

DLES 13



13th ERCOFTAC Workshop on Direct & Large Eddy Simulation

26-28 October 2022

Udine, Italy



**UNIVERSITÀ
DEGLI STUDI
DI UDINE**



ERCOFTAC

European Research Community On
Flow, Turbulence And Combustion

PROGRAM “AT A GLANCE”

Tuesday, October 25 2022, Centro Culturale Paolino d’Aquilaia	
16:00-17:00	Registration
17:00-18:00	Welcome Aperitif

Wednesday, October 26 2022, Centro Culturale Paolino d’Aquilaia	
8:30-9:00	Registration
9:00-9:10	Opening
9:10-9:50	Keynote Lecture (A. Tomboulides)
10:00-11:00	Contributed Talks (2 parallel sessions, 4 talks per session)
11:00-11:30	Coffee Break
11:30-12:45	Contributed Talks (2 parallel sessions, 5 talks per session)
12:45-14:30	Lunch Break
14:30-15:10	Keynote Lecture (A. Beck)
15:20-16:05	Contributed Talks (2 parallel sessions, 3 talks per session)
16:05-16:30	Coffee Break
16:30-17:45	Contributed Talks (2 parallel sessions, 5 talks per session)
19:45-22:00	Pizza dinner at Pizzeria Concordia

Thursday, October 27 2022, Centro Culturale Paolino d’Aquilaia	
9:00-9:40	Keynote Lecture (V. Michelassi)
9:50-10:50	Contributed Talks (2 parallel sessions, 4 talks per session)
10:50-11:20	Coffee Break
11:20-12:50	Contributed Talks (2 parallel sessions, 6 talks per session)
12:50-14:30	Lunch Break
14:30-15:10	Keynote Lecture (A. Lozano-Duran)
15:20-16:20	Contributed Talks (2 parallel sessions, 4 talks per session)
16:20-16:50	Coffee Break
16:50-18:20	Contributed Talks (2 parallel sessions, 6 talks per session)
20:00-22:30	Social Dinner at Casa della Contadinanza

Friday, October 28 2022, Centro Culturale Paolino d’Aquilaia	
9:00-9:40	Keynote Lecture (I. Vignon-Clementel)
9:50-10:50	Contributed Talks (2 parallel sessions, 4 talks per session)
10:50-11:10	Coffee Break
11:10-12:40	Contributed Talks (2 parallel sessions, 6 talks per session)
12:40-14:00	Lunch Break
14:00-14:40	Keynote Lecture (F. Picano)
14:50-15:50	Contributed Talks (2 parallel sessions, 4 talks per session)
15:50-16:20	Coffee Break
16:20-17:20	Contributed Talks (2 parallel sessions, 4 talks per session)
17:20-17:30	Conference Closure

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LOCAL ORGANIZING COMMITTEE

Conference Chairman:

Cristian Marchioli (University of Udine, ITA)

Organizing Committee:

Maria Vittoria Salvetti (University of Pisa, ITA)

Manuel Garcia Villalba (TU Wien, AUT)

Philipp Schlatter (KTH Stockholm, SWE)

Scientific Secretary:

Alessio Roccon (University of Udine, ITA)

SCIENTIFIC COMMITTEE

Vincenzo Armenio, University of Trieste, ITA

Bendiks J. Boersma, TU Delft, NED

Domenico Borello, University of Rome, ITA

Michael Breuer, Helmut-Schmidt University Hamburg, GER

Wim-Paul Breugem, TU Delft, NED

Angela Busse, University of Glasgow, UK

Paola Cinnella, Sorbonne University, Paris, FRA

Lars Davidson, Chalmers Univ. Technology, SWE

Elisabetta de Angelis, Cardiff University, UK

Mauro de Marchis, Kore University, ITA

Oscar Flores, Universidad Carlos III de Madrid, SPA

Jochen Fröhlich, TU Dresden, GER

Bettina Frohnappel, KIT, GER

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Bernard J. Geurts, University of Twente, NED

Tobias Kempe, ILK Dresden, GER

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Marco De Tullio, Technical University of Bari, ITA

Marcello Meldi, PPRIME Poitiers, FRA

Johan Meyers, University Leuven, BEL

Ugo Piomelli, Queens University, CAN

Jacek Pozorski, Polish Academy Sciences, POL

Ivette Rodriguez, Universitat Politècnica de Catalunya, SPA

Sutanu Sarkar, University of California San Diego, USA

Wolfgang Schröder, RWTH Aachen, GER

Spencer Sherwin, Imperial College London, UK

Alfredo Soldati, TU Wien, AUT

Dominique Thévenin, University of Magdeburg, GER

Ananias Tomboulides, Aristotle University Thessaloniki, GRE

Francesc Xavier Trias, Univ. Politècnica de Catalunya, SPA

Markus Uhlmann, Karlsruhe Institute Technology, GER

Roel Verstappen, University of Groningen, NED

Luc Vervisch, INSA Rouen, FRA

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13th ERCOFTAC Workshop on Direct and Large Eddy Simulation

Udine, October 26-28, 2022

USEFUL INFORMATION

Registration Desk Hours

- Tuesday, October 25: 16:00-17:00
- Wednesday, October 26: 8:30-9:00
- Thursday, October 27: 8:30-9:00
- Friday, September 30: 8:30-9:00

The registration desk is located at the workshop's venue, Centro Culturale Paolino d'Aquileia (address: via Treppo 5/b, Udine)

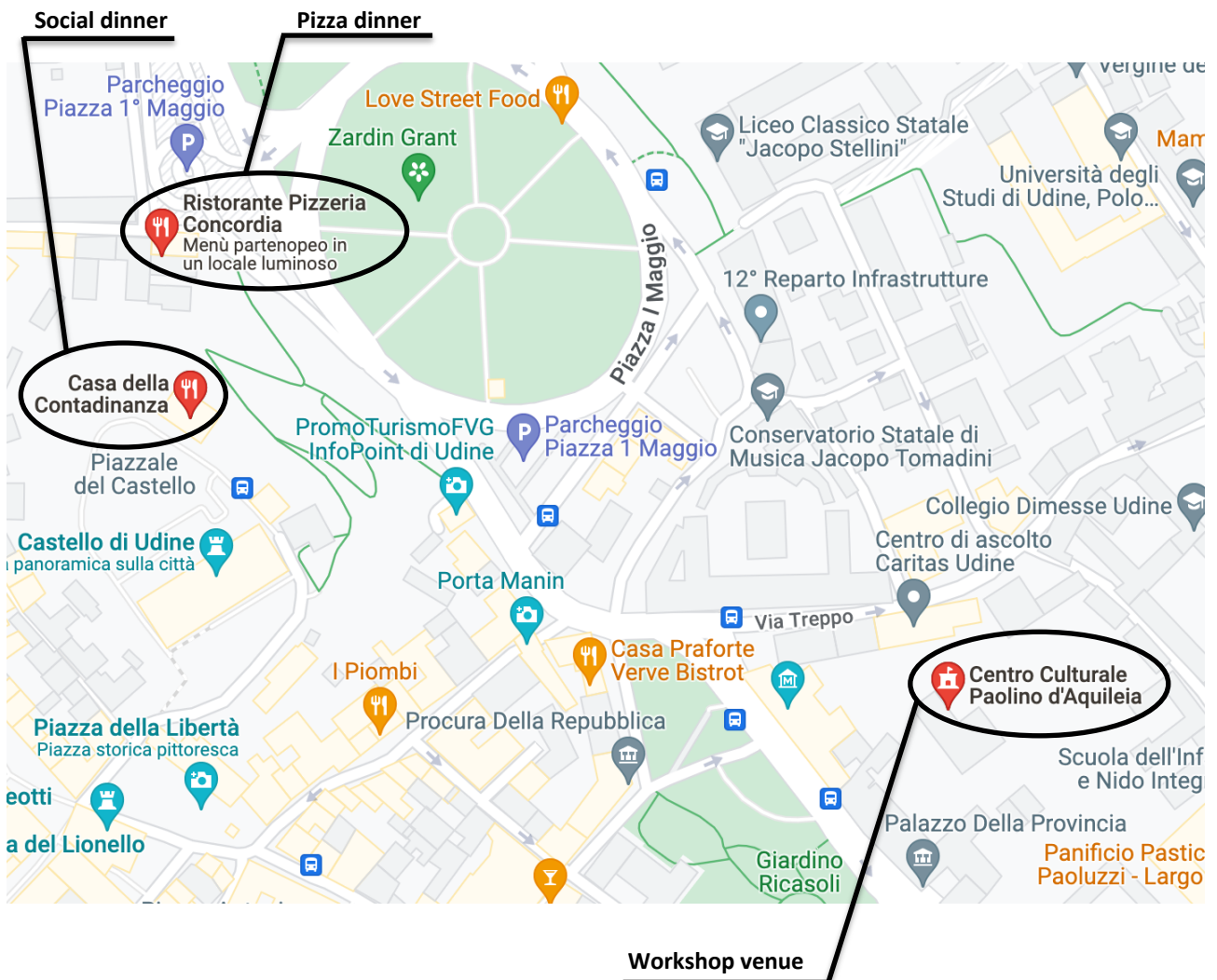
PIZZA DINNER & SOCIAL DINNER

The Pizza Dinner will be held on Wednesday, October 26 (19:45 -22:00), at *Pizzeria Concordia* (Piazza I Maggio 9/A, Udine).

The Social Dinner will be held on Thursday, October 27 (20:00-22:30), at the restaurant *Casa della Contadinanza* (Piazzale della Patria del Friuli 2, Udine).

Admission to both dinners will be limited to registered participants (please, bring your badge) and to registered accompanying persons.

WORKSHOP VENUE



DLES 13

13th ERCOFTAC Workshop on Direct and Large Eddy Simulation

Udine, October 26-28, 2022

CENTRO CULTURALE PAOLINO D'AQUILEIA

The workshop venue is located in downtown Udine (address: via Treppo 5/b, 33100 Udine). All workshop activities will take place here.



Main building



Main lobby & registration desk



Sala Paolino d'Aquileia (Auditorium, 236 seats)



Sala Paolo Diacono (56 seats)



Street view of the main entrance (via Treppo 5/b)

INVITED SPEAKERS

Wednesday, 26 October 2022

9:10 – 9:50

Chair: C. Marchioli

USING HIGH ORDER METHODS FOR LARGE-SCALE
COMBUSTION SIMULATIONS

Ananias Tomboulides

Aristotle University of Thessaloniki, Greece



Wednesday, 26 October 2022

14:30 – 15:10

Chair: P. Schlatter

TOWARDS DATA-DRIVEN CLOSURE MODELS FOR
IMPLICITLY FILTERED LES

Andrea Beck

Otto-von-Guericke University, Germany



Thursday, 27 October 2022

09:00 – 09:40

Chair: M.V. Salvetti

HIGH-FIDELITY AND MACHINE-LEARNING-ASSISTED
MODELING OF TURBOMACHINERY FOR ENERGY
TRANSITION

Vittorio Michelassi

Baker Hughes General Electric Inc., Italy



Thursday, 27 October 2022

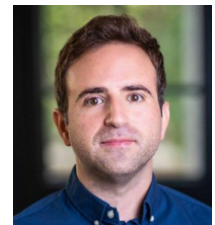
14:30 – 15:10

Chair: M. Garcia Villalba

BUILDING-BLOCK FLOW MODEL FOR LARGE-
EDDY SIMULATION

Adrian Lozano-Duran

MIT, USA



Friday, 28 October 2022

9:00 – 9:40

Chair: J. Fröhlich

BLOOD FLOW SIMULATIONS FOR DISEASE AND
SURGICAL TREATMENT UNDERSTANDING

Irene Vignon-Clementel

Inria, France



Friday, 30 September 2022

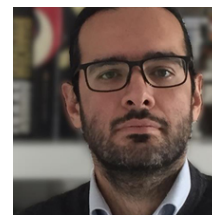
11:15 – 11:55

Chair: F. Zonta

SIMULATION AND MODELING OF TURBULENT
DILUTE SPRAYS WITH APPLICATION TO
RESPIRATORY FLOWS

Francesco Picano

University of Padova, ITA



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INSTRUCTIONS FOR SPEAKERS AND SESSION CHAIRS

1. Keynote talks are assigned 35 minutes for presentation, plus additional 5 minutes for questions and change of speaker.
2. Regular contributed talks are assigned 12 minutes for presentation, plus additional 3 minutes for questions and change of speaker.
3. Chair persons are kindly asked to strictly maintain the schedule, even in the case of no-show.
4. The conference room will be equipped with a PC (capable of displaying PDF and Powerpoint presentations) and an LCD projector. Laser presentation pointers can be provided upon request of the Chair person and depending on availability.
5. Speakers may use their own laptop. However, in order to minimize technical difficulties, they are also kindly invited to upload their presentation in the conference PC and test the presentation well beforehand.
6. Please prepare a good quality portable PDF version of the presentation in the case other formats are not supported by the PC.

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Udine, October 26-28, 2022

ORGANIZERS

UNIVERSITÀ DEGLI
STUDI DI UDINE



uniud.it

The University of Udine was founded in 1978 as part of the reconstruction plan of Friuli after the earthquake in 1976. Its aim was to provide the Friulian community with an independent center for advanced training in cultural and scientific studies. Udine and its University are a point of reference in a region that is historically a meeting place and crossroads of different worlds and cultures. Geographically situated in the center of the European Union, the University of Udine plays an active role in a close network of relations, committed to sharing its knowledge and ideas. Since its establishment, Udine University has pursued the policy of internationalization, aimed at preparing students and forging relations and partnerships with universities and institutions in Europe and the rest of the world.

ERCOFTAC



ercoftac.org

ERCOFTAC (European Research Community on Flow, Turbulence and Combustion) is an international association with scientific objectives created in 1988. The main objectives of ERCOFTAC are to promote joint efforts of European research institutes and industries who are active in all aspects of flow, turbulence and combustion, aimed at exchanging technical and scientific information about basic and applied research and the development, validation and maintenance of numerical codes and databases; to promote Pilot Centres for collaboration, stimulation and application of research; to promote industrial application of research by means of novel kinds of collaborations between industry, governments, professional societies and research groups; to stimulate, through the creation of Special Interest Groups, well-coordinated European-wide research efforts on specific topics in flow, turbulence and combustion; to stimulate the creation of advanced training activities in all fields related to flow, turbulence and combustion.

PROGRAM SUMMARY

Tuesday, October 25, 2022		
16:00	17:00	Registration
17:00	18:00	Welcome Drink

Wednesday, October 26, 2022		
08:30	09:00	Registration
09:00	09:10	Opening
09:10	09:50	Keynote lecture Ananias Tomboulides – Using high-order methods for large-scale combustion simulations Chair: C. Marchioli, Room: Sala Paolino d'Aquileia (main auditorium)
10:00	11:00	Regular talks <i>Session: Convection and heat/mass transfer</i> Chair: R. Verstappen, Room: Sala Paolino d'Aquileia
		<i>Session: Numerics and methodology</i> Chair: G. De Stefano, Room: Sala Paolo Diacono
10:00	10:15	RT1 A posteriori LES of forced convection along heated and cooled walls with temperature-dependent fluid properties (Lorenzo Sufrà, Helfried Steiner)
		Approximate deconvolution of implicit filters induced by numerical schemes for improved subfilter stresses evaluation (Andrzej Boguslawski, Karol Wawrzak, Bernard Geurts)
10:15	10:30	RT2 Pool boiling simulations using a geometric volume of fluid method (Bendiks Boersma)
		Finite-difference viscous filtering for non-regular meshes (Eric Lamballais, Rodolphe Perrin)
10:30	10:45	RT3 Effect of variable density on subgrid scales (Antonella Abbà, Mohammad Hosein Aliyoldashi, Andrea Cimarelli, Massimo Germano)
		The Brinkman penalization technique for porous-fluid media: A Lattice Boltzmann and Semi-Lagrangian Vortex method comparison (Simon Marie, Chloé Mimeau, Iraj Mortazavi)
10:45	11:00	RT4 Conjugate heat transfer simulation of target station 2 of the ISIS muon and neutron Source (Gregory Cartland-Glover, Stefano Rolfo, David Emerson, Dan Wilcox, Daniel Blanco-Lopez, Laslie Jones, David Jenkins, Stephen Jago)
		DNS and LES of buoyancy-driven turbulence at high Rayleigh numbers: numerical methods and subgrid-scale models (Francesc Xavier Trias, Xavier Álvarez-Farré, Daniel Santos, Andrey Gorobets, Assensi Oliva)
11:00	11:30	Coffee Break
11:30	12:45	Regular talks <i>Session: Combustion and reactive flows</i> Chair: A. Tomboulides, Room: Sala Paolino d'Aquileia
		<i>Session: Bluff bodies</i> Chair: M. Breuer, Room: Sala Paolo Diacono
11:30	11:45	RT5 A four mixture fraction FPV-LES for the co-firing of coal and ammonia (Dominik Meller, Linus Engelmann, Patrick Wollny, Andreas Kempf)
		Large-eddy simulation of the flow around rectangular cylinders of different chord-to-depth ratios: impact of upstream-edge sharpness (Maria Vittoria Salvetti, Gianmarco Lunghi, Mario Morello, Alessandro Mariotti)
11:45	12:00	RT6 Effects of the strain rates on the formation and growth of nano-particles in turbulent flames (Luis Cifuentes, Irenäus Wlokas, Andreas Kempf)
		Direct Numerical Simulations of the flow around a 5:1 rectangular body with sharp corners (Roberto Corsini, Andrea Cimarelli, Enrico Stalio)
12:00	12:15	RT7 Hydrogen jet flame control by global mode (Agnieszka Wawrzak, Karol Wawrzak, Andrzej Boguslawski, Artur Tyliczszak, Bernard Geurts)
		Large-eddy simulation of the accelerating flow around square and rectangular cylinders (Alessandro Mariotti, Stefano Brusco, Gianmarco Lunghi, Giuseppe Piccardo, Maria Vittoria Salvetti)
12:15	12:30	RT8 Large-eddy simulation of the stratified swirl flames series using an assumed or hybrid assumed /transported filtered density function approach (Seung-Jin Baik, Eray Inanc, Andreas Kempf)
		Data-driven large-eddy simulation of the flow around a 5:1 rectangular cylinder (Marcello Meldi, Gabriel Moldovan, Alessandro Mariotti, Maria Vittoria Salvetti, Guillaume Lehnasch, Laurent Cordier)
12:30	12:45	RT9 Reduced order combustion modelling with the Flamelet Generated Manifold method for turbulent ammonia/ hydrogen flames (Nithin Mukundakumar, Rob Bastiaans)
		Large-eddy simulation of flow around the 25° Ahmed car body at different Reynolds numbers (Florian Menter, Dmitry Kolmogorov, Alexey Matyushenko, Andreas Hüppe, Andrey Garbaruk)

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12:45	14:30	Lunch Break	
14:30	15:10	Keynote lecture	Andrea Beck - Towards data-driven closure models for implicitly filtered LES Chair: P. Schlatter, Room: Sala Paolino d'Aquileia (main auditorium)
15:20	16:05	Regular talks	<i>Session: Hybrid LES/RANS</i> Chair: P. Cinnella, Room: Sala Paolino d'Aquileia <i>Session: Moving bodies and fluid-structure interactions</i> Chair: M. Manhart, Room: Sala Paolo Diacono
15:20	15:35	RT10	An active hybrid RANS/LES approach for grey area mitigation (Mahitosh Ajaykumar Mehta, Remi Manceau, Vladimir Duffal, Benoît De Laage de Meux) Wind gust-induced flutter of an elastically mounted airfoil: A fluid-structure interaction study based on LES (Khaled Boulbrachene, Michael Breuer)
15:35	15:50	RT11	Seamless interface method for grey-area mitigation in scale-resolving hybrid RANS-LES (Magnus Carlsson, Stefan Wallin, Lars Davidson, Shia-Hui Peng, Sebastian Arvidson) Direct numerical simulation of flow around spanwise-flexible, flapping wings in horizontal tandem configuration (Cayetano Martínez-Muriel, Gonzalo Arranz, Manuel García-Villalba, Oscar Flores)
15:50	16:05	RT12	A hybrid RANS-LES approach for the numerical simulation of compact inline gas-liquid separators (Francesco Maluta, Alessandro Paglianti, Giuseppina Montante) Numerical simulation of self-propelled flexible plates in tandem (Gonzalo Arranz, Manuel García-Villalba, Oscar Flores)
16:05	16:30	Coffee Break	
16:30	17:45	Regular talks	<i>Session: Data assimilation and uncertainty quantification</i> Chair: A. Beck, Room: Sala Paolino d'Aquileia <i>Session: Bubbly flow</i> Chair: J.G.M. Kuerten, Room: Sala Paolo Diacono
16:30	16:45	RT13	Machine learning models for subgrid scale tensors of 2D Rayleigh-Bénard convection (James-Michael Leahy, Paolo Cifani, Michele Buzzicotti, Luca Biferale, Bernard J. Geurts) Volume conservation methods for VOF-based long-term simulations of turbulent bubble-laden flows on coarse grids (Elias Trautner, Josef Hasslberger, Paolo Cifani, Markus Klein)
16:45	17:00	RT14	Machine-assisted subgrid-scale modelling for Large Eddy Simulation-Probability Density Function approaches (Tin Hang Un, Salvador Navarro-Martinez) DNS of dispersed bubbly Taylor-Couette turbulence (Arnout Franken, Sagy Ephrati, Paolo Cifani, Bernard Geurts)
17:00	17:15	RT15	Numerical simulation of left atrium hemodynamics: Uncertainty quantification with respect to inflow conditions (Eduardo Duran, Manuel García-Villalba, Pablo Martínez-Legazpi, Alejandro Gonzalo, Elliot McVeigh, Andrew Kahn, Oscar Flores, Javier Bermejo, Juan Carlos del Álamo) Analysis of turbulent kinetic energy budgets in co-current Taylor bubble flow (Edo Frederix, Sina Tajfirooz, Ed Komen)
17:15	17:30	RT16	Uncertainty Quantification of LES for the buoyancy-driven mixing process between two miscible fluids using Staggered PCE and KLE - Differentially Heated Cavity of aspect ratio 4 (Philipp Wenig, Stephan Kelm, Markus Klein) DNS of mass transfer in bi-dispersed bubbly flows in a vertical pipe (Néstor Vinicio Balcázar Arciniega, Joaquim Rigola, Assensi Oliva)
17:30	17:45	RT17	Data-driven POD-based modeling for high-fidelity coarsening of two-dimensional Rayleigh-Benard turbulence (Sagy Ephrati, Paolo Cifani, James-Michael Leahy, Erwin Luesink, Arnout Franken, Bernard Geurts) Taylor bubble breakup in counter-current turbulent flow using algebraic and geometric Volume of Fluid method (Jan Kren, Edo Frederix, Blaž Mikuž)
19:45	22:00	Pizza Dinner at Pizzeria Concordia	

Thursday, October 27, 2022			
09:00	09:40	Keynote lecture	Vittorio Michelassi - High-fidelity and machine-learning-assisted modeling of turbomachinery for energy transition Chair: M.V. Salvetti, Room: Sala Paolino d'Aquileia (main auditorium)
09:50	10:50	Regular talks	<i>Session: Flow separation 1</i> Chair: S. Hickel, Room: Sala Paolino d'Aquileia
			<i>Session: Industrial and environmental applications 1</i> Chair: V. Michelassi, Room: Sala Paolo Diacono
09:50	10:05	RT1	Data-driven wall shear stress model for Large Eddy Simulations applied to flow separation (Margaux Boxho, Michel Rasquin, Thomas Toulorge, Grégory Dergham, Grégoire Winckelmans, Koen Hillewaert)
			Direct numerical simulations of non-linear transition in the magnetohydrodynamic pipe flow subject to a transverse magnetic field (Bernard Knaepen, Yelyzaveta Velizhanina)
10:05	10:20	RT2	In-situ analysis of backflow events and their relation to separation in turbulent wing flows through well-resolved LES (Fermin Mallor, Jiahui Liu, Marco Atzori, Adam Peplinski, Ricardo Vinuesa, Ramis Örlü, Tino Weinkauff, Philipp Schlatter)
			A priori analysis for LES of a plume in crossflow (Daniel Fenton, Elisabetta De Angelis, Andrea Cimarelli, Jean-Paul Mollicone, Maarten van Reeuwijk)
10:20	10:35	RT3	DNS and POD/DMD analysis of separated flow in a three-dimensional diffuser (Arnau Miro, Benet Eiximeno, Ivette Rodriguez, Oriol Lehmkuhl)
			LES study of the urban boundary layer over a city (Lan Yao, Chun-Ho Liu)
10:35	10:50	RT4	Reynolds-number dependence of separating flow over a bump in spanwise rotating channel flows (Wen Wu, Devika Patel, Benjamin Savino)
			Development and application of an algebraic wall-function for cryogenic supercritical flows from a wall-resolved LES database (Giuseppe Indelicato, Francesco Creta, Pasquale Eduardo Lapenna, Arianna Remiddi)
10:50	11:20	Coffee Break	
11:20	12:50	Regular talks	<i>Session: LES fundamentals and modelling</i> Chair: F. Xavier Trias, Room: Sala Paolino d'Aquileia
			<i>Session: Compressible flow</i> Chair: A. Cimarelli, Room: Sala Paolo Diacono
11:20	11:35	RT5	DNS-based turbulent closures for sediment transport using symbolic regression (Yvonne Stöcker, Christian Golla, Ramandeep Jain, Jochen Fröhlich, Paola Cinnella)
			Coherent turbulent stresses in transonic nozzle with shock-wave/turbulent boundary layer interaction (Nicolas Goffart, Benoît Tartinville, Charles Hirsch, Sergio Pirozzoli)
11:35	11:50	RT6	LES subgrid model assessment for wall-bounded decaying turbulence (Linus Engelmann, Patrick Wollny, Dominik Meller, Irenaeus Wlokas, Andreas Kempf)
			High-Reynolds compressible flows simulation with wall-modelled LES and Immersed Boundary Method (Francesco De Vanna, Francesco Picano, Ernesto Benini)
11:50	12:05	RT7	Coarse-grained modelling via canonical scale separation in 2D incompressible hydrodynamics (Milo Viviani, Paolo Cifani, Bernard Geurts, Klas Modin, Sagy Ephrati)
			Wavelet-based adaptive LES for compressible flows (Giuliano De Stefano, Oleg V. Vasilyev)
12:05	12:20	RT8	Subgrid-scale modelling for a semi-Lagrangian method (Marthe de Crouy-Chanel, Chloé Mimeau, Iraj Mortazavi)
			A wall-model for compressible flows based on a new scaling of the law of the wall (Romain Debroeyer, Michel Rasquin, Thomas Toulorge, Yann Bartosiewicz, Grégoire Winckelmans)
12:20	12:35	RT9	Structural models for particles in LES: Assessment through the sub-filter enstrophy field (Michał Rajek, Jacek Pozorski)
			Scale-resolving simulation of compressible turbulent flows with a Discontinuous Galerkin method (Francesco Bassi, Alessandro Colombo, Francesco Carlo Massa)
12:35	12:50	RT10	Potential of periodic box homogeneous isotropic turbulence as a sub-grid scale model (Githin Tom Zachariah, Harry E.A. Van den Akker)
12:50	14:30	Lunch Break	

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14:30	15:10	Keynote lecture	Adrian Lozano-Duran - Building-block flow model for large-eddy simulation Chair: M. Garcia Villalba, Room: Sala Paolino d'Aquileia (main auditorium)	
15:20	16:20	Regular talks	Session: <i>Turbulent flows 1</i> Chair: A. Busse, Room: Sala Paolino d'Aquileia	Session: <i>Multiphase flows</i> Chair: J. Pozorski, Room: Sala Paolo Diacono
15:20	15:35	RT11	Direct Numerical Simulation of scalar transport across the Interface between a porous medium and turbulent flow (Simon v. Wenczowski, Michael Manhart)	Drag reduction in turbulent wall-bounded flows of realistic polymer solutions (Francesco Serafini, Francesco Battista, Paolo Gualtieri, Carlo Massimo Casciola)
15:35	15:50	RT12	Turbulent Poiseuille flow of two immiscible liquid layers inside a channel (George Giamagas, Francesco Zonta, Alessio Roccon, Alfredo Soldati)	Collision statistics of cloud droplets in homogeneous isotropic turbulence considering lubrication forces and non-continuum molecular effects (Ahmad Ababaei, Antoine Michel, Bogdan Rosa)
15:50	16:05	RT13	Modulation of turbulence flux budgets by varying fluid properties in heated high Prandtl number flow (Christoph Irrenfried, Helfried Steiner)	Influence of mass loading on turbulent collision coalescence of cloud droplets (Antoine Michel, Ahmad Ababaei, Bogdan Rosa)
16:05	16:20	RT14	Turbulence characteristics of helical pipe flows (Valerio Lupi, Ramis Örlü, Philipp Schlatter)	Turbulence modulation by slender flexible fibers in channel flow (Davide Di Giusto, Cristian Marchioli)
16:20	16:50	Coffee Break		
16:50	18:20	Regular talks	Session: <i>Aerodynamics/Aeroacoustics 1</i> Chair: A. Lozano-Duran, Room: Sala Paolino d'Aquil.	Session: <i>Industrial and environmental applications 2</i> Chair: R. Bastiaans, Room: Sala Paolo Diacono
16:50	17:05	RT15	Aeroacoustic source terms from turbulent flow through a 90° pipe bend predicted by Large-Eddy Simulation (Johannes Tieber, Helfried Steiner, Paul Maurerlehner, Stefan Schoder, Manfred Kaltenbacher, Günter Brenn)	Modelling SGS-turbulent transport of fine particles with application to cyclone separator performance (Martin Sommerfeld, Manuel Taborda, Oscar Sgrott)
17:05	17:20	RT16	Transition and acoustic excitation of stenotic pipe flows at different Reynolds numbers (Abouelmagd Abdelsamie, Seong-Ryong Koh, Gabor Janiga, Dominique Thévenin)	Euler-Lagrange LES predictions of a powder disperser including a multiscale wall-impact breakage model (Ali Khalifa, Michael Breuer)
17:20	17:35	RT17	Extended comparison between Lattice-Boltzmann and Navier-Stokes solvers for unsteady aerodynamic and aero-acoustic computations (Alexandre Suss, Ivan Mary, Thomas Le Garrec, Simon Marié)	High-fidelity large-eddy simulation of a pulsed jet actuator (Özgür Yalçın, Xavier Gloerfelt, Georges Saliba, Ahmad Batikh, Lucien Baldas)
17:35	17:50	RT18	Advanced LES modeling of multiperforated plates for aeronautical engines (Thibault Duranton, Laurent Gicquel, Franck Nicoud, Antoine Dauptain)	Large eddy simulation of a low pressure turbine cascade with turbulent end-wall boundary layers (Christian Morsbach, Michael Bergmann, Adem Tosun, Edmund Kügeler, Matthias Franke)
17:50	18:05	RT19	Turbulent boundary layer in a 3-element high-lift wing: coherent structures identification (Ricard Montalà, Ivette Rodríguez, Oriol Lehmkuhl, Benet Eiximeno, Arnau Miró)	Spectral element based direct numerical simulation of a Flettner rotor (Martin Karp, Daniele Massaro, Niclas Jansson, Stefano Markidis, Philipp Schlatter)
18:05	18:20	RT20	Transition prediction on a wind turbine blade at $Re = 10^6$ under varying inflow turbulence based on wall-resolved LES (Michael Breuer, Brandon Arthur Lobo, Alois Peter Schaffarczyk)	LES of the transitional flow inside a cylindrical rotor cavity supplied by a turbulent pipe flow (Thomas Hultsch, Jörg Stiller, Frank Rüdiger, Jochen Fröhlich)
20:00	22:30	Social Dinner		

Friday, October 28, 2022			
09:00	09:40	Keynote lecture	Irene Vignon-Clementel - Blood flow simulations for disease and surgical treatment understanding Chair: J. Frohlich, Room: Sala Paolino d'Aquileia (main auditorium)
09:50	10:50	Regular talks	<i>Session: Numerical techniques</i> Chair: B. Knaepen, Room: Sala Paolino d'Aquileia
			<i>Session: Environmental and geophysical flows</i> Chair: I. Vignon-Clementel, Room: Sala P. Diacono
09:50	10:05	RT1	Towards a numerical proof of turbulence closure (Giulio Ortali, Federico Toschi, Alessandro Corbetta, Gianluigi Rozza)
			Direct and large-eddy simulation of turbulent oscillatory flow through a hexagonal sphere pack (Lukas Unglehrt, Michael Manhart)
10:05	10:20	RT2	On a conservative solution to checkerboarding: examining the discrete Laplacian kernel using mesh connectivity (Johannes Arend Hopman, Francesc Xavier Trias, Joaquim Rigola)
			Structure-preserving integration for high-performance DNS of geophysical flows (Paolo Cifani, Milo Viviani, Klas Modin, Bernard Geurts)
10:20	10:35	RT3	An energy-preserving unconditionally stable fractional step method for DNS/LES on collocated unstructured grids (Daniel Santos, Francesc Xavier Trias, Guillem Colomer, Assensi Oliva)
			New insights on buoyancy-driven turbulent flows with active scalar transport using LES (Kiran Bhaganagar)
10:35	10:50	RT4	Feature-based mesh adaptation applied to the Large-Eddy simulation of a high-Reynolds number anisothermal impinging jet on a flat surface (Adrien Grenouilloux, Vincent Moureau, Ghislain Lartigue, Pierre Benard, Paul Ferrey)
			Water-lubricated turbulent channel flow (Alessio Roccon, Francesco Zonta, Alfredo Soldati)
10:50	11:10	Coffee Break	
11:10	12:40	Regular talks	<i>Session: Aerodynamics/Aeroacoustics 2</i> Chair: D. Thévenin, Room: Sala Paolino d'Aquileia
			<i>Session: Roughness</i> Chair: M. Sommerfeld, Room: Sala Paolo Diacono
11:10	11:25	RT5	Analysis of a transonic cascade with wall-modeled LES based on DGSEM (Bjoern Klose, Edwin J. Munoz Lopez, Alex Hergt, Joachim Klinner, Christian Morsbach)
			Direct numerical simulations of turbulence over two-dimensional permeable ribs (Yusuke Kuwata, Kazuhiko Suga)
11:25	11:40	RT6	Numerical investigation of the transonic non-ideal gas flow around a circular cylinder at high Reynolds number (Camille Matar, Paola Cinnella, Xavier Gloerfelt, Stephan Sundermeier, Leander Hake, Stefan aus der Wiesche)
			Lattice-Boltzmann DNS of turbulent Taylor-Couette flows with a stationary grooved outer cylinder (Kazuhiko Suga, Yoshihisa Okada, Yusuke Kuwata, Masayuki Kaneda)
11:40	11:55	RT7	Leading-edge effects in free-stream turbulence induced transition in a dense gas flow (Aurelien Biennier, Xavier Gloerfelt, Paola Cinnella)
			Influence of ridge aspect ratio and spacing on secondary currents in turbulent channel flow over triangular ridges (Oleksandr Zhdanov, Angela Busse)
11:55	12:10	RT8	Implicit large eddy simulation of a near post-stall NACA0012 aerofoil (Mohsen Lahooti, Guglielmo Vivarelli, Francesco Montomoli, Spencer Sherwin)
			Reynolds number-dependency of turbulent flow over a surface fouled by barnacles (Angela Busse, Sotirios Sarakinos)
12:10	12:25	RT9	The effect of wing-tip vortices on the flow around a NACA0012 wing (Siavash Toosi, Adam Peplinski, Philipp Schlatter, Ricardo Vinuesa)
			Wall-Modelled Large-Eddy Simulations of flows with non-uniform roughness (Teresa Salomone, Ugo Piomelli, Giuliano De Stefano)
12:25	12:40	RT10	Laminar-turbulent transition in supercritical forward-facing steps in crossflow (Jordi Casacuberta, Stefan Hickel, Marios Kotsonis)
			Effect of roughness on elongated particles in turbulent channel flow (Mauro De Marchis, Domenico Saccone, Cristian Marchioli)
12:40	14:00	Lunch Break	
14:00	14:40	Keynote lecture	Francesco Picano - Simulation and modeling of turbulent dilute sprays with application to respiratory flows Chair: F. Zonta, Room: Sala Paolino d'Aquileia (main auditorium)
14:50	15:50	Regular talks	<i>Session: Particle-laden flows</i> Chair: F. Picano, Room: Sala Paolino d'Aquileia
			<i>Session: Turbulent flows 2</i> Chair: M. Meldi, Room: Sala Paolo Diacono

DLES 13

13th ERCOFTAC Workshop on Direct and Large Eddy Simulation

Udine, October 26-28, 2022

14:50	15:05	RT11	Turbulent transport in a lateral square cavity based on Lagrangian and Eulerian approaches (Magdalena Barros, Cristián Escauriaza)	Multi-scale phenomena in turbulent flows with walls and interfaces (Andrea Cimarelli, Gabriele Boga, Anna Pavan, Enrico Stalio)
15:05	15:20	RT12	Direct Numerical Simulation of the breakup of solid fibers in homogeneous isotropic turbulence (Federico Dalla Barba, Francesco Picano)	Assessment of the effect of the surface tension contribution on the emulsification in linearly forced turbulence (Alexander Begemann, Theresa Trummler, Elias Trautner, Josef Hasslberger, Markus Klein)
15:20	15:35	RT13	Elongated non-spherical particles in turbulent channel flow using Euler/Lagrange approach (Manuel Alejandro Taborda, Martin Sommerfeld)	A Bayesian hierarchical multifidelity model for turbulent flows (Saleh Rezaeiravesh, Timofey Mukha, Philipp Schlatter)
15:35	15:50	RT14	DNS of magnetic density separation in the wake of a honeycomb (Leon Thijs, Hans Kuerten, Jos Zeegers, Sina Tajfirooz)	The structure-based turbulent resolution approach: Evolution and applicability (Emilio Baglietto)
15:50	16:20	Coffee Break		
16:20	17:20	<i>Regular talks</i>	<i>Session: Flow separation 2</i> <i>Chair: G. Winckelmans, Room: Sala Paolino d'Aquil.</i>	<i>Session: Wall modelling</i> <i>Chair: E. Lamballais, Room: Sala Paolo Diacono</i>
16:20	16:35	RT15	Unsteady separation in a turbulent boundary layer (Francesco Ambrogi, Ugo Piomelli, David E. Rival)	Wall-modeling of turbulent flows over a periodic hill using multi-agent reinforcement learning (Di Zhou, H. Jane Bae)
16:35	16:50	RT16	Simulation of massively separated flows using hybrid turbulence models and mesh adaptation (Florian Miralles, Bastien Sauvage, Stephen Wornom, Frederic Alauzet, Bruno Koobus, Alain Dervieux)	Development of wall-modelling capabilities for LES in Nek5000 (Timofey Mukha, Geert Brethouwer, Philipp Schlatter)
16:50	17:05	RT17	Assessment of a Discontinuous Galerkin solver for the efficient simulation of turbulent separated flows (Francesco Bassi, Alessandro Colombo, Antonio Ghidoni, Francesco Carlo Massa, Gianmaria Noventa)	Visualization of wall-modeled turbulent channel flow using spectral proper orthogonal decomposition (Hadi Hosseinzade, Donald J. Bergstrom)
17:05	17:20	RT18	CFD simulation of a thick airfoil profile in stalled conditions adopting scale-resolving numerical methods (Stefano Passoni, Riccardo Mereu, Fabio Inzoli)	
17:20	17:30	Closure		