



ETMM

Eurotac Symposium on
Engineering, Turbulence,
Modelling and Measurements

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Welcome note



Message from the ETMM 2023 Chairing Committee

In front of you lies the program of the 14th ERCOFTAC Symposium on Engineering Turbulence Modelling and Measurement (ETMM14). The ETMM series of conferences is well established and continues to give prominence to research on scientific and application-oriented aspects of turbulence and its computational and experimental characterization. ETMM as a flag-ship conference closely expresses ERCOFTAC's ambitions as a research community promoting Science, Engineering and their mutual cross-fertilization.

The ETMM series was initiated in 1990 with the goal to create a highly focused forum at which academic and industrial researchers would be given the opportunity to present and discuss new developments in modelling and measurement of turbulent flows, of immediate relevance to practical applications in fluid-flow engineering and related areas. The mission of ETMM is to foster the translation of fundamental discoveries into practically relevant models and experimental systems that serve the design process in engineering and the prediction of physically and geometrically complex processes in the natural environment. Until now 13 ETMM conferences were held over the past 33 years, all around the Mediterranean area. The selection of Castelldefels in the metropolitan area of Barcelona as the location for the 2023 Symposium continues ETMM's Mediterranean tradition – an excellent location for exchanging new results and connect to colleagues from across the globe.

The broad spectrum of topics featuring at ETMM meetings encompasses computational and experimental approaches to complex aero- and hydro-dynamic flows, heat transfer, multi-phase and reacting flows, flow control, flows in power generation and environmental fluid mechanics. ETMM14 aspires to reflect this mix of research areas and provides a vital platform for science-based engineering research and development.

The Organizing committee expresses the wish that ETMM14 will be a valuable branch on the continuously growing tree of engineering knowledge and skills. It is hoped that ETMM14 will mark the beginning of new contacts and collaboration among its participants. Everything is set to help strengthen our field of work, engaging a talented community in the challenges of turbulence modelling, simulation and measurements of relevance to society as a whole.

Greetings, on behalf of the Organizing Committee:

Stefan Hickel, Maria Vittoria Salvetti, Ivette Rodríguez, Oriol Lehmkuhl

Committees

Organizing Committee

Stefan Hickel, TU Delft, The Netherlands

Maria Vittoria Salvetti, University of Pisa, Italy

Ivette Rodríguez, Universitat Politècnica de Catalunya, Spain

Oriol Lehmkuhl, Barcelona Supercomputing Center, Spain

Petros Stratis, EasyConferences, Cyprus

Scientific Committee

B. Boersma (The Netherlands)

P. Cinnella (France)

O. Flores (Spain)

B. Franzelli (France)

J. Fröhlich (Germany)

C. Gorle (USA)

S. Jakirlic (Germany)

S. Kassinos (Cyprus)

A. Kempf (Germany)

J. Larsson (USA)

O. Lehmkuhl (Spain)

I. Marusic (Australia)

W. Rodi (Germany)

I. Rodríguez (Spain)

F. Gisbert (Spain)

B. Guerts (The Netherlands)

K. Hanjalic (The Netherlands)

S. Hickel (The Netherlands)

S. Hoyas (Spain)

M. Hultmark (USA)

B. McKoen (USA)

J. Meyers (Belgium)

F. Nicoud (France)

M. Salvetti (Italy)



Keynote Speakers

Keynote Speakers



Paola Cinnella, Sorbonne University, France

Title: Machine-learning-assisted modeling of turbulence: current status and perspectives

Bio: Paola Cinnella is a full professor at the Institut Jean Le Rond D'Alembert of Sorbonne Université in France. She graduated summa cum laude in Mechanical Engineering at the Politecnico di Bari (Italy) in 1995 and she obtained a PhD degree in Fluid Mechanics (summa cum laude) from Ecole Nationale Supérieure d'Arts et Métiers-ENSAM, in Paris in 1999. She is a Member of the Aerodynamics Panel of the French Association of Aeronautics and Astronautics and she serves as editorial board member for Flow, Turbulence and Combustion, Scientific Reports and Computers & Fluids. Her research encompasses several facets of computational fluid dynamics (CFD), including high-order methods, uncertainty quantification and data-driven approaches for flow modeling, as well as applications of CFD to the analysis and design of compressible flows with real gas effects.

Benedetta Franzelli, Centre national de la recherche scientifique (CNRS), France

Title: Characterization and modelling of soot production in turbulent flames

Bio: Benedetta Franzelli is a Researcher of the French National Center for Scientific Research (CNRS) at the EM2C Laboratory (UPR288) at CentraleSupélec. Dr. Franzelli research interests are in theoretical, experimental, and numerical characterization of multi-phase turbulent reactive flows. At EM2C, she leads the investigation of soot and nanoparticles production in turbulent flames using high-speed optical diagnostics and large eddy simulations in the framework of ERC Starting Grant SOTUF (2018-2024). She graduated at Politecnico di Milano (2007) and received her PhD from Institut National Polytechnique de Toulouse (CERFACS, 2011). As a Postdoctoral Fellow, she worked at the EM2C Laboratory (2012, 2013) and at the Center for Turbulence Research at Stanford University (2014). She has been the recipient of a Stanford Center for Turbulence Research PostDoctoral Fellowship (2012), the Bernard Lewis Fellowship from the Combustion Institute (2014), the Bronze Medal from CNRS (2018) and a European Research Council (ERC) Starting Grant (2018).



Keynote Speakers



Johan Larsson, University of Maryland, USA

Title: Adaptivity in wall-modeled large eddy simulations

Bio: Johan Larsson is an Associate Professor at the University of Maryland where he works on multiple problems in the field of computational turbulence including wall-modeling for large eddy simulation, grid-adaptation for turbulence-resolving simulations, high-speed turbulent flows, and uncertainty quantification for turbulence problems. He earned his PhD at the University of Waterloo, Canada, in 2006, and then worked at the Center for Turbulence Research at Stanford University as a postdoctoral fellow and Research Associate for 6 years before joining the University of Maryland in 2012. He is an Associate Editor of the AIAA Journal.



Ivan Marusic, University of Melbourne, Australia

Title: Structure and drag-reducing scale interactions for high-Reynolds-number wall-bounded flows

Bio: Ivan Marusic is a Redmond Barry Distinguished Professor in the Faculty of Engineering and IT at the University of Melbourne. His research is primarily in experimental and theoretical studies of turbulence at high Reynolds numbers, including using atmospheric surface layer flows and large wind tunnel facilities. Over his career he has held a number of prestigious fellowships, including an Australian Research Council (ARC) Laureate Fellowship (2012-2017), ARC Federation Fellowship (2006-2011), and a Packard Fellowship in Science and Engineering (2001-2006). He is recipient of the Stanley Corrsin Award from the American Physical Society and is a Fellow of the American Physical Society, Australasian Fluid Mechanics Society, Australian Academy of Technology and Engineering and the Australian Academy of Science.

Franck Nicoud, Université de Montpellier, France

Title: Numerical analysis of the intra-cardiac flow.

Bio: Franck Nicoud graduated in 1990 from the National School of Engineering ENSEEIHT in Toulouse and was awarded a grant from the French Space Agency to carry out a doctoral thesis on the prediction of heat transfers in solid rocket engines. He became a senior scientist at the European Centre for Research and Advanced Training in Scientific Computing (CERFACS) in 1995, joined the Center for Turbulence Research at Stanford University in 1998 and was appointed Professor at the University of Montpellier in 2001, where he is now heading the Polytech Department of Mechanical Engineering and Interactive Design. He founded the YALES2BIO group at the Alexander Grothendieck Institute in Montpellier in 2011, with the aim to develop computational methods and physical models relevant to macroscopic and microscopic blood flows. Being a scientific advisor at CERFACS, some of his research remains driven by aeronautical applications, including wall modeling for Large Eddy Simulations and low order models for thermoacoustic instabilities. He is co-author of approximately 100 articles in international journals, associate editor of the International Journal for Sprays and Combustion Dynamics and co-owns 3 patents.



Keynote Speakers



Alfredo Soldati, Technical University of Vienna, Austria

Title: Modelling and computation of drops and bubbles in turbulence

Bio: Alfredo Soldati is professor of Fluid Mechanics and director of the Institute of Fluid Mechanics and Heat Transfer at TU Wien, Austria and part time professor at the University of Udine, Italy. His research focuses on physics and engineering of multiphase flows. Dr. Soldati received the 2007 ASME Robert Knapp award, the 2015 ASME Lewis Moody award, and in 2020 the ASME Freeman Scholarship. In 2013 he was elected Fellow of the American Physical Society and in 2020 was elected fellow of EUROMECH. In 2018 he received the International Prize and Gold Medal Panetti-Ferrari 2018 from Accademia delle Scienze, Torino, Italia. He is currently the Rector of the International Center for Mechanical Sciences (CISM) and the co-Editor in Chief of International Journal of Multiphase Flow.



Fernando Gisbert, ITP Aero, Spain

Title: High fidelity numerical simulation of low pressure turbine flows

Bio: Fernando Gisbert is a Technical Fellow in Computational Fluid Dynamics at ITP Aero. He graduated at Universidad Politécnica de Madrid in 2002 and received his Ph.D. from the same institution in 2007. Since 2007, he works at the Simulation Technologies department of ITP. He is in charge of the development of an in-house CFD solver used in the aerodynamic design of Low Pressure Turbines (LPTs). He also leads the development of a high fidelity, high order Navier-Stokes solver to analyse the flow around LPTs using large eddy simulations.





Programme



Programme

WEDNESDAY - SEPTEMBER 06, 2023

08:00	Registration (Support Desk hours: 8:00 - 13:00 and 14:00-17:30)	
08:45 - 09:00	Welcome and Orientation -- Ivette Rodriguez & Stefan Hickel	
09:00 - 09:45	Room A	Keynote lecture -- Alfredo Soldati : Modelling and computation of drops and bubbles in turbulence. Chair: Markus Klein
09:45 - 10:30	Room A	Keynote lecture -- Benedetta Franzelli : Characterization and modelling of soot production in turbulent flames. Chair: Luc Vervisch
10:30 - 11:00	Coffee break	
	Room A	Room B
11:00-12:40	MS. Recent advances in LES of multiphase flows Chair: Mahdi Saeedipour	Bluff bodies Chair: Woutijn Baars
11:00 - 11:20	Towards LES of liquid jet atomization using an Eulerian-Lagrangian multi-scale approach <i>Elias Trautner, Josef Hasslberger, Markus Klein</i>	Experimental investigation on the effects of upstream-edge roundness and angle of attack on the flow around a 5:1 rectangular cylinder <i>Alessandro Mariotti, Gianmarco Lunghi, Maria Vittoria Salvetti</i>
11:20 - 11:40	Complete LES of turbulent interfacial flows - challenges and perspectives <i>Mahdi Saeedipour, Jean-Luc Estivalezes, Stephane Vincent</i>	Large-Eddy Simulations of the accelerating flow around square and rectangular cylinders <i>Maria Vittoria Salvetti, Stefano Brusco, Gianmarco Lunghi, Giuseppe Piccardo, Alessandro Mariotti</i>



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10:30 - 11:00 Coffee break		
11:00-12:40	Room C	Room D
11:00-12:40	MS. Physics-compatible numerical methods for fluid flows 1 Chair: Artur Palha	Combustion modeling Chair: William Jones
11:00 - 11:20	Minimum-Dissipation Model for Large Eddy Simulation using OpenFOAM <i>Jing Sun, Roel Verstappen</i>	Flow Topologies during Flame-Wall Interaction of Premixed Combustion in turbulent Boundary Layer. <i>Khalil Abo-Amsha, Umair Ahmed, Nilanjan Chakraborty</i>
11:20 - 11:40	Energy-conserving neural network for turbulence closure modeling <i>Toby van Gastelen, Wouter Edeling, Benjamin Sandersener</i>	Stochastic representation of the effects of micromixing on soot in turbulent non-premixed flames. <i>Savvas Gkantonas, Epaminondas Mastorakos</i>

Programme

WEDNESDAY - SEPTEMBER 06, 2023

Room A		Room B	
11:00-12:40	MS. Recent advances in LES of multiphase flows Chair: Mahdi Saeedipour	Bluff bodies Chair: Woutijn Baars	
11:40-12:00	Advanced turbulence modeling for two-phase flows <i>Stephane Mimouni</i>	CFD-Grade Experimental Data of the 3D Mean Velocity Vector and 2D Reynolds Stress Tensor Obtained with Magnetic Resonance Velocimetry: Single-Phase Flow Through a 5 x 5 Rod Bundle at Re=50,250 <i>Kristine John, Markus Rehm, Hidajet Hadžić, Peter Pohl, Sven Grundmann, Martin Bruschewski</i>	
12:00-12:20	Numerical Assessment of Parcel Modeling in Large Eddy Simulation for Dispersed Multiphase Flows <i>Linda Bahramian, F.Xavier Trias, Carles Oliet, C.David Pérez-Segarra</i>	Intermediate wake characteristics behind a circular cylinder <i>Jordi Ventosa Molina, Ivette Rodriguez, Oriol Lehmkuhl, Jochen Fröhlich</i>	
12:20-12:40	Large-eddy simulation of turbulent dispersed flows: Modelling subgrid effects on particle dispersion <i>Cristian Marchioli</i>	Compressibility effects on the wake dynamics of a circular cylinder. <i>Ivette Rodriguez, Benet Eiximeno, Lucas Gasparino, Carlos Tur-Monge, Jordi Muela, Oriol Lehmkuhl</i>	
12:40-14:00		Lunch	
Room A		Room B	
14:00-16:00	MS. Transition modelling Chair: Daniele Simoni	Jets and Sprays Chair: Benedetta Franzelli	
14:00-14:20	Improved RANS-Coupled Transition Models: Recent Progress at NASA Langley Research Center. <i>Nathaniel Hildebrand, Meelan Choudhari, Balaji Venkatachari, Vishal Srivastava</i>	Three-dimensional flow visualization of rectangular underexpanded microjets by tomographic Mach-Zehnder interferometry. <i>Shota Yoshimi, Shinichiro Nakao, Yoshiaki Miyazato</i>	

WEDNESDAY - SEPTEMBER 06, 2023

Room C		Room D	
11:00-12:40	MS. Physics-compatible numerical methods for fluid flows 1 Chair: Artur Palha	Combustion modeling Chair: William Jones	
11:40-12:00	DNS of laminar-turbulent flow transition over a delta wing <i>Arthur Veldman, Wybe Rozema, Johan Kok, Roel Verstappen</i>	Effects of fuel Lewis number on turbulent flow statistics in oblique wall quenching of premixed V-shaped flames within turbulent channel flows. <i>Nilanjan Chakraborty, Sanjeev Ghai, Umair Ahmed</i>	
12:00-12:20	Suitability of Immersed Boundary Methods for high-fidelity computational aeroacoustics <i>Aleix Lazaro, Santiago Madriñan, Oscar Carrasco, Joan Grau, Ricardo Torres, Lluís Jofre, Francesco Capuano</i>	Large Eddy Simulation of hydrogen deflagrations using the Thickened Flame Model (TFM) with stretch sensitivity adaptation <i>Cédric Mehl, Sandy Poncet, Karine Truffin, Olivier Colin</i>	
12:20-12:40	Dissipation-aware discontinuous Galerkin methods for incompressible turbulent flows. <i>Niklas Fehn, Martin Kronbichler</i>	LES prediction of the ignition probability map of a model aeronautical spray burner. <i>Olivier Colin, Cédric Mehl, Ernesto Sandoval</i>	
12:40-14:00		Lunch	
Room C		Room D	
14:00-16:00	MS. Physics-compatible numerical methods for fluid flows 2 Chair: Artur Veldman	Wind Energy and environmental flows Chair: Fernando Gisbert	
14:00-14:20	Performance and error analysis of structure-preserving time-integration procedures for incompressible flow simulations <i>Carlo De Michele, Marco Artiano, Francesco Capuano, Gennaro Coppola</i>	Experimental characterization of unsteady airfoil aerodynamics for wind turbine applications. <i>Simone Chellini, Delphine Anne Marie De Tavernier, Dominic von Terzi</i>	

Programme

WEDNESDAY - SEPTEMBER 06, 2023

	Room A	Room B
14:00-16:00	MS. Transition modelling Chair: Daniele Simoni	Jets and Sprays Chair: Benedetta Franzelli
14:20-14:40	Quantification of RANS transition modeling with Bradshaw parameter. <i>Md Mizanur Rahman</i>	Three-dimensional flow visualization of elliptic underexpanded jets by tomographic rainbow schlieren deflectionometry. <i>Tatsuya Nagata, Shinichiro Nakao, Yoshiaki Miyazato</i>
14:40-15:00	Detached Eddy Simulation of Transitional Flow in a Linear Low-Pressure Turbine Cascade, Including an Algebraic Transition Model. <i>Slawomir Kubacki, Erik Dick</i>	Heat transfer of an impinging jet - sensitivity towards inflow conditions. <i>Francesco Secchi, Davide Gatti, Bettina Frohnape</i>
15:00-15:20	Numerical simulation of turbulent flow-induced vibrations, using unsteady RANS and the dynamic overset grids technique <i>Tianyang Zhao, Hector Iacovides, Tim Craft</i>	Detailed numerical investigation of the effect of nozzle flow on primary atomization of liquid jets <i>Marianne Abdelsayed, Elias Trautner, Markus Klein</i>
15:20-15:40	Eddy-Resolving Simulation Coupled with Stability Analysis for Turbulent Transition in Compressible Boundary Layer. <i>Jiseop Lim, Minwoo Kim, Solkeun Jee, Jaeyoung Park, Donghun Park</i>	Large Eddy Simulation of a supersonic kerosene lifted jet flame. <i>Florian Kissel, Guillaume Ribert, Pascale Domingo</i>
15:40-16:00	Local Correlations for Separation and Transition Position Prediction in Laminar Separation Bubbles. <i>Daniele Petronio, Matteo Dellacasagrande, Davide Lengani, Daniele Simoni</i>	LES parametric study of non-circular excited jet flames at low Reynolds numbers. <i>Jakub Stempka, Artur Tyliczszak, Epaminondas Mastorakos</i>
16:00-16:30	Coffee break	

**WEDNESDAY - SEPTEMBER 06, 2023**

	Room C	Room D
14:00-16:00	MS. Physics-compatible numerical methods for fluid flows 2 Chair: Artur Veldman	Wind Energy and environmental flows Chair: Fernando Gisbert
14:20-14:40	Physics-compatible KEEP scheme and high-fidelity scale-resolving simulation of compressible flows <i>Soshi Kawai, Yuichi Kuya, Hiroyuki Asada, Hiromichi Sashida</i>	An improved k-epsilon model for wind-farm simulation. <i>Navid Zehtabiyar-Rezaie, Mahdi Abkare</i>
14:40-15:00	Asymptotically entropy conservative discretization of convective terms in compressible Euler equations <i>Gennaro Coppola, Carlo De Michele</i>	Impact of Favourable Pressure Gradient on Wind Turbine Wake: A Wind Tunnel Study <i>Paul Bayron, Richard Kelso, Rey Chin</i>
15:00-15:20	Robust and reliable DNS and LES on unstructured grids <i>F.Xavier Trias, Johannes Arend Hopman, Daniel Santos Serrano, Andrey Gorobets, Assensi Oliva</i>	Influence of atmospheric stability on turbulence length scales in the eddy surface layer <i>Matthew Emes, Maziar Arjomandi</i>
15:20-15:40	Enforcing accurate volume conservation in VOF-based coarse grid simulations of turbulent bubble-laden flows <i>Elias Trautner, Josef Hasslberger, Paolo Cifani, Markus Klein</i>	Numerical Analysis Of Transonic Flow Over The Ffa-W3-211 Wind Turbine Tip Airfoil <i>Maria Cristina Vitulano, Delphine De Tavernier, Giuliano De Stefano, Dominic von Terzi</i>
15:40-16:00	Towards LES strategies for compressible industrial flows. <i>Oriol Lehmkuhl, Lucas Gasparino, Jordi Muela</i>	Amplitude Modulation of Turbulent Fluctuations and Fluxes in Unstably Stratified Urban Boundary Layers <i>Kangcheng Zhou, Chun-Ho Liu, Mingping Wan</i>
16:00-16:30	Coffee break	

Programme

16:30-18:00

Poster Session

1. On coupled level set-volume of fluid approaches for numerical simulation of multiphase flows on unstructured grids

Ahmad Amani, Carlos David Pérez-Segarra, Assensi Oliva

2. Towards long-term predictions of turbulence using neural operators

Fernando Gonzalez, François-Xavier Demoulin, Simon Bernard

3. Data-driven algebraic reynolds stress models for turbulent secondary flows

Ali Amarloo, Alexandros Iosifidis, Pourya Forooghi, Mahdi Abkar

4. Data-driven turbulence model for flow separation from a smooth wall and a sharp corner

Yeji Yun, Seoyeon Heo, Minjae Jeong, Solkeun Jee

5. Data-driven rans modelling of junction flows

Richard Dwight, M.E. van Ede, Tyler Buchanan

6. About mesh adaptation and intermittency model for hybrid flow calculation

Florian Miralles, Stephen Wornom, Bruno Koobus, Alain Dervieux

7. A sensor-based scale-resolving turbulence model for separated shear layers

Eike Tangermann, Markus Klein

8. On the large-eddy simulation of a fully developed wind-turbine array boundary layer

David Folch, F.Xavier Trias, Assensi Oliva

9. Direct numerical simulation of passive scalar turbulent fields with wall scalar fluctuations at low, medium and high prandtl numbers

Bruno Chaouat

10. Cfd-aided morphing and design optimisation of ultrasonic flow meters

Mario Javier Rincón, Martino Reclari, Xiang Yang, Mahdi Abkar

11. Measurements in a turbulent high-speed subsonic jet using dual-piv and their dynamic mode decomposition

Alexis Duddridge, Julio Soria, Vishal Chaugule, Callum Atkinson, Tushar Sikroria

12. Interparticle collision effects on particle-fluid coupling in turbulent channel flows

Lee Mortimer, Michael Fairweather

18:00-19:30

Welcome Reception



16:30-18:00

Poster Session

13. Multi-objective topology optimization of heat exchangers by using a customized optimizer in openfoam
Di Chen, Prashant Kumar, Yosuke Hasegawa

14. Anisotropic rans modeling in side-wall interference flowfield using les database
Yoshiharu Tamaki, Soshi Kawai

15. Validation and application of lagrangian stochastic methods for indoor air quality
Harriet Jones, Gregory Cartland-Glover, Stefano Rolfo, Ashish Kumar, Terry Dillon

16. Dns study on an undeveloped turbulent boundary layer with heat transfer
Hirofumi Hattori, Haruka Tadano, Tomoya Houra, Masato Tagawa

17. Triple line dynamics for capillary flows
Michal Remer, Tomasz Bobiński

18. Assessment of the multiscale formulation of the singular values based les model for wall-bounded flows
Josef Hasslberger, Magnus Schweiger, Elias Trautner, Markus Klein

19. 3D data matching of rans results with experimental magnetic resonance velocity data to validate and identify the optimal turbulence model for the specific application
Carolin Wüstenhagen, Clemens Domnick, Sven Grundmann, Martin Bruschewski

20. Effect of biofilm formation on the aggregation of microplastics in upper-ocean turbulence
Fedrico Pizzi, Mona Rahmani, Cristina Romera-Castillo, Francesc Peters, Joan Grau, Francesco Capuano, Lluís Jofre

21. Fluid dynamics of right ventricular filling in the presence of pulmonary regurgitation: assessment using dns and 4d flow mri
Elias Balaras, Francesco Capuano, Yue-Hin Loke, Laura Olivieri, Elias Balaras

22. Bayesian optimisation of blowing and suction for drag reduction on a transonic airfoil
Fermin Mallor, Annika Frede, Saleh Rezaeiravesh, Davide Gatti, Philipp Schlatter

18:00-19:30

Welcome Reception

Programme

THURSDAY - SEPTEMBER 07, 2023

08:30	Registration	
09:00 - 09:45	Room A	Keynote lecture -- Paola Cinnella : Machine-learning-assisted modeling of turbulence: current status and perspective. Chair: Stefan Wallin
09:45 - 10:30	Room A	Keynote lecture -- Franck Nicoud Numerical analysis of the intra-cardiac flow Chair: Ivette Rodriguez
10:30 - 11:00	Coffee break	
11:00-12:40	Room A	Room B
	MS. Machine learning for turbulence 1 Chair: Christopher Rumsey	RANS & hybrid RANS/LES Chair: Suad Jakirlic
11:00 - 11:20	Non-intrusive space-dependent aggregation of updated RANS models via Bayesian calibration and machine learning. <i>Cécile Roques, Grégory Dergham, Xavier Merle, Paola Cinnella</i>	On variable resolution in scale-resolved simulations of turbulence <i>Stefan Wallin, Sharath S. Girimaji, Stefan Wallin, Sharath S. Girimaji, Magnus Carlsson</i>
11:20 - 11:40	Machine Learning-Based Recovery of Thermophysical Information from Velocity Data in Supercritical Fluids Turbulence. <i>Núria Masclans, Fernando Vazquez, Rosa M. Badia, Lluís Jofre</i>	Improving RANS modeling with data-assimilation for compressible flows. <i>Bartolomeo Fanizza, Pedro Stefanin Volpiani, Florent Renac, Denis Sipp</i>
11:40 - 12:00	Embedding explicit smoothness constraints in data-driven turbulence models. <i>Hannes Mandler, Bernhard Weigand</i>	Contribution to the variational calculus of the hybrid RANS/LES PITM method for the simulation of turbulent fields. <i>Bruno Chaouat, Roland Schiestel</i>



THURSDAY - SEPTEMBER 07, 2023

08:30 Registration

09:00 - 09:45	Room A	Keynote lecture -- Paola Cinnella : Machine-learning-assisted modeling of turbulence: current status and perspective. Chair: Stefan Wallin
09:45 - 10:30	Room A	Keynote lecture -- Franck Nicoud Numerical analysis of the intra-cardiac flow Chair: Ivette Rodriguez

10:30 - 11:00 Coffee break

	Room C	Room D
11:00-12:40	MS. Physics-compatible numerical methods for fluid flows 2 Chair: Xavier Trias	Wall-bounded Flows 1 Chair: Richard Sandberg
11:00 - 11:20	On a high-order energy-preserving unconditionally stable discretization on collocated unstructured grids. <i>Daniel Santos Serrano, F.Xavier Trias, Roel Verstappen, Carlos David Pérez-Segarra</i>	Large-scale coherent structures in an asymmetrically heated channel flow <i>Marina Garcia-Berenguer, Lucas Gasparino, Oriol Lehmkuhl, Ivette Rodriguez</i>
11:20 - 11:40	Reconciling shock capturing with discrete local entropy conservation. <i>Davide Modesti, Matteo Bernardini, Francesco Salvatore, Sergio Pirozzoli</i>	Heat transfer in drop-laden turbulent channel flow <i>Francesca Mangani, Umberto Baú, Alessio Roccon, Francesco Zonta, Alfredo Soldati</i>
11:40 - 12:00	On the development of an entropy stable discontinuous Galerkin solver for scale-resolving flow simulations. <i>Alessandro Colombo, Samuele Capuzzi, Andrea Crivellini, Alessandra Nigro, Luca Alberti, Emanuele Carnevali</i>	Numerical simulation of drag reduction in bubbly Taylor-Couette turbulence <i>Bernard Geurts, Arnout Franken, Sagy Ephrati, Paolo Cifani, Artur Tylicszczak</i>

Programme

THURSDAY - SEPTEMBER 07, 2023

THURSDAY - SEPTEMBER 07, 2023		
11:00-12:40	<p>Room A</p> <p>MS. Machine learning for turbulence 1 Chair: Christopher Rumsey</p>	<p>Room B</p> <p>RANS & hybrid RANS/LES Chair: Suad Jakirlic</p>
12:00-12:20	<p>Active Flow Control On Three-Dimensional Cylinders Through Deep Reinforcement Learning. <i>Pol Suárez Morales, Francisco Alcántara-Ávila, Arnau Miro, Jean Rabault, Bernat Font, Oriol Lehmkuhl, Ricardo Vinuesa</i></p>	<p>Zonal Detached Eddy Simulation in a lattice-Boltzmann framework. <i>Julien Husson, Marc Terracol, Sébastien Deck</i></p>
12:20-12:40	<p>Reconstruction of mean flows using turbulence model augmented Physics Informed Neural Networks. <i>Yusuf Patel, Vincent Mons, Olivier Marquet, Georgios Rigas</i></p>	<p>URANS Computations Of Natural Convection Inside A Cubic Cavity With A Partially Heated Inner Obstacle. <i>Constantinos Katsamis, Dean Wilson, Tim Craft, Hector Iacovides</i></p>
12:40-14:00	Lunch	
14:00-16:00	<p>Room A</p> <p>MS. Machine learning for turbulence 2 Chair: Ricardo Vinuesa</p>	<p>Room B</p> <p>MS. Hybrid RANS/LES methods Chair: Christophe Friess</p>
14:00-14:20	<p>Using Machine Learning for formulating new wall functions for Detached Eddy Simulation. <i>Lars Davidson</i></p>	<p>Coupling of the gamma-Reynolds theta-t laminar-turbulent transition model to a robust hybrid Reynolds-Averaged Navier-Stokes/ Large- Eddy Simulation framework. <i>Michel Bouchard, Sébastien Deck, Julien Marty, Michel Costes</i></p>

**THURSDAY - SEPTEMBER 07, 2023**

11:00-12:40	Room C MS. Physics-compatible numerical methods for fluid flows 2 Chair: Xavier Trias	Room D Wall-bounded Flows 1 Chair: Richard Sandberg
12:00-12:20	Numerical investigation of the non-conforming Schwarz-spectral element method in low Mach number reacting flows. <i>Ioannis Kavroulakis, Dimitris Papegeorgiou, Ananias Tomboulides, Christos Frouzakis, Paul Fischer</i>	Flexible fibers in turbulent channel flow <i>Davide Di Giusto, Cristian Marchioli</i>
12:20-12:40	On self-adaptive Runge-Kutta schemes with improved energy-conservation properties. <i>Josep Plana-Riu, F.Xavier Trias, Carlos David Pérez-Segarra, Asensio Oliva</i>	Breakdown of the Reynolds analogy in DNS of rotating Couette flows <i>Geert Brethouwer</i>
12:40-14:00	Lunch	
14:00-16:00	Room C MS. Physics-compatible numerical methods for fluid flows 4 Chair: Gennaro Coppola	Room D Flames Chair: Guillaume Ribert
14:00-14:20	Energy-consistent discretization of viscous dissipation with application to natural convection flows. <i>Benjamin Sanderse, F.Xavier Trias</i>	A turbulent combustion model based on the estimation of the subgrid reactants and temperature fields. <i>Karol Wawrzak, Andrzej Boguslawski, Lena Caban, Artur Tyliczszak</i>

Programme

THURSDAY - SEPTEMBER 07, 2023

	Room A	Room B
14:00-16:00	MS. Machine learning for turbulence 2 Chair: Ricardo Vinuesa	MS. Hybrid RANS/LES methods Chair: Christophe Friess
14:20-14:40	DeepONet-Assisted Optimization of Surface Topography for Transition Delay in a Mach 4.5 Boundary Layer. <i>Nathaniel Hildebrand, Meelan Choudhari, Vishal Srivastava, Tamer Zaki</i>	Towards efficient hybrid RANS-LES for industrial aeronautical applications. <i>Axel Probst, Elrawy Soliman, Silvia Probst, Matthias Orlt, Tobias Knopp</i>
14:40-15:00	Comparing random forests and neural networks to augment RANS turbulence models. <i>Pedro Volpiani</i>	An Adaptive Dissipation Numerical Method for Detached Eddy Simulation in Turbomachinery Flow. <i>Cheng Tian, Siya Jiang, Song Fu</i>
15:00-15:20	Towards local application of data-driven turbulence modeling for separated flows. <i>Yasunari Nishi, Cornelia Grabe, Axel Probst, Tobias Knopp, Andreas Krumbein</i>	Dynamic Scale-Resolving Paradigm for Coarse Grained Simulations of Turbulent Mixing. <i>Fernando Grinstein</i>
15:20-15:40	Drag-reduction strategies in wall-bounded turbulent flows using deep reinforcement learning. <i>Luca Guastoni</i>	GPU-accelerated coupled RANS-Lattice Boltzmann simulations of turbulent flow over complex terrain. <i>Rong Wang, Marta Camps Santasmas, Alessandro De Rosi, Alex Skillen, Pablo Ouro, Alistair Revell</i>
15:40-16:00	A neural-network-based sub-grid-scale model for LES of flow over a circular cylinder. <i>Myunghwa Kim, Jonghwan Park, Haecheon Choi</i>	Sensitized-Rans Simulation Of A Ic-Engine Intake Flow. <i>Maximilian Bopp, Andrea Pati, Louis Krüger, Sebastian Wegt, Christian Hasse, Suad Jakirlic</i>
16:00-16:30	Coffee break	

**THURSDAY - SEPTEMBER 07, 2023**

	Room C	Room D
14:00-16:00	MS. Physics-compatible numerical methods for fluid flows 4 Chair: Gennaro Coppola	Flames Chair: Guillaume Ribert
14:20-14:40	Non-dissipative large-eddy simulation of high-pressure transcritical turbulent flows: formulation and a priori analysis. <i>Marc Bernades, Lluís Jofre, Francesco Capuano</i>	LES of excited hydrogen-enriched methane flames stabilized by wavy-wall bluff-bodies <i>Agnieszka Wawrzak, Lena Caban, Artur Tyliczszak, Epaminondas Mastorakos</i>
14:40-15:00	On a Conservative Solution to Checkerboarding: Examining the Causes of Non-Physical Pressure Modes. <i>Johannes Arend Hopman, Àdel Al-salti-Baldellou, F.Xavier Trias, Joaquim Rigola</i>	Studying flameless combustion with neural network chemistry and large-eddy simulation. <i>Huu-Tri Nguyen, Luc Vervisch, Pascale Domingo, Phuc-Danh Nguyen</i>
15:00-15:20	Reduced order stochastic modeling of turbulent mixing based on conservative baker's maps. <i>Marten Klein, Tommy Starick, Christian Zenker, Juan A. Medina Méndez, Heiko Schmidt</i>	Accuracy assessment of LES-ADM modelling of auto-ignition in a temporally evolving jet. <i>Lena Caban, Artur Tyliczszak, Julian Domaradzki, Bernard Geurts</i>
15:20-15:40	An Improved Approach to the Predictability & Reliability of the Onset of Turbulence with Shocks. <i>Helen Yee, Bjorn Sjogreen</i>	Assessment of the partially stirred reactor model for LES in swirlstabilized turbulent premixed flames. <i>Fredherico Rodrigues, José Maria García-Oliver, Daniel Mira</i>
15:40-16:00	Dual-field formulation for incompressible MHD equations. <i>Artur Palha</i>	Self-excited oscillations and lift-off of a hydrogen jet flame in a counterflow. <i>Agnieszka Wawrzak, Andrzej Boguslawski, Artur Tyliczszak</i>
16:00-16:30	Coffee break	

Programme

THURSDAY - SEPTEMBER 07, 2023

	Room A	Room B
16:30-18:10	MS. Machine learning for turbulence 3 Chair: Oriol Lehmkuhl	LES modelling Chair: Roel Verstappen
16:30-16:50	Sample efficient fluid flow control using neuro-evolution guided deep reinforcement learning. <i>Tarun Singh, Laurent Cordier, Ronan Fablet</i>	Modelling the small scales of Large Eddy Simulations with Periodic Box Homogeneous Isotropic Turbulence. <i>Githin Tom Zachariah, Harry Van den Akker</i>
16:50-17:10	Reconstruction of flows past air-foils near stall based on extremely scarce pressure data. <i>Cynthia Tayeh, Vincent Mons, Olivier Marquet</i>	Assessment of SGS Models in Transcritical Injection Processes. <i>Alexander Doehring, Markus Klein, Min Son, Tobias Sander, Michael Pfitzner, Lars Zigan</i>
17:10-17:30	Deep Reinforcement Learning for the design of a dynamic, dragreducing textured wall. <i>Giorgio Maria Cavallazzi, Juan Guzman-Inigo, Alfredo Pinelli</i>	Radially scaling kernels of the spectral vanishing viscosity method for LES in cylindrical configurations. <i>Thomas Hultsch, Jörg Stiller, Jochen Fröhlich</i>
17:30-17:50	Towards data driven models for the automotive industry. <i>Benet Eiximeno, Arnau Miro, Ivette Rodriguez, Oriol Lehmkuhl</i>	The Effect of Inlet Synthetic Turbulence on Aortic Haemodynamics. <i>Emily Manchester, Alex Skillen, Alistair Revell</i>
17:50-18:10	Pressure determination by assimilating 3C-2D PIV data with the direct numerical simulation of turbulent channel flow. <i>Ezhilsabareesh Kannadasan, Callum Atkinson, Julio Soria</i>	A Family of Wall-Modeled Large Eddy Simulation Formulations. <i>Florian Menter, Ekaterina Guseva, Andrey Stabnikov, Andrey Garbaruk</i>
18:45-23:00	Tour & Gala Dinner	



THURSDAY - SEPTEMBER 07, 2023

	Room C	Room D
16:30-18:10	LES applications Chair: Johan Larsson	Wall-bounded Flows 2 Chair: Ivan Marusic
16:30-16:50	Wall Resolved Large Eddy Simulations of a Three-Element High-Lift Airfoil at Different Angles of Attack. <i>Ricard Montalà Sales, Oriol Lehmkuhl, Ivette Rodriguez</i>	Turbulent Boundary Layers over Acoustic Liners. <i>Haris Shahzad, Stefan Hickel, Davide Modesti</i>
16:50-17:10	Large-Eddy Simulation on Golf-Ball Aerodynamics with Different-Flight Conditions. <i>Makoto Tsubokura, Yuma Matsuki, Ryosuke Ueda, Shota Nishinakagawa, Masahide Onuki, Takahiro Sajima</i>	Reynolds number dependence of turbulent flows over highly permeable porous media. <i>Yusuke Kuwata, Suga Kazuhiko</i>
17:10-17:30	Wall-modeled LES of shock oscillations in adiabatic and wall-cooled over-expanded nozzles. <i>Ryo Hirai, Soshi Kawai</i>	Assessing different roughness description methods in skin friction prediction. <i>Jiasheng Yang, Alexander Stroh, Sangseung Lee, Shervin Bagheri, Pourya Forooghi</i>
17:30-17:50		How do forward-facing steps promote laminar-turbulent transition inswept-wing flow? <i>Jordi Casacuberta, Stefan Hickel, Marios Kotsonis, Koen J. Groot</i>
17:50-18:10		On the behaviour of coherent structures over riblets in transitional boundary layers under a streamwise varying pressure gradient. <i>Ananth SM, Massimiliano Nardini, Aditya Vaid, Melissa Kozul, Nagabhushana Rao Vadlamani, Richard Sandberg</i>

18:45-23:00 **Tour & Gala Dinner**

Programme

FRIDAY - SEPTEMBER 08, 2023

08:30	Registration	
09:00 - 09:45	Room A	Keynote lecture -- Fernando Gisbert : High fidelity numerical simulation of low pressure turbine flows Chair: Cornelia Grabe
09:45 - 10:30	Room A	Keynote lecture -- Johan Larsson : Adaptivity in wall-modeled large eddy simulations Chair: Ugo Piomelli
10:30 - 11:00	Coffee break	
11:00-12:40	Room A	Room B
	MS. Machine learning for turbulence 4 Chair: Paola Cinnella	Complex fluids and interfaces - Chair: Alfredo Soldati
11:00 - 11:20	Deep-learning-based explanations in wall-bounded turbulence. <i>Andrés Cremades, Sergio Hoyas, Pedro Quintero, Martin Lellep, Moritz Linkmann, Ricardo Vinuesa</i>	An Accurate Reconstruction and Interpolation Scheme for a Conservative Cut-Cell Immersed Boundary Method with Gas-Surface Interactions. <i>Ata Onur Baskaya, Stefan Hickel</i>
11:20 - 11:40	Identifying Informative Features for Data-Driven Turbulence Modeling. <i>Joel Ho, Nick Pepper, Tim Dodwell</i>	Patterns in the hull of a canopy with a high Cauchy number. <i>Bastian Löhner, Jochen Fröhlich</i>
11:40 - 12:00	Data-driven RANS closure modeling for transient turbulence and heat transfer problems. <i>Richard Sandberg, Xiaowei Xu, Ali Haghiri</i>	Richtmyer-Meshkov induced turbulent mixing in a shock tube: experiments and simulations. <i>Jérôme Griffond, Olivier Soulard, Denis Souffland, Yannick Bury, Stéphane Jamme, Marta Rasteiro dos Santos</i>



FRIDAY - SEPTEMBER 08, 2023

08:30	Registration	
09:00 - 09:45	Room A	Keynote lecture -- Fernando Gisbert : High fidelity numerical simulation of low pressure turbine flows Chair: Cornelia Grabe
09:45 - 10:30	Room A	Keynote lecture -- Johan Larsson : Adaptivity in wall-modeled large eddy simulations Chair: Ugo Piomelli
10:30 - 11:00	Coffee break	
11:00-12:40	Room C	Room D
	MS. High-fidelity simulations of industrial flows 1 Chair: Maria Vittoria Salvetti	Wall-bounded Flows 3 Chair: Geert Brethouwer
11:00 - 11:20	Modeling smooth-body flow separation with variational multiscale method, finite elements and weakly enforced Dirichlet boundary conditions. <i>Artem Korobenko, Sujal Dave</i>	Passive Control of Shock-Wave/ Turbulent Boundary-Layer Interaction Using Spanwise Heterogeneous Roughness. <i>Wencan Wu, Luis Laguarda, Davide Modesti, Stefan Hickel</i>
11:20 - 11:40	Multi-cycle Direct Numerical Simulations of a Laboratory Scale Engine: Evolution of the Momentum <i>Bogdan Danciu, Christos Frouzakis, Georgios Giannakopoulos, Mathis Bode, Nicolas Noiray</i>	High-fidelity investigation into height effects for microvortex generators in high-speed boundary layers. <i>Giacomo Della Posta, Francesco Salvatore, Matteo Bernardini</i>
11:40 - 12:00	Cost vs Accuracy: second-order vs high-order methods for eddy-resolving simulations of turbulent separated flows. <i>Francesco Capuano, Nikolaos Beratlis, Fengrui Zhang, Yulia Peet, Kyle Squires, Elias Balaras</i>	An experimental realisation of steady spanwise forcing for turbulent drag reduction. <i>Max Knoop, Friso Hartog, Bas van Oudheusden, Ferdinand Schrijer</i>

Programme

FRIDAY - SEPTEMBER 08, 2023

Room A		Room B
11:00-12:40	MS. Machine learning for turbulence 4 Chair: Paola Cinnella	Complex fluids and interfaces Chair: Alfredo Soldati
12:00-12:20	Predictive correlations for particle motion across a stratified interface using machine learning <i>Liron Simon Keren, Teddy Lazebnik, Alex Liberzon</i>	Two-phase flow of quantum turbulence and normal-fluid turbulence in superfluid helium-4. <i>Hiromichi Kobayashi, Satoshi Yui, Makoto Tsubota, Rio Yokota</i>
12:20-12:40	CFD-driven stochastic aggregation of data-driven turbulence models. <i>Soufiane Cherroud, Xavier Merle, Paola Cinnella, Xavier Gloerfelt</i>	Direct numerical simulation of H-type transition in a flat-plate boundary layer with supercritical fluids. <i>Pietro Carlo Boldini, Benjamin Bugeat, Pedro Costa, Jurriaan Peeters, Rene Pecnik</i>
12:40-14:00		Lunch
Room A		Room B
14:00-16:00	Particles and bubbles Chair: Bernard Geurts	MS. Towards climate neutral thermochemical energy conversion Chair: Christian Trapp
14:00-14:20	DNS study on the effect of skin friction of over millimeter sized bubbles in horizontal channel flow. <i>Sangwon Kim, Nobuyuki Oshima, Makoto Tsubokura</i>	DNS of a RCCI engine using octanol-ethanol as the fuel blend. <i>Antony Ashley Raja Bosco Premkumar, Francesca Loffredo, Heinz Pitsch, Markus Klein</i>
14:20-14:40	Impact of behavioural modification techniques on agglomeration dynamics in particle-laden turbulent pipe flows. <i>Lee Mortimer, Michael Fairweather, Bisrat Wolde</i>	Comparison of experimental and numerical analyses of water-ingasoline emulsions. <i>Benjamin Blau, Oscar Krzeczek, Christoph Heinrich, Markus Klein</i>

**FRIDAY - SEPTEMBER 08, 2023**

FRIDAY - SEPTEMBER 08, 2023		
	Room C	Room D
11:00-12:40	MS. High-fidelity simulations of industrial flows 1 Chair: Maria Vittoria Salvetti	Wall-bounded Flows 3 Chair: Geert Brethouwer
12:00-12:20	Scale-resolving simulation of turbulent flows with a Discontinuous Galerkin method. <i>Francesco Bassi, Alessandro Colombo, Francesco Carlo Massa</i>	Real-time opposition control of skin-friction drag-producing structures in a turbulent boundary layer. <i>Giulio Dacome, Robin Morsch, Marios Kotsonis, Woutijn J. Baars</i>
12:20-12:40	Synthetic turbulent inflow for lattice Boltzmann simulations of corner separation in a linear compressor cascade <i>Malo Tarpin, Jérôme Boudet, Emmanuel Lévêque</i>	Drag Reduction Effect of Local Oblique Blowing with Shallow Angle for Turbulent Boundary Layer Flow on Flat Plate. <i>Ryo Tobita, Akihiko Mitsuishi, Kaoru Iwamoto, Akira Murata</i>
12:40-14:00 Lunch		
	Room C	Room D
14:00-16:00	MS. High-fidelity simulations of industrial flows 2 Chair: Stefan Hickel	Wall-bounded flows 4 Chair: Davide Modesti
14:00-14:20	Towards a machine learning model for Explicit Algebraic Reynolds Stress Modelling using Multi-Expression Programming. <i>Arnaud Miro, Stefan Wallin, Alessandro Colombo, Lionel Temmerman, Dirk Wunsch, Oriol Lehmkuhl</i>	Effect of pressure gradient history on rough-wall turbulent boundary layers. <i>Thomas Preskett, Bharathram Ganapathisubramani</i>
14:20-14:40	Leading-edge and tip vortices and their effect on the aerodynamic performance of a vertical-axis wind turbine. <i>Sangwoo Ahn, Haecheon Choi</i>	History effects in turbulent boundary layer under different levels of adverse pressure gradient. <i>Witold Elsner, Artur Drózdź, Paweł Niegodajew, Vasily Sokolenko</i>

Programme

FRIDAY - SEPTEMBER 08, 2023

	Room A	Room B
14:00-16:00	Particles and bubbles Chair: Bernard Geurts	MS. Towards climate neutral thermochemical energy conversion Chair: Christian Trapp
14:40-15:00	Experimental and Numerical Investigation of Elongated Non-Spherical Particles in a Turbulent Jet-in-Crossflow Configuration. <i>Manuel A. Taborda, Martin Sommerfeld</i>	Investigation of hydrogen direct injection jets using a simplified injector geometry. <i>Mark Treacy, Hesameddin Fatehi, Xue-Song Bai</i>
15:00-15:20	Spread of bi-disperse particles in the downstream domain of a turbulent co-flowing jet <i>Xinchen Zhang, Graham Nathan, Zhao Tian, Rey Chin</i>	Developing optical measurement techniques for improving ignition simulation models. <i>Saraschandran Kottakalam, Ahmad Anas Alkezbari, Gregor Rottenkolber, Christian Trapp</i>
15:20-15:40	Non-spherical particle interactions in isotropic turbulence using an immersed boundary approach. <i>Jacob Anderson, Michael Fairweather, Lee Mortimer</i>	Hydrogen enriched natural gas jet flame in a cross-flow at elevated pressures. <i>William Jones, Weiyue Liu, Andrew Marquis</i>
15:40-16:00	Influence of shear rate and surface potential on particle interaction and aggregation in nanofluids. <i>Lee Mortimer, Michael Fairweather</i>	Investigation of the influence of premixed ratio on the behaviour of homogeneous reactivity-controlled compression ignition (hRCCI) combustion process with renewable fuels for a highly phlegmatized ICE. <i>Larissa Grundl, Pravin Kumar Sundaram, Christian Trapp</i>
16:00-16:30	Coffee break	
16:30-17:15	Room A	Keynote lecture -- Ivan Marusic Structure and drag-reducing scale interactions for high-Reynolds-number wall-bounded flows Chair: Wolfgang Rodi
17:15-17:30	Closure -- Maria Vittoria Salvetti & Oriol Lehmkuhl	



FRIDAY - SEPTEMBER 08, 2023

14:00-16:00	Room C MS. High-fidelity simulations of industrial flows 2 Chair: Stefan Hickel	Room D Wall-bounded flows 4 Chair: Davide Modesti
14:40-15:00	Advances in scale-resolving simulations of complex flows using highorder finite differences and implicit time stepping. <i>Aurelien Bienner, Camille Matar, Özgür Yalçın, Xavier Gloerfelt, Paola Cinnella</i>	Hot-wire spatial resolution effects in adverse-pressure-gradient turbulent boundary layers. <i>Artur Drózdź, Ramis Örlü, Paweł Niegodajew, Vasyi Sokolenko, Philipp Schlatter, Witold Elsner</i>
15:00-15:20	Large eddy simulation of dense organic vapor flow through a supersonic turbine stage. <i>Camille Matar, Paola Cinnella, Xavier Gloerfelt</i>	Spatial averaging effects in adverse pressure gradient turbulent boundary layers. <i>Fermin Mallor, Ramis Örlü, Philipp Schlatter</i>
15:20-15:40	Large eddy simulation of the interaction between a supersonic parachute and the wake of a descent module during mars entry. <i>Luca Placco, Giulio Soldati, Alessio Aboudan, Francesca Ferri, Matteo Bernardini, Federico Dalla Barba, Francesco Picano</i>	The investigation of friction velocity determination techniques for turbulent boundary layers influenced by miniature vortex generators. <i>Jiahao Kong, Luke Bennetts, Bagus Nugroho, CHI IP CHAN, Rey Chin</i>
15:40-16:00	Reliable overnight industrial LES: challenges and limitations. Application to CSP technologies. <i>Àdel Alsalti-Baldellou, Guillem Colomer, Johannes Arend Hopman, Xavier Álvarez-Farré, Andrey Gorobets, F.Xavier Trias, Assensi Oliva</i>	Advection dynamics of a turbulent separation bubble. <i>Francesco Ambrogi, Ugo Piomelli, David D. Rival</i>
16:00-16:30	Coffee break	
16:30-17:15	Room A	Keynote lecture -- Ivan Marusic Structure and drag-reducing scale interactions for high-Reynolds-number wall-bounded flows Chair: Wolfgang Rodi
17:15-17:30	Closure -- Maria Vittoria Salvetti & Oriol Lehmkuhl	



Social Events

Welcome Reception

Date: **06 September 2023**

Time: **18:00 – 19:30**

Where: **Outside bar by the hotel swimming pool**

Welcome Cocktail is the first social gathering between all conference delegates and it will take place at the Venue Hotel. It will be a relaxing evening during which delegates will have the opportunity to talk to colleagues and peers, while enjoying local drinks and ample canapés.

The Welcome Reception is included in all Registration Types.

Ticket per accompanying person: **€40.00**



Tour & Gala Dinner

Date: **07 September 2023**

Time: **18:45 – 23:00**

Departure: **Venue Hotel at 18:45**

We will depart from the hotel accompanied by a licensed guide and head to the city of Barcelona where we will have a panoramic tour of the city. We will have the opportunity to see a number of important sites, including the famous architectural wonders of Gaudi. We will end up at **Can Travi Nou**, a renovated 17th century farmhouse, where we will enjoy a traditional Catalanian tapas dinner.

The Tour & Gala Dinner is included in all Registration Types.

Ticket per accompanying person: **€80.00**



About Barcelona

ABOUT BARCELONA

Barcelona is a city with a wide range of original leisure options that encourage you to visit time and time again. Overlooking the Mediterranean Sea, and famous for Gaudí and other Art Nouveau architecture, Barcelona is one of Europe's trendiest cities. It's a hub of new trends in the world of culture, fashion and cuisine. It combines the creativity of its artists and designers with respect and care for local traditions.

Barcelona draws visitors to its famous sights, like the Sagrada Familia, Parc Güell, Casa Batlló and La Pedrera. But they can also discover a city full of pleasant surprises on each trip. A walk along the seafront, evenings on a rooftop terrace with views over the city skyline, spacious parks such as the Parc de Montjuïc or Ciutadella, the Marina, the Olympic village, and everything to do with FC Barcelona; a range of options for new experiences on each visit.

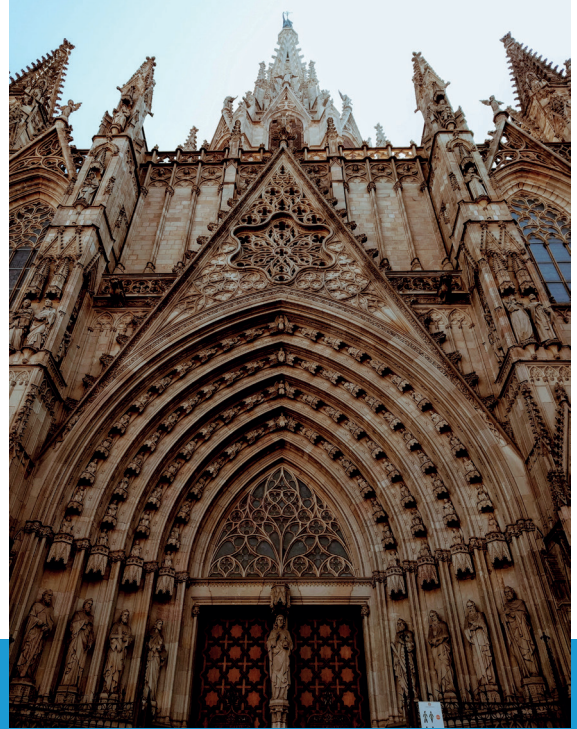
Culinary options are also varied, with world renowned haute cuisine restaurants, traditional Catalan dishes, food markets, and establishments that take you around the world with their flavours.

The city's cultural agenda also includes major art centres, like the Picasso Museum, the National Art Museum of Catalonia, and the CaixaForum; a wide range of festivals and one of Spain's leading opera houses, the Gran Teatre del Liceu.

BARCELONA, a city of rich history and culture

Barcelona has a rich and fascinating history that spans over 2,000 years. In the Middle Ages, Barcelona was an important center of commerce and culture, and the city flourished under the rule of the Counts of Barcelona. In the 19th century, Barcelona experienced rapid growth and became an important industrial city. After WW2, Barcelona underwent a period of reconstruction and modernization, and today it is a vibrant and cosmopolitan city that attracts millions of visitors each year. Throughout its history, Barcelona has been a center of art, culture, and innovation, and it has produced some of the world's greatest artists, architects, and thinkers. From the ancient Roman ruins to the modernist architecture of Gaudi, Barcelona's history is reflected in its buildings, streets, and people, making it a captivating and endlessly fascinating city to explore.





Venue & Accommodation

Hotel SB BCN Events ****

Hotel SB BCN Events is a luxurious 4-star hotel located in the heart of Castelldefels, just a stone's throw away from the beautiful Mediterranean coast. With its prime location, modern amenities, and exceptional service, Hotel SB BCN Events is a top-rated destination for travelers seeking comfort and convenience. The hotel features 190 stylishly decorated rooms and suites, all equipped with high-speed internet, air conditioning, flat-screen TVs, and private bathrooms. The hotel also offers a wide range of facilities, including an outdoor pool, a fitness center, a sauna, and a restaurant serving delicious Mediterranean cuisine. Business travelers can take advantage of the hotel's conference rooms and business center, which are equipped with the latest audio-visual technology. With its luxurious accommodations, exceptional service, and prime location, Hotel SB BCN Events is the perfect choice for both leisure and business travelers visiting Castelldefels.



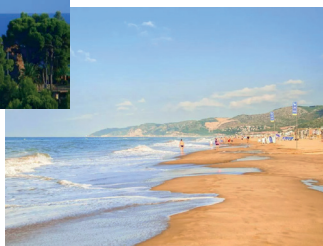
Venue Contact Details:

Ronda de Can Rabadà 22-24, 08860, Castelldefels, Spain

T: + 34 936 646 230 E: bcnevents@sbhotels.es

About Castelldefels

Castelldefels is a beautiful coastal town located in the province of Barcelona, Catalonia, Spain. Situated just 20 kilometers southwest of Barcelona, Castelldefels is situated on the shores of the Mediterranean Sea and boasts a stunning 5-kilometer-long beach, perfect for sunbathing, swimming, and water sports. The town has a population of around 70,000 people, and it is known for its cosmopolitan atmosphere, diverse culture, and rich history. Visitors can explore the town's historic center, which is home to ancient monuments, narrow alleys, and traditional shops. Castelldefels is also a popular destination for outdoor activities such as hiking, cycling, and horse riding. Other notable attractions include the Castle of Castelldefels, the Garraf Natural Park, and the Olympic Channel of Catalonia. With its beautiful beaches, rich history, and vibrant culture, Castelldefels is a must-visit destination for anyone traveling to Barcelona or the surrounding area.





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