

TSFP12 Program Overview (Final version, July 18)

Notes

- All time is in Japan Standard Time (JST = UTC+9).
- Keynote lectures are given real-time online (no pre-recorded video is provided). General presentations are made with pre-recorded videos (10-12 minutes).
- In each presentation slot, the video is played real-time (operated by the student staff), followed by a live discussion. Therefore, the presenters are advised to be present online at their session as much as possible.
- The pre-recorded videos are made available for on-demand view during the conference.
- **The links to the papers, the Zoom rooms, and the view-only folders containing the pre-recorded videos is available on the program that can be downloaded via [Registrant zone of the NTA website](#).**

Tuesday, July 19, 2022

Time / Room	In some other timezones	Room 1	Room 2	Room 3	Room 4
7:55- 8:00	0:55 CEST Mon, July 18, 15:55 PDT	Opening Ceremony (Room 1) Hyung Jin Sung (KAIST) and Kazuhiko Suga (Osaka Metropolitan Univ.)			
8:00-8:50	1:00 CEST Mon, July 18, 16:00 PDT	Kasagi Award Lecture (Room 1) / Chair: Beverley J. McKeon (Caltech) Dennice Gayme (Johns Hopkins University, USA), A Coherent Structure Based Approach to Modeling Wall-bounded Turbulence			
9:00-10:30	2:00 CEST Mon, July 18, 17:00 PDT	Boundary Layers 1	Heat and Mass Transfer 1	Instability and Transition 1	Separation 1
10:45-12:15	3:45 CEST Mon, July 18, 18:45 PDT	Boundary Layers 2	Heat and Mass Transfer 2	Instability and Transition 2	Separation 2
12:15-14:00		Break			
14:00-15:30	7:00 CEST Mon, July 18, 22:00 PDT	Boundary Layers 3	Heat and Mass Transfer 3	Instability and Transition 3	Fundamentals 1
15:40-16:20	8:40 CEST Mon, July 18, 23:40 PDT	Invited Lecture 1 (Room 1) / Chair: Martin Oberlack (TU Darmstadt) Michael Wilczek (University of Bayreuth, Germany), Statistics and Geometry of Lagrangian Turbulence			
16:30-18:00	9:30 CEST Tue, July 19, 0:30 PDT	Boundary Layers 4	Bio-flows	Instability and Transition 4	Complex Flows

Wednesday, July 20, 2022

Time / Room	In some other timezones	Room 1	Room 2	Room 3	Room 4
8:40-9:20	1:40 CEST Tue, July 19, 16:40 PDT	Invited Lecture 2 (Room 1) / Chair: Kazuhiko Suga (Osaka Metropolitan Univ.) Makoto Tsubokura (Kobe University, Japan), Turbulence Simulation on Massively Parallel Environments toward Next-Generation Computer-Aided Engineering			
9:30-11:00	2:30 CEST Tue, July 19, 17:30 PDT	Boundary Layers 5	Magnetic and Reacting Flows	Measurement Techniques	Applications 1
11:15-12:45	4:15 CEST Tue, July 19, 19:15 PDT	Boundary Layers 6	Flow Control 1		Applications 2
12:45-14:00		Break			
14:00-15:30	7:00 CEST Tue, July 19, 22:00 PDT	Boundary Layers 7	Flow Control 2	Acoustics and Fluid-Structure Interactions 1	Applications 3
15:45-17:30	8:45 CEST Tue, July 19, 23:45 PDT	Multiphase Flows	Flow Control 3	Acoustics and Fluid-Structure Interactions 2	Wakes 1

Thursday, July 21, 2022

Time / Room	In some other timezones	Room 1	Room 2	Room 3	Room 4
8:00-8:40	1:00 CEST Wed, July 20, 16:00 PDT	Invited Lecture 3 (Room 1) / Chair: Stavros Tavoularis (Univ. Ottawa) Pino Martin (University of Maryland, USA), Reduced Order Model for Low-frequency Dynamics Inshock Separated Flow			
8:40-9:20	1:40 CEST Wed, July 20, 16:40 PDT	Invited Lecture 4 (Room 1) / Chair: Hyung Jin Sung (KAIST) Tamer Zaki (Johns Hopkins University, USA), Observation-Infused Simulations of Turbulence			
9:30-11:00	2:30 CEST Wed, July 20, 17:30 PDT	Closure 1	Flow Control 4	Compressible Flows 1	Wakes 2
11:15-12:45	4:15 CEST Wed, July 20, 19:15 PDT	Closure 2	Machine Learning 1	Compressible Flows 2	Environmental Flows 1
12:45-14:00		Break			
14:00-15:30	7:00 CEST Wed, July 20, 22:00 PDT	Rough Boundary Layers 1	Machine Learning 2	Compressible Flows 3	Environmental Flows 2
15:45-17:30	8:45 CEST Wed, July 20, 23:45 PDT	Rough Boundary Layers 2	Machine Learning 3	Jets 1	Environmental Flows 3

Friday, July 22, 2022

Time / Room	In some other timezones	Room 1	Room 2	Room 3	Room 4
8:00-8:40	1:00 CEST Thu, July 21, 16:00 PDT	Invited Lecture 5 (Room 1) / Chair: Arne V. Johansson (KTH) Bharath Ganapathisubramani (University of Southampton, UK), Turbulent Flows over Heterogeneous Rough Surfaces			
8:50-10:35	1:50 CEST Thu, July 21, 16:50 PDT	Rough Boundary Layers 3	Machine Learning 4	Jets 2	Fundamentals 2
10:40-10:45	3:40 CEST Thu, July 21, 18:40 PDT	Closing and Announcement on TSFP13 (Room 1) Kazuhiko Suga (Osaka Metropolitan Univ.), Hyung Jin Sung (KAIST), and Laurent Mydlarski (McGill Univ.)			

TSFP12 Detailed Program (Final version, July 18)

The links to the papers, the Zoom rooms, and the view-only folders containing the pre-recorded videos is available on the program that can be downloaded via [Registrant zone of the NTA website](#).

[Opening and Kasagi Award Lecture] Tuesday, July 19, 7:55-8:50 JST / 0:55-1:50 Central European Summer Time (CEST) / Mon, July 18, 15:55-16:50 Pacific Daylight Time (PDT)

7:55-8:00	Opening Ceremony (Room 1) / Hyung Jin Sung (KAIST) and Kazuhiko Suga (Osaka Metropolitan Univ.)
8:00-8:50	Kasagi Award Lecture (Room 1) / Chair: Beverley J. McKeon (Caltech) Dennice Gayme (Johns Hopkins University, USA), A Coherent Structure Based Approach to Modeling Wall-bounded Turbulence

[Parallel Session 1] Tuesday, July 19, 9:00-10:30 JST / 2:00-3:30 Central European Summer Time (CEST) / Mon, July 18, 17:00-18:30 Pacific Daylight Time (PDT)

Time / Room	Room 1 Boundary Layers 1 Chair: Yulia T. Peet (Arizona State Univ.)	Room 2 Heat and Mass Transfer 1 Chair: Yasuo Hattori (CRIEPI)	Room 3 Instability and Transition 1 Chair: Takahiro Tsukahara (Tokyo Univ. Science)	Room 4 Separation 1 Chair: Chair: Rozie Zangeneh (Lawrence-Technological Univ.) → Yusuke Kuwata (Osaka Metropolitan Univ.)
9:00 2:00 CEST Mon, July 18, 17:00 PDT	263. Universality of probability density function in high Reynolds-number turbulent boundary layer Yoshiyuki Tsuji, Nagoya University Atsushi Ido Railway Technical Research Institute wind tunnel center Michio Nishioka, Osaka Prefecture University	342. Probabilities of high-concentration events in scalar point-source plume in a turbulent boundary layer Miaoyan Pang, The University of Sydney; Kapil Chauhan, The University of Sydney	371. On the new unstable mode in the boundary layer flow of supercritical fluids Benjamin Bugeat, Delft University of Technology; Pietro Carlo Boldini, Delft University of Technology; Rene Pecnik, Delft University of Technology	240. The relation between wall pressure and velocity fluctuations in a turbulent separation bubble Sen Wang, University of Alberta; Bradley Gibeau, University of Alberta; Sina Ghaemi, University of Alberta
9:15	470. Wall turbulence at high friction Reynolds numbers Sergio Hoyas, Universitat Politècnica de València; Martin Oberlack, TU Darmstadt	468. Life cycle of turbulent kinetic energy in Rayleigh-Benard convection at moderate Ra Myoungkyu Lee, University of Alabama	343. Ultra-fine roughness effect on transition delay using direct numerical simulation Shingo Hamada, Tohoku University; Aiko Yakeno, Tohoku University; Shigeru Obayashi, Tohoku University	260. Direct numerical simulation of turbulent flow around 3D stepped cylinder with adaptive mesh refinement Daniele Massaro, KTH Royal Institute of Technology (KTH); Adam Peplinski, KTH; Philipp Schlatter, KTH
9:30	64. Statistical characteristics of three-component turbulence intensities for high Reynolds number pipe flow using LDV Marie Ono, National Metrology Institute of Advanced Industrial Science and Technology; Noriyuki Furuichi, National Metrology Institute of Advanced Industrial Science and Technology; Yoshiyuki Tsuji, Nagoya University	125. Effects of initial conditions on mixing in wall-bounded turbulent flow Milind Singh, McGill University; Emmanuel Germaine, McGill University; Laurent Mydlarski, McGill University; Luca Cortelezzi, Politecnico di Milano	72. Stability analysis in boundary layer behind a roughness with free-stream turbulence Tristan M. Römer, University of Stuttgart; Ulrich Rist, University of Stuttgart	185. Time-resolved PIV investigation of gap ratio effects on turbulent flow past a square cylinder with rough upstream wall Heath Chalmers, University of Manitoba; Xingjun Fang, University of Manitoba; Mark F. Tachie, University of Manitoba
9:45	451. Invariant moment and PDF solutions of wall-bounded turbulent shear flows Dominik Plümacher, TU Darmstadt; Martin Oberlack, TU Darmstadt; Sergio Hoyas, UP València	319. Simultaneous velocity and temperature measurements in the laminar boundary layer of a melting vertical ice face Pamoda Herath, The University of Melbourne; Saurabh Pathak, The University of Melbourne; Bishakhdatta Gayen, The University of Melbourne; Joseph Klewicki, The University of Melbourne; Jimmy Philip, The University of Melbourne	98. Study of bypass transition in dense-gas boundary layers Aurelien Bienner, Arts et Metiers Institut of Technology; Xavier Gloerfelt, Arts et Metiers Institut of Technology; Paola Cinnella, Sorbonne University; Leander Hake, Muenster University of Applied Sciences, Stefan aus der Wiesche, Muenster University of Applied Sciences; Steffen Strehle, Technische Universität Ilmenau	249. Spatio-temporal characteristics of turbulent flow separations around rectangular and trapezoidal prisms in uniform flow Sedem Kumahor, University of Manitoba; Xingjun Fang, University of Manitoba; Mark F. Tachie, University of Manitoba
10:00 3:00 CEST Mon, July 18, 18:00 PDT	166. Wall-pressure-velocity transfer kernel in high Reynolds number turbulent channel flows Woutijn Baars, Delft University of Technology; Myoungkyu Lee, The University of Alabama	323. Unstable natural convection in a vertical channel with hot-cold wall configuration ChungGang Li, Kobe University; Makoto Tsubokura, Kobe University	398. Mechanics of boundary layer transition induced by multiple discrete roughness elements Saikishan Suryanarayanan, The University of Texas at Austin; David Goldstein, The University of Texas at Austin; Edward B. White, Texas A&M University; Garry L. Brown, Princeton University	251. Effects of streamwise aspect ratio on spatio-temporal characteristics of rectangular cylinders in uniform flows Sedem Kumahor, University of Manitoba; Mark F. Tachie, University of Manitoba
10:15		191. Mixing transition in the magnetic Rayleigh-Taylor instability Antoine Briard, CEA, DAM, DIF; Benoit-Joseph Grea, CEA, DAM, DIF; Florian Nguyen, CEA, DAM, DIF	175. Turbulent transitions in axisymmetric flow Wesley Agoua, LMFA (CNRS,Ecole Centrale de Lyon, Univ Lyon); Wouter J.T. Bos, LMFA (CNRS,Ecole Centrale de Lyon, Univ Lyon); Benjamin Favier, IRPHE (Aix Marseille Univ, CNRS, Centrale Marseille); Jorge Morales, IRFM (CEA)	

Time / Room	Room 1 Boundary Layers 2 Chair: Hiroyuki Abe (JAXA)	Room 2 Heat and Mass Transfer 2 Chair: Shunsuke Yamada (National Defense Academy)	Room 3 Instability and Transition 2 Chair: Michael D. Graham (Univ. Wisconsin-Madison)	Room 4 Separation 2 Chair: Robert Martinuzzi (Univ. Calgary)
10:45	<p>28. The quiescent core of turbulent channel flow under the influence of inlet turbulence Masoud Asadi, Norwegian University of Science and Technology; Md Kamruzzaman, Norwegian University of Science and Technology; R.Jason Hearst, Norwegian University of Science and Technology</p>	<p>457. Reynolds-stress modelling of flow and thermal fields in an IC-engine-related cooling channel Sebastian Wegt, Technische Universität Darmstadt (TU Darmstadt); Maximilian Bopp, TU Darmstadt; Louis Kruger, TU Darmstadt; Suad Jakirlic, TU Darmstadt</p>	<p>23. Stability and resolvent analysis of plane Couette flow in the distinguished limit $Re \rightarrow \infty, \alpha \rightarrow 0$ with $Re \cdot \alpha = O(1)$ Toni Dokoza, Technical University Darmstadt; Martin Oberlack, Technical University Darmstadt</p>	<p>14. Heat transfer mechanisms in separated turbulent flows Roziye Zangeneh, Lawrence Tech University</p>
11:00 4:00 CEST Mon, July 18, 19:00 PDT	<p>167. Lagrangian statistics of superstructures in a turbulent boundary layer with pressure gradients Matthew Bross, Bundeswehr University Munich; Matteo Novara, German Aerospace Center (DLR); Daniel Schanz, German Aerospace Center (DLR); Felix Eich, Bundeswehr University Munich; Andreas Schroeder, German Aerospace Center (DLR); Christian J. Kaehler, Bundeswehr University Munich</p>	<p>458. Impact of a Dean vortex-characterized inflow stream on thermal mixing in a T-junction: A sensitized-RANS modeling study Ivan Joksimovic, Technical University Darmstadt; Tarik Corbo, University of Sarajevo; Suad Jakirlic, Technical University Darmstadt</p>	<p>295. Tollmien-Schlichting waves over forward-facing steps: An experimental and numerical study Marina Barahona, Delft University of Technology (TU Delft); Alberto Felipe Rius-Vidales, Delft University of Technology (TU Delft); Francesco Tocci, German Aerospace Center (DLR); Paul Ziegler, German Aerospace Center (DLR) and University of Stuttgart; Stefan Hein, German Aerospace Center (DLR); Marios Kotsonis, Delft University of Technology (TU Delft)</p>	<p>111. Impact of grid resolution on hybrid RANS-LES of transition in a separated boundary layer Eike Tangermann, Bundeswehr University Munich; Markus Klein, Bundeswehr University Munich</p>
11:15	<p>115. Wall-attached structures in a turbulent channel flow with Navier slip Min Yoon, Korea Maritime and Ocean University; Hyung Jin Sung, KAIST</p>	<p>328. Correlation between velocity and heat transfer near reattachment point behind a backward facing step Shunsuke Yamada, National Defense Academy; Yuki Funami, National Defense Academy; Hajime Nakamura, National Defense Academy</p>	<p>311. Turbulent stripe survival in plane Couette flow Hirohito Kawajiri, Doshisha University; Koji Fukudome, Tokyo University of Science; Shumpei Hara, Doshisha University</p>	<p>212. POD and DMD mode analyses of poiseuille and couette flows over 1/2-contraction-ratio forward-facing step Toru Yamada, Nagoya Institute of Technology; Takumi Sugisaka, Nagoya Institute of Technology; Shinji Tamano, Nagoya Institute of Technology; Yohei Morinishi, Nagoya Institute of Technology</p>
11:30	<p>143. Spectral behavior of self-similar coherent structures in canonical wall-bounded turbulent flows Jinyul Hwang, Pusan National University; Jae Hwa Lee, UNIST; Hyung Jin Sung, KAIST</p>	<p>339. Heat transfer enhancement of swirling flow in a circular pipe in the transition regime Hajime Nakamura, National Defense Academy of Japan; Yoshinori Sugawara, National Defense Academy of Japan; Shunsuke Yamada, National Defense Academy of Japan; Yuki Funami, National Defense Academy of Japan</p>	<p>312. Directed percolation phenomena in subcritical transition of high-aspect-ratio duct flow Kazuki Kohyama, Tokyo University of Science; Masaki Sano, The University of Tokyo; Keichi Tamai, National Institute of Advanced Industrial Science and Technology; Takahiro Tsukahara, Tokyo University of Science</p>	<p>421. Flow past sudden step-change in surface topography from streamwise ridges to smooth wall Takfarinas Medjnoun, University of Southampton; Bharathram Ganapathisubramani, University of Southampton</p>
11:45	<p>376. Bispectral analysis of attached eddy modeling of wall-bounded turbulence Oles Dubrovski, Technion Israel Institute of Technology; Guangyao Cui, Technion Israel Institute of Technology; Ian Jacobi, Technion Israel Institute of Technology</p>	<p>220. Effects of energetic large-scale coherent structures on wall mass transfer rate of turbulent flow behind orifice in round pipe Feng Shan, Huazhong University of Science and Technology; Zhiqiang Yu, Huazhong University of Science and Technology; Kano Masashi, Nagoya University Yoshiyuki Tsuji, Nagoya University</p>	<p>405. Homoclinic bifurcation, edge states, and boundary crisis in plane Couette flow Julius Rhoan T.Lustro, University of the Philippines Diliman; Yudai Shimizu, Toyota Motor Corporation; Genta Kawahara, Osaka University</p>	
12:00 5:00 CEST Mon, July 18, 20:00 PDT	<p>334. Spanwise large scale motions and their relation to energy spectrum in turbulent shear flows Wang Yu, Nagoya University; Yoshinobu Yamamoto, University of Yamanashi; Yoshiyuki Tsuji, Nagoya University</p>	<p>221. Inter-scale transfer of passive scalar in grid turbulence Muyang Wang, Nagoya University; Takuya Yurikusa, Nagoya University; Koji Iwano, Nagoya University; Yasuhiko Sakai, Nagoya Industrial Science Research Institute; Yasumasa Ito, Nagoya University</p>	<p>444. Tollmien-Schlichting route to elastoinertial turbulence Ashwin Shekar, University of Wisconsin-Madison; Richard J. Hommel, University of Wisconsin-Madison; Ryan M. McMullen, Caltech; Beverley J. McKeon, Caltech; Michael D. Graham, University of Wisconsin-Madison</p>	

Time / Room	Room 1 Boundary Layers 3 Chair: Sylvain Laizet (Imperial College London)	Room 2 Heat and Mass Transfer 3 Chair: Kapil Chauhan (Univ. Sydney)	Room 3 Instability and Transition 3 Chair: Oliver T. Schmidt (UCSD)	Room 4 Fundamentals 1 Chair: Hiromichi Kobayashi (Keio Univ.)
14:00 7:00 CEST Mon, July 18, 22:00 PDT	147. Statistics of unsteady favorable pressure gradient turbulent boundary layers Aadhy Parthasarathy, University of Illinois at Urbana-Champaign; Theresa Saxton-Fox, University of Illinois at Urbana-Champaign	369. Growing turbulent spot in plane Couette flow provides dissimilarity between momentum and heat transfers Koji Fukudome, Tokyo University of Science; Takahiro Tsukahara, Tokyo University of Science; Hiroya Mamori, The University of Electro-Communications; Makoto Yamamoto, Tokyo University of Science	108. Mechanisms of interaction between a stationary crossflow instability and backward-facing steps Oleksandr Krochak, Technische Universiteit Delft; Jordi Casacuberta, Technische Universiteit Delft; Stefan Hicel, Technische Universiteit Delft; Marios Kotsonis, Technische Universiteit Delft	241. Balanced non-equilibrium turbulence Konstantinos Steiros, Imperial College London
14:15	268. A new point of view on skin-friction contributions in adverse-pressure-gradient turbulent boundary layers Marco Atzori, Johannes Kepler University; Alexander Stroh, Karlsruhe Inst. of Technology; Davide Gatti, Karlsruhe Inst. of Technology; Koji Fukagata, Keio University; Ricardo Vinuesa, KTH; Philipp Schlatter, KTH	200. Direct numerical simulation of forced thermal convection in square ducts Davide Modesti, Delft University of Technology; Sergio Pirozzoli, La Sapienza Universita di Roma	216. Modal properties of cross-flow instability in compressible boundary layers Zhiyong Liu, China Academy of Aerospace Aerodynamics	193. A scale-space analysis of simultaneous energy, helicity, and enstrophy cascades Douglas W Carter, University of Southampton; Felipe Alves Portela, University of Lille; Pawel Baj, Warsaw University of Technology
14:30	9. Large eddy simulations of a turbulent boundary layer with unsteady pressure gradients Francesco Ambrogi, Queen's University; Ugo Piomelli, Queen's University; David E. Rival, Queen's University	271. Ultimate heat transfer in turbulent thermal convection between porous walls Fanyu Meng, Osaka University; Shingo Motoki, Osaka University; Genta Kawahara, Osaka University	100. Effect of streamwise surface undulations on the nonlinear stability of crossflow instabilities Sven Westerbeek, Delft University of Technology; Marios Kotsonis, Delft University of Technology	242. Turbulent/non-turbulent interfaces in equilibrium and non-equilibrium turbulence Marco Zecchetto, Instituto Superior Tecnico; Tomoaki Watanabe, Nagoya University; Kouji Nagata, Nagoya University; Carlos da Silva, Instituto Superior Tecnico
14:45	238. Direct numerical simulation of adverse pressure gradient turbulent boundary layer up to $Re_\tau = 8000$ Hussein Rkein, University of Lille; Jean-Philippe Laval, CNRS - LMFL	380. Dissimilarity between thermal and flow fields in turbulence pipe flow with circumferentially-varying surface heat flux Yasuo Hattori, Central Research Inst. of Electric Power Industry; Yuma Hasebe, Denryoku Computing Center, Ltd.; Hitoshi Suto, Central Research Inst. of Electric Power Industry; Keisuke Nakao, Central Research Institute of Electric Power Industry; Shuji Ishihara, Denryoku Computing Center, Ltd.	70. On the multi-modal growth of disturbances in a laminar separation bubble subjected to freestream turbulence Thomas Jaroslowski, ONERA; Olivier Vermeersch, ONERA; Maxime Forte, ONERA; Erwin Gowree, ISAE-SUPAERO; Jean-Marc Moschetta, ISAE-SUPAERO	274. Study on the curvature of Lagrangian particle trajectories in quantum turbulence Naoto Sakaki, Nagoya University; Takumi Maruyama, Nagoya University; Yoshiyuki Tsuji, Nagoya University
15:00 8:00 CEST Mon, July 18, 23:00 PDT	85. Velocity spectra and scale decomposition of adverse pressure gradient turbulent boundary layers Sylvia K. Romero, University of Melbourne; Spencer J.Zimmerman, University of Melbourne; Jimmy Philip, University of Melbourne; Joseph C. Kiewicki, University of Melbourne	363. DNS and LES studies on turbulent heat transfer phenomena of round impinging jet in finite vessel Hirofumi Hattori, Nagoya Institute of Technology; Taira Mizukami, Nagoya Institute of Technology; Hiroki Baba, Nagoya Institute of Technology; Tomoya Houra, Nagoya Institute of Technology; Masato Tagawa, Nagoya Institute of Technology	258. On the stability and transition to turbulence of the flow over a wind-turbine airfoil under varying free-stream turbulence intensity Thales Coelho Leite Fava, KTH; Brandon A. Lobo, Kiel University of Applied Sciences; Alois P. Schaffarczyk, Kiel University of Applied Sciences; Michael Breuer, Helmut-Schmidt-Univ. Hamburg; Ardeshir Hanifi, KTH; Dan Henningson, KTH	36. Low-order modelling of turbulent quasi-cyclic behaviour and sudden relaminarisation Ryo Araki, Ecole Centrale de Lyon and Osaka University; Wouter J.T. Bos, Ecole Centrale de Lyon; Susumu Goto, Osaka University
15:15	452. Effect of streamwise domain size on the POD mode characteristics in an adverse pressure gradient turbulent boundary layer Muhammad Shehzad, Monash University; Bihai Sun, Monash University; Daniel Jovic, Monash University; Callum Atkinson, Monash University; Julio Soria, Monash University; Yasar Ostovan, Univ. Lille; Christophe Cuvier, Univ. Lille; Jean-Marc Foucaut, Univ. Lille; Christian Willert, German Aerospace Center (DLR)	230. Impact of wall boundary conditions on passive scalars in complex turbulent flows Francesco Secchi, Karlsruhe Institute of Technology; Davide Gatti, Karlsruhe Institute of Technology; Bettina Frohnappfel, Karlsruhe Institute of Technology	186. Freestream-turbulence independence of secondary instability of cross-flow vortices in swept-flat-plate boundary layer Kosuke Nakagawa, Tokyo University of Science; Takahiro Ishida, Japan Aerospace Exploration Agency; Takahiro Tsukahara, Tokyo University of Science	236. Shock-like focusing of inertial waves - the localized generation of turbulence Jie Liu, Technical University of Darmstadt; Ahmed Mohamed, Ecole Centrale de Lyon; Alexandre Delache, Ecole Centrale de Lyon; Fabien Godefert, Ecole Centrale de Lyon; Martin Oberlack, Technical University of Darmstadt; Yongqi Wang, Technical University of Darmstadt

[Invited Lecture 1] Tuesday, July 19, 15:40-16:20 JST / 8:40-9:20 Central European Summer Time (CEST) / Mon, July 18, 23:40 - Tue July 19, 0:20 Pacific Daylight Time (PDT)

15:40-16:20	Invited Lecture 1 (Room 1) / Chair: Martin Oberlack (TU Darmstadt)
	Michael Wilczek (University of Bayreuth, Germany), Statistics and Geometry of Lagrangian Turbulence

[Parallel Session 4] Tuesday, July 19, 16:30-18:00 JST / 9:30-11:00 Central European Summer Time (CEST) / Tue, July 19, 0:30-2:00 Pacific Daylight Time (PDT)

Time / Room	Room 1 Boundary Layers 4 Chair: Sergio Hoyas (UP València)	Room 2 Bio-flows Chair: Wei-Xi Huang (Tsinghua Univ.)	Room 3 Instability and Transition 4 Chair: Hiroya Mamori (Univ. Electro-Communications)	Room 4 Complex Flows Chair: Susumu Goto (Osaka Univ.)
16:30 9:30 CEST Tue July 19, 0:30 PDT	403. Mixing and large-scale modulation of a turbulent boundary layer perturbed by an effusion film Jeremy Basley, Univ. Polytechnique Hauts-de-France; Kevin Gouder, Imperial College London; Jonathan F Morrison, Imperial College London	304. An experimental study of pressure drop and fluid flow in Triply Periodic Minimal Surface (TPMS) scaffolds Daejung Kim, The University of Melbourne; Chenxi Peng, RMIT University; Jonathan Tran, RMIT University; Jimmy Philip, The University of Melbourne	32. Turbulent transonic buffet onset prediction on the NASA common research model via global stability analysis Andrea Sansica, Japan Aerospace Exploration Agency (JAXA); Atsushi Hashimoto, Japan Aerospace Exploration Agency (JAXA)	338. Modification of Taylor-Couette turbulence in an asymptotic ultimate regime by the viscoelasticity of dilute surfactant solution Yasufumi Horimoto, Hokkaido University; Taisei Hayama, Tokyo University of Science; Homare Okuyama, Hokkaido University
16:45	286. Dynamics of secondary motions in turbulent channels with streamwise ridges Kay Schafer, Karlsruhe Institute of Technology; Bettina Frohnafel, Karlsruhe Institute of Technology; Davide Gatti, Karlsruhe Institute of Technology	399. Hydrodynamics of a cow-nosed ray (Rhinoptera javanica) in forward swimming at a high Reynolds number Dong Zhang, Tsinghua University; Wei-Xi Huang, Tsinghua University	61. Stability and transition of a laminar separation bubble on a finite wing Connor Toppings, University of Waterloo; Serhiy Yarusevych, University of Waterloo	136. Turbulence with spatially fixed anisotropic viscosity Hanna Berning, ETH Zurich; Davide Gatti, Karlsruhe Institute of Technology; Daniel Stalder, ETH Zurich; Tommaso Ciuti, ETH Zurich; Thomas Rosgen, ETH Zurich
17:00 10:00 CEST 1:00 PDT	207. On the spectral decomposition of skewness in canonical and actuated turbulent boundary layers Samaresh Midya, University of Notre Dame; Flint O. Thomas, University of Notre Dame; Stanislav V.Gordeyev, University of Notre Dame	146. Hydrodynamics of slender undulating foil Li-Ming Chao, Harbin Institute of Technology (Shenzhen); Md. Mahub Alam, Harbin Institute of Technology	353. Multi-fidelity approach for transitional boundary-layer Minwoo Kim, Gwangju Institute of Science and Technology; Jiseop Lim, Gwangju Institute of Science and Technology; Solkeun Jee, Gwangju Institute of Science and Technology; Donghun Park, Pusan National University	255. Why velocity overshoots in accelerating porous media flow Yoshiyuki Sakai, Technical University of Munich; Michael Manhart, Technical University of Munich
17:15	86. Accelerating turbulent pipe flow: Role of the large- and small-scales of motion Byron Guerrero, University of Adelaide; Martin F. Lambert, University of Adelaide; Rey C. Chin, University of Adelaide	190. Active turbulence and its modeling Benjamin Deußen, Technical University of Darmstadt; Martin Oberlack, Technical University of Darmstadt; Yongqi Wang, Technical University of Darmstadt	101. Boundary layer transition in sonic converging-diverging nozzles Bruno Zebrowski, Institut Pprime - CNRS, ENSMA; Peter Jordan, Institut Pprime - CNRS, Université de Poitiers; Vincent Jaunet, Institut Pprime - CNRS, ENSMA	8. Inline coalescence of two bubbles ascending in a shear-thinning viscoelastic liquid Wenjun Yuan, Xi'an Jiaotong University
17:30	254. Structured input-output analysis of oblique turbulent bands in transitional plane Couette-Poiseuille flow Yu Shuai, Peking University; Chang Liu, University of California, Berkeley; Dennice F. Gayme, Johns Hopkins University	233. Turbulence in simulations of blood flow in cerebral arteries with aneurysms Rafaello D. Luciano, University of Saskatchewan; Xiongbiao Chen, University of Saskatchewan; Donald J. Bergstrom, University of Saskatchewan	118. Non-modal mechanisms in the flow over the leading-edge of blunt bodies Eduardo Martini Rodrigue da Silva, DFTC-2AT Institut Pprime - CEA; Clement Caillaud, DFTC-2AT Institut Pprime - CEA; Oliver Schmidt, University of California San Diego; Guillaume Lehnasch, DFTC-2AT Institut Pprime; Peter Jordan, DFTC-2AT Institut Pprime	429. Viscoelastic effects in the vicinity of a turbulent/non-turbulent interface layer Hugo Abreu, Instituto Superior Tecnico/University of Lisbon; Fernando Pinho, Faculdade de Engenharia/University of Porto; Carlos Silva, Instituto Superior Tecnico/University of Lisbon
17:45			126. Three-dimensional transition of a low Reynolds number flow past a plunging NACA 0012 airfoil at post-stall angle of attack An-Kang Gao, Imperial College London; Spencer J. Sherwin, Imperial College London; Chris D. Cantwell, Imperial College London	134. Modulation of homogeneous isotropic turbulence by dispersed fibres and particles Ianto Cannon, Okinawa Institute of Science & Technology; Stefano Olivieri, Okinawa Institute of Science & Technology; Marco E. Rosti, Okinawa Institute of Science & Technology

[Invited Lecture 2] Wednesday, July 20, 8:40-9:20 JST / 1:40-2:20 Central European Summer Time (CEST) / Tue, July 19, 16:40-17:20 Pacific Daylight Time (PDT)

8:40-9:20	Invited Lecture 2 (Room 1) Chair: Kazuhiko Suga (Osaka Metropolitan Univ.)
Makoto Tsubokura (Kobe University, Japan), Turbulence Simulation on Massively Parallel Environments toward Next-Generation Computer-Aided Engineering	

[Parallel Session 5] Wednesday, July 20, 9:30-11:00 JST / 2:30-4:00 Central European Summer Time (CEST) / Tue, July 19, 17:30-19:00 Pacific Daylight Time (PDT)

Time / Room	Room 1 Boundary Layers 5 Chair: Yoshiyuki Tsuji (Nagoya Univ.)	Room 2 Magnetic and Reacting Flows Chair: Masayasu Shimura (Tokyo Inst. of Technology)	Room 3 Measurement Techniques Chair: Shumpei Hara (Doshisha Univ.)	Room 4 Applications 1 Chair: Godfrey Mungal (Santa Clara Univ.)
9:30 2:30 CEST Tue, July 19, 17:30 PDT	92. Scaling of turbulent boundary layer profiles in airflow over young wind-waves Meital Geva, Tel-Aviv University; Lev Shemer, Tel-Aviv University	5. The effect of sweep-angle variation on the turbulence structure in high speed turbulent reactive flows Radouan Boukharfane, Mohammed VI Polytechnic University; Safae El Misraoui, Mohammed VI Polytechnic University; Matteo Parsani, King Abdullah University of Science and Technology; Nilanjan Chakraborty, Newcastle University	297. Optical mems sensors for instantaneous wall-shear stress measurements in turbulent boundary-layer flows Nima Ebrahimzade, Newcastle University; Jose Portoles, Newcastle University; Peter Cumpson, University of New South Wales; Michael Wilkes, Newcastle University; Richard D. Whalley, Newcastle University	356. On the effect of free-stream turbulence on the aerodynamic drag and wake dynamics of an Ahmed body Pierre-Yves Passaggia, Université d'Orléans; Nicolas Mazellier, Université d'Orléans; Azeddine Kourta, Université d'Orléans
9:45	333. Turbulent boundary layer over structured porous surface Zhixiang Feng, Zhejiang University; Qingqing Ye, Zhejiang University	278. Investigations of vortex shedding and flame base fluctuations in a dual swirl burner using SPIV, OH PLIF and chemiluminescence Masayasu Shimura, Tokyo Institute of Technology; Hiroki Hattori, Tokyo Institute of Technology; Mamoru Tanahashi, Tokyo Institute of Technology	282. Convective velocity in drag-reduced oscillating pipe flow Daniel Coxe, Arizona State University; Ronald Adrian, Arizona State University; Yulia Peet, Arizona State University	383. Physics based tailored numerical grid for statistical turbulence models based on dissipation elements Fettah Aldudak, University of Siegen; Holger Foysi, University of Siegen
10:00 3:00 CEST Tue, July 19, 18:00 PDT	417. Estimating Uncertainty of low- and high-order turbulence statistics in wall turbulence Saleh Rezaeiravesh, KTH Royal Inst. of Technology; Donnatella Xavier, KTH Royal Inst. of Technology; Ricardo Vinuesa, KTH Royal Inst. of Technology; Jie Yao, Texas Tech University; Fazle Hussain, Texas Tech University; Philipp Schlatter, KTH Royal Inst. of Technology	116. LES of MHD turbulent Taylor-Couette flow in axial magnetic field Hiromichi Kobayashi, Keio University; Ryo Sasaki, University of Tsukuba; Takayasu Fujino, University of Tsukuba; Hidemasa Takana, Tohoku University	76. Near-field turbulence in a multi-fan wind tunnel Jovan Nedić, McGill University; Austin L'Ecuyer, McGill University	283. Yawed Ahmed body: Impact of vertical flaps on flow structures Sukruth Satheesh, Institut Pprime, UPR 3346 CNRS, ENSMA, Université de Poitiers; Laurent Cordier, Institut Pprime, UPR 3346 CNRS, ENSMA, Université de Poitiers; Franck Kerherve, Institut Pprime, UPR 3346 CNRS, ENSMA, Université de Poitiers; Andreas Spohn, Institut Pprime, UPR 3346 CNRS, ENSMA, Université de Poitiers
10:15	97. On the role of the Kelvin-Helmholtz wave of turbulent flows over permeable porous wall Yusuke Kuwata, Osaka Prefecture University	218. Lean, high EGR rate TRF-air turbulent combustion with tumble flow in a constant volume vessel at elevated pressure Ryoichi Urasaki, Tokyo Institute of Technology; Yuki Minamoto, Tokyo Institute of Technology; Masayasu Shimura, Tokyo Institute of Technology; Mamoru Tanahashi, Tokyo Institute of Technology	169. Single-pixel PIV measurements of high-Re turbulent pipe flow Jerry Westerweel, Delft University of Technology; Sudarshan Sridharan, Delft University of Technology; Gosse Oldenziel, Deltares	74. Implications of shear and thermal stratification on wind turbine tip-vortex stability Amy Hodgkin, Imperial College London; Sylvain Laizet, Imperial College London; Georgios Deskos, National Renewable Energy Laboratory
10:30	145. Large-eddy simulation of free-surface turbulent channel flow over square bars Razieh Jalalabadi, University College London; Thorsten Stoesser, University College London		394. Measurements of turbulent wall heat transfer using temperature sensitive paint with image denoising by a machine learning method Yutaka Oda, Kansai University; Masaharu Shimoda, Kansai University; Tomohiro Kasahara, Kansai University; Tatsuro Yamazaki, Kansai University; Ryosuke Matsumoto, Kansai University	
10:45	202. Modelling secondary structures developing over longitudinal ridges with different geometries Gerardo Zampino, University of Southampton; Davide Lasagna, University of Southampton; Bharath Ganapathisubramani, University of Southampton			

Time / Room	Room 1 Boundary Layers 6 Chair: Ivan Marusic (Univ. Melbourne)	Room 2 Flow Control 1 Chair: Bernd Noack (Harbin Inst. Tech.)	Room 3	Room 4 Applications 2 Chair: Godfrey Mungal (Santa Clara Univ.)
11:15 4:15 CEST Tue, July 19, 19:15 PDT	30. Law of bounded dissipation and its consequences in turbulent wall flows Xi Chen, Beijing University of Aeronautics and Astronautics; Katepalli R. Sreenivasan, New York University	151. Turbulence enhancement in body force opposed flows Stephen D. Jackson, University of Sheffield; Shuisheng He, University of Sheffield		306. Response of high Reynolds number turbulent pipe flow to the presence of an axisymmetric body Ian E. Gunady, Princeton University; Liuyang Ding, Princeton University; Marcus Hultmark, Princeton University; Alexander J. Smits, Princeton University
11:30	49. Scale-space energy density and inhomogeneous effect in turbulent channel flow Fujihira Hamba, The University of Tokyo	270. Prediction and control of turbulent flows using deep learning Jiyeon Kim, Yonsei Univ.; Junhyuk Kim, Yonsei Univ.; Changhoon Lee, Yonsei Univ.		157. Flow past an inclined spheroid in homogeneous and stratified environments Sheel Nidhan, University of California San Diego; Jose Luis Ortiz-Tarin, University of California San Diego; Sutanu Sarkar, University of California San Diego
11:45	402. Pressure source contribution and near wall flow structures related to high amplitude wall pressure peaks Yoshitsugu Naka, Meiji University; Kosuke Osawa, Universidad Politecnica de Madrid	152. A comparison of spatial and temporal acceleration in turbulent channel flows Matthew A. Falcone, University of Sheffield; Shuisheng He, University of Sheffield		203. Near wake coherent structures of a turbulent axisymmetric wake Taihang Zhu, Imperial College London; Georgios Rigas, Imperial College London; Jonathan Morrison, Imperial College London
12:00 5:00 CEST Tue, July 19, 20:00 PDT	344. Inflow turbulence generation using equivalent boundary layer Haining Wang, Tsinghua University; Weixi Huang, Tsinghua University; Chunxiao Xu, Tsinghua University	348. Prediction of drag reduction effect in turbulent pulsating pipe flow by machine learning based on experimental data Takuho Kitta, Tokyo University of Agriculture and Technology; Akihiko Mitsui, Tokyo University of Agriculture and Technology; Kaoru Iwamoto, Tokyo University of Agriculture and Technology; Akira Murata, Tokyo University of Agriculture and Technology		329. Development of drag-reduced turbulent boundary layers on smooth walls with different polymer concentrations Mohamed G. AbdElKader, University of Melbourne; John R. Elsnab, University of Melbourne; Nicholas Hutchins, University of Melbourne; Jason P. Monty, University of Melbourne
12:15	446. On the streamwise wall-shear fluctuations generated by attached eddies in a turbulent channel flow Cheng Cheng, The Hong Kong University of Science and Technology; Lin Fu, The Hong Kong University of Science and Technology	205. The role of an optimal modeling basis in variational resolvent analysis Benedikt Barthel, California Institute of Technology; Salvador Gomez, California Institute of Technology; Beverly J. McKeon, California Institute of Technology		16. The forward-facing fin – An unusual hydrodynamic design Mark Godfrey Mungal, Santa Clara University; Tioga Benner, Santa Clara University
12:30	140. Modal decomposition of nonlinear interactions in wall turbulence Ugur Karban, Middle East Technical University; Eduardo Martini, Institut Pprime; Andre V. G. Cavalieri, Instituto Tecnológico de Aeronáutica; Peter Jordan, Institut Pprime	364. Drag reduction on a transonic wing Maurizio Quadrio, Politecnico di Milano; Alessandro Chiarini, Politecnico di Milano; Davide Gatti, Karlsruhe Institute of Technology; Jacopo Banchetti, Politecnico di Milano; Antonio Memmolo, CINECA; Sergio Pirozzoli, Università di Roma - La Sapienza		

Time / Room	Room 1 Boundary Layers 7 Chair: Suad Jakirlic (TU Darmstadt)	Room 2 Flow Control 2 Chair: Sylvain Laizet (Imperial College London)	Room 3 Acoustics and Fluid-Structure Interactions 1 Chair: Makoto Tsubokura (Kobe Univ.)	Room 4 Applications 3 Chair: Godfrey Mungal (Santa Clara Univ.)
14:00 7:00 CEST Tue, July 19, 22:00 PDT	4. Multi-structure turbulence in a boundary layer with a uniformly sheared free stream Curtis Livingston, University of Ottawa; Stavros Tavoularis, University of Ottawa	194. Theoretical and numerical analyses of uniform blowing and suction in turbulent plane Couette flow Yusuke Nabae, Keio University; Koji Fukagata, Keio University	149. Triadic nonlinear interactions and acoustics of forced versus unforced turbulent jets Akhil Nekkanti, University of California San Diego; Oliver T. Schmidt, University of California San Diego; Igor Maia, University of Poitiers; Peter Jordan, University of Poitiers; Liam Heidt, California Institute of Technology; Tim Colonius, California Institute of Technology	336. Quadratic constitutive relation for a corner flow and its application to a wing-body juncture flow Hiroyuki Abe, Japan Aerospace Exploration Agency; Taisuke Nambu, Japan Aerospace Exploration Agency; Yasuhiro Mizobuchi, Japan Aerospace Exploration Agency
14:15	294. DNS study of turbulent flow in a circular pipe subjected to axial system rotation Zhao-Ping Zhang, University of Manitoba; Bing-Chen Wang, University of Manitoba	19. Large-scale flow organization of wall-bounded turbulence over flush-mounted rotating discs Kushal U. Kempaiah, Delft University of Technology; Jacopo Sem, Delft University of Technology; Woutijn J. Baars, Delft University of Technology	201. Wake flow - acoustic resonance in a generic air outlet Asvath Ravichandran, Technical University of Munich; Michael Manhart, Technical University of Munich; Florian Schwertfirm, Kreuzinger+Manhart Turbulenz GmbH; Nikolaus Peller, AUDI AG	381. On the structure of turbulence fields in a separated flow around a finite wing: analysis using direct numerical simulation Juan Carlos Bilbao-Ludena, Imperial College London; George Papadakis, Imperial College London
14:30	379. Production and transport of turbulent helicity in wall-normal rotating channel flow Maito Horie, University of Tokyo; Fujihito Hamba, University of Tokyo	244. Experimental studies of boundary layer dynamics via active manipulation of large-scale structures Mitchell Lozier, University of Notre Dame; Flint O. Thomas, University of Notre Dame; Stanislav Gordeyev, University of Notre Dame	66. Experimental investigation of vortex-induced vibrations of a circular cylinder Agathe Schmider, Institut PPrime; Franck Kerherve, Institut PPrime; Laurent Cordier, Institut PPrime; A. Spohn, Institut PPrime; N. Dellinger, ICube	114. Implications of spanwise wake instability on the formation of secondary structures behind oscillating foils Suyash Verma, University of Alberta; Arman Hemmati, University of Alberta
14:45	127. Scaling laws and wall-attached structures in a supersonic turbulent channel flow Hyeon Gyu Hwang, Ulsan National Institute of Science and Technology, UNIST; Jae Hwa Lee, Ulsan National Institute of Science and Technology, UNIST; Jinyul Hwang, Pusan National University, PNU; Ji-Hoon Kang, Korea Institute of Science and Technology Information, KISTI; Hyung Jin Sung, Korea Advanced Institute of Science and Technology, KAIST	265. Feedback control effect in turbulent channel flow with a bump by means of direct numerical simulation Yusuke Okochi, Keio University; Yusuke Nabae, Keio University; Koji Fukagata, Keio University	326. A fluid-structure interaction study on wake-induced pendulum motion of tandem cylinders Hyunjun Kim, Pusan National University; Youngjin Jang, Hyundai Heavy Industry; Inwon Lee, Pusan National University	43. Investigation of Reynolds stresses prior to vortex breakdown on a triple-delta wing at transonic condition Tony Di Fabbio, Universitat der Bundeswehr Munchen; Eike Tangermann, Universitat der Bundeswehr Munchen; Markus Klein, Universitat der Bundeswehr Munchen
15:00 8:00 CEST Tue, July 19, 23:00 PDT	165. Assessment of three wall models in a spatially developing three-dimensional boundary layer in a bent square duct Xiaohan Hu, University of Pennsylvania; Imran Hayat, Hayat; George Ilhwan Park, University of Pennsylvania	34. Effect of wave-like body force control on reattachment length in backward-facing step turbulent flow Junichi Morita, The University of Electro-Communications; Hiroya Mamori, The University of Electro-Communications; Takeshi Miyazaki, The University of Electro-Communications	289. Data-driven model for vortex lock-in of circular cylinders in an acoustically-driven oscillatory flow Girish K. Jankee, Norwegian University of Science and Technology (NTNU); Srikar Yadala, NTNU; Eirik Asoy, NTNU; James R. Dawson, NTNU; Nicholas A. Worth, NTNU	82. Low-order representation of the wake dynamics of offshore floating wind turbines Cedric Raibaud, LHEEA, Centrale Nantes; Laurent Perret, LHEEA, Centrale Nantes
15:15	171. Influence of wall shear stress on the secondary flow in square ducts Alexander Doehring, Technical University of Munich; Thomas Kaller, Technical University of Munich; J. Steffen Schmidt, Technical University of Munich; Nikolaus A. Adams, Technical University of Munich	122. Separation control with air-jet vortex generators of shock/boundary-layer interactions on flexible panels Anne-Marie Schreyer, RWTH Aachen University; Deepak Prem Ramaswamy, RWTH Aachen University; Christopher Julian Schauerte, RWTH Aachen University		210. High-fidelity computational study of roughness effects on high pressure turbine performance and heat transfer Thomas O. Jelly, University of Melbourne; John Leggett, University of Melbourne; Ivan Marusic, University of Melbourne; Richard D. Sandberg, University of Melbourne; Massimiliano Nardini, University of Melbourne; Marco Rosenaweig, University of Melbourne

Time / Room	Room 1 Multiphase Flows Chair: Shinya Okino (Kyoto Univ.)	Room 2 Flow Control 3 Chair: Azeddine Kourta (Univ. d'Orléans)	Room 3 Acoustics and Fluid-Structure Interactions 2 Chair: Aiko Yakeno (Tohoku Univ.)	Room 4 Wakes 1 Masayuki Kaneda (Osaka Metropolitan Univ.)
15:45 8:45 CEST Tue, July 19, 23:45 PDT	228. Experimental investigation of shear-induced migration in particle-laden pipe flow using MRI Willian Hogendoorn, Delft University of Technology (TU Delft); David Frank, Universität Rostock; Martin Bruscheck, Universität Rostock; Christian Poelma, TU Delft	354. On the structure of a turbulent boundary layer perturbed by a large-eddy break-up device Abhishek Tyagi, Indian Institute of Science; A. Chandan Kumar, Indian Institute of Science; Sourabh S. Diwan, Indian Institute of Science	65. Spectral proper orthogonal decomposition for coupled hydrodynamic/acoustic fields Maxime Fiore, ISAE-Supaero; Helene Parisot-Dupuis, ISAE-Supaero; Benjamin Etchebarne, ISAE-Supaero; Romain Gojon, ISAE-Supaero	431. Lagrangian diffusion properties of the wake behind a cylinder using time-resolved particle tracking velocimetry Ali Rahimi Khojasteh, French National Institute for Agriculture, Food, and Environment (INRAE); Dominique Heitz, INRAE; Lionel Fiabane, INRAE
16:00 9:00 CEST Wed, July 20, 0:00 PDT	197. Resolvent analysis of turbulent pipe flow laden with low inertia particles Rasmus Korslund Schlander, Imperial College London; George Papadakis, Imperial College London; Stelios Rigopoulos, Imperial College London	177. Numerical study of turbulent resistance reduction effect by staggered superhydrophobic surface Daito Hirata, The University of Electro-Communications; Junichi Morita, Univ. Electro-Commun.; Hiroya Mamori, Univ. Electro-Commun.; Takeshi Miyazaki, Univ. Electro-Commun.	448. Turbulence structures in an axisymmetric adverse-pressure-gradient boundary layer and their rotor aeroacoustic response Di Zhou, University of Notre Dame; Kan Wang, University of Notre Dame; Meng Wang, University of Notre Dame	288. Energy exchanges in the wake of a multiscale system Neelakash Biswas, Imperial College London; Oliver R. H. Buxton, Imperial College London
16:15	340. Role of the hierarchy of coherent structures in the transport of solid particles in turbulent channel flow at high Reynolds numbers Yutaro Motoori, Osaka University; Susumu Goto, Osaka University	50. Numerical simulation of turbulent channel flow with particle adhered riblet surfaces Chikara Shimizu, The University of Electro-Communications; Junichi Morita, Univ. Electro-Commun.; Hiroya Mamori, Univ. Electro-Commun.; Takeshi Miyazaki, Univ. Electro-Commun.	91. Acoustic liners and their induced drag Haris Shahzad, Delft University of Technology; Stefan Hickel, Delft University of Technology; Davide Modesti, Delft University of Technology	250. Spectral proper orthogonal decomposition of the junction flow behind a cantilevered square cylinder Ali Mohammadi, University of Calgary; Chris Morton, University of Calgary; Robert Martinuzzi, University of Calgary
16:30	335. Kolmogorov constant for particle-laden turbulent channel flow Naveen Rohilla, Indian Institute of Technology Bombay; Partha S. Goswami, Indian Institute of Technology Bombay	62. Drag reduction by means of an array of staggered circular cavities Francesco Scarano, ISAE - SUPAERO; Erwin R. Gowree, ISAE - SUPAERO; Marc C. Jacob, CNRS, Université de Lyon, Ecole Centrale de Lyon, INSA Lyon, Université Claude Bernard Lyon	290. Simulation of the turbulent flow over a canopy of highly flexible blades Bastian Lohrer, Technische Universität Dresden; Leo Guiot de la Rochere, Université de Lyon; Delphine Doppler, Université de Lyon; Sara Puijalon, Univ Lyon, Université Claude Bernard Lyon 1; Jochen Fröhlich, Technische Universität Dresden	246. The dynamics of coherent structures in a turbulent wake past a sphere at Re=3700 Fengrui Zhang, Arizona State University; Yulia T. Peet, Arizona State University
16:45	322. Finite-time blowup related to particle collision in direct Eulerian simulation Seulgi Lee, Yonsei University; Changhoon Lee, Yonsei University	355. Direct numerical simulation of turbulent flow above riblets under adverse pressure gradient Satoshi Ikeda, Osaka University; Kie Okabayashi, Osaka University; Shintaro Takeuchi, Osaka University	131. Numerical simulation of the sibilant /s/ sound articulation process HsuehJui Lu, Kobe University; Sakuya Sugimoto, Kobe University; Tsukasa Yoshinaga, Toyohashi University of Technology; ChungGang Li, Kobe University; Kazunori Nozaki, Osaka Univ. Dental Hospital; Akiyoshi Iida, Toyohashi University of Technology; Makoto Tsubokura, Kobe University	456. Effect of upstream boundary layer on coherent structures in the wake of a blunt trailing edge profiled body Ross Cruikshank, University of Toronto; Philippe Lavoie, University of Toronto
17:00 10:00 CEST Wed, July 20, 1:00 PDT	25. Fractal properties of atomizing turbulent two-phase jets Josef Hasslberger, Bundeswehr University Munich; Elias Trautner, Bundeswehr University Munich; Markus Klein, Bundeswehr University Munich	387. Spanwise wall oscillation applied to exact coherent states of plane Couette flow Yacine Bengana, Imperial College London; Qiang Yang, State Key Laboratory of Aerodynamics, China Aerodynamics Research and Development Centre; Yongyun Hwang, Imperial College London		183. Investigation on the drag force and flow field of an accelerating plate Jesse Reijnenbagh, Delft University of Technology (TU Delft); Mark J. Tummers, TU Delft; Jerry Westerweel, TU Delft
17:15	144. A direct numerical simulation study of two-phase turbulent flow with large-sized multiple bubbles in a horizontal flat channel Sang Won Kim, Hokkaido University; Nobuyuki Oshima, Hokkaido University; Yuichi Murai, Hokkaido University; Hyun Jin Park, Hokkaido University			13. Regimes of near wake interactions of a square back bluff body. consequences for drag Di Bao, Institut Pprime UPR 3346, CNRS-ENSMA-Université de Poitiers; Jacques Borée, Institut Pprime UPR 3346, CNRS-ENSMA-Université de Poitiers; Yann Haffner, Institut Pprime UPR 3346, CNRS-ENSMA-Université de Poitiers; Christophe Sicot, Institut Pprime UPR 3346, CNRS-ENSMA-Université de Poitiers

[Invited Lectures 3, 4] Thursday, July 21, 8:00-9:20 JST / 1:00-2:20 Central European Summer Time (CEST) / Wed, July 20, 16:00-17:20 Pacific Daylight Time (PDT)

8:00-8:40	Invited Lecture 3 (Room 1) / Chair: Stavros Tavoularis (Univ. Ottawa)
	Pino Martin (University of Maryland, USA), Reduced Order Model for Low-frequency Dynamics Inshock Separated Flow
8:40-9:20	Invited Lecture 4 (Room 1) / Chair: Hyung Jin Sung (KAIST)
	Tamer Zaki (Johns Hopkins University, USA), Observation-Infused Simulations of Turbulence

[Parallel Session 9] Thursday, July 21, 9:30-11:00 JST / 2:30-4:00 Central European Summer Time (CEST) / Wed, July 20, 17:30-19:00 Pacific Daylight Time (PDT)

Time / Room	Room 1 Closure 1 Chair: Fujihira Hamba (Univ. Tokyo)	Room 2 Flow Control 4 Chair: Stanislav Gordeyev (Univ. Notre Dame)	Room 3 Compressible Flows 1 Chair: Subrahmanyam Duvvuri (Indian Institute of Science)	Room 4 Wakes 2 Chair: Hajime Nakamura (National Defense Academy)
9:30 2:30 CEST Wed, July 20, 17:30 PDT	445. Near-wall model for large eddy simulation that incorporates resolved non-equilibrium and Reynolds-number effects Kevin Griffin, Stanford University; Lin Fu, The Hong Kong University of Science and Technology	6. Passive scalar mixing enhancement and multi-structure turbulence downstream of a grid and a porous obstruction Dana Duong, University of Ottawa; Stavros Tavoularis, University of Ottawa	106. Linear and non-linear dynamics of streak breakdown in a hypersonic boundary layer Clement Caillaud, Institut Pprime - CEA/CESTA; Guillaume Lehnasch, Institut Pprime - ISAE ENSMA; Peter Jordan, Institut Pprime - CNRS; Eduardo Martini, Institut Pprime - CEA/CESTA; Eric Goncalves, Institut Pprime - ISAE-ENSMA; Ludovic Hallo, CEA/CESTA	425. An efficient drag reduction of bluff bodies by tessellation Nikolaos Beratlis, Arizona State University; Kyle Squires, Arizona State University; Elias Balaras, George Washington University
9:45	54. Near-autonomous large eddy simulations of turbulence based on interscale energy transfer among resolved scales Julian Andrzej Domaradzki, University of Southern California	105. Slip and drag in turbulent flows over superhydrophobic surfaces with surfactant Samuel D. Tomlinson, Univ. Manchester; Ruby Gans, University of California, Santa Barbara (UCSB); Frederic Gibou, UCSB; Oliver E. Jensen, Univ. Manchester; Julien R. Landel, Univ. Manchester; Paolo Luzzatto-Fegiz, UCSB; Francois Peaudecerf, ETH Zurich; Fernando Temprano-Coletto, UCSB	196. Effects of favorable downstream pressure gradients on separated shock-wave/boundary-layer interactions Lionel Larcheveque, Aix-Marseille Univ; Deepak Prem Ramaswamy, RWTH Aachen University; Anne-Marie Schreyer, RWTH Aachen University	407. Numerical analysis of the flow dynamics behind non-circular bluff-bodies Agnieszka Wawrzak, Czestochowa University of Technology; Robert Kantoch, Czestochowa University of Technology; Artur Tyliczcak, Czestochowa University of Technology; Bernard J. Geurts, University of Twente
10:00 3:00 CEST Wed, July 20, 18:00 PDT	11. A sub-grid activity sensor applied to mixed modeling in large eddy simulation Josef Hasslberger, Bundeswehr University Munich	199. Effect of incoming boundary layer characteristics on an air layer within a liquid turbulent boundary layer Lina Nikolaidou, Delft University of Technology; Angeliki Laskari, Delft University of Technology; Christian Poelma, Delft University of Technology; Tom van Terwisga, Delft University of Technology/MARIN	420. Large-eddy simulation of a hypersonic turbulent boundary layer over a cone in support of focused laser differential interferometry (FLDI) measurements Takahiko Toki, Purdue University; Victor C. B. Sousa, Purdue University; Yongkai Chen, Purdue University; Giannino P. Camillo, German Aerospace Center (DLR); Alexander Wagner, German Aerospace Center (DLR); Carlo Scalo, Purdue University	273. Mean wake of surface-mounted finite-height square prisms of small aspect ratio Barbara L. da Silva, University of Saskatchewan; Dylan G. H. Hahn, University of Saskatchewan; David Sumner, University of Saskatchewan; Donald J. Bergstrom, University of Saskatchewan
10:15	188. Investigation of subgrid-scale turbulent kinetic energy in channel flows Kazuhiro Inagaki, Keio University; Hiromichi Kobayashi, Keio University	309. The effect of large eddy break-up device on rough wall turbulent boundary layer Shubham Kumbhar, The University of Newcastle, Australia; Lyazid Djenidi, Univ. Newcastle; Farzin Ghanadi, Univ. Newcastle; Md Kamruzzaman, Univ. Newcastle	262. Wall-heated/cooled effects on low-frequency pressure fluctuations in shock-wave and turbulent boundary layer interactions Ryo Hirai, Department of Aerospace Engineering, Tohoku University; Soshi Kawai, Department of Aerospace Engineering, Tohoku University	305. Multi-scale analysis on 3D flow structures behind a wall-mounted short cylinder controlled by using a front inclined hole Hiroya Rinoshika, Yamagata University; Akira Rinoshika, Yamagata University; Masato Akamatsu, Yamagata University
10:30	103. A volume forcing method based on a reconstruction-like procedure for hybrid RANS/LES Jeremie Janin, Institut de Radioprotection et de Surete Nucleaire (IRSN); Fabien Duval, IRSN; Christophe Friess, Aix-Marseille Univ., CNRS; Pierre Sagaut, Aix-Marseille Univ., CNRS	313. Flow structure characteristics of turbulent boundary layer modified by miniature vortex generators Chi Ip Chan, The University of Adelaide; Rey Cheng Chin, The University of Adelaide	99. High-Reynolds number effects in shock-wave/turbulent boundary-layer interactions Luis Laguarda, Delft University of Technology (TU Delft); Stefan Hickel, TU Delft; Ferry F. J. Schrijer, TU Delft; Bas W. van Oudheusden, TU Delft	18. The near-wake of discrete roughness elements on swept wings: tomographic PTV measurements Giulia Zoppini, Technische Universitat Delft; Theodoros Michelis, Technische Universitat Delft; Daniele Ragni, Technische Universitat Delft; Marios Kotsonis, Technische Universitat Delft
10:45		347. Heat transfer enhancement by traveling wave-like body force in turbulent channel flow Ryo Yamamoto, The University of Electro-Communications; Junichi Morita, Univ. Electro-Commun.; Hiroya mamori, Univ. Electro-Commun.; Takeshi Miyazaki, Univ. Electro-Commun.; Shumpei Hara, Doshisha University	138. Sweep effects on a canonical shock wave/turbulent boundary layer interaction Thomas Bergier, ISAE-SUPAERO, University of Toulouse; Romain Gojon, Univ.Toulouse; Jeremie Gressier, Univ.Toulouse; Stephane Jamme, Univ.Toulouse; Laurent Joly, Univ.Toulouse;	

Time / Room	Room 1 Closure 2 Chair: Stefan Wallin (KTH)	Room 2 Machine Learning 1 Chair: Ricardo Vinuesa (KTH)	Room 3 Compressible Flows 2 Chair: Takahiko Toki (Purdue Univ.)	Room 4 Environmental Flows 1 Chair: Keigo Matsuda (JAMSTEC)
11:15 4:15 CEST Wed, July 20, 19:15 PDT	459. Heat flux modeling in wall-bounded turbulent flows by Reynolds stress models within RANS and sensitized-RANS frameworks Maximilian Bopp, Technical University of Darmstadt; Sebastian Wegt, TU Darmstadt; Louis Krueger, TU Darmstadt; Suad Jakirlic, TU Darmstadt; Francesco Secchi, KIT Bettina Frohnafel, KIT	301. Methodology to achieve robust closed-loop turbulent flow control using machine learning Calin G. Gaiu, University of Calgary; Matthew R. Singbeil, University of Calgary; Chris Morton, University of Calgary; Robert J. Martinuzzi, University of Calgary	37. Shock-wave and shear-layer oscillations over a double cone in high-speed flow Vaisakh Sasidharan, Indian Institute of Science; Gaurav Kumar, Indian Institute of Science; Akshaya G. Kumara, Indian Institute of Science; Subrahmanyam Duvvuri, Indian Institute of Science	318. Direct numerical simulations of hyporheic exchange induced by rough bedforms Guangchen Shen, Michigan State University; Junlin Yuan, Michigan State University; Mantha S. Phanikumar, Michigan State University
11:30	181. Symmetry-based eddy-viscosity models: a hands-on approach Dario Klingenberg, Technical University Darmstadt; Martin Oberlack, TU Darmstadt	94. Reinforcement learning for reduction of skin friction drag in a fully developed turbulent channel flow Takahiro Sonoda, The University of Tokyo; Zhuchen Liu, The University of Tokyo; Toshitaka Itoh, The University of Tokyo; Yosuke Hasegawa, The University of Tokyo	428. The quasi-spectral viscosity (QSV) closure to sub-filter scale fluxes: unifying shock capturing and large-eddy simulation Victor C. B. Sousa, Purdue University; Carlo Scalo, Purdue University	373. Direct numerical simulations of oscillatory boundary layers over rough walls Umberto Ciri, University of Puerto Rico at Mayaguez; Sylvia Rodriguez-Abudo, University of Puerto Rico at Mayaguez; Stefano Leonardi, The University of Texas at Dallas
11:45	408. Explicit algebraic Reynolds stress modelling in scale-resolved simulations of turbulence Matteo Montecchia, KTH, Royal Institute of Technology; Stefan Wallin, KTH, Royal Institute of Technology	385. Gradient-enriched machine learning control for shear flow stabilization Guy Y. Cornejo Maceda, Laboratoire Interdisciplinaire des Sciences du Numerique; Yiqing Li, Harbin Institute of Technology; Francois Lusseyran, Laboratoire Interdisciplinaire des Sciences du Numerique; Marek Morzyński, Poznań University of Technology; Bernd R. Noack, Harbin Institute of Technology	45. Direct numerical simulations of shocklet-containing turbulent channel counter-flows Arash Hamzehloo, Imperial College London; David J. Lusher, Okinawa Institute of Science and Technology; Sylvain Laizet, Imperial College London; Neil D. Sandham, University of Southampton	327. PIV Measurement of turbulent flow and particle motion over a rough wall Kazumasa Matsumoto, Kyoto University; Taka-aki Okamoto, Kyoto University; Michio Sanjou, Kyoto University
12:00 5:00 CEST Wed, July 20, 20:00 PDT	437. Towards a generalizable data-driven approach to predict separation-induced transition Vishal Srivastava, University of Michigan, Ann Arbor; Karthik Duraisamy, University of Michigan, Ann Arbor	386. Prediction of friction drag in pulsating turbulent pipe flow by deep learning for improvement of generalization capability Kazunori Matsubara, Tokyo University of Agriculture and Technology (TUAT); Akihiko Mitsuishi, TUAT; Kaoru Iwamoto, TUAT; Akira Murata, TUAT	310. Curvature effects on compressible turbulent shear layers Kristen V. Matsuno, Stanford University; Sanjiva K. Lele, Stanford University	435. Particle resolved DNS study of turbulence effects on hyporheic mixing in randomly packed sediment beds Shashank K. Karra, Oregon State University; Sourabh V. Apte, Oregon State University; Xiaoliang He, Pacific Northwest National Laboratory; Timothy D. Scheibe, Pacific Northwest National Laboratory
12:15	279. Wall-modelled LES using high- and low-order CFD codes: application to a flat-plate boundary layer Timofey Mukha, KTH Royal Institute of Technology; Philipp Schlatter, KTH Royal Institute of Technology	433. Learning turbulence control strategies with data-driven reduced-order models and deep reinforcement learning Alec J. Linot, University of Wisconsin-Madison; Kevin Zeng, University of Wisconsin-Madison; Michael D. Graham, University of Wisconsin-Madison	163. On implicit large eddy simulation in compressible turbulence Guiyu Cao, Southern University of Science and Technology; Wenjin Zhao, Hong Kong University of Science and Technology; Shiyi Chen, Southern University of Science and Technology	314. Three-dimensional structural aspects of the attached turbulent boundary layer flow over a hill Julie Duetsch-Patel, Virginia Tech; Aldo Gargiulo, Virginia Tech; Vignesh Sundarraj, Virginia Tech; William J. Devenport, Virginia Tech; K. Todd Lowe, Virginia Tech
12:30		406. Explorative gradient method for high-dimensional actuation parameter spaces Yiqing Li, Harbin Institute of Technology (Shenzhen); Bernd R. Noack, Harbin Institute of Technology (Shenzhen); Zhigang Yang, Tongji University; Marek Morzyński, Poznan University of Technology	206. Non-linearities in transitional shock wave/boundary layer interactions Mariadebora Mauriello, Aix-Marseille Univ; Lionel Larcheveque, Aix-Marseille Univ; Pierre Dupont, Aix-Marseille Univ	441. LES-based generation of time sequential data of instantaneous urban wind in typhoon - comparison with observational data Masaharu Kawaguchi, Tokyo Institute of Technology; Tetsuro Tamura, Tokyo Institute of Technology

Time / Room	Room 1 Rough Boundary Layers 1 Chair: Bettina Frohnafel (Karlsruhe Inst. Tech.)	Room 2 Machine Learning 2 Chair: Mitul Luhar (Univ. Southern California)	Room 3 Compressible Flows 3 Chair: Neil D. Sandham (Univ. Southampton)	Room 4 Environmental Flows 2 Chair: Yoshinori Mizuno (Meteorological Research Institute)
14:00 7:00 CEST Wed, July 20, 22:00 PDT	424. On the origin of secondary flows in turbulent boundary layers over rough walls Ioannis K. Kaminaris, George Washington University; Elias Balaras, George Washington University; Ralph Volino, United States Naval Academy; Michael P. Schultz, United States Naval Academy	235. Turbulent mean flow estimation with state observer assimilation of velocity measurements in RANS models Markus Zauner, ONERA; Vincent Mons, ONERA; Olivier Marquet, ONERA; Benjamin Leclaire, ONERA	332. Unsteadiness in a 2D cylinder wake flow at Mach 6 Premika S. Thasu, Indian Institute of Science; Vaisakh Sasidharan, Indian Institute of Science; Subrahmanyam Duvvuri, Indian Institute of Science	443. Three-dimensional measurements of flow and scalar dispersion through a stadium using MRI Megan Colpo, U.S. Military Academy; Ty Homan, U.S. Military Academy; Zachary Zalar, U.S. Military Academy; Michael J. Benson, U.S. Military Academy; Andrew J. Banko, U.S. Military Academy; Christopher J. Elkins, Stanford University; John K. Eaton, Stanford University
14:15	291. Slip-type boundary conditions for turbulent flows over heterogeneous roughness Jonathan Neuhauser, Karlsruhe Institute of Technology; Kay Schafer, Karlsruhe Institute of Technology; Davide Gatti, Karlsruhe Institute of Technology; Bettina Frohnafel, Karlsruhe Institute of Technology	180. Non-intrusive sensing in turbulent boundary layers via deep fully-convolutional neural networks Luca Guastoni, KTH; Arivazhagan Geetha Balasubramanian, KTH; Alejandro Guemes, Universidad Carlos III de Madrid; Andrea Ianiro, Univ. Carlos III de Madrid; Stefano Discetti, Univ. Carlos III de Madrid; Philipp Schlatter, KTH; Hossein Azizpour, KTH; Ricardo Vinuesa, KTH	316. Direct numerical simulations of turbulent air intake in a hypersonic flow Youcheng Xi, Tsinghua University; Song Fu, Tsinghua University	296. Measurements of 3D transport boundaries with urban canopies using magnetic resonance imaging Andrew J. Banko, U.S. Military Academy; Ty Homan, U.S. Military Academy; Michael J. Benson, U.S. Military Academy; Christopher J. Elkins, Stanford University
14:30	148. Restricted nonlinear scales of turbulent secondary flows over spanwise heterogeneous roughness Benjamin A. Minnick, Johns Hopkins University; Xiaowei Zhu, Princeton University; Dennice F. Gayme, Johns Hopkins University	224. Complete flow characterization from snapshot PIV, fast probes and Physics-Informed Neural Networks Alvaro Moreno Soto, Universidad Carlos III de Madrid; Alejandro Guemes, Univ. Carlos III de Madrid; Stefano Discetti, Univ. Carlos III de Madrid	67. Transitional shock-wave boundary layer interaction over a compression ramp Nikhil Mahalingesh, Aix Marseille Univ, CNRS, IUSTI, Marseille; Sebastien Piponniau, Aix Marseille Univ, CNRS, IUSTI, Marseille; Pierre Dupont, Aix Marseille Univ, CNRS, IUSTI, Marseille	358. LES for urban boundary layer using inflow condition including meteorological disturbance of typhoon Hidenori Kawai, Ochanomizu University; Tetsuro Tamura, Tokyo Institute of Technology; Keigo Nakajima, Kajima Corporation
14:45	71. Global friction of uniform vs. heterogeneous sandpaper roughness Lars H. von Deyn, Karlsruhe Institute of Technology (KIT); Alexander Stroh, KIT; Davide Gatti, KIT; Bettina Frohnafel, KIT	112. Statistically consistent resolvent-based reconstruction of turbulent channel flows from limited measurements Vamsi Krishna Chinta, University of Southern California; Mitul Luhar, University of Southern California	75. LES analysis of a supersonic air inlet experiencing buzz phenomenon Riwan Hammachi, ISAE-SUPAERO, University of Toulouse; Romain Gojon, ISAE-SUPAERO, University of Toulouse; Jeremie Gressier, ISAE-SUPAERO, University of Toulouse; Stephane Jamme, ISAE-SUPAERO, University of Toulouse	401. Assessment of outer-layer similarity in turbulent flows over canopies Zishen Chen, University of Cambridge; Ricardo Garcia-Mayoral, University of Cambridge
15:00 8:00 CEST Wed, July 20, 23:00 PDT	187. Permeability effects on turbulent channel flows over porous rib-roughness Yuki Okazaki, Osaka Prefecture University; Yumeto Takase, Osaka Prefecture University; Yusuke Kuwata, Osaka Prefecture University; Kazuhiko Suga, Osaka Prefecture University	80. LES-informed resolvent-based estimation of turbulent pipe flow Filipe R. Amaral, Instituto Tecnológico de Aeronautica; Andre V. G. Cavalieri, Instituto Tecnológico de Aeronautica	272. Effect of boundary-layer tripping on transonic buffet for a laminar-flow wing section Pradeep Moise, University of Southampton; Markus Zauner, University of Southampton; Neil D. Sandham, University of Southampton	346. Direct global stability of atmospheric shear flow that causes aircraft turbulence Ryoichi Yoshimura, Tohoku University; Aiko Yakeno, Tohoku University; Junshi Ito, Tohoku University; Shigeru Obayashi, Tohoku University
15:15	21. Roughness effects modeling with a double averaged Navier-Stokes turbulence model Francois Chedevigne, ONERA	51. Integration of PIV data into the simple algorithm for 2D time-averaged turbulent flows Nikolaos-Petros Pallas, National Technical University of Athens; Demetri Bouris, National Technical University of Athens		360. Extreme divergence and rotation values of the inertial particle velocity in high Reynolds number turbulence using voronoi tessellation Thibault Oujia, Institut de Mathématiques de Marseille, Aix-Marseille Université, CNRS; Keigo Matsuda, Japan Agency for Marine-Earth Science and Technology; Kai Schneider, Institut de Mathématiques de Marseille, Aix-Marseille Université, CNRS

Time / Room	Room 1 Rough Boundary Layers 2 Chair: Yusuke Kuwata (Osaka Metropolitan Univ.)	Room 2 Machine Learning 3 Chair: Vincent Mons (ONERA)	Room 3 Jets 1 Chair: Jacques Borée (ENSMA)	Room 4 Environmental Flows 3 Chair: Hidenori Kawai (Ochanomizu Univ.)
15:45 8:45 CEST Wed, July 20, 23:45 PDT	204. The structure of turbulent channel flow over ratchet-type roughness Angela Busse, University of Glasgow; Oleksandr Zhdanov, University of Glasgow	195. Unsteady two-dimensional flow reconstruction and force coefficient estimation around arbitrary shapes via conformal mapping aided deep neural networks Ali Girayhan Ozbay, Imperial College London; Sylvain Laizet, Imperial College London	26. Interaction between wavepackets and streaks in turbulent jets Petronio A. S. Nogueira, Monash University; Andre V. G. Cavalieri, Instituto Tecnológico de Aeronautica; Vincent Jaunet, Institut PPrime; Oliver Schmidt, University of California San Diego; Peter Jordan, Institut PPrime; Daniel Edgington-Mitchell, Monash University	368. QG simulation of Jupiter's great red spot with discrete exterior calculus Pankaj Jagad, King Abdullah University of Science and Technology; Ravi Samtaney, King Abdullah University of Science and Technology
16:00 9:00 CEST Thu, July 21, 0:00 PDT	189. DNS study of turbulent flow through a channel roughened by circular-arc ribs Weijian Xiong, Nanjing University of Aeronautics and Astronautics; Jinglei Xu, Nanjing University of Aeronautics and Astronautics; Seyyed Vahid Mahmoodi Jezeh, University of Manitoba; Bing-Chen Wang, University of Manitoba	275. Deep reinforcement learning for large-eddy simulation of wall-bounded turbulence Junhyuk Kim, Yonsei University; Hyojin Kim, Yonsei University; Jiyeon Kim, Yonsei University; Changhoon Lee, Yonsei University	153. Scalings of the temporally developing turbulent planar jet and its turbulent/non-turbulent interface Sarp Er, Univ. Lille, CNRS, ONERA, Arts et Metiers Institute of Technology J. Christos Vassilicos, Univ. Lille; Jean-Philippe Laval, Univ. Lille	292. Equilibrium and non-equilibrium scaling relations in atmospheric boundary layer Marta Waclawczyk, University of Warsaw; Jakub Nowak, University of Warsaw; Szymon P. Malinowski, University of Warsaw
16:15	96. Effect of the surface morphology on rough wall turbulence Yoshiki Yamamoto, Osaka Prefecture University; Shinya Tabata, Osaka Prefecture University; Yusuke Kuwata, Osaka Prefecture University; Kazuhiko Suga, Osaka Prefecture University	47. An active learning approach for the prediction of hydrodynamic roughness properties Jiasheng Yang, Karlsruhe Institute of Technology (KIT); Alexander Stroh, KIT; Pascal Friederich, KIT; Bettina Frohnappel, KIT; Pouya Forooghi, Aarhus University	225. Direct numerical simulations of turbulent planar jets and wakes with FENE-P fluids Mateus C. Guimaraes, Universidade de Lisboa; Fernando T. Pinho, Universidade do Porto; Carlos B. da Silva, Universidade de Lisboa	341. Large-scale clustering of inertial particles in homogeneous isotropic turbulence Keigo Matsuda, Japan Agency for Marine-Earth Science and Technology; Katsunori Yoshimatsu, Nagoya University; Kai Schneider, Aix-Marseille University, CNRS
16:30	104. Effects of frontal and plan solidity on rough-wall turbulent channel flow over pyramid roughness Oleksandr Zhdanov, University of Glasgow; Angela Busse, University of Glasgow	277. Deep mean-field modeling of transient and post-transient, multi-tractor flow dynamics-exemplified for the fluidic pinball Nan Deng, IMSIA ENSTA-Paris, Institut Polytechnique de Paris; Bernd R. Noack, Harbin Institute of Technology, Shenzhen; Marek Morzynski, Poznan University of Technology; Luc R. Pastur, IMSIA ENSTA-Paris, Institut Polytechnique de Paris	20. Numerical simulations of non-Newtonian jets Giovanni Soligo, Okinawa Institute of Science and Technology; Marco Edoardo Rosti, Okinawa Institute of Science and Technology	130. Logarithmic scaling of higher-order temperature moments in the atmospheric surface layer Kelly Y. Huang, University of Notre Dame; Matt K. Fu, Caltech; Clayton P. Byers, Trinity College; Gabriel G. Katul, Duke University
16:45	440. Reynolds number effects in 2D square-bar roughness wall-bounded turbulent flows Jiahao Kong, University of Adelaide; Rey Chin, University of Adelaide; Luke G. Bennetts, University of Adelaide; Bagus Nugroho, University of Melbourne	324. A study on spatial organization of coherent structures in channel flow using unsupervised deep learning Mohammad Javad Sayyari, Pusan National University (PNU); Jinyul Hwang, PNU; Kyung Chun Kim, PNU	68. On late stages of transition in round jets Naveen Balakrishna, Indian Institute of Science; Joseph Mathew, Indian Institute of Science; Arnab Samanta, Indian Institute of Technology	176. Experimental study on a transition of flow in weakly unstably stratified turbulent boundary layers Yoshinori Mizuno, Meteorological Research Institute (MRI-JMA) ; Toshimasa Yagi, MRI-JMA; Kazuyasu Mori, MRI-JMA
17:00 10:00 CEST Thu, July 21, 1:00 PDT	308. Scaling of rough-wall turbulence in a transitionally rough regime Guo-zhen Ma, Tsinghua University; Chun-xiao Xu, Tsinghua University; Hyung Jin Sung, KAIST; Wei-xi Huang, Tsinghua University	229. Subgrid-scale surrogate modeling of idealized atmospheric flows: A deep learned approach using high-resolution simulation data Muralikrishnan Gopalakrishnan Meena, Oak Ridge National Laboratory; Matthew R. Norman, Oak Ridge National Laboratory; David M. Hall, NVIDIA	178. Influence of a cylinder installed upstream on the flow field of a turbulent jet Srikar Yadala, Norwegian University of Science and Technology (NTNU); Girish Jankee, NTNU; Eirik Aesøy, NTNU; James R. Dawson, NTNU; Nicholas A. Worth, NTNU	211. Small-scale density fluctuations in grid-generated turbulence in a salt-stratified fluid Shinya Okino, Kyoto University; Soichiro Minakami, Kyoto University; Yuki Imanishi, Kyoto University; Hideshi Hanazaki, Kyoto University
17:15			450. Vortical structures in the initial region of a round jet with bifurcating flows Akinori Muramatsu, Nihon University; Kohei Tanaka, Nihon University	

[Invited Lecture 5] Friday, July 22, 8:00-8:40 JST / 1:00-1:40 Central European Summer Time (CEST) / Thu, July 21, 16:00-16:40 Pacific Daylight Time (PDT)

8:00-8:40	Invited Lecture 3 (Room 1) / Chair: Arne V. Johansson (KTH) Bharath Ganapathisubramani (University of Southampton, UK), Turbulent Flows over Heterogeneous Rough Surfaces
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[Parallel Session 13] Friday, July 22, 8:50-10:35 JST / 1:50-3:35 Central European Summer Time (CEST) / Thu, July 21, 16:50-18:35 Pacific Daylight Time (PDT)

Time / Room	Room 1 Rough Boundary Layers 3 Chair: Ricardo Garcia-Mayoral (Univ. Cambridge)	Room 2 Machine Learning 4 Chair: Yutaka Oda (Kansai Univ.)	Room 3 Jets 2 Chair: Giovanni Soligo (OIST)	Room 4 Fundamentals 2 Chair: Philippe Lavoie (Univ. Toronto)
8:50 1:50 CEST Thu, July 21, 16:50 PDT	247. Roughness function and turbulent statistics with increasing roughness size from direct numerical simulations Hiten Mulchandani, University of Cambridge; Ricardo Garcia-Mayoral, University of Cambridge	281. Interpretation and prediction for Prandtl number effect in turbulent heat transfer using generative adversarial networks Hyojin Kim, Yonsei University; Junhyuk Kim, Yonsei University; Changhoon Lee, Yonsei University	455. Three-dimensional turbulent jet study using volumetric particle tracking velocimetry Nimesh Virani, University of Windsor; Vesselina Roussinova, University of Windsor; Ram Balachandar, University of Windsor	231. Inhomogeneous turbulence scalings in a free shear flow Felipe Alves Portela, Laboratoire de Mecanique des Fluides de Lille; John C. Vassilicos, Laboratoire de Mecanique des Fluides de Lille
9:05 2:05 CEST Thu, July 21, 17:05 PDT	400. History effects and wall similarity of non-equilibrium turbulent boundary layers in varying pressure gradient over rough and smooth surfaces Vidya Vishwanathan, Virginia Polytechnic Institute & State University (VirginiaTech); Daniel J. Fritsch, VirginiaTech; K. Todd Lowe, VirginiaTech; William J. Devenport, VirginiaTech	22. Non-linear orthogonal modal decompositions in turbulent flows via autoencoders Hamidreza Eivazi, KTH; Soledad Le Clairche, Universidad Politecnica de Madrid; Sergio Hoyas, Univ. Politecnica de Valencia; Ricardo Vinuesa, KTH	24. Symmetry-induced high-moment turbulent scaling laws of a spatially evolving turbulent round jet Cat Tuong Nguyen, Technical University Darmstadt; Martin Oberlack, Technical University Darmstadt	434. Scale-dependent geometric statistics of the lagrangian and eulerian accelerations in homogeneous turbulent shear flow Frank G. Jacobitz, University of San Diego; Kai Schneider, Aix-Marseille University
9:20	59. Comparison of smooth- and rough-wall non-equilibrium boundary layers with favorable and adverse pressure gradients Ralph J. Volino, United States Naval Academy; Michael P. Schultz, United States Naval Academy	123. Machine learning for the prediction of the local drag forces and heat transfer rates in turbulent flows past rough surfaces Rafael Diez Sanhueza, Delft University of Technology; Ido Akkerman, Delft University of Technology; Jurriaan W. R. Peeters, Delft University of Technology	256. Experimental investigation of compressibility effects in axisymmetric supersonic ejectors and free jets Kenneth Yi-Nian Hinh, University of Calgary; Robert J. Martinuzzi, University of Calgary; Craig Johansen, University of Calgary	170. Study of fine-scale vortical structures in a von Karman mixing flow Farid Aligolzadeh, Norwegian University of Science and Technology (NTNU); Markus Holzner, Swiss Federal Institute of Forest, Snow and Landscape Research WSL & Swiss Federal Institute of Aquatic Science and Technology Eawag; James R. Dawson, NTNU
9:35	39. Rough-wall heat transfer at moderate Prandtl numbers: towards reconciling the diverse model predictions Kevin Zhong, University of Melbourne; Nicholas Hutchins, University of Melbourne; Daniel Chung, University of Melbourne	17. Analysis of large-scale/small-scale interactions in turbulent channel flow at $Re_\tau = 5200$ using auto-encoder combined with multivariate-pdf Lionel Agostini, Institut Pprime, CNRS / Universite de Poitiers / ENSMA; Michael Leschziner, Imperial College London; Laurent Cordier, Institut Pprime, CNRS / Universite de Poitiers / ENSMA	349. Turbulent diffusion of scalar and heat in an off-source heated steady round jet Rohit Singhal, Indian Institute of Science; S. Ravichandran, Nordic Institute for Theoretical Physics; Sourabh S. Diwan, Indian Institute of Science	55. On the nature of the turbulent/turbulent interface Oliver R. H. Buxton, Imperial College London; Krishna S. Kankanwadi, Imperial College London
9:50	42. Scalar transport in flow past finite circular patches of tall roughness Dea Daniella Wangsawijaya, University of Southampton; Claudia Nicolai, University of Southampton; Bharathram Ganapathisubramani, University of Southampton	110. Fourier-averaged-Navier-Stokes analysis of periodic wakes: A new technique Benjamin R. S. Freeman, University of Alberta; Arman Hemmati, University of Alberta; Robert J. Martinuzzi, University of Alberta;	179. Self-excited oscillations in variable density counter-current round jets Karol Wawrzak, Czestochowa University of Technology; Andrzej Boguslawski, Czestochowa University of Technology	79. Symmetry breaking and turbulence in oscillatory flow through a hexagonal sphere pack Lukas Ungelhardt, Technical University of Munich; Michael Manhart, Technical University of Munich
10:05 3:05 CEST Thu, July 21, 18:05 PDT	84. Turbulent boundary-layer response to active roughness Aditya Ramani, University of Melbourne; Jason P. Monty, University of Melbourne; Nicholas Hutchins, University of Melbourne	113. Gappy spectral proper orthogonal decomposition for reconstruction of turbulent flow data Oliver T Schmidt, University of California San Diego; Akhil Nekkanti, University of California San Diego	208. Stochastic modeling of three-scalar mixing in a coaxial jet using one-dimensional turbulence Marten Klein, Brandenburgische Technische Universität Cottbus-Senftenberg (B-TU); Christian Zenker, B-TU; Tommy Starick, B-TU; Heiko Schmidt, B-TU	
10:20			252. The turbulent shear stress and turbulent heat flux of two parallel plane jets with periodic vortex shedding Soichiro Hiromasa, Doshisha University; Shumpei Hara, Doshisha University; Kyoji Inaoka, Doshisha University	

[Closing and Announcement on TSFP13] Friday, July 22, 10:40-10:45 JST / 3:40-3:45 Central European Summer Time (CEST) / Thu, July 21, 18:40-18:45 Pacific Daylight Time (PDT)

10:40-10:45	Closing and Announcement on TSFP13 (Room 1) / Kazuhiko Suga (Osaka Metropolitan Univ.), Hyung Jin Sung (KAIST), and Laurent Mydlarski (McGill Univ.)
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