iTi Workshop on
Structure and control of wall-bounded turbulent flows

July 27, 2025 | Bertinoro, Italy

Time	Sunday (27th of July)
08.30	Registration and Introductory remarks
	Session 1 – Chair: Marios Kotsonis
9:00	*Smooth surface modifications for passive laminar flow control: recent results and future steps.* **M. Kotsonis**
10:00	*Direct numerical simulation of streamwise traveling wave induced turbulent pipe flow relaminarization.* **C. Bauer**, C. Wagner
10:20	*Towards optimal plasma actuator arrays for friction drag reduction.* **E. Fracchia**, L. Antal, G. Cafiero, D. Gatti and J. Serpieri
10:40	*Reducing the rough wall pressure drag via imposition of spanwise wall oscillations.* **R. Deshpande**, A. G. Kidanemariam, I. Marusic
11:00	*On the optimal parameters of spanwise forcing for turbulent drag reduction.* **F. Gattere**, A. Chiarini, M. Castelletti, M. Quadrio
	Coffee break (11:20 -11:50)

	Sunday (27th of July)
	Session 2 – Chair: Clara Marika Velte
11:50	*Real-time particle image velocimetry using event-based imaging*. **C. Willert**, L. Franceschelli
12:10	*Design and characterization of the transient response of oscillating plasma actuators for turbulent skin-friction control.* **L. Magnani**, G. Neretti, J. Serpieri, A. Popoli, A. Cristofolini, A. Talamelli, G. Bellani
12:30	*Turbulent drag reduction using metamaterial surfaces*. **N. Fu,** J. Morrison, M. Santer
12:50	*Wall-bounded turbulence manipulation using miniature Helmholtz resonators*. **A. H. Hassanein**, D. Modesti, W. J. Baars
	Lunch (13:10 – 14:30)
	Session 3 – Chair: Peter Schmid
14:30	*Data-driven flow control.* **P. Schmid**
15:30	*From robotics to fluid dynamics: opportunities and pitfalls of Reinforcement Learning in flow control.* **O. Semeraro**, L. Mathelin
15:50	*Gradient-enriched machine learning control of wingtip vortices via online S-PIV and synthetic jets*. **G. Salomone**, A. Scala, G. Paolillo, T. Astarita, G. Cardone, C.S. Greco
16:10	*Towards a bio-inspired flow estimation in wall-bounded turbulence*. **A. Ianiro**
16.30	*Deep reinforcement learning for turbulent control: drag reduction and heat transfer management.* Z. Zhou, **X. Zhu**
	Coffee break (16:50-17:20)

time	Sunday (27th of July)
	Session 4 – Chair: Woutjin Baars
17:20	*Intra-phase recovery in a turbulent boundary layer subjected to spatial square-wave spanwise forcing.* **M. Knoop,** R. Deshpande, B. van Oudheusden
17:40	*Boundary layer development derived from Galilean symmetry.* **C. M. Velte,** P. Buchhave
18:00	*Reconstructed modal velocity fields in wall turbulence*. **M. Guala,** R. Ehsani, A. Ghosh, M. Heisel, I. Jacobi
18:20	*On the manipulation of coherent structures in turbulent flows using Fourier-based wall modifications.* **Y. Dincoglu**, S. Verma, A. Hemmati
18:40	**Concluding remarks and final discussion: Chair G. Bellani and G. Cafiero**

iTi Conference on Turbulence XI

July 28 - 30, 2025 | Bertinoro, Italy

time	Sunday (27th of July)
19:00	Welcome buffet - Registration

Time	Monday (28th of July)
08.30	Registration and Introductory remarks
	Session 1 – Roughness I – Chair: Elias Balaras (TBC)
9:00	*Urban Aerodynamics and Turbulent Dispersion.* **C. Vanderweel**
9:30	*Turbulent Boundary Layers over Multiscale Urban Arrays*. **C. Southgate-Ash,** S. Grimmond, A. Robins, M. Placidi
9:50	*Wavelength impact on floating offshore wind farms.* Z. Sadek, O. Ferčák, M. Ayala, D. Gayme, C. Meneveau, **R. B. Cal**
10:10	*The influence of wall-normal oscillating roughness on a turbulent boundary-layer*. **A. Ramani,** T. P. Illukkumbura, B. Ganapathisubramani, J. P. Monty, N. Hutchins
10:30	*Influence of oncoming boundary layer on flow over a protruding forward-facing step*. **R. J. Martinuzzi,** E. Larose
	Coffee break (10:50 -11:20)

Time	Monday (28th of July)
	Session 2 – Turbulence Theory I – Chair: Martin Oberlack
11:20	*Wavenumber-to-wavenumber energy exchange by triadic Fourier-mode interactions in wall turbulence*. **T. Kawata,** T. Tsukahara
11:40	*On velocity spectra in turbulent wall-bounded flows.* **S. Pirozzoli**
12:00	*The Reynolds shear stress phase distribution and its relationship to spectral energy density in wall bounded flows*. **S. Zimmerman,** J. Philip, J. Klewicki
12:20	*Homogeneous shear turbulence: kinetic energy growth rate as a nonlinear eigenvalue problem*. **J. Albert,** T. Gebler, M. Oberlack
12.40	*Two-point enstrophy budget and energy cascade in turbulence*. **A. Cimarelli,** C.B. da Silva, G. Boga
	Lunch (13:00 – 14:00)
	Session 3 – Wall Turbulence I – Chair: Ramis Örlü
14:00	*Turbulent drag reduction by streamwise traveling waves of wall deformation.* **K. Fukagata**
14:30	*Restricted Nonlinear Investigation of Developing Boundary Layers over Accelerating Walls.* **A. Risha,** B. A. Minnick, D. F. Gayme
14:50	*Towards a composite mean velocity profile for adverse pressure gradient turbulent boundary layers*. **A. Zarei,** M. Lozier, R. Deshpande, I. Marusic
15:10	*Constructing wall turbulence using attached hairpin vortices*. Y. Ge, W. Shen, Z. Han, **Y. Zhao,** Y. Yang
15.30	*High Spatial Resolution PIV Study of Self-Similar Adverse Pressure Gradient Turbulent Boundary Layer on the Verge of Separation.* **Z. Chen,** B. Sun, A. Heidarian, C. Atkinson, J. Soria
15:50 – 16:50	**Coffee break and Poster presentation (session 1)**

time	Monday (28th of July)
	Session 4 – Roughness II – Chair: Christina Vanderweel (TBC)
16:50	*Characterisation of rough-wall drag in compressible turbulent boundary layers.* **D. D. Wangsawijaya,** R. Baidya, S. Scharnowski, B. Ganapathisubramani, C. J. Kähler
17:10	*Relaxation of staggered roughness generated turbulence in a low Re number channel flow*. **S. Tardu,** B. Arrondeau
17:30	*A rough recovery*. **M. Formichetti,** A. Kwong, S. Symon, B. Ganapathisubramani
17:50	*Influence of windward and effective slope on the structure of turbulent channel flow over ratchet-type roughness.* **O. Zhdanov,** A. Busse
18:10	*DNS of turbulent boundary layers over dense soft filaments*. N. Beratlis, A. Camminatiello, K. Squires, **E. Balaras**
18:30	**Possible Visit to CICLoPE**

time	Tuesday (29th of July)
	Session 5 – Turbulence Theory II – Chair: Martin Oberlack
8:30	*Breakup of small aggregates in turbulent flows.* **A. Lanotte**
9:00	*A Universal Relation Between Intermittency and Dissipation in Turbulence.* **F. Schmitt,** J. Peinke, M. Obligado
9:20	*Spontaneous generation of helicity in anisotropic turbulence near the two-dimensional limit.* **S. Sukoriansky,** E. Barami
9:40	*Near and far field development of the turbulent round jet derived from Galilean symmetry*. P. Buchhave, **C. M. Velte**
10:00	*Amplitude Modulation in Restricted Nonlinear Turbulence.* **B. Viggiano,** B. Minnick, D. F. Gayme
	Coffee break (10:20 -10:50)
	Session 6 – Wake Turbulence – Chair: Bettina Frohnapfel (TBC)
10:50	*Turbulent/turbulent entrainment in a planar wake*. **O. R. H. Buxton,** J. Chen
11:10	*Coherent structures in the turbulent near-wake of a flapping wing*. **Y. Goodwin,** G. Rigas, J. F. Morrison
11:30	*Turbulent wake resonance via oscillation of a solid plate.* **G. Xiangyu,** K. Steiros
11:50	*A CFD Flow Control Study Using Plasma Actuation on the Leading Edge of a Bluff Body*. **G. Minelli,** R. Magal, G. Bellani
	Lunch (12:10-13:10)

	Session 7 – Turbulence theory III – Chair: Michael Wilczek
13:10	**Invited talk**: **J. Peinke**
13:40	*Entrainment and small-scale features in merging turbulent regions*. **F. A. Branco,** C. B. da Silva
14.00	*Multiscale circulation in wall-parallel planes of turbulent channel flows.* **P.-Y. Duan,** X. Chen, K. R. Sreenivasan
14:20	*Noise-expansion cascade – a fundamental property of turbulence*. **S. Liao,** S. Qin
14:40	*Extending Kolmogorov Theory to Polymeric Turbulence*. **A. Chiarini,** R. K. Singh, M. E. Rosti
15:00 – 16:00	**Coffee break and Poster presentation (session 2)**
	Session 8 – Simulation Techniques – Chair: Martin Obligado (TBC)
16:00	*Resolvent-Based Models for Wall-Modelled Large-Eddy Simulations*. Z. Hantsis, M. Chan, N. Hoang, B. J. McKeon, **U. Piomelli**
16:20	*Investigation of the physical role of backward scatter in minimal channel flow*. **K. Inagaki**
16:40	*Efficient Compressible Turbulent Flow Simulations: Entropy Projection and Correction for an ILES in a Discontinuous Galerkin solver*. A. Crivellini, L. Alberti, **E. Carnevali,** A. Colombo
17:00	*Merging Filtering, Modeling and Discretization to Simulate Large Eddies in Burgers' Turbulence*. **R. Verstappen**
17:50	**Conference dinner: Bagno Holiday, Milano Marittima (BUS)**

time	Wednesday (30th of July)
	Session 9 – Convection & Rotating flows – Chair: Sergio Pirozzoli (TBC)
8:30	Tornado-like vortices in turbulent thermal convection. **S. Horn**
9:00	*Very low Ekman number turbulent rotating convection.* **E. Knobloch,** A. van Kan, B. Miquel, K. Julien, G. Vasil
9:20	*On the flow statistics and dynamics of axial rotating turbulent pipe flows: A DNS study*. **L. Yang,** J. Yao
9:40	*Validation of helicity turbulence model and its application to stellar convection.* **N. Yokoi**
10:00	*Direct Numerical simulations of Taylor-Couette flows with extreme small radius inner rotating cylinders*. **P. Orlandi,** S. Pirozzoli
	Coffee break (10:20-10:50)
	Session 10 – Complex flows – Chair: Hassan Nagib (TBC)
10:50	*Heat transfer fluctuations measurements with a heated thin foil.* **A. Cuéllar,** E. Amico, J. Serpieri, G. Cafiero, W. J. Baars, S. Discetti, A. Ianiro
11:10	*Momentum and heat transfer in turbulent channels with drag-increasing riblets*. S. Cipelli, N. Rapp, B. Frohnapfel, **D. Gatti**
11:30	*Energetic aspects of the Reynolds analogy in rough-wall turbulent forced convection*. F. Secchi, D. Gatti, U. Piomelli, **B. Frohnapfel**
11:50	*Richtmyer-Meshkov induced turbulent mixing in a shock tube*. **J. Griffond,** O. Soulard, Y. Bury, S. Jamme
12:10	*Learning to Backtrace Turbulent Scalar Fields.* **M. Carbone,** L. Piro, R. Heinonen, L. Biferale, M. Cencini
	Lunch (12:30-13:30)

	Session 11 – Wall turbulence – Chair: Alessandro Talamelli
13:30	*Identity variation of turbulent spots in pipe flow associated with multigenerational splits, reconnect and re-splits*. **X. Wu,** P. Moin, R. J. Adrian
13:50	*Experimental and numerical investigations of laminarization via preconditioning in turbulent pipe flows*. **S. Nozarian,** M. J. Rincón, P. Forooghi, M. Reclari, M. Abkar
14:10	*High Reynolds number trends of centerline mean velocity and normal stress in pipe flow*. **H. Nagib,** L. Lazzarini, G. Bellani, A. Talamelli
14.30	*On the inertial sublayer of the mean velocity profile in turbulent wall-flows*. **J. Klewicki,** J. Philip
14:50	*High-order moment scaling of near-wall turbulence for arbitrary velocities: Extending the symmetry approach.* **M. Oberlack,** S. Hoyas, S. Görtz
15:10	Closing remarks

Posters

Generalized Scaling of Wall-Bounded Turbulent Flow Structure. T.-W. Lee, J. E. Park

Structures and cascades for each wall-normal mode in wall-less models of wall-bounded turbulent flows. M. Takaoka

Angular momentum transport scaling in Very wide gap turbulent Taylor-Couette flow ($\eta = 0.1$). M.H. Hamede, S. Merbold, C. Egbers

Connecting the Kramers-Moyal coefficients of turbulent flows with the turbulence dissipation constant C_ε. F. Köhne, F. Schmitt, J. Peinke

Correlating large-scale turbulent structures and wind turbine loads within LES Simulations. M. Bock, D. Moreno, J. Peinke

Spatio-temporal linear stability of plane Couette flow. K. Wilhelm, M. Oberlack, S. Görtz, J. Conrad, L. De Broeck, Y. Wang

On the impact of tip speed ratio and free-stream turbulence on blade dynamics of a wind turbine. F. J. G. de Oliveira, Z.S. Khodaei, O. R. H. Buxton

Effects of pressure gradient sequences on wall shear stress in turbulent boundary layers at Re_τ = 1500. M. Mattei, T. Saxton-Fox

Coherent structures and pressure fluctuations in axisymmetric turbulent boundary layer. C. Xu, Y. Xu, W. Huang.

Experimental Investigation of Turbulent Thermal Diffusion in Inhomogeneous and Anisotropic Turbulence. E. Elmakies, O. Shildkrot, N. Kleeorin, A. Levy, I. Rogachevskii

A Lie-symmetry-based approach for the self-similar profiles of velocity moments in the turbulent round jet. N. Benedikt, M. Oberlack, C. T. Nguyen

Experimental investigation of wind turbine wakes exposed to freestream turbulence. M. Bourhis, T. Messmer, M. Hölling, O. R. H. Buxton

A new definition for the turbulent boundary layer thickness based on streamwise velocity skewness. M. Lozier, R. Deshpande, A. Zarei, L. Lindić, W. A. Rowin, I. Marusic

Space-time wall-pressure–velocity correlations spanning across a turbulent boundary layer and large streamwise offsets. R. Deshpande, A. Hassanein, W. J. Baars

Influence of Adverse Pressure Gradients on the Outer Region of High Reynolds Number Wall Turbulence. L. Lindić, R. Deshpande, W. A. Rowin, I. Marusic

The fractal atmospheric turbulent-non-turbulent interface: characterization and experimental reproduction. M. Wächter, L. Neuhaus, M. Hölling, K. Avila, J. Peinke

Drag reduction of a turbulent boundary layer by imposing a square-wave type spatial spanwise forcing. M. W. Knoop, R. Deshpande, B. W. van Oudheusden

Non-uniform heating effects in turbulent pipe flows. J. Neuhauser, D. Gatti, B. Frohnapfel

Balancing of MHD turbulence imbalance in strong shear flows. M. Kavtaradze, G. Mamatsashvili, G. Chagelishvili

Scalings for transition of the boundary layer on a rotating slender cone in axial flow. K. Kato, K. Yamada, K. Takahara, P. H. Alfredsson, M. Matsubara

Direct Numerical Simulations of turbulent channel flow roughened with 2D triangular bars: on the Effective Distribution parametrization. F. Bruno, S. Leonardi, M. De Marchis

Anisotropic turbulence in transition phenomena of Taylor–Couette–Poiseuille flow. Y. Matsukawa, R. Araki, T. Tsukahara

Turbulent channel flow manipulations by sinusoidal riblets – a numerical study. E. Amico, A. Busse, F. A. Portela, G. Cafiero

Geometric and Statistical Characterization of the Turbulent/Non-Turbulent Interface in a Turbulent Bounday Layer Flow Identified Using Uniform Momentum Zone Concepts. B. Sun, C. Atkinston and J. Soria

Structure of the momentum and temperature fields in a turbulent boundary layer perturbed by an effusion film. D. Burnett, J. F. Morrison

Direct Numerical Investigation of Flow Dynamics in Karst Conduits. I. El Mellas, J. Hidalgo, M. Dentz

The effect of porosity on the drag of a sphere. N. Conlin, K. Steiros, M. Hultmark

Influence of wall temperature on separation-induced transition in boundary layers of real gas flows. D. Bulgarini, M. Dellacasagrande, A. Ghidoni, E. Mantecca, G. Noventa

Oscillating grid turbulence: the influence of Reynolds number and forcing. M. Iovieno, H. Foysi, G. Khujadze

Multi-point probability density hierarchy for homogeneous isotropic turbulence. S. Görtz, J. Conrad, N. Benedikt, M. Oberlack.

Convective organization and their influence on wind stress in a Large-Eddy Simulation ensemble. E. Foschi, L. Nuijens, P. Lopez-Dekker

Image Processing Analysis of Large-Scale Structures in Two-Dimensional Turbulent Channel Flow. R. Takai, K. Takahara, K. Sato, S. Yimprasert, K. Kato, M. Matsubara

Physical significance of artificial numerical noise of DNS for turbulence. S. Liao, S. Qin

The Stability of The Frozen Top Bubble Model: Two-Dimensional Rayleigh-Bénard Convection on the Spherical Surface. X. He, P. Fischer, K. Kadhra, Y. Xiong

Active heat-transfer control by pulsed jet in a turbulent pipe flow at high Reynolds numbers. L. Magnani, S. Discetti, A. Ianiro, G. L. Morini, A. Talamelli, M. Rossi, G. Bellani

Scaling and Filtering of Sparse Wall-Pressure Measurements at the CICLoPE Long Pipe. L. Lazzarini, G. Dacome, W. J. Baars, G. Bellani, A. Talamelli

An experimental platform to investigate the propagation of turbulent fluctuations in a lung model. A. Ravaioli, G. Santi, B. Bortolani, E. Marcelli, A. Benassi, G. Bellani

Representation of turbulent structures in stable atmospheric boundary-layer regimes using large eddy simulations. L. Bührend, A. Englberger

Differential lag equations to predict the effects of pressure gradient histories on turbulent boundary-layers. M. Virgilio, T. Preskett, P. Jaiswal, B. Ganapathisubramani