ETMM14

14th International ERCOFTAC Symposium on Engineering Turbulence Modelling and Measurements

Wednesday, 06 Sep

8:00 - 8:45   Registration

Support Desk hours: 8:00 - 13:00 and 14:00-17:30

8:45 - 9:00   Welcome and Orientation

by Ivette Rodriguez & Stefan Hickel

9:00 - 9:45   Keynote lecture by Alfredo Soldati

Modelling and computation of drops and bubbles in turbulence.

Chair: Marcus Klein

9:45 - 10:30   Keynote lecture by Benedetta Franzelli

Characterization and modelling of soot production in turbulent flames.

Chair: Luc Vervisch

10:30 - 11:00   Coffee Break

11:00 - 12:40   Parallel sessions

MS. Recent advances in LES of multiphase flows
Chair: Mahdi Saeedipour

11:00   Towards LES of liquid jet atomization using an Eulerian-Lagrangian multiscale approach
Elias Trautner, Josef Hasslberger, Markus Klein

11:20   Complete LES of turbulent interfacial flows - challenges and perspectives
Mahdi Saeedipour, Jean-Luc Estivalezes, Stephane Vincent

11:40   Advanced turbulence modeling for two-phase flows
Stephane MIMOUNI

12:00   Numerical Assessment of Parcel Modeling in Large Eddy Simulation for Dispersed Multiphase Flows
Linda Bahramian, F.Xavier Trias, Carles Oliet, C.David Pérez-Segarra

12:20   Large-eddy simulation of turbulent dispersed flows: Modelling subgrid effects on particle dispersion
Cristian Marchioli

Bluff bodies
Chair: Woutijn Baars

11:00   Experimental investigation on the effects of upstream-edge roundness and angle of attack on the flow around a 5:1 rectangular cylinder
Alessandro Mariotti, Gianmarco Lunghi, Maria Vittoria Salvetti

11:20   Large-Eddy Simulations of the accelerating flow around square and rectangular cylinders
Maria Vittoria Salvetti, Stefano Brusco, Gianmarco Lunghi, Giuseppe PIccardo, Alessandro Mariotti

11:40   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
Kristine John, Markus Rehm, Hidajet Hadžić, Peter Pohl, Sven Grundmann, Martin Bruschewski

12:00   Intermediate wake characteristics behind a circular cylinder
Jordi Ventosa Molina, Ivette Rodriguez, Oriol Lehmkuhl, Jochen Fröhlich

12:20   Compressibility effects on the wake dynamics of a circular cylinder
Ivette Rodriguez, Benet Eiximeno, Lucas Gasparino, Carlos Tur-Monge, Jordi Muela, Oriol Lehmkuhl

MS. Physics-compatible numerical methods for fluid flows 1
Chair: Artur Palha

11:00   Minimum-Dissipation Model for Large Eddy Simulation using OpenFOAM
Jing Sun, Roel Verstappen

11:20   Energy-conserving neural network for turbulence closure modeling
Toby van Gastelen, Wouter Edeling, Benjamin Sanderse

11:40   DNS of laminar-turbulent flow transition over a delta wing
Arthur Veldman, Wybe Rozema, Johan Kok, Roel Verstappen

12:00   Suitability of Immersed Boundary Methods for high-fidelity computational aeroacoustics
Aleix Lazaro, Santiago Madriñan, Oscar Carrasco, Joan Grau, Ricardo Torres, Lluis Jofre, Francesco Capuano

12:20   Dissipation-aware discontinuous Galerkin methods for incompressible turbulent flows
Niklas Fehn, Martin Kronbichler

Combustion modeling
Chair: William Jones

11:00   Flow Topologies during Flame-Wall Interaction of Premixed Combustion in turbulent Boundary Layer
Khalil Abo-Amsha, Umair Ahmed, Nilanjan Chakraborty

11:20   Stochastic representation of the effects of micromixing on soot in turbulent non-premixed flames
Savvas Gkantonas, Epaminondas Mastorakos

11:40   Effects of fuel Lewis number on turbulent flow statistics in oblique-wall quenching of premixed V-shaped flames within turbulent channel flows
Nilanjan Chakraborty, Sanjeev Ghai, Umair Ahmed

12:00   Large Eddy Simulation of hydrogen deflagrations using the Thickened Flame Model (TFM) with stretch sensitivity adaptation
Cédric Mehl, Sandy Poncet, Karine Truffin, Olivier Colin

12:20   LES prediction of the ignition probability map of a model aeronautical spray burner
Olivier Colin, Cédric Mehl, Ernesto Sandoval

12:40 - 14:00 Lunch

14:00 - 16:00 Parallel Sessions

MS. Transition modelling
Chair: Daniele Simoni

14:00   Improved RANS-Coupled Transition Models: Recent Progress at NASA Langley Research Center
Nathaniel Hildebrand, Meelan Choudhari, Balaji Venkatachari, Vishal Srivastava

14:20   Quantification of RANS transition modeling with Bradshaw parameter
Md Mizanur Rahman

14:40   Detached Eddy Simulation of Transitional Flow in a Linear Low-Pressure Turbine Cascade, Including an Algebraic Transition Model
Slawomir Kubacki, Erik Dick

15:00   Numerical simulation of turbulent flow-induced vibrations, using unsteady RANS and the dynamic overset grids technique
Tianyang Zhao, Hector Iacovides, Tim Craft

15:20   Eddy-Resolving Simulation Coupled with Stability Analysis for Turbulent Transition in Compressible Boundary Layer
Jiseop Lim, Minwoo Kim, Solkeun Jee, Jaeyoung Park, Donghun Park

15:40   Local Correlations for Separation and Transition Position Prediction in Laminar Separation Bubbles
Daniele Petronio, matteo dellacasagrande, Davide Lengani, *Daniele Simoni*

Jets and Sprays
Chair: Benedetta Franzelli

14:00   Three-dimensional flow visualization of rectangular underexpanded microjets by tomographic Mach-Zehnder interferometry
Shota Yoshimi, Shinichiro Nakao, Yoshiaki Miyazato

14:20   Three-dimensional flow visualization of elliptic underexpanded jets by tomographic rainbow schlieren deflectometry
Tatsuya Nagata, Shinichiro Nakao, Yoshiaki Miyazato

14:40   Heat transfer of an impinging jet - sensitivity towards inflow conditions
Francesco Secchi, Davide GATTI, Bettina Frohnapfel

15:00   Detailed numerical investigation of the effect of nozzle flow on primary atomization of liquid jets
Marianne Abdelsayed, Elias Trautner, Markus Klein

15:20   Large Eddy Simulation of a supersonic kerosene lifted jet flame
Florian Kissel, Guillaume Ribert, Pascale Domingo

15:40   LES parametric study of non-circular excited jet flames at low Reynolds numbers
Jakub Stempka, Artur Tyliszczak, Epaminondas Mastorakos

MS. Physics-compatible numerical methods for fluid flows 2
Chair: Artur Veldman

14:00   Performance and error analysis of structure-preserving time-integration procedures for incompressible-flow simulations
Carlo De Michele, Marco Artiano, Francesco Capuano, Gennaro Coppola

14:20   Physics-compatible KEEP scheme and high-fidelity scale-resolving simulation of compressible flows
Soshi Kawai, Yuichi Kuya, Hiroyuki Asada, Hiromichi Sashida

14:40   Asymptotically entropy conservative discretization of convective terms in compressible Euler equations
Gennaro Coppola, Carlo De Michele

15:00   Robust and reliable DNS and LES on unstructured grids
F.Xavier Trias, Johannes Arend Hopman, Daniel Santos Serrano, Andrey Gorobets, Assensi Oliva

15:20   Enforcing accurate volume conservation in VOF-based coarse grid simulations of turbulent bubble-laden flows
Elias Trautner, Josef Hasslberger, Paolo Cifani, Markus Klein

15:40   Towards LES strategies for compressible industrial flows
Oriol Lehmkuhl, Lucas Gasparino, Jordi Muela

Wind Energy and environmental flows
Chair: Fernando Gisbert

14:00   Experimental characterization of unsteady airfoil aerodynamics for wind turbine applications
Simone Chellini, Delphine Anne Marie De Tavernier, Dominic von Terzi

14:20   An improved k-epsilon model for wind-farm simulation
Navid Zehtabiyan-Rezaie, Mahdi Abkar

14:40   Impact of Favourable Pressure Gradient on Wind Turbine Wake: A Wind Tunnel Study
Paul Bayron, Richard Kelso, Rey Chin

15:00   Influence of atmospheric stability on turbulence length scales in the eddy surface layer
Matthew Emes, Maziar Arjomandi

15:20   Numerical Analysis Of Transonic Flow Over The Ffa-W3-211 Wind Turbine Tip Airfoil
Maria Cristina Vitulano, Delphine De Tavernier, Giuliano De Stefano, Dominic von Terzi

15:40 Amplitude Modulation of Turbulent Fluctuations and Fluxes in Unstably Stratified Urban Boundary Layers
Kangcheng Zhou, Chun-Ho Liu, Minping Wan

16:00 - 16:30 Coffee Break

16:30 - 18:00 Poster Session

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

Towards Long-Term Predictions of Turbulence using Neural Operators
Fernando Gonzalez, François-Xavier Demoulin, Simon Bernard

Data-driven algebraic Reynolds stress models for turbulent secondary flows
Ali Amarloo, Paola Cinnella, Alexandros Iosifidis, Pourya Forooghi, Mahdi Abkar

Data-Driven Turbulence Model for Flow Separation from a Smooth Wall and a Sharp Corner
Yeji Yun, Seoyeon Heo, Minjae Jeong, *Solkeun Jee*

Data-driven RANS modelling of junction flows
Richard Dwight, M.E. van Ede, Tyler Buchanan

About mesh adaptation and intermittency model for hybrid flow calculation
Bastien Sauvage, Florian Miralles, Stephen Wornom, bruno koobus, Alain Dervieux

A Sensor-Based Scale-Resolving Turbulence Model for Separated Shear Layers
Eike Tangermann, Markus Klein

On the large-eddy simulation of a fully developed wind-turbine array boundary layer
David Folch, F.Xavier Trias, Assensi Oliva

Direct numerical simulation of passive scalar turbulent fields with wall scalar fluctuations at low, medium and high Prandtl numbers
BRUNO CHAOUAT

CFD-aided morphing and design optimisation of ultrasonic flow meters
Mario Javier Rincón, Martino Reclari, Xiang Yang, Mahdi Abkar

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

Interparticle collision effects on particle-fluid coupling in turbulent channel flows
Lee Mortimer, Michael Fairweather

Multi-objective topology optimization of heat exchangers by using a customized optimizer in OpenFOAM
Di CHEN, Prashant Kumar, Yosuke Hasegawa

Anisotropic RANS modeling in side-wall interference flowfield using LES database
Yoshiharu Tamaki, Soshi Kawai

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

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

Triple line dynamics for capillary flows
Michal Remer, Tomasz Bobiński

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

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

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

Fluid dynamics of right ventricular filling in the presence of pulmonary regurgitation: assessment using DNS and 4D Flow MRI
Ibrahim Yildiran, Francesco Capuano, Yue-Hin Loke, Laura Olivieri, Elias Balaras

A wall-modelled LES approach based on a multi-direct forcing immersed boundary method
Federico Dalla Barba, Pedro Costa, Francesco Picano

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

ETMM14

14th International ERCOFTAC Symposium on Engineering Turbulence Modelling and Measurements

Thursday, 07 Sep

8:30 - 9:00   Registration

9:00 - 9:45   Keynote Lecture by Paola Cinnella

Machine-learning-assisted modeling of turbulence: current status and perspective.

Chair: Stefan Wallin

9:45 - 10:30   Keynote Lecture by Franck Nicoud

Numerical analysis of the intra-cardiac flow

Chair: Ivette Rodriguez

10:30 - 11:00   Coffee Break

11:00 - 12:40   Parallel Sessions

MS. Machine learning for turbulence 1
Chair: Christopher Rumsey

11:00   Non-intrusive space-dependent aggregation of updated RANS models via Bayesian calibration and machine learning
Cécile ROQUES, Grégory Dergham, Xavier MERLE, Paola Cinnella

11:20   Machine Learning-Based Recovery of Thermophysical Information from Velocity Data in Supercritical Fluids Turbulence
Núria Masclans, Fernando Vazquez, Rosa M. Badia, Lluís Jofre

11:40   Embedding explicit smoothness constraints in data-driven turbulence models
Hannes Mandler, Bernhard Weigand

12:00   Active flow control on three-dimensional cylinders through deep reinforcement learning
Pol Suárez Morales, Francisco Alcántara-Ávila, Arnau Miro, Jean Rabault, Bernat Font, Oriol Lehmkuhl, Ricardo Vinuesa

12:20   Reconstruction of mean flows using turbulence model augmented Physics Informed Neural Networks
Yusuf Patel, Vincent Mons, Olivier Marquet, Georgios Rigas

RANS & hybrid RANS/LES
Chair: Suad Jakirlic

11:00   On variable resolution in scale-resolved simulations of turbulence
Stefan Wallin, Sharath S. Girimaji, Magnus Carlsson

11:20   Improving RANS modeling with data-assimilation for compressible flows
Bartolomeo Fanizza, Pedro Stefanin Volpiani, Florent Renac, Denis Sipp

11:40   Contribution to the variational calculus of the hybrid RANS/LES PITM method for the simulation of turbulent fields
BRUNO CHAOUAT, Roland SCHIESTEL

12:00   Zonal Detached Eddy Simulation in a lattice-Boltzmann framework
Julien Husson, Marc Terracol, Sébastien Deck

12:20   URANS computations of natural convection inside a cubic cavity with a partially heated inner obstacle
Constantinos Katsamis, Dean Wilson, Tim Craft, Hector Iacovides

MS. Physics-compatible numerical methods for fluid flows 3
Chair: Xavier Trias

11:00   On a high-order energy-preserving unconditionally stable discretization on collocated unstructured grids
Daniel Santos Serrano, F.Xavier Trias, Roel Verstappen, Carlos David Pérez-Segarra

11:20   Reconciling shock capturing with discrete local entropy conservation
Davide Modesti, Matteo Bernardini, Francesco Salvadore, Sergio Pirozzoli

11:40   On the development of an entropy stable discontinuous Galerkin solver for scale-resolving flow simulations
Alessandro Colombo, Samuele Capuzzi, Andrea Crivellini, Alessandra Nigro, Luca Alberti, Emanuele Carnevali

12:00   Numerical investigation of the non-conforming Schwarz-spectral element method in low Mach number reacting flows
Ioannis Kavroulakis, Dimitris Papageorgiou, Ananias Tomboulides, Christos Frouzakis, Paul Fischer

12:20   On self-adaptive Runge-Kutta schemes with improved energy-conservation properties
Josep Plana-Riu, F.Xavier Trias, Carlos David Pérez-Segarra, Asensio Oliva

Wall-bounded Flows 1
Chair: Richard Sandberg

11:00   Large-scale coherent structures in an asymmetrically heated channel flow
Marina Garcia-Berenguer, Lucas Gasparino, Oriol Lehmkuhl, Ivette Rodriguez

11:20   Heat transfer in drop-laden turbulent channel flow
Francesca Mangani, Umberto Baú, Alessio Roccon, Francesco Zonta, Alfredo Soldati

11:40   Numerical simulation of drag reduction in bubbly Taylor-Couette turbulence
Bernard Geurts, Arnout Franken, Sagy Ephrati, Paolo Cifani, Artur Tyliszczak

12:00   Flexible fibers in turbulent channel flow
Davide Di Giusto, Cristian Marchioli

12:20   Breakdown of the Reynolds analogy in DNS of rotating Couette flows
Geert Brethouwer

12:40 - 14:00 Lunch

14:00 - 16:00 Parallel Sessions

MS. Machine learning for turbulence 2
Chair: Ricardo Vinuesa

14:00   Using Machine Learning for formulating new wall functions for Detached Eddy Simulation
Lars Davidson

14:20   DeepONet-Assisted Optimization of Surface Topography for Transition Delay in a Mach 4.5 Boundary Layer
Nathaniel Hildebrand, Meelan Choudhari, Vishal Srivastava, Tamer Zaki

14:40   Comparing random forests and neural networks to augment RANS turbulence models
Pedro Volpiani

15:00   Towards local application of data-driven turbulence modeling for separated flows
Yasunari Nishi, Cornelia Grabe, Axel Probst, Tobias Knopp, Andreas Krumbein

15:20   Drag-reduction strategies in wall-bounded turbulent flows using deep reinforcement learning
Luca Guastoni, Jean Rabault, Hossein Azizpour, Ricardo Vinuesa

15:40   A neural-network-based subgrid-scale model for LES of flow over a circular cylinder
MYUNGHWA KIM, JONGHWAN PARK, Haecheon Choi

MS. Hybrid RANS/LES methods
Chair: Christophe Friess

14:00 Coupling of the gamma-Reynolds theta-t laminar-turbulent transition model to a robust hybrid Reynolds-Averaged Navier-Stokes/Large-Eddy Simulation framework
Michel Bouchard, Sébastien Deck, Julien Marty, Michel Costes

14:20 Towards efficient hybrid RANS-LES for industrial aeronautical applications
Axel Probst, Elrawy Soliman, Silvia Probst, Matthias Orlt, Tobias Knopp

14:40 An Adaptive Dissipation Numerical Method for Detached Eddy Simulation in Turbomachinery Flow
Cheng Tian, Siya Jiang, Song Fu

15:00 Dynamic Scale-Resolving Paradigm for Coarse Grained Simulations of Turbulent Mixing
Fernando Grinstein

15:20 GPU-accelerated coupled RANS-Lattice Boltzmann simulations of turbulent flow over complex terrain
Rong Wang, Marta Camps Santasmasas, Alessandro De Rosis, Alex Skillen, Pablo Ouro, Alistair Revell

15:40 Sensitized-RANS simulation of an IC-engine intake flow
Maximilian Bopp, Andrea Pati, Louis Krüger, Sebastian Wegt, Christian Hasse, *Suad Jakirlic*

MS. Physics-compatible numerical methods for fluid flows 4
Chair: Gennaro Coppola

14:00 Energy-consistent discretization of viscous dissipation with application to natural convection flows
Benjamin Sanderse, *F.Xavier Trias*

14:20 Non-dissipative large-eddy simulation of high-pressure transcritical turbulent flows: formulation and a priori analysis
Marc Bernades, Lluís Jofre, Francesco Capuano

14:40 On a Conservative Solution to Checkerboarding: Examining the Causes of Non-Physical Pressure Modes
Johannes Arend Hopman, Àdel Alsalti-Baldellou, F.Xavier Trias, Joaquim Rigola

15:00 Reduced order stochastic modeling of turbulent mixing based on conservative baker's maps
Marten Klein, Tommy Starick, Christian Zenker, Juan A. Medina Méndez, Heiko Schmidt

15:20 An Improved Approach to the Predictability & Reliability of the Onset of Turbulence with Shocks
Helen Yee, Bjorn Sjogreen

15:40 Dual-field formulation for incompressible MHD equations
Artur Palha

Flames
Chair: Guillaume Ribert

14:00 A turbulent combustion model based on the estimation of the subgrid reactants and temperature fields
Karol Wawrzak, *Andrzej Boguslawski*, Lena Caban, Artur Tyliszczak

14:20 LES of excited hydrogen-enriched methane flames stabilized by wavy-wall bluff-bodies
Agnieszka Wawrzak, Lena Caban, *Artur Tyliszczak*, Epaminondas Mastorakos

14:40 Studying flameless combustion with neural network chemistry and large-eddy simulation
Huu-Tri Nguyen, *Luc VERVISCH*, Pascale Domingo, Phuc-Danh Nguyen

15:00 Accuracy assessment of LES-ADM modelling of auto-ignition in a temporally evolving jet
Lena Caban, Artur Tyliszczak, Julian Domaradzki, Bernard Geurts

15:20 Assessment of the partially stirred reactor model for LES in swirl-stabilized turbulent premixed flames
Fredherico Rodrigues, José Maria García-Oliver, Daniel Mira

15:40 Self-excited oscillations and lift-off of a hydrogen jet flame in a counterflow
Agnieszka Wawrzak, Andrzej Boguslawski, Artur Tyliszczak

16:00 - 16:30 Coffee Break

16:30 - 18:30 Parallel Sessions

MS. Machine learning for turbulence 3
Chair: Oriol Lehmkuhl

16:30   Sample efficient fluid flow control using neuro-evolution guided deep reinforcement learning
Tarun Singh, Laurent Cordier, Ronan Fablet

16:50   Reconstruction of flows past airfoils near stall based on extremely scarce pressure data
Cynthia Tayeh, Vincent Mons, Olivier Marquet

17:10   Deep Reinforcement Learning for the design of a dynamic, drag-reducing textured wall
Giorgio Maria Cavallazzi, Juan Guzman-Inigo, Alfredo Pinelli

17:30   Towards data driven models for the automotive industry
Benet Eiximeno, Arnau Miro, Ivette Rodriguez, Oriol Lehmkuhl

17:50   Pressure determination by assimilating 3C-2D PIV data with the direct numerical simulation of turbulent channel flow
Ezhilsabareesh Kannadasan, Callum Atkinson, *Julio Soria*

LES modelling
Chair: Roel Verstappen

16:30   Modelling the small scales of Large Eddy Simulations with Periodic Box Homogeneous Isotropic Turbulence
Githin Tom Zachariah, Harry Van den Akker

16:50   Assessment of SGS Models in Transcritical Injection Processes
Alexander Doehring, Markus Klein, Min Son, Tobias Sander, Michael Pfitzner, Lars Zigan

17:10   Radially scaling kernels of the spectral vanishing viscosity method for LES in cylindrical configurations
Thomas Hultsch, Jörg Stiller, Jochen Fröhlich

17:30   The Effect of Inlet Synthetic Turbulence on Aortic Haemodynamics
Emily Manchester, Alex Skillen, Alistair Revell

17:50   A Family of Wall-Modeled Large Eddy Simulation Formulations
Florian Menter, Ekaterina Guseva, Andrey Stabnikov, Andrey Garbaruk

LES applications
Chair: Johan Larsson

16:30   Wall Resolved Large Eddy Simulations of a Three-Element High-Lift Airfoil at Different Angles of Attack
Ricard Montalà Sales, Oriol Lehmkuhl, Ivette Rodriguez

16:50   Large-Eddy Simulation on Golf-Ball Aerodynamics with Different Flight Conditions
Makoto Tsubokura, Yuma Matsuki, Ryosuke Ueda, Shota Nishinakagawa, Masahide Onuki, Takahiro Sajima

17:10   Wall-modeled LES of shock oscillations in adiabatic and wall-cooled over-expanded nozzles
Ryo Hirai, Soshi Kawai

Wall-bounded Flows 2
Chair: Ivan Marusic

16:30   Turbulent Boundary Layers over Acoustic Liners
Haris Shahzad, Stefan Hickel, Davide Modesti

16:50   Reynolds number dependence of turbulent flows over highly permeable porous media
Yusuke Kuwata, Suga Kazuhiko

17:10   Assessing different roughness description methods in skin friction prediction
Jiasheng Yang, Alexander Stroh, Sangseung Lee, Shervin Bagheri, Pourya Forooghi

17:30   How do forward-facing steps promote laminar-turbulent transition in swept-wing flow?
JORDI CASACUBERTA, Stefan Hickel, Marios Kotsonis, Koen J. Groot

17:50   On the behaviour of coherent structures over riblets in transitional boundary layers under a streamwise varying pressure gradient
Ananth SM, Massimiliano Nardini, Aditya Vaid, Melissa Kozul, Nagabhushana Rao Vadlamani, Richard Sandberg

18:45 - 23:00   Tour & Gala Dinner

ETMM14

14th International ERCOFTAC Symposium on Engineering Turbulence Modelling and Measurements

Friday, 08 Sep

8:30 - 9:00   Registration

9:00 - 9:45   Keynote Lecture by Fernando Gisbert

High fidelity numerical simulation of low pressure turbine flows.

Chair: Cornrlia Grabe

9:45 - 10:30   Keynote Lecture by Johan Larsson

Adaptivity in wall-modeled large eddy simulations

Chair: Ugo Piomelli

10:30 - 11:00   Coffee Break

11:00 - 12:40   Parallel Sessions

MS. Machine learning for turbulence 4
Chair: Paola Cinnella

11:00   Deep-learning-based explanations in wall-bounded turbulence
Andrés Cremades, Sergio Hoyas, Pedro Quintero, Martin Lellep, Moritz Linkmann, *Ricardo Vinuesa*

11:20   Identifying Informative Features for Data-Driven Turbulence Modeling
Joel Ho, Nick Pepper, Tim Dodwell

11:40   Data-driven RANS closure modeling for transient turbulence and heat transfer problems
Richard Sandberg, Xiaowei Xu, Ali Haghiri

12:00   Predictive correlations for particle motion across a stratified interface using machine learning
Liron Simon Keren, Teddy Lazebnik, Alex Liberzon

12:20   CFD-driven stochastic aggregation of data-driven turbulence models
Soufiane CHERROUD, Xavier Merle, Paola Cinnella, Xavier Gloerfelt

Complex fluids and interfaces
Chair: Alfredo Soldati

11:00   An Accurate Reconstruction and Interpolation Scheme for a Conservative Cut-Cell Immersed Boundary Method with Gas-Surface Interactions
Ata Onur Baskaya, Stefan Hickel

11:20   Patterns in the hull of a canopy with a high Cauchy number
Bastian Löhrer, Jochen Fröhlich

11:40   Richtmyer-Meshkov induced turbulent mixing in a shock tube : experiments and simulations
Jérôme Griffond, Olivier Soulard, Denis Souffland, Yannick Bury, Stéphane Jamme, Marta Rasteiro dos Santos

12:00   Two-phase flow of quantum turbulence and normal-fluid turbulence in superfluid helium-4
Hiromichi Kobayashi, Satoshi Yui, Makoto Tsubota, Rio Yokota

12:20   Direct numerical simulation of H-type transition in a flat-plate boundary layer with supercritical fluids
Pietro Carlo Boldini, Benjamin Bugeat, Pedro Costa, Jurriaan Peeters, Rene Pecnik

MS. High-fidelity simulations of industrial flows 1
Chair: Maria Vittoria Salvetti

11:00   Modeling smooth-body flow separation with variational multiscale method, finite elements and weakly enforced Dirichlet boundary conditions
Artem Korobenko, Sujal Dave

11:20   Multi-cycle Direct Numerical Simulations of a Laboratory Scale Engine: Evolution of the Momentum and Thermal Boundary Layers
Bogdan Danciu, Christos Frouzakis, Georgios Giannakopoulos, Mathis Bode, Nicolas Noiray

11:40   Cost vs Accuracy: second-order vs high-order methods for eddy-resolving simulations of turbulent separated flows
Francesco Capuano, Nikolaos Beratlis, Fengrui Zhang, Yulia Peet, Kyle Squires, *Elias Balaras*

12:00   Scale-resolving simulation of turbulent flows with a Discontinuous Galerkin method
Francesco Bassi, Alessandro Colombo, *Francesco Carlo Massa*

12:20   Synthetic turbulent inflow for lattice Boltzmann simulations of corner separation in a linear compressor cascade
Malo Tarpin, Jérôme Boudet, Emmanuel Lévêque

Wall-bounded Flows 3
Chair: Geert Brethouwer

11:00   Passive Control of Shock-Wave/Turbulent Boundary-Layer Interaction Using Spanwise Heterogeneous Roughness
Wencan Wu, Luis Laguarda, Davide Modesti, Stefan Hickel

11:20   High-fidelity investigation into height effects for microvortex generators in high-speed boundary layers
Giacomo Della Posta, Francesco Salvadore, Matteo Bernardini

11:40   An experimental realisation of steady spanwise forcing for turbulent drag reduction
Max Knoop, Friso Hartog, Bas van Oudheusden, Ferdinand Schrijer

12:00   Real-time opposition control of skin-friction drag-producing structures in a turbulent boundary layer
Giulio Dacome, Robin Morsch, Marios Kotsonis, Woutijn J. Baars

12:20   Drag Reduction Effect of Local Oblique Blowing with Shallow Angle for Turbulent Boundary Layer Flow on Flat Plate
Ryo Tobita, Akihiko Mitsuishi, Kaoru Iwamoto, Akira Murata

12:40 - 14:00   Lunch

14:00 - 16:00   Parallel Sessions

Particles and bubbles
Chair: Bernard Geurts

14:00   DNS study on the effect of skin friction of aver millimeter sized bubbles in horizontal channel flow
Sangwon Kim, Nobuyuki Oshima, Makoto Tsubokura

14:20   Impact of behavioural modification techniques on agglomeration dynamics in particle-laden turbulent pipe flows
Lee Mortimer, Michael Fairweather, *Bisrat Wolde*

14:40   Experimental and Numerical Investigation of Elongated Non-Spherical Particles in a Turbulent Jet-in-Crossflow Configuration
Manuel A. Taborda, Martin Sommerfeld

15:00   Spread of bi-disperse particles in the downstream domain of a turbulent co-flowing jet
Xinchen Zhang, Graham Nathan, Zhao Tian, Rey Chin

15:20   Non-spherical particle interactions in isotropic turbulence using an immersed boundary approach
Jacob Anderson, Michael Fairweather, Lee Mortimer

15:40   Influence of shear rate and surface potential on particle interaction and aggregation in nanofluids
Lee Mortimer, Michael Fairweather

MS. Towards climate neutral thermochemical energy conversion
Chair: Christian Trapp

14:00   DNS of a RCCI engine using octanol-ethanol as the fuel blend
Antony Ashley Raja Bosco Premkumar, Francesca Loffredo, Heinz Pitsch, Markus Klein

14:20   Comparison of experimental and numerical analyses of water-in-gasoline emulsions
Benjamin Blau, Oscar Krzeczek, Christoph Heinrich, Markus Klein

14:40   Investigation of hydrogen direct injection jets using a simplified injector geometry
Mark Treacy, Hesameddin Fatehi, Xue-Song Bai

15:00   Developing optical measurement techniques for improving ignition simulation models
Saraschandran Kottakalam, Ahmad Anas Alkezbari, Gregor Rottenkolber, Christian Trapp

15:20   Hydrogen enriched natural gas jet flame in a cross-flow at elevated pressures
William Jones, Weiyue Liu, Andrew Marquis

15:40   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
Larissa Grundl, Pravin Kumar Sundaram, Christian Trapp

MS. High-fidelity simulations of industrial flows 2
Chair: Stefan Hickel

14:00   Towards a machine learning model for Explicit Algebraic Reynolds Stress Modelling using Multi-Expression Programming
Arnau Miro, Stefan Wallin, Alessandro Colombo, Lionel Temmerman, Dirk Wunsch, Oriol Lehmkuhl

14:20   Leading-edge and tip vortices and their effect on the aerodynamic performance of a vertical-axis wind turbine
Sangwoo Ahnn, Haecheon Choi

14:40   Advances in scale-resolving simulations of complex flows using high-order finite differences and implicit time stepping
Aurelien Bienner, *Camille Matar*, Özgür Yalçın, Xavier Gloerfelt, Paola Cinnella

15:00   Large eddy simulation of dense organic vapor flow through a supersonic turbine stage
Camille Matar, Paola Cinnella, Xavier Gloerfelt

15:20   Large eddy simulation of the interaction between a supersonic parachute and the wake of a descent module during mars entry
Luca Placco, Giulio Soldati, Alessio Aboudan, Francesca Ferri, Matteo Bernardini, Federico Dalla Barba, Francesco Picano

15:40   Reliable overnight industrial LES: challenges and limitations. Application to CSP technologies
Àdel Alsalti-Baldellou, Guillem Colomer, Johannes Arend Hopman, Xavier Álvarez-Farré, Andrey Gorobets, F.Xavier Trias, Assensi Oliva

Wall-bounded flows 4
Chair: Davide Modesti

14:00   Effect of pressure gradient history on rough-wall turbulent boundary layers
Thomas Preskett, Bharathram Ganapathisubramani

14:20   History effects in turbulent boundary layer under different levels of adverse pressure gradient
Witold Elsner, Artur Dróżdż, Paweł Niegodajew, Vasyl Sokolenko

14:40   Hot-wire spatial resolution effects in adverse-pressure-gradient turbulent boundary layers
Artur Dróżdż, Ramis Örlü, Paweł Niegodajew, Vasyl Sokolenko, Philipp Schlatter, Witold Elsner

15:00   Spatial averaging effects in adverse pressure gradient turbulent boundary layers
Fermin Mallor, Ramis Örlü, Philipp Schlatter

15:20   The investigation of friction velocity determination techniques for turbulent boundary layers influenced by miniature vortex generators
Jiahao Kong, Luke Bennetts, Bagus Nugroho, CHI IP CHAN, Rey Chin

15:40   Dynamic of turbulent kinetic energy advection in an unsteady separated turbulent boundary layer
Francesco Ambrogi, *Ugo Piomelli*

16:00 - 16:30 Coffee Break

16:30 - 17:15 Keynote Lecture by Ivan Marusic

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

Chair: Wolfgang Rodi

17:15 - 17:30 Closure
Chair: Maria Vittoria Salvetti & Oriol Lehmkuhl