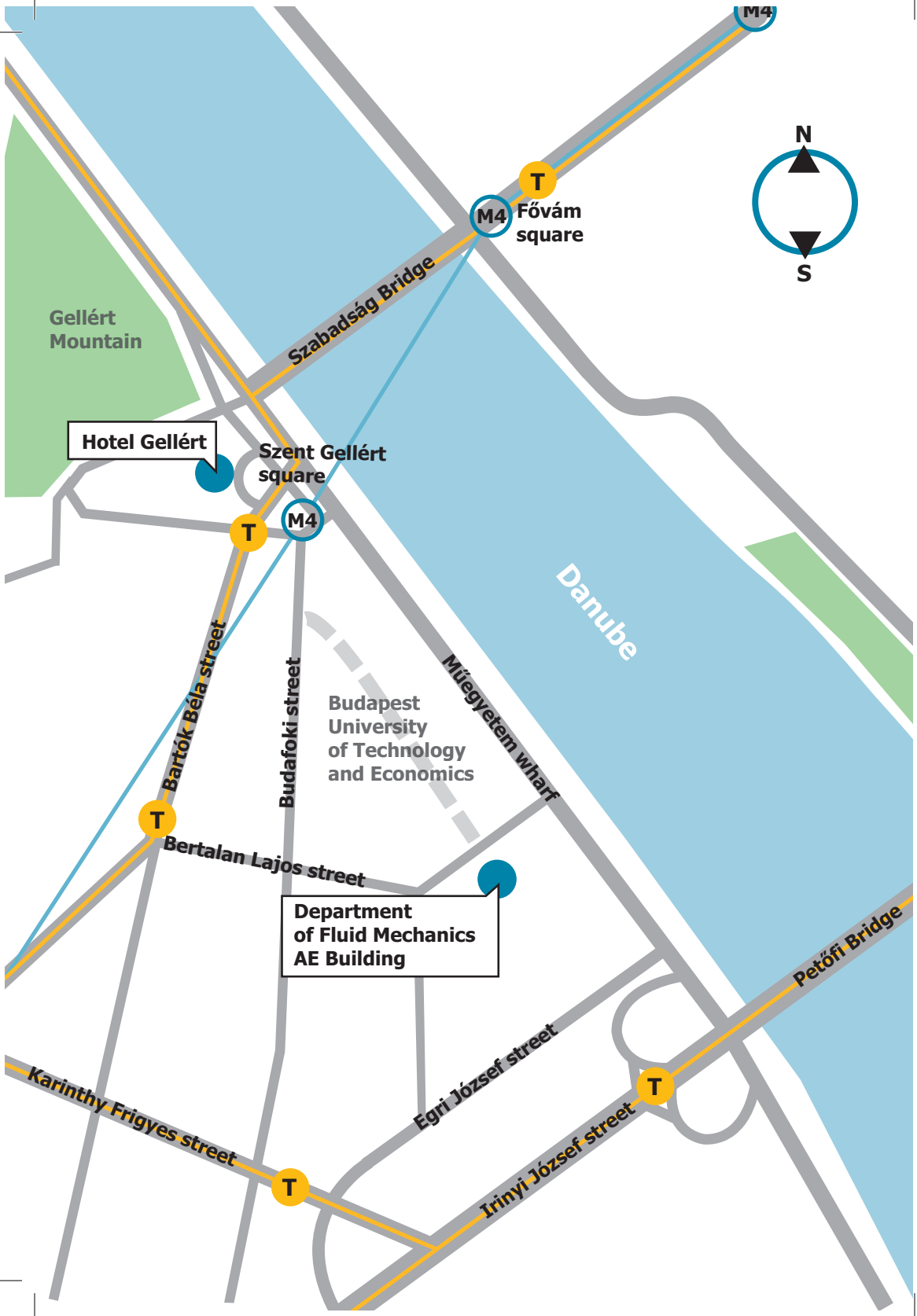
Conference on Modelling Fluid Flow

Danubius Hotel Gellért

September 4-7, 2018
Danubius Hotel Gellért
Budapest, Hungary

Final Programme

Department of Fluid Mechanics / Faculty of Mechanical Engineering
Budapest University of Technology and Economics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Fővám square
Szabadság Bridge
Gellért Mountain
Hotel Gellért
Szent Gellért square
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Danube
Bartók Béla street
Budafoki street
Műegyetem wharf
Budapest University of Technology and Economics
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Bertalan Lajos street
Department of Fluid Mechanics AE Building
Petőfi Bridge
Egri József street
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Karinthy Frigyes street
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Irinyi József street

Welcome to the 17th event
of the international conference series
on Fluid Flow Technologies!

Conference Venue - Buildings of Interest

Danubius Hotel Gellért

Szent Gellért tér 1.,
Budapest, H-1111

Registration on the 5th of September, the Plenery Session, the oral presentations and the workshops will take place in this building.
The venue of the Conference, Danubius Hotel Gellért is located at Szent Gellért tér/square (see the map).

Department of Fluid Mechanics

Bertalan Lajos u. 4-6., H-1111 Budapest
"AE" building of BME

The Registration and Welcome Reception on the 4th of September will take place in this building.
The Department can be reached from Szent Gellért tér/square along Budafoki út/avenue, along the bank of the Danube and through the garden of the University, or from Petőfi híd/bridge along the bank of the Danube (see the map).

The 17th event of the international conference series
on Fluid Flow Technologies held in Budapest

CMFF'18 September 4-7, 2018

Danubius Hotel Gellért
Budapest, Hungary

Conference Secretariat

Department of Fluid Mechanics / Faculty of Mechanical Engineering
Budapest University of Technology and Economics

Bertalan L. u. 4-6., H 1111 Budapest, Hungary

Tel: +36 1 463 26 35

cmff@ara.bme.hu www.cmff.hu

Registration and Information Desk

Opening hours:

Tuesday 4th of September, 6 pm -8 pm:
Located on the ground floor of the Department of Fluid Mechanics, AE building.

Wednesday 5th of September, 8 am - 6 pm:
Located in the Danubius Hotel Gellért.
Organizers wearing blue badges are pleased to provide information.

Lunch and coffee breaks

Lunch as well as coffee will be served in the Danubius Hotel Gellért.

Transportation

Danubius Hotel Gellért is easily accessible by public transport (tram, bus, M4).

You can find more information about public transport on the internet.
www.bkk.hu

Restrictions

Videotaping or audio recording of any session and sale of any publication not authorised by the Conference Secretariat is prohibited.

Social programmes

Welcome Reception (4th of September, 6 pm - 8 pm)
offered by the Conference Organisers and hosted
by the Department of Fluid Mechanics (AE Building).

Gala Dinner (5th of September, 7:30 pm -10 pm)
to be held in the Duna Room of Danubius Hotel Gellért.

Speaker briefing

• Laptops for PowerPoint and pdf presentations, video projectors and pointers are available in each conference room.

• Please contact your session chairperson 10 minutes prior to session opening and provide him/her with your data in a written format, in order to make it possible for him/her to introduce you to the audience:

- ¬ name of the presenting author
- ¬ title
- ¬ position
- ¬ affiliation
- ¬ year of receipt and subject of scientifc degree (as appropriate)

• Please also contact the session secretary 10 minutes prior to session opening to load your PowerPoint or pdf presentation onto the on-site laptop. You have to deliver your PowerPoint or pdf files on a pen-drive.

• Timing of presentation: You are requested to prepare an oral presentation of duration of 15 minutes. Please respect this time limit strictly, in order to avoid the disturbance of the time schedule. Your presentation will be followed by a 5-minute discussion.

The 4 keynote speeches will be in the topics of:

"Turbomachinery-related aeroacoustic modelling and simulation"
by Prof. S. **Moreau**, Sherbrooke (CDN)

"Modeling (understanding and controlling) turbulent flows: the heritage of Leonardo da Vinci in modern computational fluid dynamics"
by Dr. A. **Corsini**, Rome (I)

"State of the art and challenges related to application of CFD in fluids engineering",
by Prof. M. **Perić**, Erlangen (D)

"Experimental characterization of sprays: special needs in validating computational models"
by. Prof. Y. **Hardalupas**, London (UK)

CMFF'18 Programme of Tuesday

Dept. of Fluid Mechanics
Budapest University of Technology and Economics

4 September 2018
1111 Budapest, Bertalan Lajos utca 4-6

16:00 - 18:00	**Registration and Welcome Reception**

CMFF'18 Programme of Wednesday

Danubius Hotel Gellért

5 September 2018

	Tea Room	Gobelin Room	Kávé Room	Forrás Room
9 :00 - 9:10	-	**Welcome Address**	-	-
9 :10 - 9:55	-	**Plenary Session 1** Invited Speaker: Prof. Stéphane Moreau	-	-
9:55 - 10:25	**Break**	**Break**	**Break**	**Break**
10:25 - 12:05	**WS1**	**WS2**	**IF1**	**ET**
12:05 - 13:35	**Lunch**	**Lunch**	**Lunch**	**Lunch**
13:35 - 14:20	-	**Plenary Session 2** Invited Speaker: Prof. Alessandro Corsini	-	-
14:20 - 14:50	**Break**	**Break**	**Break**	**Break**
14:50 - 16:50	**WS3**	**WS4**	**EF1**	**WS5**

	Duna Room
19 :30 - 22:00	**Gala Dinner**

WS1: **Biomedical flows: experiments and simulations I**
WS2: **On the use of big data technologies in turbomachinery, machine learnt technologies in turbomachinery applications**
WS3: **Biomedical flows: experiments and simulations II**
WS4: **Aeroacoustics**
WS5: **Challenges in unsteady modelling of valves**
WS6: **Guidelines for environmental flow and dispersion modelling - what do we need?**

CMFF'18 Programme of Thursday

Danubius Hotel Gellért

6 September 2018

	Tea Room	Gobelin Room	Kávé Room	Forrás Room
9:00 - 9:10	-	**Address**	-	-
9:10 - 9:55	-	**Plenary Session 3** Invited Speaker: Prof. Milovan Perić	-	-
9:55 - 10:25	**Break**	**Break**	**Break**	**Break**
10:25 - 12:05	**WS6**	**TM1**	**IF2**	**BU**
12:05 - 13.35	**Lunch**	**Lunch**	**Lunch**	**Lunch**
13.35 - 14:20	-	**Plenary Session 4** Invited Speaker: Prof. Yannis Hardalupas	-	-
14:20 - 14:50	**Break**	**Break**	**Break**	**Break**
14:50 - 16:50	**BIO**	**TM2**	**EF2**	**PL**

CMFF'18 Programme of Friday

Danubius Hotel Gellért

7 September 2018

	Tea Room	Gobelin Room	Kávé Room	Forrás Room
9 :00 - 11:00	**TM3**	**TM4**	**EV**	**MF**
11:00 - 11:30	**Break**	**Break**	**Break**	**Break**
11:30 - 12:50	-	**TM5**	**IF3**	**RF**
12:50 - 13:00	-	**Closing Plenary**	-	-

BIO: Biomedical Flow
BU: Bubble Flow and Caviation
EF 1/2: External Flow
ET: Energy Transfer
EV: Enviromental Flow
IF1/2/3: Internal Flow
MF: Multi-Fluid Flow
PL: Particle-Laden Flow
RF: Reactive Flow
TM1: Turbine: General Interest
TM2: Wind Turbines
TM3: Pump
TM4: Turbomachinery: General Interest
TM5: Hydraulic Turbine

Session Identifier	**Plenary Session 1**	**Gobelin Room**
Chairperson	**Prof. Dominique Thévenin** Laboratory of Fluid Dynamics and Technical Flows, Institute of Fluid Dynamics and Thermodynamics, University of Magdeburg "Otto von Guericke", Germany	
Invited Speaker	**Prof. Stéphane Moreau** Université de Sherbrooke, Sherbrooke (Québec), Canada	

Wed. 5. Sept. 9:10 - 9:55

#141

¬ Turbomachinery-related aeroacoustic modelling and simulation

Prof. Stéphane **Moreau**
Université de Sherbrooke, Sherbrooke (Québec), Canada

¬ ABSTRACT

In future Ultra-High By-Pass Ratio turboengines, the turbomachinery noise (fan and turbine stages mainly) is expected to increase significantly. A review of analytical models and numerical meth- ods to yield both tonal and broadband contributions of such noise sources is presented. The former rely on hybrid methods coupling gust response over in- finitely thin flat plates of finite chord length either isolated or in cascade, and acoustic analogies in free- field and in a duct. The latter yields tonal noise with unsteady Reynolds-Averaged Navier-Stokes (u- RANS) simulations, and broadband noise with Large Eddy Simulations (LES). The analytical models are shown to provide good and fast first sound estimates at pre-design stages, and to easily separate the differ- ent noise sources. The u-RANS simulations are now able to give accurate estimates of tonal noise of the most complex asymmetric, heterogeneous fan-OGV configurations. Wall-modeled LES on rescaled stage configurations have now been achieved on all com- ponents: a low-pressure compressor stage, a tran- sonic high-pressure turbine stage and a fan-OGV configuration with good overall sound power level predictions for the latter.
In this case, hybrid Lattice- Boltzmann /very large-eddy simulations also appear to be an excellent alternative to yield both contribu- tions accurately at once.

Session Identifier **WS1- WORKSHOP** **Tea Room**

Title **Biomedical flows: experiments and simulations I**

WS Leader **Dr. Gábor Janiga**
Dept. Fluid Dynamics and Technical Flows,
Forschungscampus STIMULATE, Univ. Magdeburg, Germany

Co-organizers **Dr. Philipp Berg**
Dept. Fluid Dynamics and Technical Flows,
Forschungscampus STIMULATE, Univ. Magdeburg, Germany

Prof. Bernard J. Geurts
Multiscale Modeling and Simulation, Fac. EEMCS, Univ. Twente, Enschede, The Netherlands,
Multiscale Physics of Energy Systems, Fac. Applied Physics, Eindhoven Univ. Technology, Eindhoven, The Netherlands

Dr. Julia Mikhal
BIOS Lab-on-a-Chip Group, Faculty EEMCS, Univ. Twente, Enschede, The Netherlands

Christoph Roloff
Dept. Fluid Dynamics and Technical Flows, Univ. Magdeburg, Germany

Wed. 5. Sept. 10:25 - 12:05

10:25 - 10:45

¬ Medical introduction to endovascular treatment of intracranial aneurysms

Jeroen **Boogaarts** Dept. Neurosurgery,
Radboud Univ. Medical Center, Nijmegen, Netherlands

10:45 - 11:05

¬ Haemodynamics, thrombosis and computational flow diverter selection protocols for cerebral aneurysms

Yiannis **Ventikos** Dept. Mechanical Engineering,
University College London, England

#137 11:05 - 11:25

¬ Toward automated analysis of flow in stented aneurysms

Julia **Mikhal**[1], Gabriela **Ong**[2], Guido de **Jong**[3], Rene **Aquarius**[3], Joost de **Vries**[3], Jeroen **Boogaarts**[3] and Bernard **Geurts**[2,4]

1 BIOS Lab-on-a-Chip Group, Fac. EEMCS, Univ. Twente, Enschede, The Netherlands

2 Multiscale Modeling and Simulation, Fac. EEMCS, Univ. Twente, Enschede, NL

3 Dept. of Neurosurgery, Radboud Univ. Medical Center, Nijmegen, Netherlands

4 Multiscale Physics of Energy Systems, Fac. Applied Physics, Eindhoven Univ. Technology, The Netherlands

#84 11:25 - 11:45

¬ Haemodynamic risk factors of endothelial erosion for patient-specific treatment of coronary heart disease

Michael **McElroy**[12], Stephen **White**[1], Thomas **Johnson**[3], Frank **Gijsen**[4] and Amir **Keshmiri**[2]

1 School of Healthcare Science, Manchester Metropolitan University, U.K.

2 School of Mechanical, Aerospace and Civil Engineering (MACE), The University of Manchester, U.K

3 Bristol Heart Institute, University Hospitals Bristol NHS Foundation Trust, Bristol, U.K.

4 Dept. of Biomedical Engineering, Erasmus Medical Center, Rotterdam, The Netherlands.

#131 11:45 - 12:05

¬ How to measure blood damage? – Custom-made test benches for cardiovascular implants and devices

Christina **Esch**, Marc **Mueller**, Benjamin **Krolitzki** and Birgit **Glasmacher**

Institute of Multiphase Processes, Faculty of Mechanical Engineering, Leibniz University of Hannover, Germany

Session Identifier **WS2- WORKSHOP** **Gobelin Room**

Title **On the use of big data technologies in turbomachinery, machine learnt technologies in turbomachinery applications**

WS Leader **Prof. Alessandro Corsini**
Dept. Mechanical and Aerospace Engineering, Fac. Civil and Industrial Engineering, Sapienza University of Rome, Roma, Italy

Co-organizer **Dr. Giovanni Delibra**
Dep. Mechanical and Aerospace Engineering, Fac. Civil and Industrial Engineering, Sapienza University of Rome, Roma, Italy

Wed. 5. Sept. 10:25 - 11:45

10:25 - 10:45

¬ On surrogate-based optimization of low-speed axial fan blade profiles

Gino **Angelini**

Department of Mechanical and Aerospace Engineering, Faculty of Civil and Industrial Engineering, Sapienza University of Rome, Italy

10:45 - 11:05

¬ Adaptive wall function based on deep learning of turbulent flows

Lorenzo **Tieghi**

Department of Mechanical and Aerospace Engineering, Faculty of Civil and Industrial Engineering, Sapienza University of Rome, Italy

11:05 - 11:25

¬ Axial fan performance correlations using deep data diving

Giovanni **Delibra**

Department of Mechanical and Aerospace Engineering, Faculty of Civil and Industrial Engineering, Sapienza University of Rome, Italy

11:25 - 11:45

¬ Anomaly detection in turbomachinery with use of phase space portraits

Alessandro **Corsini**

Department of Mechanical and Aerospace Engineering, Faculty of Civil and Industrial Engineering, Sapienza University of Rome, Italy

Session Identifier	**IF1**	**Kávé Room**
Session Main Topic	**Internal Flow**	
Chairperson	**Prof. Valery Goryachev**	
	Dep. Mathematics, Tver State Technical University, Russia	

Wed. 5. Sept. 10:25 - 12:05

#3 10:25 - 10:45

¬ Impacts of pitched tips of kneading element in twin-screw extrusion: tuning flow pattern and mixing performance

Yasuya **Nakayama**[2], Hiroki **Takemitsu**[2], Toshihisa **Kajiwara**[1], Koichi **Kimura**[3], Takahide **Takeuchi**[3] and Hideki **Tomiyama**[3]

1 Department of Chemical Engineering, Kyushu University, Fukuoka, Japan

2 Department of Chemical Engineering, Kyushu University, Fukuoka, Japan

3 Hiroshima Plant, The Japan Steel Works Ltd., Hiroshima, Japan

#27 10:45 - 11:05

¬ Couette-Poiseuille flow of a general non-Newtonian liquid in a cylinder annuli

Péter **Nagy-György** and Csaba **Hős**

Department of Hydrodynamic Systems, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Hungary

#91 11:05 - 11:25

¬ A rotary wave in phase condenser mode

Herbert **Steinrück**[1] Anton **Maly**[2] and Gregor **Glanz**[1]

1 Department of Fluid Mechanics and Heat Transfer, TU Wien, Vienna, Austria

2 Institute of Energy Systems and Thermodynamics, TU Wien, Vienna, Austria

#110 11:25 - 11:45

¬ Development of air-cooling concepts for electric motor used in electric aircrafts

Márton **Koren**[1], Zoltán **Petró**[2], Viktor **Szente**[1], János **Dorogi**[2], Gergely György **Balázs**[2]

1 Department of Fluid Mechanics, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Budapest, Hungary

2 Corporate Technology, Siemens Zrt., Budapest, Hungary

#117 11:45 - 12:05

¬ Cooling jacket development for electric motors used in e-aircrafts

Szabolcs **Santa**[1], Zoltan **Petro**[2], Viktor **Szente**[1], Janos **Dorogi**[2], Gergely Gy. **Balazs**[2]

1 Department of Fluid Mechanics, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Budapest, Hungary

2 Corporate Technology, Siemens Zrt., Budapest, Hungary

Session Identifier **ET** **Forrás Room**
Session Main Topic **Energy Transfer**
Chairperson **Prof. Petr Louda**
Inst. Thermomechanics CAS, Prague, Czech Republic
Czech Technical Univ. Prague, Dept. Technical Mathematics, Fac. Mechanical Engineering, Czech Republic

Wed. 5. Sept. 10:25 - 12:05

#37 10:25 - 10:45
¬ Heat transfer across the free surface of a thermocapillary liquid bridge

Francesco **Romanò** and Hendrik **Kuhlmann**
Institute of Fluid Mechanics and Heat Transfer, TU Wien, Vienna, Austria

#77 10:45 - 11:05
¬ Modelling of breathing phenomena within large storage tanks during rapid cooling into metastable two-phase condition

Natalie **Schmidt**[1], Jens **Denecke**[1], Juergen **Schmidt**[1] and Michael **Davies**[2]
1 CSE Center of Safety Excellence gGmbH, Pfinztal, Germany
2 Braunschweiger Flammenfilter GmbH

#82 11:05 - 11:25
¬ Modelling of heat transfer through the external wall barrier

Ewa **Szymanek** and Artur **Tyliszczak**
Fac. of Mechanical Engineering and Computer Science,
Czestochowa Univ. of Technology, Poland

#104 11:25 - 11:45
¬ Computations of non-isothermal compressible gas flows around moving solid object

Daisuke **Toriu** and Satoru **Ushijima**
Academic Center for Computing and Media Studies (ACCMS),
Kyoto University, Japan

#68 11:45 - 12:05
¬ Energy cascade in a nonlinear mechanistic model of turbulence

Bendegúz Dezső **Bak** and Tamás **Kalmár-Nagy**
Department of Fluid Mechanics, Faculty of Mechanical Engineering,
Budapest University of Technology and Economics, Hungary

Session Identifier	**Plenary Session 2**	**Gobelin Room**
Chairperson	**Prof. Dominique Thévenin** Laboratory of Fluid Dynamics and Technical Flows, Institute of Fluid Dynamics and Thermodynamics, University of Magdeburg "Otto von Guericke", Germany	
Invited Speaker	**Prof. Alessandro Corsini** Department of Mechanical and Aerospace Engineering, Faculty of Civil and Industrial Engineering, Sapienza University of Rome, Roma, Italy	

Wed. 5. Sept. 13:35 - 14:20

#140

¬ Modeling (understanding and controlling) turbulent flows: the heritage of Leonardo da Vinci in modern computational fluid dynamics

Prof. Alessandro **Corsini**
Department of Mechanical and Aerospace Engineering,
Faculty of Civil and Industrial Engineering,
Sapienza University of Rome, Roma, Italy

¬ ABSTRACT

Why it is possible to claim that Leonardo da Vinci has been the "inventor" of the scientific method decades before the Ones (i.e. Galileo Galilei for instance) the History of Science is traditionally giving the fatherhood?
Why Leonardo da Vinci is (somehow) an ante- litteram fluid-dynamic scientist?
Why Leonardo's approach can be considered an anticipation of modern applied physics (CFD) and why his newness has not yet fully appreciated?
Taking the move from the above three questions, the present work possibly explores the open literature to find proofs of Leonardo's contribution to modern fluid dynamics. The manuscript focuses on three pillar contributions chosen, in the vast repertoire of Leonardo's Notebooks and Artworks, to give a personal perspective on his contribution to the frontiers of the fluid dynamics investigation. Specifically, the manuscript advocates: the link between flow visualization and modern deep learning usage in flow modelling (Section 2), the eco-design perspective implicit in the mimicry of Nature (Section 3), and the intuition of a science of quality and patterns (Section 4)

Session Identifier **WS3 - WORKSHOP** **Tea Room**

Title **Biomedical flows: experiments and simulations II**

WS Leader **Dr. Julia Mikhal**

BIOS Lab-on-a-Chip Group, Fac. EEMCS, Univ. of Twente, Enschede, The Netherlands

Co-organizers **Dr. Philipp Berg**

Dept. Fluid Dynamics and Technical Flows, Univ. Magdeburg, Germany, Forschungscampus STIMULATE, Univ. Magdeburg, Germany

Prof. Bernard J. Geurts

Multiscale Modeling and Simulation, Fac. EEMCS, Univ. Twente, Enschede (NL), Multiscale Physics of Energy Systems, Fac. Applied Physics, Eindhoven Univ. Technology (NL)

Dr. Gábor Janiga

Dept. Fluid Dynamics and Technical Flows, Univ. Magdeburg, Germany, Forschungscampus STIMULATE, Univ. Magdeburg, Germany

Christoph Roloff

Otto von Guericke Universität, Magdeburg, Germany,

Wed. 5. Sept. 14:50 - 16:30

#139 14:50 - 15:10

¬ Virtual stenting of intracranial aneurysms – explicit versus implicit approaches

Philipp **Berg** and Gábor **Janiga**

Dept. of Fluid Dynamics and Technical Flows, University of Magdeburg, Germany
Forschungscampus STIMULATE, University of Magdeburg, Germany

#133 15:10 - 15:30

¬ Uncertainties in the Hydraulic Resistance measurement of Flow Diverter Stents

Benjamin **Csippa**[1], Csaba **Fülöp**[1], Péter **Haraszti**[1], Gábor **Závodszky**[1,2], György **Paál**[1] and István **Szikora**[3]

1 Dept. of Hydrodynamic Systems, Fac. of Mechanical Engineering, Budapest University of Technology and Economics, Hungary

2 Computational Science Institute, University of Amsterdam, The Netherlands

3 Dept. Neurointerventions, National Inst. of Clinical Neurosciences, Budapest, Hungary

#132 15:30 - 15:50

¬ PIV measurement in an ideal aneurysmal model using a transparent coil model

Makoto **Ohta**[1,3], Masanori **Kuze**[2], Simon **Tupin**[1], Kaihong **Yu**[1], Yasutomo **Shimizu**[1] and Hitomi **Anzai**[1]

1 Institute of Fluid Science, Tohoku University, Sendai, Japan

2 Graduate School of Biomedical Engineering, Tohoku University, Sendai, Japan

3 ElyT-MAX, Lyon, France

#134 15:50 - 16:10

¬ CFD validation of intracranial aneurysm flow: impact of light sheet thickness on PIV results

Christoph **Roloff**[1], Philipp **Berg**[1,2,3], Frank **Beyrau**[4] and Dominique **Thévenin**[2]

1 Department of Fluid Dynamics and Technical Flows, University of Magdeburg, Germany

2 Department of Fluid Dynamics and Technical Flows, University of Magdeburg, Germany

3 Research Campus STIMULATE, Magdeburg, Germany

4 Department of Technical Thermodynamics, University of Magdeburg, Germany

#138 16:10 - 16:30

¬ IB method for stented aneurysms - bounding solutions and resolution requirements

Bernard **Geurts**[1,2], Gabriela **Ong**[1], Guido de **Jong**[3], Rene **Aquarius**[3], Joost de **Vries**[3], Jeroen **Boogaarts**[3] and Julia **Mikhal**[4]

1 Multiscale Modeling and Simulation, Faculty EEMCS, University of Twente, Enschede, The Netherlands

2 Multiscale Physics of Energy Systems, Faculty Applied Physics, Eindhoven University of Technology, Eindhoven, The Netherlands

3 Department of Neurosurgery, Radboud University Medical Center, Nijmegen, The Netherlands

4 BIOS Lab-on-a-Chip Group, Faculty EEMCS, University of Twente, Enschede, The Netherlands

Session Identifier **WS4 - WORKSHOP** **Gobelin Room**

Title **Aeroacoustics**

WS Leader **Prof. Stéphane Moreau**

Dep. Mechanical Engineering, Université de Sherbrooke, Canada

Co-organizer **Dr. Csaba Horváth**

Dept. Fluid Mechanics, Fac. Mechanical Engineering, Budapest University of Technology and Economics, Budapest, Hungary

Wed. 5. Sept. 14:50 - 16:50

#95 14:50 - 15:10

¬ Study on characteristics of aerodynamic sound radiated from longitudinal vortex generated around the leading edge of a delta wing

Shigeru **Ogawa**, Keita **Yano**, Hiroki **Okada** and Kouta **Samura**

Dept. Mechanical Engineering, National Inst. Technology, Kure Coll., Hiroshima, Japan

#11 15:10 - 15:30

¬ Investigation of the noise sources of a pylon

Kristóf **Tokaji**, Bence **Fenyvesi**, Bálint **Kocsis** and Csaba **Horváth**

Department of Fluid Mechanics, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Hungary

#32 15:30 - 15:50

¬ Investigation of turbomachinery noise sources using beamforming technology and proper orthogonal decomposition methods

Bence **Fenyvesi**[1], Eszter **Simon**[1], Jochen **Kriegseis**[2] and Csaba **Horváth**[1]

1 Department of Fluid Mechanics, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Budapest, Hungary

2 Institute of Fluid Mechanics, Karlsruhe Institute of Technology, Germany

#12 15:50 - 16:10

¬ Modelling the vortex-jet interaction in self-sustained flow oscillations

Péter Tamás **Nagy** and György **Paál**

Department of Hydrodynamic Systems, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Budapest, Hungary

#15 16:10 - 16:30

¬Numerical and experimental research of the flow over cavity taking into account heat transfer effects

Sebastian **Rulik**, Krzysztof **Rusin** and Włodzimierz **Wróblewski**

Institute of Power Engineering and Turbomachinery, Faculty of Energy and Environmental Engineering, Silesian University of Technology, Gliwice, Poland

#1 16:30 - 16:50

¬ Drone noise reduction via radiation efficiency considerations

Csaba **Horváth**, Bence **Fenyvesi**, and Bálint **Kocsis**

Dept. Fluid Mechanics, Fac. Mechanical Engineering, Budapest University of Technology and Economics, Hungary

Session Identifier	**EF1**	**Kávé Room**
Session Main Topic	**External Flow**	
Chairperson	**Prof. Song Fu**	
	Dep. Engineering Mechanics, Tsinghua University, Beijing, China	

Wed. 5. Sept. 14:50 - 16:50

#19 14:50 - 15:10

¬ Aerodynamic characteristics of shuttlecock (the effect of flow of the feather shuttlecock and the nylon shuttlecock)

Ryota **Katayama** and Hiroo **Okanaga**

Department of Mechanical Engineering, Tokai University, Kanagawa, Japan

#21 15:10 - 15:30

¬ Effects of streamwise and transverse damping on flow around an elastically supported cylinder

Dániel **Dorogi** and László **Baranyi**

Department of Fluid and Heat Engineering, Faculty of Mechanical Engineering and Informatics, University of Miskolc, Miskolc-Egyetemváros, Hungary

#55 15:30 - 15:50

¬ Aerodynamic characteristics of a reentry capsule at transonic speeds

Yuichiro **Osawa** and Gouji **Yamada** Mitsuhiro **Hase**

Department of Mechanical Engineering, Tokai University, Kanagawa, Japan

#89 15:50 - 16:10

¬ Natural frequency effect on the path of an elastically supported circular cylinder

Dániel **Dorogi** and László **Baranyi**

Department of Fluid and Heat Engineering, Faculty of Mechanical Engineering and Informatics, University of Miskolc, Miskolc-Egyetemváros, Hungary

#111 16:10 - 16:30

¬ Prediction of aerodynamic coefficients of road vehicles on bridge deck with and without wind protection by means of CFD

Balazs **Pritz,** Veronika **Krämer,** Martin **Gabi** and Emmerich **Tempfli**

Institute of Fluid Machinery, Karlsruhe Institute of Technology, Karlsruhe, Germany

#122 16:30- 16:50

¬ The numerical study on the effect of the number of vehicle on fire characteristics in tunnel fire

Younggi **Park**[1], Junyoung **Na**[1], Kun Hyuk **Sung**[2] and Hong Sun **Ryou**[2]

1 Department of Mechanical System Engineering, Chung-Ang University, Seoul, Korea

2 Department of Mechanical Engineering, Chung-Ang University, Seoul, Korea

Session Identifier **WS5 - WORKSHOP** **Forrás Room**

Title **Challenges in unsteady modelling of valves**

WS Leader **Dr. Csaba Hős**

Dep. Hydrodynamic Systems, Fac. Mechanical Engineering,

Budapest University of Technology and Economics, Hungary

Wed. 5. Sept. 14:50 - 16:10

#56 14:50 - 15:10

¬ Stability analysis of spring operated check valves with upstream and downstream pipings

István Tamás **Erdődi**[1], Csaba **Hős**[1] and Dávid **Felhős**[2]

1 Department of Hydrodynamic Systems, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Budapest, Hungary

2 Knorr-Bremse Rail Systems, Budapest, Hungary

#22 15:10 - 15:30

¬ An impedance-based technique for predicting valve chatter

Csaba **Hős**

Department of Hydrodynamic Systems, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Budapest, Hungary

#75 15:30 - 15:50

¬ Formation and propagation of pressure surges in inlet lines of safety valves and their influence on valve stability

Tobias S. **Dannenmaier**[1], Jürgen **Schmidt**[1], Jens **Denecke**[1],

Oliver **Odenwald**[2] and Dariusz **Jablonski**[3]

1 CSE Center of Safety Excellence GmbH, Pfinztal, Germany

2 BASF SE, Ludwigshafen, Germany

3 Bayer AG, Leverkusen, Germany

#33 15:50 - 16:10

¬ Modelling of critical mass flow rates through safety valves in case of non-equilibrium multi-component flashing mixtures

Sara **Claramunt**, Jürgen **Schmidt** and Jens **Denecke**

CSE Center of Safety Excellence GmbH, Pfinztal, Germany

Session Identifier	**Plenary Session 3**	**Gobelin Room**
Chairperson	**Prof. Dominique Thévenin** Laboratory of Fluid Dynamics and Technical Flows, Institute of Fluid Dynamics and Thermodynamics, University of Magdeburg "Otto von Guericke", Germany	
Invited Speaker	**Prof. Milovan Perić** Inst. Ship Technology, Ocean Engineering and Transport Systems, Fac. Engineering, Univ. Duisburg-Essen (D) CoMeT Continuum Mechanics Technologies GmbH, Erlangen (D)	

Thurs. 6. Sept. 9:10 - 9:55

#135 9:10 - 9:55

¬ State of the art and challenges related to application of CFD in fluids engineering

Prof. Milovan **Perić**,
Institute of Ship Technology, Ocean Engineering and Transport Systems,
Faculty of Engineering, University of Duisburg-Essen, Duisburg, Germany
CoMeT Continuum Mechanics Technologies GmbH, Erlangen, Germany

¬ ABSTRACT

In this paper the state-of-the-art and challenges related to application of Computational Fluid Dynamics (CFD) in fluids engineering are discussed. The major milestones in the development from a pure research discipline to an integral part of the design and optimization process in industry are described. Advantages of CFD over alternatives, especially in the early product design stage but also in product optimization and problem solving, are also addressed. Finally, the trends for future developments in CFD and its application in engineering are outlined.
Keywords: CFD, Fluid Dynamics, Fluids Engineering, Industrial Application of CFD

Session Identifier **WS6 - WORKSHOP** **Tea Room**

Title **Guidelines for environmental flow and dispersion modelling - what do we need?**

WS Leader **Prof. Bernd Leitl**

Environmental Wind Tunnel Lab, Meteorological Institute, Univ. Hamburg, Germany

Thurs. 6. Sept. 10:25 - 12:05

#88 10:25 - 10:45

¬ Guidelines for environmental flow and dispersion modeling - what do we need?

Bernd **Leitl** and Frank **Harms**

Environmental Wind Tunnel Lab, Meteorological Institute, Univ. Hamburg, Germany

10:45 - 11:05

¬ Modeling the urban environment of Budapest with the WRF and WRF-Chem models at the ELTE University

H. **Breuer**, J. **Göndöcs**, A. **Kovács**, Á. **Leelőssy,** and R. **Mészáros**

Dept. Meteorology, Fac.Science, Eötvös Lóránd University, Budapest, Hungary

11:05 - 11:25

¬ NWP models serving dispersion applications at the Hungarian Meteorological Service: turbulence parameterization developments and validation

B. **Szintai**, A. **Csáki**, Á. **Kovács**, D. **Lancz**, and Á. **Tímár**

Hungarian Meteorological Service, Budapest, Hungary

11:25 - 11:45

¬ Applying CHIMERE chemical transport model for the assessment of the air quality of Hungary

E. **Homolya** and Z. **Ferenczi**

Hungarian Meteorological Service, Budapest, Hungary

11:45 - 12:05

¬ Wind tunnel and CFD simulation of environmental and urban flows at the Department of Fluid Mechanics

M. **Balczó**, G. **Kristóf**, and M. **Balogh**

Department of Fluid Mechanics, Faculty of Mechanical Engineering,
Budapest University of Technology and Economics, Hungary

Session Identifier	**TM1**	**Gobelin Room**
Session Main Topic	**Turbine: General Interest**	
Chairperson	**Prof. Helmut Benigni**	
	Institute of Hydraulic Fluid Machinery, Graz University of Technology, Austria	

Thurs. 6. Sept. 10:25 - 12:05

#24 10:25 - 10:45

¬ Measurement and CFD prediction of turbine endwall film cooling

Pingting **Chen**, Xueying **Li**, Jing **Ren** and Hongde **Jiang**

Department of Energy and Power Engineering, Tsinghua University, Beijing, PR China

#4 10:45 - 11:05

¬ Primary and secondary conversion efficiencies of a fixed oscillating water column-type wave energy converter with generator

Tengen **Murakami**[1], Yasutaka **Imai**[1], Shuichi **Nagata**[1], Manabu **Takao**[2], Toshiaki **Setoguchi**[1] and Toshiaki **Kanemoto**[1]

1 Institute of Ocean Energy, Saga University, Saga, Japan

2 Department of Mechanical Engineering, National Institute of Technology, Matsue College, Matsue, Japan

#2 11:05 - 11:25

¬ Investigations of an enclosed annular rotor stator system

Zhe **Jiao** and Song **Fu**

School of Aerospace Engineering, Tsinghua University, Beijing, China

#64 11:25 - 11:45

¬ Mathematical modelling of flow in the first stage of high-pressure turbine with multiple steam nozzle control

Arkady **Zaryankin**[1], Andrey **Rogalev**[2], Alexander **Akatov**[1], Takhid **Padash**[1] and Vladislav **Krutitskii**[1]

1 Department of Steam and Gas Turbines, National Research University "Moscow Power Engineering Institute", Moscow, Russia

2 Department of Innovative Technologies of High-Tech Industries, National Research University "Moscow Power Engineering Institute", Moscow, Russia

#96 11:45 - 12:05

¬ A new horizontal wind turbine with a circular cylinder driven by longitudinal vortex system

Shigeru **Ogawa**, Takahiro **Nomura**, Naoki **Hata**, Yusuke **Kimura** and Yoshihiko **Sorokin**

Department of Mechanical Engineering, National Institute of Technology, Kure College, Hiroshima, Japan

Session Identifier	**IF 2**	**Kávé Room**
Session Main Topic	**Internal Flow**	
Chairperson	**Prof. Kawaguchi Yasuo** Department of Mechanical Engineering, Tokyo University of Science, Tokyo, Japan	

Thurs. 6. Sept. 10:25 - 12:05

#78 10:25 - 10:45

¬ Planar elongation flow analysis of non-Newtonian fluids using a disk-shaped bob

Shunsaku **Ito**[1], Yukinobu **Sugihara**[1], Shuichi **Iwata**[2], Tsutomu **Takahashi**[3]

1 Department of Life-Science and Applied Chemistry, Graduate School of Engineering, Nagoya Institute of Technology, Aichi, Japan

2 Department of Electronic Control Engineering, National Institute of Technology, Nagaoka College

3 Department of Mechanical Engineering, Nagaoka University of Technology, Nagaoka, Japan

#102 10:45 - 11:05

¬ Rheo-optic properties of chromonic liquid crystal dye in transient shear

Shiro **Wakaki**, Yoshiki **Yamada** and Tsutomu **Takahashi**

Dept. Mechanical Engineering, Nagaoka University of Technology, Niigata, Japan

#105 11:05 - 11:25

¬ Shear layer generation in yield behavior of gels

Yasunori **Sato**, Ippei **Homma** and Tsutomu **Takahashi**

Dept. Mechanical Engineering, Nagaoka University of Technology, Niigata, Japan

#114 11:25 - 11:45

¬ Influence of magnetic field on a shear driven motion of a viscous non-conducting ferrofluid

Gabriella **Bognar**

Institute of Machine and Product Design, Faculty of Mechanical Engineering and Informatics, University of Miskolc, Hungary

Session Identifier	**BU**	**Forrás Room**
Session Main Topic	**Bubble Flow and Cavitation**	
Chairperson	**Prof. Tsutomu Takahashi**	
	Dept. Mechanical Engineering, Nagaoka University of Technology, Niigata, Japan	

Thurs. 6. Sept. 10:25 - 12:05

#25 10:25 - 10:45

¬ Cavitation in a high specific speed Kaplan pit-type turbine – two-phase CFD-simulations and experimental verification

Juergen **Schiffer**, Helmut **Benigni** and Helmut **Jaberg**

Institute of Hydraulic Fluidmachinery, Graz University of Technology, Graz, Austria

#93 10:45 - 11:05

¬ CFD simulation of the nonlinear dynamics of laser generated cavitation bubbles

Max **Koch**[1], Christiane **Lechner**[1,2], Robert **Mettin**[1] and Werner **Lauterborn**[1]

1 Third Physical Institute, Georg-August Universität Göttingen, Göttingen, Germany

2 Institute of Fluid Mechanics and Heat Transfer, TU Wien, Vienna, Austria

#99 11:05 - 11:25

¬ Investigation of single bubble dynamics and strength of collapse in dual-frequency driven acoustic field

Roxána **Varga**[1], Robert **Mettin**[2] and Ferenc **Hegedűs**[1]

1 Department of Hydrodynamic Systems, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Budapest, Hungary

2 Third Institute of Physics, Georg-August-University, Göttingen, Germany

#45 11:25 - 11:45

¬ Effect of pressure-oscillation on bubble-liquid phase mass transfer

Keita **Yamamoto**[1], Shuichi **Iwata**[1], Ryo **Nagumo**[1], Hideki **Mori**[1]

and Tsutomu **Takahashi**[2]

1 Department of Life Science and Applied Chemistry, Graduate School of Engineering, Nagoya Institute of Technology, Aichi, Japan

2 Department of Mechanical Engineering, Nagaoka University of Technology, Niigata, Japan

Session Identifier	**Plenary Session 4**	**Gobelin Room**
Chairperson	**Prof. Dominique Thévenin** Laboratory of Fluid Dynamics and Technical Flows, Institute of Fluid Dynamics and Thermodynamics, University of Magdeburg "Otto von Guericke", Germany	
Invited Speaker	**Prof. Yannis Hardalupas** Department of Mechanical Engineering, Imperial College London, United Kingdom	

Thurs. 6. Sept. 13:35 - 14:20

#142 13:35 - 14:20

¬ Experimental characterization of sprays: special needs in validating computational models

Prof. Yannis **Hardalupas**,
Department of Mechanical Engineering, Imperial College London, United Kingdom

¬ ABSTRACT

The formation and droplet dispersion of sprays is important for many industrial applications. The formation of sprays occurs through two stages of the liquid breakup process. The primary breakup, during which the continuous liquid, supplied to an atomiser, breaks up into liquid fragments, and the secondary breakup, during which the liquid fragments breakup again to form the final stable droplets that exist in sprays downstream from the nozzle. The stable droplets then, for example, disperse through interaction with the surrounding gas flow turbulence, collide or evaporate, and these processes modify the characteristics of sprays.

The current paper summarises recent experimental approaches that allow the study of primary and secondary breakup close to the atomiser exit, where optical access is limited, and the downstream stable droplet behaviour in sprays. Examples of the physical understanding gained from these experimental studies are presented.

The consequences of these findings on the development and evaluation of improved computational models for liquid atomisation and droplet dispersion is discussed.

Session Identifier **BIO** **Tea Room**

Session Main Topic **Biomedical Flow**

Chairperson **Dr. Philipp Berg**

Department of Fluid Dynamics and Technical Flows, University of Magdeburg, Germany
Forschungscampus STIMULATE, University of Magdeburg, Magdeburg, Germany

Thurs. 6. Sept. 14:50 - 16:10

#73 14:50 - 15:10

¬ Flow diversion capability of intracranial FD stents by means of hydrodynamic resistance measurements

Benjamin **Csippa**[1], Gábor **Závodszky**[1,2], György **Paál**[1] and István **Szikora**[3]

1 Department of Hydrodynamic Systems, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Budapest, Hungary

2 Computational Science Institute, University of Amsterdam, The Netherlands

3 Department of Neurointerventions, National Institute of Clinical Neurosciences, Budapest, Hungary

#58 15:10 - 15:30

¬ Computational modelling of Newtonian fluids flow in a bypass tube

Radka **Keslerova**[1], Hynek **Reznicek**[1] and Tomas **Padelek**[2]

1 Department of Technical Mathematics, Faculty of Mechanical Engineering, Czech Technical University in Prague, Czech Republic

2 Department of Transport Systems, Faculty of Transportation Sciences, Czech Technical University in Prague, Czech Republic

#72 15:30 - 15:50

¬ Hydrodynamic resistance of stenosed coronary arteries

Benjamin **Csippa**[1], Dániel **Gyürki**[1], György **Paál**[1] and Zsolt **Kőszegi**[2]

1 Department of Hydrodynamic Systems, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Budapest, Hungary

2 Institute of Cardiology, University of Debrecen, Debrecen, Hungary

#9 15:50 - 16:10

¬ Modeling of dry powder transport and deposition in the respiratory tract

Vasilis **Bontozoglou**[1] and Konstantinos **Gourgoulianis**[2]

1 Department of Mechanical Engineering, School of Engineering, University of Thessaly, Volos, Greece

2 Pulmonology Clinic, School of Medicine, University of Thessaly, Volos, Greece

Session Identifier	**TM2**	**Gobelin Room**
Session Main Topic	**Wind Turbines**	
Chairperson	**Dr. Viktor Szente** Dept. Fluid Mechanics, Fac. Mech. Eng., Budapest University of Technology and Economics, Hungary	

Thurs. 6. Sept. 14:50 - 16:30

#103 14:50 - 15:10

¬ Introduction of a new wind turbine system driven by longitudinal vortex

Tsutomu **Takahashi**[1], Kasumi **Sakamoto**[2] and Withun **Hemsuwan**[3]

1 Dept. Mechanical Engineering, Nagaoka University of Technology, Niigata, Japan
2 Dept. Science of Technology Innovation, Nagaoka Univ. of Technology, Niigata, Japan
3 Graduate School of Engineering, Nagaoka University of Technology, Niigata, Japan

#43 15:10 - 15:30

¬ Influence of pitch of blades on efficiency characteristic of wind turbine driven by longitudinal vortex

Kasumi **Sakamoto**[1], Shota **Nakada**[1], Withun **Hemsuwan**[2]
and Tsutomu **Takahashi**[3]

1 Dept. Science of Technology Innovation, Nagaoka Univ. of Technology, Niigata, Japan
2 Graduate School of Engineering, Nagaoka University of Technology, Niigata, Japan
3 Dept. Mechanical Engineering, Nagaoka University of Technology, Niigata, Japan

#49 15:30 - 15:50

¬ Effect of the blade tip on power characteristics of horizontal axis circular cylinder blades wind turbine driven by longitudinal vortex

Shota **Nakada**[1], Kasumi **Sakamoto**[1], Withun **Hemsuwan**[2]
and Tsutomu **Takahashi**[3]

1 Dept. Science of Technology Innovation, Nagaoka Univ. Technology, Niigata, Japan
2 Graduate School of Engineering, Nagaoka University of Technology, Niigata, Japan
3 Dept. Mechanical Engineering, Nagaoka University of Technology, Niigata, Japan

#51 15:50 - 16:10

¬ Numerical modelling of the ice throw from wind turbines

Robert **Szasz**[1], Alexandre **Leroyer**[2] and Johan **Revstedt**[1]

1 Department of Energy Sciences, Lund University, Sweden
2 ISAE-ENSMA, Chasseneuil-du-Poitou, France

#70 16:10 - 16:30

¬ The aerodynamic performance of a novel wind turbine blade design

Ali Al **Sam**[1], Johan **Revstedt**[2] and Rikard **Berthilsson**[1]

1 Energy Sciences Department, Lund University, Lund, Sweden
2 Winfoor AB, Lund, Sweden

Session Identifier	**EF2**	**Kávé Room**
Session Main Topic	**External Flow**	
Chairperson	**Prof. László Baranyi,** Dept. Fluid and Heat Engineering, Fac. Mechanical Engineering and Informatics, University of Miskolc, Hungary	

Thurs. 6. Sept. 14:50 - 16:50

#13 14:50 - 15:10

¬ The effect of spanwise and streamwise flexible coating on the boundary layer transition

Péter Tamás **Nagy** and György **Paál**

Department of Hydrodynamic Systems, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Hungary

#16 15:10 - 15:30

¬ The influence of disc roughness on Tesla turbine performance prediction

Krzysztof **Rusin** and Włodzimierz **Wróblewski**

Institute of Power Engineering and Turbomachinery, Faculty of Energy and Environmental Engineering, Silesian University of Technology, Gliwice, Poland

#29 15:30 - 15:50

¬ A stochastic approach to investigate the incompressible temporally developing turbulent boundary layer

Rakhi and Heiko **Schmidt** Department of Mechanical Engineering, Electrical and Energy Systems, BTU Cottbus-Senftenberg, Germany

#42 15:50 - 16:10

¬ Effects of horizontal grooves and concave portion to aerodynamic characteristics of square cylinder

Tatsuya **Takaya** Department of Fluid Mechanics, Faculty of Mechanical Engineering, Tokai University, Kanagawa, Japan

#66 16:10 - 16:30

¬ Investigation of the influence of dimples on the resistance of overflowed plates

Julian **Praß**[1], Hagen **Wannemacher**[1], Jörg **Franke**[2] and Stefan **Becker**[1]

1 Institute of Process Machinery and Systems Engineering, Faculty of Engineering, Friedrich-Alexander-University Erlangen-Nuremberg, Erlangen, Germany
2 Institute for Factory Automation and Production Systems, Faculty of Engineering, Friedrich-Alexander-University Erlangen-Nuremberg, Erlangen, Germany

#6 16:30 - 16:50

¬ Boundary layer flow approximation for asymmetric oscillatory sheet flow transport

Xin **Chen** and Fujun **Wang**

Beijing Engineering Research Center of Safety and Energy Saving Technology for Water Supply Network System, China Agricultural University , Beijing, China

Session Identifier	**PL**	**Forrás Room**
Session Main Topic	**Particle-Laden Flow**	
Chairperson	**Dr. Daisuke Toriu**	
	Academic Center for Computing and Media Studies (ACCMS), Kyoto University, Japan	

Thurs. 6. Sept. 14:50 - 16:30

#38 14:50 - 15:10

¬ Researches on the simulation of the hydrodynamic erosion phenomenon in the riverbed

Mihail **Luca**[1], Alexandru-Lucian **Luca**[2], Stefania **Chirica**[3], Fabian **Tamasanu**[2] and Anca **Balan**[3]

1 Dept. Hydrotechnic and Environment Engineering, Technical Univ. „Gh. Asachi", Jassy, Romania
2 Polias-Instal Company, Iaşi, Romania
3 Doctoral School of the Faculty of Hydrotechnics, Geodesy and Environmental Engineering, Technical University „Gh. Asachi" Jassy, Romania

#41 15:10 - 15:30

¬ Study on capillary rise of suspension

Yukinobu **Sugihara**, Yuto **Nishikawa** and Tsutomu **Takahashi**

Dept. Mechanical Engineering, Nagaoka University of Technology, Niigata, Japan

#52 15:30 - 15:50

¬ Sedimentation of cubical particles in a power-law fluid

Naser **Hamedi** and Johan **Revstedt**

Department of Energy Sciences, Fluid Mechanics, Lund University, Lund, Sweden

#108 15:50 - 16:10

¬ Experimental and numerical study on the inertial focusing of spherical particles suspended in square channel flows

Masako **Sugihara-Seki**[1,2] and Hiroshi **Yamashita**[3]

1 Dept. Pure and Applied Physics, Fac. Engineering Science, Kansai University, Osaka, Japan
2 Graduate School of Engineering Science, Osaka University, Osaka, Japan
3 Graduate School of Science and Engineering, Kansai University, Osaka, Japan

#130 16:10 - 16:30

¬ Multiphase model to predict many gravel particles transported by free-surface flows

Satoru **Ushijima**[1] and Daisuke **Toriu**[1], Hirofumi **Yanagi**[2]

1 Academic Center for Computing and Media Studies (ACCMS), Kyoto Univ. Kyoto-shi, Japan
2 CERE, Graduate School of Engineering, Kyoto University, Kyoto-shi, Japan

Session Identifier	**TM3**	**Tea Room**
Session Main Topic	**Pump**	
Chairperson	**Prof Young-Seok Choi**	
	Advanced Energy & Technology, University of Science & Technology, Daejeon, Korea Thermal & Fluid System R&D Group, Korea Institute of Industrial Technology, Cheonan, Korea	

Fri. 7. Sept. 9:00 - 10:40

#129 9:00 - 9:20

¬ Guide vane foils change the positive slope on pump performance curves of pump-turbines

Guocheng **Lu**, Zhigang **Zuo** and Shuhong **Liu**

Department of Energy and Power Engineering, Tsinghua University, Beijing, P.R. China

#98 9:20 - 9:40

¬ Analysis of four-quadrant performance curves for calculation of hydraulic machinery transient regimes

Zdravko **Giljen**[1] and Milos **Nedeljkovic**[2], Yongguang **Cheng**[3]

1 Business and Technical Development Directorate, Sector for new projects, Montenegro Electric Company, Nikšić, Montenegro

2 University of Belgrade, Faculty of Mechanical Engineering, Department for Hydraulic Machinery and Energy Systems, Belgrade, Serbia

3 State Key Laboratory of Water Resources and Hydropower Engineering Science, Wuhan University, Wuhan, China

#31 9:40 - 10:00

¬ Maximum efficiency despite lowest specific speed – optimisation of a side channel pump by means of CFD

Markus **Mosshammer**[1], Helmut **Benigni**[1], Helmut **Jaberg**[1] and Juergen **Konrad**[2]

1 Institute of Hydraulic Fluidmachinery, Faculty of Mechanical Engineering, Graz University of Technology, Austria

2 Dickow Pumpen GmbH & Co. KG, Waldkraiburg, Germany

#34 10:00 - 10:20

¬ Numerical and experimental investigation of a vortical flow-inducing jet pump

Andrew **Morrall**, M. Sergio **Campobasso** and Stephen **Quayle**

Department of Engineering, Faculty of Science and Technology, Lancaster University, United Kingdom

#59 10:20 - 10:40

¬ Numerical investigation of the 4-quadrant behaviour of different mixed flow diffuser pumps with experimental verification

Stefan **Holler**, Helmut **Benigni** and Helmut **Jaberg**

Institute of Hydraulic Fluidmachinery, Graz University of Technology, Graz, Austria

Session Identifier	**TM4**	**Gobelin Room**
Session Main Topic	**Turbomachinery: General Interest**	
Chairperson	**Dr. Csaba Horváth** Dept. Fluid Mechanics, Fac. Mech Eng., Budapest University of Technology and Economics, Hungary	

Fri. 7. Sept. 9:00 - 11:00

#20 9:00 - 9:20

¬ Numerical modelling of transonic flows in wind tunnel test section

Petr **Louda**[1] and Jaromir **Prihoda**[2]

1 Institute of Thermomechanics CAS, Prague, Czech Republic

2 Czech Technical University in Prague, Dept. of Technical Mathematics, Fac. of Mechanical Engineering, Institute of Thermomechanics CAS, Prague, Czech Republic

#48 9:20 - 9:40

¬ Low-speed aerodynamic characteristics of double-delta wings with canards

Saya **Mochizuki** and Gouji **Yamada**

Department of Mechanical Engineering, Tokai University, Kanagawa, Japan

#50 9:40 - 10:00

¬ Application of aerodynamic design limits for radial flow fans to the Cordier-diagram

Martin **Kalva** and Reinhard **Willinger**

Institute for Energy Systems and Thermodynamics, Technische Universität Wien, Austria

#92 10:00 - 10:20

¬ Fluid-structure interaction in the first stage of an axial compressor

Johan **Revstedt**, Weiwei **Li** and Magnus **Genrup**

Department of Energy Sciences, Lund University, Lund, Sweden

#101 10:20 - 10:40

¬ Three-components LDA investigation of the turbulent swirl jet behind the axial fan

Novica **Jankovic**, Djordje **Cantrak** and Milos **Nedeljkovic**

Hydraulic Machinery and Energy Systems Department, Faculty of Mechanical Engineering, University of Belgrade, Serbia

#128 10:40 - 11:00

¬ Flow mechanism of the aperiodic flow patterns around an airfoil with leading-edge protuberances

Chang **Cai**, Zhigang **Zuo** and Shuhong **Liu**

Department of Energy and Power Engineering, Tsinghua University, Beijing, China

Session Identifier	**EV**	**Kávé Room**
Session Main Topic	**Environmental Flow**	
Chairperson	**Dr. Gergely Kristóf** Dep. Fluid Mechanics, Fac. Mech Eng., Budapest University of Technology and Economics, Hungary	

Fri. 7. Sept. 9:00 - 10:40

#8 9:00 - 9:20

¬ Wind tunnel measurement of the dispersion for two side by side plumes over a thin fence

Bao-Shi **Shiau**[1,2] and Sine-Jie **Wang**[2]

1 Institute of Physics, Academia Sinica, Taipei, Taiwan

2 Dept. of Harbor and River Engineering, National Taiwan Ocean Univ., Keelung, Taiwan

#39 9:20 - 9:40

¬ Map-based modelling of high-Rayleigh-number turbulent convection in planar and spherical confinements

Marten **Klein**[1], Heiko **Schmidt**[1] and David O. **Lignell**[2]

1 Dept. of Numerical Fluid and Gas Dynamics, Fac. of Mech. Engineering, Electrical and Energy Systems, Brandenburg Univ. of Technology (BTU) Cottbus-Senftenberg, Germany

2 Department of Chemical Engineering, Brigham Young University, Provo, UT, U.S.A.

#40 9:40 - 10:00

¬ Modeling of the diffusion characteristics of the unsteady plume in quasi-homogeneous turbulence for the estimation of the diffusion source

Toma **Shimohigashi**, Takahiro **Tsukahara** and Yasuo **Kawaguchi**

Department of Mechanical Engineering, Tokyo University of Science, Tokyo, Japan

#86 10:00 - 10:20

¬ Modeling dense gas dispersion processes in a boundary layer wind tunnel

Frank **Harms** and Bernd **Leitl**

Meteorological Institute, University of Hamburg, EWTL, Hamburg, Germany

#113 10:20 - 10:40

¬ Modeling and computation of air flow in solar chimney power plant

Aleksandar **Ćoćić**[1] and Vladan **Djordjević**[2]

1 Department of Fluid Mechanics, Faculty of Mechanical Engineering, University of Belgrade, Serbia

2 Serbian Academy of Sciences and Arts, Belgrade, Serbia

Session Identifier	**MF**	**Forrás Room**
Session Main Topic	**Multi-Fluid Flow**	
Chairperson	**Dr. Artur Tyliszczak**	
	Inst. Thermal Machinery, Fac. Mechanical Engineering and Computer Science, Czestochowa University of Technology, Częstochowa, Poland	

Fri. 7. Sept. 9:00 - 10:20

#63 9:00 - 9:20

¬ CFD modelling and experimental investigation of flow behavior in sewer pipes

Maryam **Alihosseini**, Raja Abou **Ackl** and Paul Uwe **Thamsen**

Department of Fluid Mechanics, Faculty of Mechanical Engineering, Berlin University of Technology, Berlin, Germany

#85 9:20 - 9:40

¬ Smoothed particle hydrodynamics for Navier-Stokes fluid flow applications

Pierre **Sabrowski**[1], Sabine **Przybilla**[2], Felix **Pause**[3], Lennart **Beck**[2], Joachim **Villwock**[2] and Paul Uwe **Thamsen**[1]

1 Institute of Fluid Mechanics and Acoustic, Technical University Berlin, EFRE research project OPuS, Berlin, Germany

2 Beuth University of Applied Sciences Berlin, EFRE research project OPuS, Germany

3 dive.sph, Berlin, Germany

#118 9:40 - 10:00

¬ Numerical study of a flat surface wettability for varying initial conditions

Dariusz **Asendrych**

Institute of Thermal Machinery, Częstochowa University of Technology, Poland

#126 10:00 - 10:20

¬ A novel numerical scheme for N-fluid flow with full thermodynamic consistency on arbitrary moving grids

Thibaud **Vazquez-Gonzalez**[1], Antoine **Llor**[1] and Christophe **Fochesato**[2]

1 CEA, DAM, DIF, Arpajon, France

2 CEA, DEN, CAD, Saint-Paul-lez-Durance, France

Session Identifier	**TM5**	**Gobelin Room**
Session Main Topic	**Hydraulic Turbine**	
Chairperson	**Prof. Milos Nedeljkovic**	
	Dep. Hydraulic Machinery and Energy Systemxs, Fac. Mech. Eng., University of Belgrade, Belgrade, Serbia	

Fri. 7. Sept. 11:30 - 12:50

#76 11:30 - 11:50

¬ Experimental evaluation of the behavior of flexible structures for vertical axis water turbines

Stefan **Hoerner**[1], Shokoofeh **Abbaszadeh**[2], Thierry **Maître**[3], Laure **Vignal**[3], Christian-Toralf **Weber**[4], Roberto **Leidhold**[2] and Dominique **Thévenin**[1]

1 Institute of Fluid Dynamics and Thermodynamics, Faculty of Process and Systems Engineering, Otto-von-Guericke-University Magdeburg, Germany

2 Institute of Electric Power Systems, Faculty of Electrical Engineering and Information Technology, Otto-von-Guericke-University Magdeburg, Germany

3 Laboratory of Geophysical and Industrial Flows, Grenoble Institute of Technology, University Grenoble-Alpes, Grenoble, France

4 Department of Engineering and Industrial Design, University of Applied Sciences Magdeburg, Germany

#106 11:50 - 12:10

¬ Blockage effect of a runner blade on the hydraulic performance and internal flow characteristics of a Francis hydro turbine

Seung-Jun **Kim**[1], Young-Seok **Choi**[1], Yong **Cho**[2], Jong-Woong **Choi**[2] and Jin-Hyuk **Kim**[1]

1 Advanced Energy & Technology, University of Science & Technology, Daejeon, Korea; Thermal & Fluid System R&D Group, Korea Institute of Industrial Technology, Cheonan, Korea

2 K-water Institute, Korea Water Resources Corporation, Daejeon, Korea

#74 12:10 - 12:30

¬ Pressure pulsation in the stationary and rotating system of a high specific speed Kaplan pit-type turbine – CFD-simulations and experimental verification

Helmut **Benigni**, Juergen **Schiffer**, Christian **Bodner** and Helmut **Jaberg**
Institute of Hydraulic Fluid Machinery, Faculty of Mechanical Engineering,
Graz University of Technology, Austria

#83 12:30 - 12:50

¬ Development of a cross-flow-turbine by using 3D-CFD-calculations

Christian **Bodner**, Helmut **Benigni** and Helmut **Jaberg**
Institute for Hydraulic Fluid Machinery, Graz University of Technology, Austria

Session Identifier	**IF3**	**Kávé Room**
Session Main Topic	**Internal Flow**	
Chairperson	**Prof. Jing Ren**	
	Dep. Thermal Engineering, Institute of Gas Turbine, Tsinghua University, Beijing, China	

Fri. 7. Sept. 11:30 - 12:50

#5 11:30 - 11:50

¬ CFD-based optimization of sharp square-sectioned U-bends with/without system rotation: RANS vs. IDDES

Evgueni **Smirnov**[1], Dmitry **Panov**[2], Vladimir **Ris**[2] and Valery **Goryachev**[3]

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Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia

2 Peter the Great St. Petersburg Polytechnic University, St. Petersburg, Russia

3 Tver State Technical University, Tver, Russia

#26 11:50 - 12:10

¬ Predicting the flow field in a U-bend with deep neural networks

Gergely **Hajgató**[1], Bálint **Gyires-Tóth**[2] and György **Paál**[1]

1 Department of Hydrodynamic Systems, Faculty of Mechanical Engineering, Budapest University of Technology and Economics, Budapest, Hungary

2 Department of Telecommunications and Media Informatics, Faculty of Electrical Engineering and Informatics, Budapest University of Technology and Economics

#36 12:10 - 12:30

¬ Comparison of LES and RANS evaluations with experimental tests on u-bend duct geometry

Giacomo **Alessi**[1,2], Tom **Verstraete**[1], Lilla **Koloszar**[1] and Jeroen van **Beeck**[1]

1 von Karman Institute for Fluid Dynamics, Sint-Genesius-Rode, Belgium

2 Catholic University of Leuven, Civil Engineering Department, Leuven, Belgium

#54 12:30 - 12:50

¬ Tomographic PIV measurements in a helically coiled reactor

Péter **Kováts**, Katharina **Zähringer**,

Dominique **Thévenin** and Fabio J. W. A. **Martins**

Laboratory of Fluid Dynamics and Technical Flows, Otto-von-Guericke-Universität Magdeburg, Magdeburg, Germany

Session Identifier	**RF**	**Forrás Room**
Session Main Topic	**Reactive Flow**	
Chairperson	**Dr. Balázs Pritz**	
	Institute of Fluid Machinery, Karlsruhe Institute of Technology, Karlsruhe, Germany	

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¬ One-dimensional turbulence simulations for reactive flows in open and closed systems

Tommy **Starick**, Juan **A**. Medina **M**. and Heiko **Schmidt**

Faculty of Mechanical Engineering, Brandenburg University of Technology Cottbus-Senftenberg, Germany

#97 11:50 - 12:10

¬ Flamelet progress variable modelling of pulverised coal devolatilisation and burning in opposed jets

Yiran **Chen**[1,2], Oliver **Stein**[2], Andreas **Kronenburg**[2],

Michele V**ascellari**[3], Christian **Hasse**[4] and Kaihong **Luo**[1,5]

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4 Simulation of Reactive Thermo-Fluid Systems, TU Darmstadt, Darmstadt, Germany

5 Department of Mechanical Engineering, University College London, London, UK

#79 12:10 - 12:30

¬ Modelling of the spark ignition in turbulent reacting droplet-laden jet using LES

Jakub **Stempka**, Lukasz **Kuban** and Artur **Tyliszczak**

Institute of Thermal Machinery, Czestochowa University of Technology,

Faculty of Mechanical Engineering and Computer Science, Czestochowa, Poland

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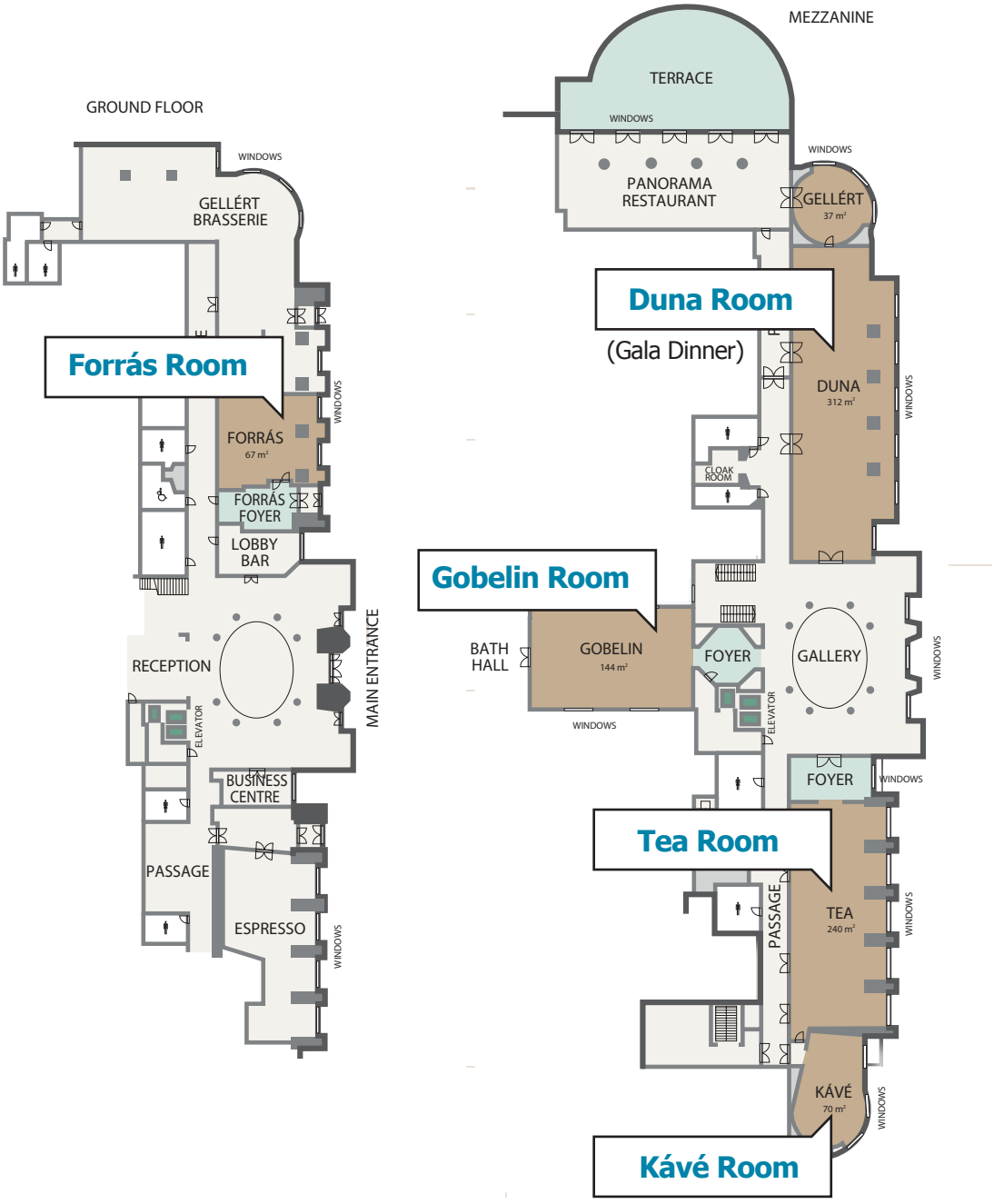

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